



U.S. Water Resources Council

FLOODPLAIN  
MANAGEMENT  
GUIDELINES

For Implementing

E.O. 11988

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[8410-01]

## WATER RESOURCES COUNCIL

### FLOODPLAIN MANAGEMENT

#### Guidelines for Implementing Executive Order 11988

AGENCY: Water Resources Council.

ACTION: Notice of Guidelines Adoption.

SUMMARY: This notice incorporates the Guidelines for Implementing Executive Order 11988—Floodplain Management adopted by the Water Resources Council on January 25, 1978 to assist Federal agencies in preparation of their regulations and procedures for implementing the Order.

#### FOR FURTHER INFORMATION CONTACT:

Frank H. Thomas, Floodplain Management Specialist, Policy Division, U.S. Water Resources Council, 2120 L Street NW., Washington, D.C. 20037, phone 202-254-6352.

**SUPPLEMENTARY INFORMATION:** These guidelines provide: (1) explanation of key terms and floodplain management concepts; (2) section-by-section analyses of the Order; and (3) procedures in the form of a decisionmaking process leading from the determination that a proposed action is or is not located in the base floodplain, through the implementation of agency actions.

Dated: February 3, 1978.

LEO M. EISEL,  
*Director.*

#### PREFACE

These guidelines result from recognition in two Executive Orders that the Nation's floodplains are the scene of: (1) unacceptable and increasing flood losses and (2) degradation of natural and beneficial values.

The 1966 Executive Order 11296—*Flood Hazard Evaluation*, represented Presidential recognition that structural flood control measures alone were inadequate to stem rising flood losses. It was followed by establishment of flood insurance, disaster assistance and related Federal programs, and some State and local government floodplain management programs. Yet, a decade later, annual flood losses were estimated to approach \$3 billion and continuing to rise.

In the decade following Executive Order 11296, there developed widespread recognition that the natural and beneficial values of floodplains, wetlands and coastal barrier islands must be restored and preserved. Thus, on May 24, 1977, the President issued a comprehensive environmental message accompanied by Executive Order 11988—*Floodplain Management*, to replace the 1966 Order. The new order is a significant policy initiative tying together the need to protect lives and property with the need to restore and preserve natural and beneficial floodplain values. The *Unified National Program for Floodplain Management* (1976) of the Water Resources Council is cited by the Order to provide direction. Federal agencies are directed to lead the Nation by exemplary demonstration of a comprehensive approach to floodplain management and to prepare procedures for achieving the goals of the Order.

The objective of these guidelines is to provide broad guidance in the interpretation of the Order to assist each agency which will be developing its own individual procedures for compliance with the Order. It is recognized that agency procedures will necessarily vary to meet legislatively prescribed missions as well as the requirements of the Order. This guidance should prove useful to State and local governments and interested members of the public.

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The guidelines have been developed over a 12-month period by the efforts of an interagency task force of floodplain specialists. Comments and suggestions for improvement are welcomed.

GUY R. MARTIN,  
*Alternate to the Chairman.*

### EXECUTIVE SUMMARY

#### THE OBJECTIVE OF EXECUTIVE ORDER 11988 IS:

- " \* \* to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative \* \* \*"

#### THE ORDER APPLIES TO:

- ALL AGENCIES that: (1) acquire, manage, or dispose of Federal lands and facilities; (2) undertake finance, or assist construction and improvements; and (3) conduct activities and programs affecting land use, including planning, regulating, and licensing.
- ALL FEDERAL ACTIONS: described in the preceding sentence.
- ALL FLOODPLAIN LOCATIONS: whether they are along or near to rivers, streams, oceans, ponds, or related water bodies—as a minimum, areas subject to inundation by a flood with a one percent chance of occurring in any year (i.e., "100-year or base flood").

#### THE ORDER REQUIRES THAT AGENCIES:

- AVOID THE BASE FLOODPLAIN: unless it is the only practicable alternative.
- ADJUST TO THE BASE FLOODPLAIN: if the base floodplain cannot be avoided, adjust to it in order to: (1) reduce the hazard and

the risk of flood loss; (2) minimize the impact of floods on human safety, health, and welfare; and (3) restore and preserve the natural and beneficial floodplain values. The framework for meeting these requirements is the Water Resources Council's *Unified National Program for Flood Plain Management*.

- EVALUATE, DESIGN, AND IMPLEMENT ALL AGENCY ACTIONS: to meet the policies of the Order.
- NOTIFY THE PUBLIC: if the head of an agency finds there is no practicable alternative. This will usually occur after there has been early notice to the public on plans and proposals and alternative courses of action.
- AMEND OR ISSUE REGULATIONS AND PROCEDURES: (1) to avoid the base floodplain if at all practicable; (2) to provide for actions to ADJUST TO THE BASE FLOODPLAIN, if it cannot be avoided; and (3) to keep the public informed of proposed actions in the base floodplain and encourage participation in floodplain decisionmaking. Each agency shall issue or amend existing regulations within one year to comply with this Order. Agencies shall prepare their procedures in consultation with the Water Resources Council, the Federal Insurance Administration and the Council on Environmental Quality, and shall update such procedures as necessary.

#### THESE GUIDELINES ARE INTENDED:

- TO BE USED BY AGENCIES: in preparing their procedures in consultation with the WRC, CEQ, and FIA.
- TO FURNISH: (1) explanations of key terms and floodplain management concepts; (2) analyses of the Order, section by section, for

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agency use in developing their regulations and procedures for complying with the intent of each section; and (3) procedures in the form of a decision-making process leading from the determination that a proposed action is or is not located in the base floodplain through the implementation of agency action.

- **TO ASSIST AGENCIES:** by providing broad guidance in the implementation of the Order for use in the preparation of individual agency procedures. It is recognized that agency procedures will necessarily vary to meet legislatively prescribed missions as well as the requirements of the Order.

### THESE GUIDELINES DO NOT INTEND:

- **TO PROHIBIT** floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances.

### ACKNOWLEDGEMENT

Preparation of these Guidelines began in December 1976 by a work group of the Floodplain Management Technical Committee of the Water Resources Council, in anticipation of an Executive Order. In October 1977 when the Water Resources Council's technical committees were abolished as part of a restructuring of the Council, a first draft of the Guidelines had been completed. In November 1977, a 60-day task force of essentially the same membership as the work group was appointed to complete the Guidelines.

The members of these two groups and colleagues who provided specialized assistance are listed below. We are indebted to all of these persons for their professional dedication and especially to the members of the drafting team whose overtime ef-

forts secured completion of the Guidelines.

LEO M. EISEL,  
*Director.*

#### WATER RESOURCES COUNCIL

\*Frank Thomas (Task Force and Technical Committee Chairman)

#### DEPARTMENT OF AGRICULTURE

\*Richard Leisher (SCS)

#### DEPARTMENT OF THE ARMY

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\*Robert Plott (COE)

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#### COUNCIL ON ENVIRONMENTAL QUALITY

Robert Smythe

Zell Steever

#### TENNESSEE VALLEY AUTHORITY

\*Glenn Wall

#### DELAWARE RIVER BASIN COMMISSION

Robert Goodell

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**GREAT LAKES RIVER BASIN COMMISSION**  
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COMMITTEE**  
Gary Mathews  
Steve Sutterfield

**STATE REPRESENTATIVES**  
Jack Pardee (California)  
\*James Wright (Minnesota)

**INTRA-STATE REPRESENTATIVE**  
Robert Reemelin (Miami Conservancy  
District, Ohio)

\*Members of the drafting team.

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#### GLOSSARY

Throughout this document, the following basic definitions shall apply:

- *Action*—any Federal activity including: “\* \* \* (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.
- *Agency*—an executive department, a government corporation, or an independent establishment and includes the military departments.
- *Base Flood*—is that flood which has a one percent chance of occurrence in any given year (also known as a 100-year flood). This term is used in the National Flood Insurance Program (NFIP) to indicate the minimum level of flooding to be used by a community in its floodplain management regulations.
- *Base Floodplain*—the 100-year floodplain (one percent chance floodplain). Also see definition of floodplain.
- *Channel*—a natural or artificial watercourse of perceptible extent, with a definite bed and banks to confine and conduct continuously or periodically flowing water.
- *Critical Action*—any activity for which even a slight chance of flooding would be too great.
- *Facility*—any man-made or man-placed item other than a structure.
- *Flood or Flooding*—a general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland and/or tidal waters, and/or the unusual and rapid accumulation or runoff of surface waters from any source.
- *Flood Fringe*—that portion of the floodplain outside of the regulatory floodway (often referred to as “floodway fringe”).
- *Floodplain*—the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year. The base floodplain shall be used to designate the 100-year floodplain (one percent chance floodplain). The critical action floodplain is defined as the 500-year floodplain (0.2 percent chance floodplain).
- *Floodproofing*—the modification of individual structures and facilities, their sites, and their contents to protect against structural failure, to keep water out or to reduce effects of water entry.
- *Minimize*—to reduce to the smallest possible amount or degree.
- *One Percent Chance Flood*—the flood having one chance in 100 of being exceeded in any one-year

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period (a large flood). The likelihood of exceeding this magnitude increases in a time period longer than one year. For example, there are two chances in three of a larger flood exceeding the one percent chance flood in a 100-year period.

- *Practicable*—capable of being done within existing constraints. The test of what is practicable depends upon the situation and includes consideration of the pertinent factors, such as environment, cost or technology.
- *Preserve*—to prevent modification to the natural floodplain environment or to maintain it as closely as possible to its natural state.
- *Regulatory Floodway*—the area regulated by Federal, State or local requirements; the channel of a river or other watercourse and the adjacent land areas that must be reserved in an open manner, i.e., unconfined or unobstructed either horizontally or vertically, to provide for the discharge of the base flood so the cumulative increase in water surface elevation is no more than a designated amount (not to exceed one foot as set by the NFIP).
- *Restore*—to re-establish a setting or environment in which the natural functions of the floodplain can again operate.
- *Structures*—walled or roofed buildings, including mobile homes and gas or liquid storage tanks that are primarily above ground (as set by the NFIP).
- *Wetlands*—“those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil condi-

tions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds” (as defined in Executive Order 11990, *Protection of Wetlands*).

### INTRODUCTION

Executive Order 11988—*Floodplain Management*, signed May 24, 1977, revokes and replaces Executive Order 11296, issued August 10, 1966. It establishes a new general policy and cites specific requirements for compliance by Federal executive agencies (hereafter referred to as agencies). Executive Order 11988 (hereafter referred to as the Order) requires agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid the direct or indirect support of floodplain development whenever there is a practicable alternative. The preferred method for satisfying this requirement is to avoid sites on the base floodplain. If an action must be located on the base floodplain, the Order requires that agencies minimize potential harm to people and property and to natural and beneficial floodplain values.

Executive Order 11988 is based in part on the National Environmental Policy Act of 1969, and adds new prominence to the environmental aspects of floodplain management which were not present in the old Executive order. To achieve this, the Order requires that decision-making by Federal agencies clearly recognize that floodplains have unique and significant public values. Consideration must be given, therefore, to natural and beneficial floodplain values and to the public benefit to be derived from their restoration or preservation.

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Throughout these guidelines the concept of the floodplain is expressed using varying terminology depending on the context of the discussion. When referring to the floodplain in a descriptive sense, such as in the discussion of natural values (Part II—Step 4.C.), the term floodplain refers to any land area susceptible to being inundated from any source of flooding. When referring to the floodplain from the standpoint of the Order's mandatory provisions, the terms used in these guidelines are "base floodplain," in most cases, and "500-year floodplain" when referring to critical actions (Part II—Step 1.C.). The base floodplain is the area subject to inundation from a flood having a one percent chance of occurring in any given year (100-year flood). The critical action floodplain is the area subject to inundation from a flood having a 0.2 percent chance of occurring in any given year (500-year flood).

Executive Order 11988 directs implementation of the *Unified National Program for Flood Plain Management* (U.S. Water Resources Council, 1976) which sets forth a conceptual framework and recommends Federal and State actions for a continuing unified program for planning and action at all levels of government to reduce the risk of flood losses through floodplain management. The Unified National Program includes a broad Federal effort, both directly and by example, to pursue the wise and nonhazardous use of floodplains including recognition of natural and beneficial floodplain values.

To assure compliance with the Order, provision is made for both public and Federal review of proposed actions. Early public notice, Office of Management and Budget (OMB) Circular A-95 Notice, an environmental impact statement or its equivalent, and notice of findings

are specified vehicles for providing information and opportunity for public participation. Budgetary review of compliance with the Order and periodic review of agency procedures by the Water Resources Council provide for further review. In providing opportunity for these reviews, the potential for withholding of budget approval should be minimized.

Agency procedures are required to be prepared in consultation with the Council on Environmental Quality (CEQ), the Water Resources Council (WRC), and the Federal Insurance Administration (FIA). These guidelines provide a basis for this consultation.

These guidelines have been prepared to provide broad guidance in the implementation of the Order and to offer a common point of reference for each agency to prepare implementing procedures for compliance with the Order. The interpretations in the guidelines are built upon a strong Executive Order and directed at development of demonstrable Federal leadership in floodplain management in the immediate future. In preparing these guidelines, the Water Resources Council recognized: (1) the impossibility of anticipating the full range of individual program situations affected by the Order, and (2) the responsibility for individual agencies to tailor their procedures to meet both their legislatively prescribed missions and the requirements of the Order.

Because these guidelines are advisory and the agencies will draft their own rules and regulations, there is some concern that reasonable consistency will exist among agencies. Therefore, by October 1, 1978, the WRC will: (1) review the rules and regulations promulgated by the various agencies with respect to consistency with the guidelines and reasonable consistency among agencies,

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and (2) make recommendations for suggested actions.

These guidelines are presented in two parts. Part I provides a section-by-section interpretation basic on an overall understanding of the Order. Part II discusses the decision-making process required by Section 2 of the Order and is critical to the development of agency procedures. The guidelines do not intend to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances.

Appended to the guidelines are descriptions of agency programs providing floodplain information, related programs and references, and the President's Policy Statement and copies of the complete Executive orders, *Floodplain Management*, *Protection of Wetlands*, and *Protection and Enhancement of Environmental Quality*.

Executive Order 11990—*Protection of Wetlands* has been included because most of the Nation's wetlands are located on floodplains. Also, both the floodplain and wetland orders were issued as part of the President's *Message on the Environment*, May 24, 1977. Thus the guidance provided in this document and the agency procedures for floodplain management will frequently apply to wetlands. Agencies may wish to develop a single set of procedures for these orders.

Executive Order 11514—*Protection and Enhancement of Environmental Quality* has been included to clarify the public notice aspects of the Order.

### PART I—INTERPRETATION OF EXECUTIVE ORDER 11988

This part of the guidelines provides detailed section-by-section discussion of the Order as interpreted by CEQ, WRC, and HUD/FIA. Key concepts are discussed and reference

is made to the decision-making process (Part II).

### INTRODUCTION

By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*), the National Flood Insurance Act of 1968, as amended (42 U.S.C. 4001 *et seq.*), and the Flood Disaster Protection Act of 1973 (Pub. L. 93-234, 87 Stat 975), in order to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative, it is hereby ordered as follows:

The Introduction establishes the broad scope of the Order derived from NEPA and the flood insurance legislation. (Part II—Step 4, discusses impacts associated with the occupancy and modification of floodplains and support of floodplain development. Part II—Step 3 discusses the practicability of alternatives.)

### SECTION 1

Each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

The basic concepts expressed in Section 1 of the Order are: (1) all agencies are covered; (2) all actions are covered; (3) all agencies are to affirmatively carry out efforts to, and

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provide a good example of, sound floodplain management practices; and (4) all agencies are required to act, not merely consider, reducing risk, minimizing adverse impacts, and restoring and preserving floodplain values.

The comprehensiveness of the Order recognizes that each agency, in carrying out the various types of actions enumerated in this section, can affect the floodplain through any of its actions. The mandate that the agencies take a leadership role places them in a unique position relative to state, regional and local levels of government in carrying out actions which affect the floodplain. This role requires the agencies to lead other public and private entities in achieving the goals of the Order by setting a good example. (The concepts of reducing risk, minimizing impact, and restoring and preserving floodplain values are discussed in Part II—Step 5.)

### SECTION 2

In carrying out the activities described in Section 1 of this Order, each agency has a responsibility to evaluate the potential effects of any actions it may take in a floodplain; to ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management; and to prescribe procedures to implement the policies and requirements of this Order, as follows:

Three concepts are introduced in this section: evaluation, construction vs. planning programs, and implementation. Evaluation as discussed in these guidelines goes beyond identifying the impacts of a specific proposal and includes an ongoing analysis of the effects of agency policies and programs and the development of new or improved policies and programs to carry out this Order. (The analysis of the full range of their effects is discussed in Part II—Step 4.A.) By including planning programs as a separate item, the Order

emphasizes that all actions, even those which do not result in a physical change, must be evaluated for their impacts to or within the floodplain. Implementation means that agencies must adopt and carry out evaluation procedures. The results of this evaluation should be included in any environmental assessment prepared under NEPA. (See Part II—Step 7.)

### SECTION 2(a)(1)

Before taking an action, each agency shall determine whether the proposed action will occur in a floodplain—for major Federal actions significantly affecting the quality of the human environment, the evaluation required below will be included in any statement prepared under Section 102(2)(C) of the National Environmental Policy Act. This determination shall be made according to a Department of Housing and Urban Development (HUD) floodplain map or a more detailed map of an area, if available. If such maps are not available, the agency shall make a determination of the location of the floodplain based on the best available information. The Water Resources Council shall issue guidance on this information not later than October 1, 1977.

The intent of this subsection is that agencies use the best available information in determining whether a proposed action will be located in a floodplain. HUD/FIA floodplain maps are established as the minimum standards for making this determination. Even if no map data exists, the intent is that the agency proposing the action perform or have performed a determination of whether a proposed action is located in a floodplain. Guidance for this determination was published in the FEDERAL REGISTER, (Vol. 42, No. 190, Friday, September 30, 1977) entitled "Guidance for Floodplain Management." (See Part II—Step 1.)

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### SECTION 2(a)(2)

If an agency has determined to, or proposes to, conduct, support, or allow an action to be located in a floodplain, the agency shall consider alternatives to avoid adverse effects and incompatible development in the floodplains. If the head of the agency finds that the only practicable alternative consistent with the law and with the policy set forth in this Order requires siting in a floodplain, the agency shall, prior to taking action, (i) design or modify its action in order to minimize potential harm to or within the floodplain, consistent with regulations issued in accord with Section 2(d) of this Order, and (ii) prepare and circulate a notice containing an explanation of why the action is proposed to be located in the floodplain.

The major issues here include: (1) consideration of alternatives which will avoid the floodplain, wherever practicable, and alternatives which will avoid adverse effects and incompatible development (development which has adverse effects); (2) minimization of harm to or within the floodplain resulting from proposed actions; and (3) circulation of a notice ("finding")—to the general public and affected agencies that siting in the floodplain is the only practicable alternative. The notice requirement introduced in this subsection is part of a larger concern for public notice and review carrying through to Section 4.

This section does not provide a standard for minimizing harm because of the great variety of actions and environments subject to the requirement. Instead, the Order expressly recognizes that it is more appropriate for agency procedures to spell this out for specific programs and activities.

Two important points should be noted about the standards to be embodied in agency procedures. First, while minimize means reduce to the smallest amount or degree, there is an implicit acceptance of practical limitations. Agencies are required to

use all *practicable* means and measures to minimize harm. The Order does not expect agencies to employ unworkable means to meet this goal. Second, agency procedures are intended to be consistent with the standards in the Flood Insurance Program of the Federal Insurance Administration (FIA). For this reason, agencies are required to consult with FIA before issuing their procedures, and agencies with control over Federal property are required to follow the standards in FIA's regulations unless they are demonstrably inappropriate.

(Avoidance is discussed in Part II—Steps 3 and 4. Minimization is discussed in Part II—Step 5. Findings and public notice are discussed in Part II—Steps 2 and 7.)

### SECTION 2(a)(3)

For programs subject to the Office of Management and Budget Circular A-95, the agency shall send the notice, not to exceed three pages in length including a location map, to the state and areawide A-95 clearinghouses for the geographic areas affected. The notice shall include: (i) the reasons why the action is proposed to be located in a floodplain; (ii) a statement indicating whether the action conforms to applicable state or local floodplain protection standards and (iii) a list of the alternatives considered. Agencies shall endeavor to allow a brief comment period prior to taking any action.

Items (i), (ii), and (iii) are the minimum to be included in the notice. (The notice requirements set out in this subsection are discussed in Part II—Step 7.)

### SECTION 2(a)(4)

Each agency shall also provide opportunity for early public review of any plans or proposals for actions in floodplains, in accordance with Section 2(b) of Executive Order No. 11514, as amended, including the development of procedures to accomplish this objective for Federal actions whose impact is not significant enough to require the preparation of an

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environmental impact statement under Section 102(2)(C) of the National Environmental Policy Act of 1969, as amended.

This section requires public notice much earlier than the finding requirement, including notice for actions which do not require environmental impact statements. (The notice requirements set out in this subsection are discussed in Part II—Step 2.)

### SECTION 2(b)

Any requests for new authorizations or appropriations transmitted to the Office of Management and Budget shall indicate, if an action to be proposed will be located in a floodplain, whether the proposed action is in accord with this Order.

This subsection complements the public review element in the Order (Subsections 2(a) (2), (3), and (4)). It provides for Federal review and raises the possibility that agency funds may be withheld from proposed actions which are not in accord with the intent of the Order. "In accord with" means in compliance with the policy and mandatory provisions (the letter and spirit) of the Order.

### SECTION 2(c)

Each agency shall take floodplain management into account when formulating or evaluating any water and land use plans and shall require land and water resources use appropriate to the degree of hazard involved. Agencies shall include adequate provision for the evaluation and consideration of flood hazards in the regulations and operating procedures for the licenses, permits, loan or grants-in-aid programs that they administer. Agencies shall also encourage and provide appropriate guidance to applicants to evaluate the effects of their proposals in floodplains prior to submitting applications for Federal licenses, permits, loans or grants.

Each agency shall take floodplain management, as provided for in Sec-

tion 2(d), into account when: (1) formulating its own water and land use plans, and (2) evaluating the water and land use plans of others.

In the operation of a license, permit, loan, or grant-in-aid program, each agency must make adequate provision for the evaluation and consideration of flood hazards. These provisions shall be included in agency's regulations and procedures. When the action involves more than one Federal agency, the "lead agency" will be responsible and will obtain input from all agencies. In all cases, as a minimum, the "practicability" and "minimization" standards of Section 2(a) of the Order apply. Therefore, as a pre-condition for an agency's approval of an application for a license, permit, loan, or grant-in-aid, the agency must assure that the requirements of Section 2(a) have been met. To the extent that an agency deems the requirements of Section 2(a) not to constitute adequate provision for evaluation and consideration of the flood hazard, the agency shall impose additional requirements.

The flood hazard aspects and to the degree they are quantifiable, the floodplain value aspects should be expressed in terms of: (1) potential (or residuals) for monetary loss; (2) human safety, health, and welfare; (3) shifting of costs or damage to others; and (4) potential for affecting the natural and beneficial floodplain values.

Agencies shall encourage and provide appropriate guidance to applicants to enable them to evaluate the effects of their proposals in floodplains prior to submitting applications for Federal licenses, permits, loans, or grants. It is important that applicants be made aware early in their planning process of the floodplain management parameters which the agency must consider when reviewing the proposed action. In this way, applicants will not go to

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the trouble of putting together completed plans and submitting them formally before being made aware of the standards to which the agency is subject in reviewing such plans. Agencies are encouraged to refer applicants to the agencies listed in Part II—Table 1 for guidance on floodplain management matters.

### SECTION 2(d)

As allowed by law, each agency shall issue or amend existing regulations and procedures within one year to comply with this Order. These procedures shall incorporate the Unified National Program for Floodplain Management of the Water Resources Council, and shall explain the means that the agency will employ to pursue the nonhazardous use of riverine, coastal and other floodplains in connection with the activities under its authority. To the extent possible, existing processes, such as those of the Council on Environmental Quality and the Water Resources Council, shall be utilized to fulfill the requirements of this Order. Agencies shall prepare their procedures in consultation with the Water Resources Council, the Federal Insurance Administration, and the Council on Environmental Quality, and shall update such procedures as necessary.

Agency regulations and procedures will systematically address each section of the Order, and their procedures will define the extent to which responsibility for compliance is to be delegated by the agency head.

Each agency is to reflect the conceptual framework of floodplain management as set out in the *Unified National Program for Flood Plain Management* in its regulations and procedures developed in response to provisions of the Order. Floodplain management according to the Unified National Program has as its goals the "wise use, conservation, development, and utilization of interrelated land and water resources to serve objectives of economic efficiency, environmental quality, and social well-being as con-

sonant with responsibilities \* \* \*"  
This concept requires that the floodplain be viewed as having a role to play in the future of its surroundings. Within it, further adjustments in the way floodplain land is used or in the way floods behave must be made in a manner that is supportive of this future. From the standpoint of this Order, the Federal posture in floodplain management would be one of overcoming the apparent inertia in environmental value recognition when the appropriate floodplain role is being determined, as well as one of avoiding hazardous and uneconomic uses as part of this future role. The term "uneconomic" also includes the concept of costs shifted by floodplain users to others, both directly and indirectly.

In order to comply with the requirement that the means to be employed to pursue nonhazardous use be identified, each agency will be required to assess the degree of hazard associated with its program activities under a possible range of flood conditions. Then the agency must state the specific kinds of actions or adjustments that would be employed to comply with this section.

To the extent possible, agencies will utilize existing processes established under the NEPA directives of CEQ and WRC's Principles and Standards in addition to these guidelines.

Each agency shall consult with WRC, CEQ, and FIA in the preparation of their regulations and procedures in response to the Order. This consultation will, of course, include any issue relevant to compliance with the Order. WRC will be the point of contact, and will arrange for consultation as needed with an inter-agency panel including members from the three agencies cited. Contact WRC Policy Office, 202-254-6352, for arrangements. Each agency's procedures should identify those actions, if any, which: (1) typically

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do not create adverse effects or incompatible development, or (2) normally will not require specific agency and public review under the Order.

To ensure that the public will be informed of agency procedures, the proposed agency regulations and procedures should be published in the FEDERAL REGISTER within a minimum 30-day review period provided. However, each agency must consult with CEQ, WRC and FIA prior to making procedures available for public review or prior to publishing them in the FEDERAL REGISTER.

Agency regulations or procedures should include relevant material in the following areas: (1) *mechanical requirements* that an agency will use to meet the procedural requirements of the Executive Order, such as timing, routing of documents, preparation and circulation of findings and notices, and specific links between the Order and other planning decision-making processes and requirements (e.g., budget process, NEPA, P&S,A-95); (2) *substantive requirements*, such as the standards for determining which alternatives are practicable, and the criteria and methods for minimizing harm (using FIA regulations as a guide wherever applicable); (3) *policy direction*, such as incorporation by reference of the Executive Order, Unified Program, NEPA, and other relevant requirements; general policies on the agency's approach to implementing the Order; program-specific policies; and commitments to research monitoring and evaluation; and (4) *other information*, such as appendices identifying the agency contacts in Washington and in the field who are principally responsible for implementing the Order, cross-references to other relevant agency procedures and manuals, and other material that will assist agencies and the public to understand just what the agency is doing to comply with the Order.

### SECTION 3

In addition to the requirements of Section 2, agencies with responsibilities for Federal real property and facilities shall take the following measures:

The requirements of this section of the Order are *supplemental* to those of Sections 1 and 2, and must be met by agencies having responsibilities for Federal real property, structures and facilities.

#### SECTION 3(a)

The regulations and procedures established under Section 2(d) of this Order shall, at a minimum, require the construction of Federal structures and facilities to be in accordance with the standards and criteria and to be consistent with the intent of those promulgated under the National Flood Insurance Program. They shall deviate only to the extent that the standards of the Flood Insurance Program are demonstrably inappropriate for a given type of structure or facility.

There are three key concepts expressed in this subsection: (1) the relationship of the NFIP requirements to the Order's minimization requirement; (2) the scope and nature of the NFIP requirements; and (3) situations where the NFIP requirements are not applicable to the agency actions.

The intent of this subsection is twofold; first, to assure that the Federal government will require itself no less than it requires of non-Federal entities for the protection of property from flood hazards, and second, to assure that the NFIP is not undermined by the actions of the Federal agencies. Both the positioning of the reference to the NFIP requirements following the avoidance and minimization responsibilities set out in Section 2, as well as the emphasis on the NFIP as the *minimum*, is most significant in that it recognizes the precedence of the requirements of Section 2 and limited scope of the NFIP requirements. Of

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the three areas of concern which the Order addresses (minimization of harm to lives, property and floodplain values), the NFIP requirements are primarily directed towards the protection of property. Thus, an agency's application of the NFIP requirements to proposed actions does not comprise full compliance with the minimization responsibilities of the Order.

The standards and criteria of the NFIP are directed towards the protection of structures and facilities from the flood hazard and the protection of existing development from the effects of new development. Under the NFIP, residential structures (including basements) are required to be elevated to or above the base flood level. Nonresidential structures may be elevated as described above, or floodproofed watertight to or above the base flood level. For the protection of existing development, the NFIP standards and criteria rely on a regulatory floodway (see Glossary).

Under the NFIP, actions involving the placement of facilities are subject to the requirements that the cumulative effect of the proposed action, when combined with all existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community wherein the action is proposed. It should be noted that the NFIP's one foot stage rise standard is a minimum standard, and more restrictive stage rise standards that are in effect in States and local communities take precedence over the NFIP standard as set out in Section 1910.1(d) of the NFIP regulations.

This subsection allows deviation from the NFIP requirements only to the extent that its standards and criteria are "demonstrably inappropriate" for a given type of structure or facility. Where this can be demon-

strated, the proposed structure or facility must satisfy the requirements of Section 2, and must not endanger existing development, encourage development which would result in harm to or within the floodplain, or itself be vulnerable to flood damage.

### SECTION 3(b)

If, after compliance with the requirements of this Order, new construction of structures or facilities are to be located in a floodplain, accepted floodproofing and other flood protection measures shall be applied to new construction or rehabilitation. To achieve flood protection, agencies shall, wherever practicable, elevate structures above the base flood level rather than filling in land.

The key concepts in this subsection are: (1) requirements for new construction and existing structures; (2) accepted floodproofing measures and other flood protection measures; and (3) the requirement to achieve flood protection for structures, wherever practicable, without the use of fill.

For the purposes of the Order, the term "new construction" includes construction associated with: (1) new structures and facilities; (2) the reconstruction of existing structures and facilities following damage caused by fire, flood or other hazard; and (3) the improvement of existing structures and facilities by rehabilitation, repair, alteration or addition. The application of the Order's requirements to existing structures is emphasized in this section.

Floodplain management approaches have in the past set varying thresholds for what constitutes a major improvement. In most cases a market value threshold has been relied on which varies from 50 percent to 80 percent of the pre-improvement value of the structure or facility (see, for instance, the NFIP definition of substantial improvement (24 CFR 1909.1). In the case of major improvements, agencies are

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offered an opportunity to compensate for previous siting and design decisions which did not reflect the intent of the Order. In meeting the responsibility to apply the Order's requirement to existing structures, the agencies shall consider whether the proposed action would: (1) result in an increase in the useful life of the structure or facility in question; (2) maintain the investment at risk and the exposure of lives to the flood hazard; or (3) eliminate an opportunity to restore the natural and beneficial floodplain values.

Accepted floodproofing measures for structures are defined under the NFIP regulations and are set out in the discussion under Subsection 3(a), above. The Order further limits what constitutes accepted floodproofing for structures through additional language in this subsection which requires that, wherever practicable, *all* structures shall be elevated using open works, e.g., columns, walls, piles, piers, etc., rather than fill (see Appendix B). Accepted floodproofing measures for facilities vary considerably, since the scope of the term facility, as defined in the Glossary, is extremely broad. Floodproofing measures for certain types of facilities, e.g., sewer interceptor lines and other types of piping, and bridges and roads have been developed, and are familiar to agencies having responsibilities in those areas. Other flood protection measures including warning and evacuation plans, etc. are discussed in the *Unified National Program for Flood Plain Management*.

### SECTION 3(c)

If property used by the general public has suffered flood damage or is located in an identified flood hazard area, the responsible agency shall provide on structures, and other places where appropriate, conspicuous delineation of past and probable flood height in order to en-

hance public awareness of and knowledge about flood hazards.

The conspicuous delineation of past and probable flood heights is required on property which has been or could be subjected to flooding and is used by the general public. This delineation responsibility applies to all types of property (land, structures and facilities). Agencies must identify in their regulations and procedures the areas where this requirement will be most effective in minimizing the adverse impacts of floods, especially on human safety. The 100-year flood level and the flood of record should be shown where available. The 500-year flood should also be shown where appropriate.

### SECTION 3(d)

When property in floodplains is proposed for lease, easement, right-of-way, or disposal to non-Federal public or private parties, the Federal agency shall (1) reference in the conveyance those uses that are restricted under identified Federal, State, or local floodplain regulations; and (2) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successors, except where prohibited by law; or (3) withhold such properties from conveyance.

Three requirements are set out for agencies which dispose of Federal properties (land, structures or facilities) in the base floodplain. Of these three, the agencies must meet both requirements 3(d)(1) and 3(d)(2), or they must meet Section 3(d)(3). That is, if both 3(d)(1) and (2) cannot be satisfied, or if the agency does not choose to implement both, then the property must be withheld from conveyance.

Under Section 3(d)(1), the agencies' regulations or procedures must provide for the identification of those uses that are restricted, and how they are restricted under state and local floodplain regulations. Such restrictions are generally set out in state shoreline or coastal

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management plans or regulations, local plans and building codes, zoning and subdivision ordinances. If no such restrictions exist, the agency must note this when it implements the finding and public notice procedures (see Part II—Step 7). Then it still must satisfy *either* 3(d)(2) or 3(d)(3).

Under Section 3(d)(2), the agencies are required to provide appropriate restrictions to the uses of properties by the grantee or purchaser and any successors, which would augment those restrictions referred to in (d)(1), above, or if none, adequately stand on their own. For the purpose of this Order, the term "appropriate" as it refers to restrictions, means restrictions equal in scope and strictness to those of this Order. Since the property in question is located in the floodplain, then the agency must assure through these restrictions that harm to lives and property and to floodplain values is identified, and such harm is minimized and floodplain values are restored and preserved. Section 3(d)(2) recognizes that these additional restrictions need not be applied to the conveyance where prohibited by law.

Section 3(d)(3) requires that where an agency cannot or does not choose to meet the requirements of either 3(d)(1) or (2), or both, it is prohibited from making the conveyance. Even where the option is open to meet 3(d)(1) or (2), withholding the conveyance may be the most appropriate approach to meeting the Order's intent. Where, for instance, the existing use is not compatible with the intent of the Order, or the area in question is not subject to meaningful floodplain management requirements, withholding the land or facility from conveyance may be required.

This section makes it clear that each agency now has a mandate to condition or withhold the conveyance of Federal property, unless a

specific law expressly prohibits such activity.

### SECTION 4

In addition to any responsibilities under this Order and Sections 202 and 205 of the Flood Disaster Protection Act of 1973, as amended (42 U.S.C. 4106 and 4128), agencies which guarantee, approve, regulate, or insure any financial transaction which is related to an area located in a floodplain shall, prior to completing action on such transaction, inform any private parties participating in the transaction of the hazards of locating structures in the floodplain.

This section applies to the Federal Housing Administration, the Veterans Administration, and the six agencies enumerated in the Flood Disaster Protection Act of 1973: the Board of Governors of the Federal Reserve System, the Federal Deposit Insurance Corporation, the Comptroller of the Currency, the Federal Home Loan Bank Board, the Federal Savings and Loan Insurance Corporation, and the National Credit Union Administration (to the extent that an Executive Order may be binding on them). Other agencies that have responsibilities similar to those described in this section are also subject to its requirements. The notice requirements of this section are in addition to the other responsibilities of these agencies under the Order and under Sections 202 and 205 of the Flood Disaster Protection Act of 1973, as amended (42 U.S.C. 4106 and 4128).

This section covers any financial transaction guaranteed, approved, regulated or insured by a Federal agency which is and which pertains to an area located in a floodplain. If an agency does not operate on an individual transaction basis with private parties, but rather guarantees, approves, regulates or insures the institutions conducting such transactions, then it is the agency's respon-

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sibility to require that the institution provide the requisite notice.

The private parties must be informed of the hazards of locating in the base floodplain. Such notice should be given in a way which: (1) explains the chances of being flooded in language readily understandable to the private party; (2) indicates if the property is in a floodway or coastal high hazard area; (3) indicates if there is a flood insurance purchase requirement; and (4) indicates if the transaction involves the sale of unimproved real estate, that the property may be subject to floodplain management regulations which dictate the manner, and in some cases the location of new construction.

### SECTION 5

The head of each agency shall submit a report to the Council on Environmental Quality and to the Water Resources Council on June 30, 1978, regarding the status of their procedures and the impact of this Order on the agency's operations. Thereafter, the Water Resources Council shall periodically evaluate agency procedures and their effectiveness.

Agencies may be called on to furnish documentation covering revisions or special applications of procedures in years subsequent to 1978. WRC will involve interested and affected agencies in the review.

### SECTION 6

As used in this Order:

(a) The term "agency" shall have the same meaning as the term "Executive agency" in Section 105 of Title 5 of the United States Code and shall include the military departments; the directives contained in this Order, however, are meant to apply only to those agencies which perform the activities described in Section 1 which are located in or affecting floodplains.

(b) The term "base flood" shall mean that flood which has a one percent or greater chance of occurrence in any given year.

(c) The term "floodplain" shall mean the lowland and relatively flat areas adjoining inland and coastal waters including floodprone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

The terms "agency," "base flood," and "floodplain" are defined in the Glossary. The 100-year floodplain is used as the base or minimum floodplain for these guidelines.

### SECTION 7

Executive Order No. 11296 of August 10, 1966, is hereby revoked. All actions, procedures, and issuances taken under that Order and still in effect shall remain in effect until modified by appropriate authority under the terms of this Order.

The previous Executive Order 11296 is revoked, but agencies are allowed to operate under existing procedures until they can be revised to reflect this Order. At the latest, this revision must be accomplished by May 24, 1978.

### SECTION 8

Nothing in this Order shall apply to assistance provided for emergency work essential to save lives and protect property and public health and safety, performed pursuant to Sections 305 and 306 of the Disaster Relief Act of 1974 (88 Stat. 148, 42 U.S.C. 5145 and 5146).

Although Section 8 exempts flood-related and other emergency activities "essential to save lives and protect property and public health and safety" from the provisions of the Order. (e.g., the requirement to prepare and circulate notice of proposed activity), it doesn't exempt them from the spirit of the Order expressed in Section 1. Activities under portions of legislatively directed emergency programs, (e.g., under

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P.L. 84-99), covering the same kinds of situations as those sections specifically cited in the Order, are clearly within the meaning and intent of Section 8, and therefore are subject to the same interpretation.

### SECTION 9

To the extent the provisions of Section 2(a) of this Order are applicable to projects covered by Section 104(h) of the Housing and Community Development Act of 1974, as amended (88 Stat. 640, 42 U.S.C. 5304(h)), the responsibilities under those provisions may be assumed by the appropriate applicant, if the applicant has also assumed, with respect to such projects, all of the responsibilities for environmental review, decisionmaking, and action pursuant to the National Environmental Policy Act of 1969, as amended.

This section allows units of general purpose, local government which may assume the status of Federal agencies for purposes of NEPA compliance under the HUD Community Development Block Grant (CDBG) Program to assume the responsibility for carrying out the provisions of Section 2(a) of this Order for specific projects under CDBG as part of their overall NEPA responsibilities. Thus, the provisions of Section 2(a) of this Order will be carried out in conjunction with NEPA compliance, and one responsibility may not be assumed without the other also being assumed by a grantee. Compliance with Section 2(a) of the Order will be completed prior to the grantee's certification of compliance with NEPA.

### PART II—DECISION-MAKING PROCESS

This part of the guidelines is structured in eight steps to reflect the decision-making process (Figure 1) required in Section 2(a) of the Order. The eight steps are summarized below.

1. The first step of the decision process is to determine if a proposed agency action is located in the base\* floodplain. (As reflected in Figure 2, the base\* floodplain is the 100-year floodplain. Also, the term 500-year floodplain should be substituted for base\* floodplain for critical actions—see Step 1.C.) This discussion identifies various types of floodplains and their boundaries. If the proposed action is not in the base\* floodplain, proceed to Step 4.

2. The agency must make public its intent to locate a proposed action in the base\* floodplain. This notice must provide a description of the proposed action with ample lead time for meaningful input from the public.

3. If the action is in the base\* floodplain, the third step is to identify and evaluate the practicable alternatives to locating in the base\* floodplain. This determination requires the agency to consider whether the base\* floodplain can be avoided either through alternative siting; through alternate actions which would perform the intended function but would minimize harm to or within the floodplain; or by taking no action.

4. For the proposed alternative, the agency must identify if the action has impacts in the base\* floodplain or directly or indirectly supports floodplain development that has additional impacts. If the proposed action is outside the base\* floodplain and has no identifiable impacts or support, the action can be implemented, Step 8.

5. If the proposed action has identifiable impacts or support, these effects must be minimized. Further, natural and beneficial floodplain values must be restored and preserved.

6. The proposed alternative can now be reevaluated taking into account

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the identified impacts, the steps necessary to minimize these impacts and opportunities to restore and preserve floodplain values.

*In the base\* floodplain:* If this reevaluation shows that the proposed action is no longer feasible, consider limiting the action to make a non-floodplain site practicable or taking no action.

*Outside the base\* floodplain:* If the action has impacts or support, consider modifying or relocating the action to eliminate or reduce these effects or taking no action.

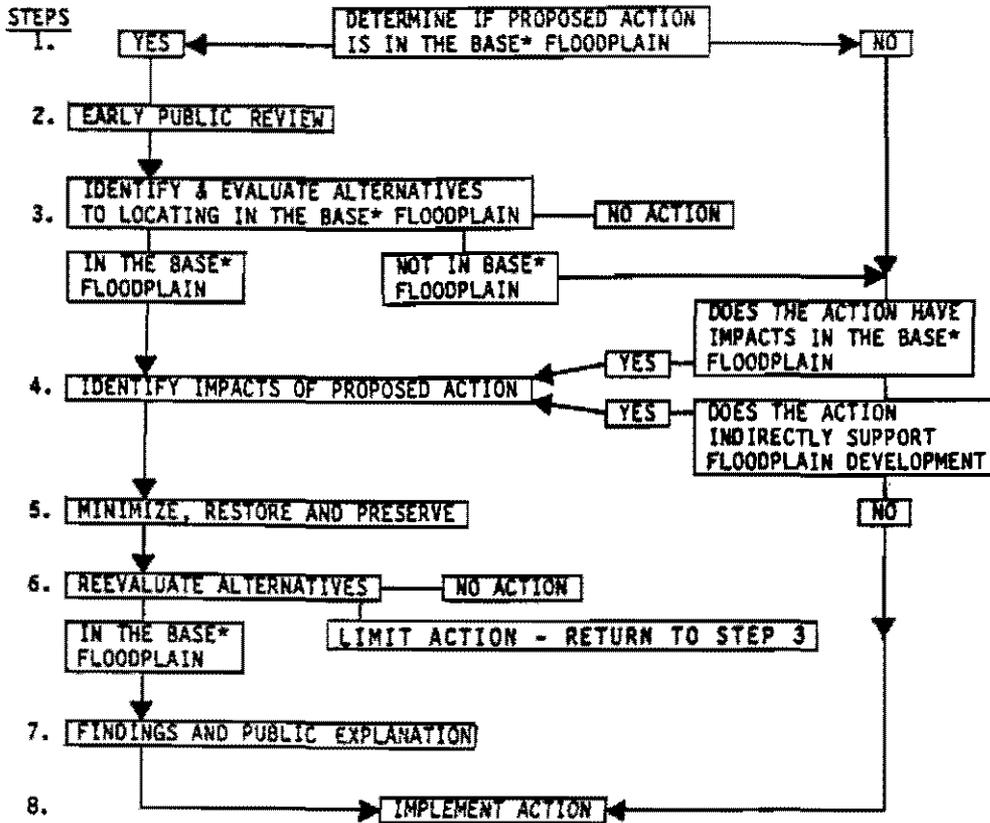
7. If the agency head finds that the only practicable alternative is locating in the base\* floodplain, public notice of the reasons must be given for this finding (including the alternatives considered).

8. After a reasonable period to allow for public response, the proposed action can be implemented.

Note that depending on the situation, this process may be carried out with fewer steps if all of the objectives of the decision-making process can be achieved.

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DECISION-MAKING PROCESS FOR E.O. 11988  
FIGURE 1



\* FOR CRITICAL ACTIONS SUBSTITUTE "500 YEAR" FOR "BASE".

## STEP 1—DETERMINE IF A PROPOSED ACTION IS IN THE BASE FLOODPLAIN

The first step in complying with the Order is to determine whether or not a proposed action is located in the base floodplain. This procedure was published in the FEDERAL REGISTER (Vol. 42, No. 190, Friday, September 30, 1977). The following discussion includes types of floodplains (1.A.), limits of flooding (1.B.) and critical action (1.C.).

### 1.A. Types of Floodplain

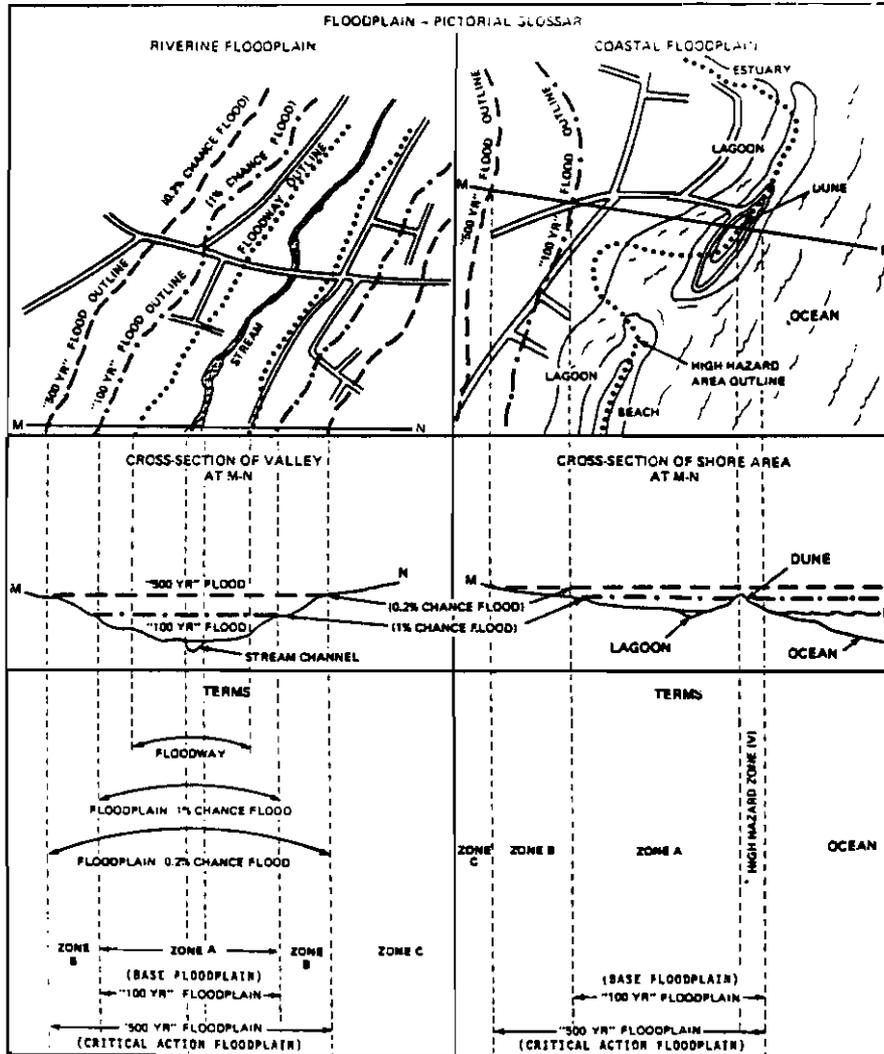
The general types of land area where flood hazards are encountered are riverine floodplains and coastal floodplains. The term floodplain is not limited only to areas surrounding large bodies of water such as coastal areas and the shores of large rivers. In this document, the term floodplain refers to any land area susceptible to being inundated from any source of flooding including

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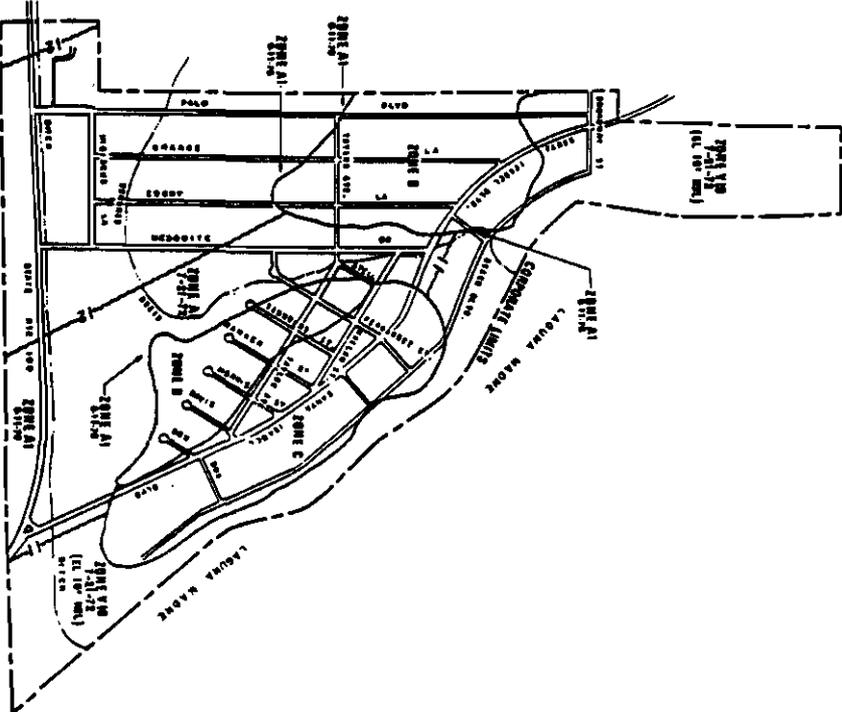
those which can be flooded from small and often dry watercourses. Small watercourses can become sources of major flood damage when their watersheds experience rapid runoff from intense rain or melting snow. At some locations the flood hazard results from several sources.

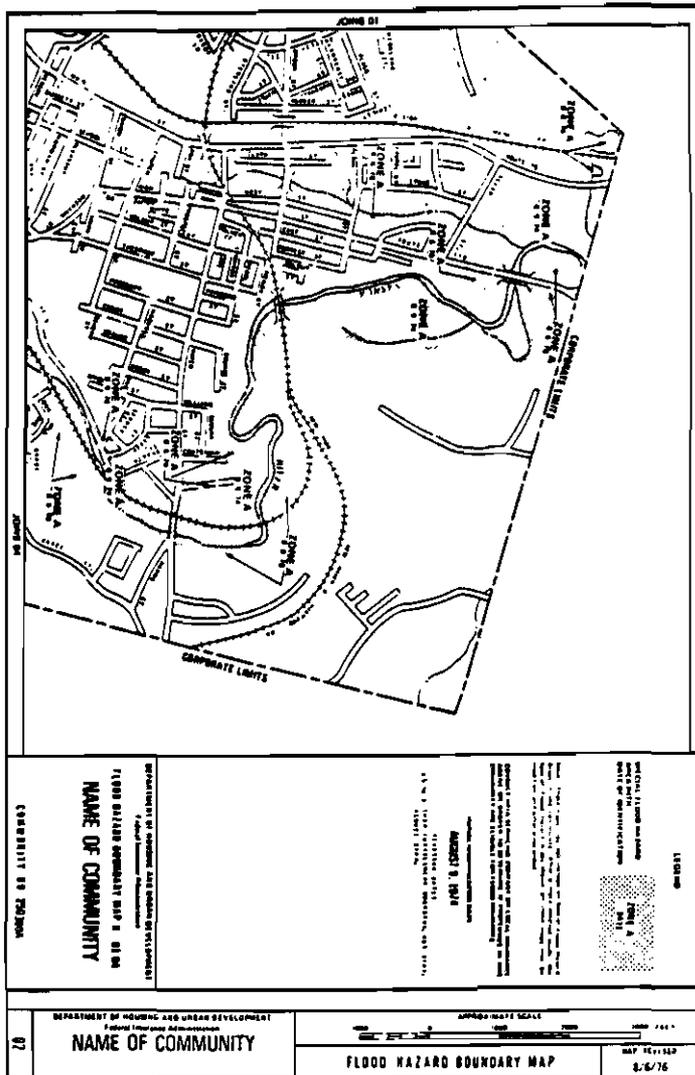
Aggravating factors contribute to the flood hazard in many riverine, coastal, and sheet flow areas. This is particularly true in riverine situa-

tions where high velocity flow causes flood-related erosion. In other areas where sheet flow has high velocity, sheet flow erosion may occur. Unusually high waves and tides are the most frequent agents of coastal erosion. Ice also contributes to structural damages. Land subsidence may occur with extensive withdrawals of ground water or other substances producing a relative increase in flood levels.



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<p><b>KEY TO SYMBOLS</b></p> <p>Zone B Zone A</p> 	<p><b>NAME OF COMMUNITY</b></p> <p><b>MAP INDEX</b></p> <p><b>COMMUNITY NO. (AGENCY)</b></p>	<p><b>DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT</b> Federal Insurance Administration</p> <p><b>FLOOD HAZARD BOUNDARY MAP H - 01</b> <b>FLOOD INSURANCE RATE MAP I - 01</b></p> <p><b>NAME OF COMMUNITY</b></p> <p><b>MAP INDEX</b></p> <p><b>COMMUNITY NO. (AGENCY)</b></p>
		
<p><b>DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT</b> Federal Insurance Administration</p> <p><b>FLOOD HAZARD BOUNDARY MAP H - 01</b> <b>FLOOD INSURANCE RATE MAP I - 01</b></p> <p><b>NAME OF COMMUNITY</b></p> <p><b>MAP INDEX</b></p> <p><b>COMMUNITY NO. (AGENCY)</b></p>	<p><b>DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT</b> Federal Insurance Administration</p> <p><b>FLOOD HAZARD BOUNDARY MAP H - 01</b> <b>FLOOD INSURANCE RATE MAP I - 01</b></p> <p><b>NAME OF COMMUNITY</b></p> <p><b>MAP INDEX</b></p> <p><b>COMMUNITY NO. (AGENCY)</b></p>	<p><b>DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT</b> Federal Insurance Administration</p> <p><b>FLOOD HAZARD BOUNDARY MAP H - 01</b> <b>FLOOD INSURANCE RATE MAP I - 01</b></p> <p><b>NAME OF COMMUNITY</b></p> <p><b>MAP INDEX</b></p> <p><b>COMMUNITY NO. (AGENCY)</b></p>



1.A.1. RIVERINE FLOODPLAINS

Riverine floodplains are valley areas adjacent to any size stream or river which can be covered by floodwaters (Figure 2). Flooding in these areas results from excessive rainfall, snowmelt, or a combination thereof. If runoff is increased to the point that the carrying capacity of the channel is exceeded, flooding occurs.

Flooding also occurs when the capacity of the stream channel is reduced by natural obstructions (ice or debris dams, sediment, and vegetation) or man-placed obstruction (structures and facilities). Some areas flood either from tributary stream overflow, backwater from a major stream, or from both simultaneously.

### 1.A.2. COASTAL FLOODPLAINS

Coastal floodplains border lakes, estuaries, oceans, or similar bodies of standing water (Figure 2). Flooding in these areas is due to landward flows caused by unusually high tides, waves from high winds, storm surges, tsunamis (large waves in the sea associated with very strong earthquakes or other impulsive disturbances), or by a combination of these causes.

### 1.A.3. SPECIAL FLOODPLAIN AREAS

Special floodplain areas encompass sheet flow or shallow flooding areas, wetlands, and sinkholes. Sheet flow occurs where a clearly defined channel is absent and where the path of flooding is unpredictable and indeterminate. In some cases, high velocity flow may occur with sheet flow, as it does commonly on debris cone floodplains (alluvial fans). These cones build up from eroded geological debris that is carried by mountain streams and deposited when the stream encounters an abrupt decrease in slope. Other flood problems are caused when development occurs in areas drained by sinkholes which often become plugged.

### 1.B. Limits of Flooding

For purposes of the Order, all agency heads will be concerned at a minimum with the floodplain area which would be inundated by a flood having a one percent chance of occurring in any year—the so-called “100-year or base flood”—because they must support any decision to conduct, support, or allow an action (i.e., “structure”, “facility” or “activity”) to be located within this area. The pictorial glossary (Figure 2) depicts and defines the 100-year or base floodplain and other portions of floodplains. The base floodplain is delineated by Zone A on the examples of flood insurance maps shown in Figures 3 and 4.

Within the base floodplain, extreme hazard is associated with those portions of riverine and coastal floodplains nearest to flood sources, where depths and velocities of flood waters are greatest. These areas are usually referred to as a “floodway” and “coastal high hazard area”, and with few exceptions, are locations to be avoided. These are the floodplain areas where flooding is not only most frequent and damaging, but where natural and beneficial values of the land and water interface are at their maximum.

In addition, agency heads should consider the implications of the occurrence of a flood larger than the base flood on the economics and safety of a proposed floodplain action. If a proposed action would be especially dangerous when exposed to larger floods, consideration must be given to the larger floodplain area. (See Step 1.C. “Critical Actions”.) Herein, such larger floodplains are identified as those of a flood with a 0.2 percent chance of occurring in any year—the so-called “500-year flood”—shown as Zone B on the Flood Insurance Rate Maps issued by the Federal Insurance Administration. Larger floods are also used to delineate floodplains in flood hazard studies by other agencies. (Examples are the Standard Project Flood (SPF) used in the U.S. Army Corps of Engineers' studies, and the Maximum Probable Flood (MPF) used in Tennessee Valley Authority (TVA) studies which are computed from basin runoff potentials rather than through statistical analyses of flow frequencies.) In summary, the key question is: How does the agency decision-maker ascertain if his decision involves a floodplain location, particularly a site within the floodplain of the one percent chance flood?

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### 1.B.1. PROCEDURES FOR DETERMINING A FLOODPLAIN LOCATION

The Order states that "this determination shall be made according to a Department of Housing and Urban Development (HUD) floodplain map or a more detailed map of an area, if available." Two cautions are suggested in using flood insurance maps: (1) they generally do not delineate portions of the floodplain less than 200 feet wide where headwater flooding may be a concern, and (2) possible adverse consequences from future urbanization are difficult to infer from the maps. Thus, technical assistance may be desirable for interpreting flood insurance maps. In addition, decision-makers seeking flood insurance maps may find them unavailable for areas of extensive public land holdings.

The following is a guide for obtaining the floodplain information needed to make a determination.

*Areas of Predominantly Private Land Ownership:* If a decision involves a publicly or privately owned site within an area of predominantly private ownership, a map showing the flood hazard areas will usually be available from the National Flood Insurance Program administered by the Federal Insurance Administration (FIA), HUD. Detailed maps showing the elevations and boundaries of the "100-year" (Zones A and V) and "500-year" (Zone B) floodplains are known as "Flood Insurance Rate Maps" (FIRM). A sample is shown as Figure 3. Such maps have been published by the FIA for over 1,300 communities and maps for more communities continue to be published for FIA's program to provide maps of all flood prone areas by 1983. Many of the communities which have a FIRM also have a Flood Insurance Study Report (FIS) containing detailed flood information. Some 13,000 less detailed maps showing the approximate areas of

the base (Zone A) floodplain are available for most of the remaining communities. These are called "Flood Hazard Boundary Maps" (FHBM). A sample is shown as Figure 4. Similar information, some very detailed, is also available from the agencies described in Appendix A. The search for flood hazard information should follow the sequence below.

- The detailed map (FIRM) or the Flood Insurance Study (FIS) report should be consulted first. Information on how to request single maps, FIS reports, and how to be placed on the FIA mailing list to receive new or revised FIRM's, FHBM's, and FIS reports is detailed in Appendix A.
- If a detailed map (FIRM) is not available—obtain an approximate boundary map (FHBM) from the same source as in the preceding step. If the proposed site is at or near the "100-year" boundary, if data on flood elevations are needed, or if the map does not delineate the flood hazard boundaries in the vicinity of the proposed site—seek detailed information and assistance from the agencies listed in Table 1. (There are additional agencies with professional competence not listed in Table 1 which can perform their own floodplain studies when needed.)
- If an approximate boundary map (FHBM) is not available or if the map does not delineate the flood hazard boundaries in the vicinity of the proposed site—seek detailed information and assistance from the agencies listed in Table 1.
- If the agencies listed do not have or know of detailed information and are unable to assist in determining whether or not the proposed site is in the base floodplain—seek the services of a li-

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censed consulting engineer experienced in this type of work. The quality of information obtained from the consulting engineer must be comparable to that required of flood insurance study contractors for the FIA. A list of experienced consulting engineers from which a selection can be made may be provided by the agencies in Table 1.

*Areas of Predominantly Federal and State Land Holdings:* If a decision involves an area or location within extensive Federal or State holdings, it is unlikely that FIS reports and FIRM or FHBM maps would be available. In this event, information should be sought from the land administering agency

before information and/or assistance is sought from the agencies listed in Table 1. If none of these agencies has information or can provide assistance, the services of an experienced consulting engineer should be sought as described above.

### 1.B.2. PROCEDURES IF SITE IS OUT OF THE BASE FLOODPLAIN

Actions located out of the base floodplain as shown on either the FIRM or FHBM would meet the minimum requirements and no further action is required for compliance with the Order, unless the action impacts the base floodplain (Step 4), indirectly supports floodplain development (Step 4.A.), or is a critical action (Step 3.C.).

TABLE 1.—Sources of floodplain information and technical assistance services for determining whether a location is in a floodplain

Agency*	Floodplain maps and profiles		Technical assistance services
	Riverine	Coastal	
Department of Agriculture: Soil Conservation Service .....	●	●	●
Department of the Army: Corps of Engineers .....	●	●	●
Department of Commerce: National Oceanic and Atmospheric Administration .....		●	●
Department of Housing and Urban Development:			
Federal Housing Administration .....			●
Federal Insurance Administration .....	●	●	●
Department of the Interior:			
Geological Survey .....	●	●	●
Bureau of Land Management .....	●	●	
Bureau of Reclamation .....	●		●
Tennessee Valley Authority .....	●		●
Delaware River Basin Commission .....	●	●	●
Susquehanna River Basin Commission .....	●		●
States .....	Varies from State to State.		

\*See app. A for detailed description.

### 1.B.3. PROCEDURES IF SITE IS IN THE BASE FLOODPLAIN

If the location is within Zones A or V as shown on a FIRM, or in Zone A on a FHBM, as verified by other detailed information, alternative sites outside of these zones and alterna-

tive actions are to be identified and evaluated (Step 3.) in an initial attempt to avoid the floodplain.

### 1.C. Critical Actions

As indicated previously, the minimum floodplain of concern for cer-

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tain critical actions is the area subject to inundation from a flood having a 0.2 percent chance of occurring in any given year (500-year floodplain). This floodplain includes both Zones A and B as shown on FIRM's. Critical actions are those for which even a slight change of flooding would be too great. Some key questions in this regard are:

- If flooded, would the proposed action create an added dimension to the disaster as could be the case for liquefied natural gas terminals and facilities producing and storing highly volatile, toxic, or water-reactive materials?
- Given the flood warning lead-time available, would the occupants of buildings such as hospitals, schools, and nursing homes be insufficiently mobile to avoid loss of life and injury?
- Would essential and irreplaceable records, utilities, and/or emergency services be lost or become inoperative if flooded?

If the answer to questions such as these is "yes", an alternative location must be sought completely outside the larger floodplain. Agencies listed in Table 1 may be in a position to provide information and assistance in evaluation of proposed locations for critical actions. If neither the base floodplain nor larger floodplain for certain critical actions can be avoided, the next responsibility (Step 2) is to provide an opportunity for public review and comment on the proposed floodplain location.

### STEP 2—EARLY PUBLIC REVIEW

Early public review is one of several requirements of the Order directed at the objective of public involvement. It should be considered in the context of the whole public involvement process.

The objective of public involvement is to provide sufficient infor-

mation early enough in the process of making decisions affecting floodplains so that the public can have impact on the decision outcome. The order includes requirements that the public be provided adequate information, opportunity for review and comment, and an accounting for the rationale for proposed actions affecting floodplains. These requirements are stated in Section 2 of the order, which:

- requires agencies to provide opportunity for early public review of any plans or proposals for actions in floodplains;
- requires agencies subject to the OMB A-95 Budget Circular to provide notice explaining a proposed action;
- requires preparation and circulation of a notice of findings and explanation prior to taking an action.

An overview of these sections suggests that agency procedures should provide an integrated procedure for involvement of the public in the floodplain management decision-making process. Thus, to insure that adequate information and opportunities are provided for the public to effectively participate in floodplain decisions, and to meet the requirements of the Order, the following elements should be incorporated in agency public involvement procedures:

- A description of the overall audience, including specific segments to whom public notice information will be targeted (e.g., floodplain residents, elected officials, basin residents, interest groups, other agencies, etc.). The responsibility is to reach as broad an audience as possible.
- A description of the vehicles or public information mechanism which will be utilized to reach the target audience (e.g., public hear-

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ings, newsletters, workshops, advisory groups, etc.). The responsibility is to provide continuous interaction and involvement opportunities for the public during the floodplain decision-making process.

- A description of the purpose for which various public notice actions will be undertaken and assurance that public input will be integrated into the decision-making process (e.g., specific efforts to provide one-way information dissemination, two-way public communication or interaction, etc.). The responsibility is to provide information which promotes the fullest understanding of the proposed plan or action.
- A statement explaining the timing of public notice actions to promote public understanding and provide opportunities for the public to affect a proposed action or plan before alternative actions have been precluded.

It is recognized that the public involvement process must be tailored to specific program types (permits, direct and federally assisted projects, etc.) and will vary. Nevertheless, agency procedures must be compatible with Section 2(b) of Executive Order 11514 (Appendix E), and must also apply to actions which do not require preparation of an EIS under Section 102(2)(C) of NEPA.

If there is a reasonable likelihood that a plan or proposed action or its alternatives will impact a floodplain, then it should be announced as early as that is known, and not delayed until much more detailed information is developed.

It is recognized that variations in program types will determine the earliest time in the floodplain decision-making process when the public can be notified. For example, in the case of a private developer applying for a permit to construct a housing

complex with floodplain impact, the earliest public notice may not come until a point very late in the decision-making process. At that point, the only options may be no project, or the project as designed and proposed. In another example, a major facility such as a proposed regional wastewater treatment facility requires considerable expenditure for site evaluation, engineering and design. Public notice must precede major site identification and analysis so the public can have an input early in the decision-making process of preliminary site screening and selection. If not, public choice options may be foreclosed, or decisions will not be based on similarly detailed information bases.

Early public notice is the first in a series of public information and involvement activities. This would logically be followed by continuing public communication at Step 4, in identifying impacts, Step 6, reevaluating alternatives through the environmental review process, and at Step 7, in the issuance of findings and explanation of why the proposed plan or action must impact the floodplain.

### STEP 3—IDENTIFY AND EVALUATE PRACTICABLE ALTERNATIVES TO LOCATING IN THE BASE FLOOD-PLAIN

Having determined that a proposed action is located in the base floodplain, the agency is required by the Order to identify and evaluate practicable alternatives to locating in the base floodplain. Alternatives to be evaluated include: (1) carrying out the proposed action at a location outside the base floodplain (alternative sites); (2) other means which accomplish the same purpose as the proposed action (alternative actions); and (3) no action.

### 3.A. Alternative Sites

Alternative sites must be identified and the practicability of such sites evaluated. If a practicable site exists outside the base floodplain, the proposed action must not be located in the base floodplain. Whenever a floodplain site is the only practicable alternative, the agency analysis leading to this conclusion should be fully documented. In determining the practicability of a non-floodplain site, the general concepts of site feasibility apply. At a minimum, site practicability shall be addressed in the light of the following:

- natural (topography, habitat, hazards, etc.);
- social (aesthetics, historic and cultural values, land use patterns, etc.);
- economic (cost of space, construction, services, relocation); and
- legal (deeds, leases, etc.).

### 3.B Alternative Actions

Alternative actions must be considered before a decision is made to carry out an action in the base floodplain. These are actions which substitute for the proposed action in that they comprise new solutions or approaches which serve the same function or purpose as that proposed, but which have less potential for harm. For example, where an agency has proposed the construction of a document storage facility within the floodplain to handle expanding record keeping needs, the alternative of microfilming the documents could allay the need for a new structure. Similarly, rather than providing expanded waste treatment capacity for an area by constructing a new or larger facility in the floodplain, the alternative of using surplus capacity in a neighboring locale

could serve the need for a new or expanded facility.

### 3.C No Action

No action is also an alternative, and assessment of this course is required. The alternative of no action probably can not be fully evaluated until a determination has been made in Step 4 of the harm to or within the floodplain resulting from the proposed action.

### STEP 4—IDENTIFY IMPACTS OF THE PROPOSED ACTION

If the agency has determined that the only practicable alternative is locating in the base floodplain, the impacts of the proposed action must be identified. Similarly, where actions proposed to be located out of the floodplain will affect the base floodplain, impacts resulting from these actions must be identified. Since the Order is based primarily on NEPA, the agencies can draw upon the impact identification and assessment experience and guidance which they have developed in their implementation of NEPA. The concepts of impact assessment applicable to both NEPA and the Order are identical, with the Order's focus being narrower. The following discussion addresses general concepts of impact identification and assessment (Step 4.A.), and the two areas of concern which are impacted as a result of the occupancy and modification of floodplains; lives and property (Step 4.B.), and floodplain values (Step 4.C.).

#### 4.A. General Concepts

In their regulations and procedures, the agencies must identify the means by which they will address the following impact-related issues:

- All agency actions can have impacts associated with the modification of floodplains. Although the modification of floodplains and en-

suing impacts most clearly result from actions located in the floodplain or at its periphery, it can also result from actions out of the floodplain.

- Certain types of agency actions may support subsequent actions which have additional impacts of their own;
- The Order focuses on the adverse impacts of proposed actions on lives and property, and on natural and beneficial floodplain values.
- The three basic types of impacts are: (a) positive and negative; (b) concentrated and dispersed; and (c) short- and long-term.

#### 4.A.1. DIRECT AND INDIRECT SUPPORT OF FLOODPLAIN DEVELOPMENT

The Order requires the agencies to avoid the direct and indirect support of floodplain development. For the purposes of these guidelines, an action supports floodplain development if it encourages, allows, serves or otherwise facilitates additional floodplain development. The agencies may also reflect in their regulations and procedures, the manner in which agency actions similarly accommodate the maintenance of existing uses in the floodplain. That is, a proposed action can reinforce existing land use patterns which generally have developed without reflecting the concepts of hazard and risk minimization and restoration and preservation of natural floodplain values which form the basis of the Order.

Direct support results from actions located on the floodplain, while indirect support results from those outside the floodplain. For example, the location of a major public service structure or facility (a post office, library or office building), in the floodplain, requires new or additional investment in or construction of support facilities for food service,

parking, etc. Further, simply through their location, such actions would foster additional developments in the floodplain. Floodplain development could be indirectly supported by the provision of infrastructure (water and waste water systems, power supplies, highway and secondary road networks, mass transit systems and airports) outside the floodplain.

Clearly, it is the intent of the Order that the impacts of Federal actions and the impacts of actions supported by Federal actions be evaluated. However, the identification and evaluation of these positive and negative changes to the systems of flood losses, threats to life and health, and environmental values are often both difficult and even speculative. Moreover, the process by which an agency tries to describe the actions supported by their actions is both complex and often not well addressed in accepted methodologies, without a clear conceptualization of the supported action, there is little chance that the impacts can be identified. On the other hand, when the supported actions are describable in terms of growth experience in the area or from experience with similar actions elsewhere, the impacts of the supported actions can be identified as they are for the proposed Federal action.

#### 4.A.2. TYPES OF IMPACTS

The three basic types of impacts which must be addressed are: (a) positive and negative; (b) concentrated and dispersed; and (c) short and long term.

*Positive and negative impacts:* both must be identified, even though the focus of impact identification and assessment is on negative or adverse impacts. This is necessary in order to identify the full range of impacts against which to weigh the practicability of a proposed action.

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In addition, it must be recognized that impacts which are beneficial to some, may be harmful to others. For example, draining wetlands establishes an environment which is suitable for certain uses, but at the expense of the beneficial values of the wetland.

*Concentrated and dispersed impacts:* both may result from any action. The impact is concentrated if it occurs at or near the site of the action and is dispersed if it occurs at a site remote from the action. For example, a concentrated impact of constructing a building on a wooded area is the loss of vegetation at the site. A dispersed impact of the same action could be sedimentation downstream caused by erosion at the site.

*Short- and long-term impacts:* both must be analyzed in order to evaluate the total impact of an action. Short-term impacts are temporary changes occurring during or immediately following an action and usually persist for a short while. Long-term impacts occur during or after an action and may take the form of delayed changes or changes resulting from the cumulative effects of many individual actions. Long-term impacts may persist for a considerable time and may continue indefinitely. An example of a short-term impact could be sedimentation at or below a construction site. A long-term impact could be the loss of valley floodwater storage resulting from the cumulative effect of floodplain development.

### 4.A.3. SOURCES OF IMPACTS

Regardless of the source of impacts, the agencies are required to identify the types of impacts discussed above which arise from their actions when these impacts affect the floodplain. Thus, this requirement applies to actions proposed both in and out of the base floodplain (or the 500-year floodplain

where a critical action is proposed). The location of the action causing the impact determines which of the requirements of the Order must be met by the agencies. For actions proposed in the base floodplain (or the 500-year floodplain where a critical action is proposed), all of the requirements of the Order must be met as outlined (Figure 1). For actions proposed out of the base floodplain, however, the Order does not require that the public notice and findings discussed in Steps 2 and 7 be prepared. Similarly, since in these cases the action causing the impacts in the base floodplain is located outside of it, the practicability test (Step 3) is not required. As a minimum, however, the agencies must identify these impacts and minimize ensuing harm to or within the floodplain which would result if the action is taken as proposed. Because there is no requirement for public notice or the practicability test, the minimization responsibility (Step 5) takes on added significance. This should be reflected in agency procedures.

The agencies are strongly encouraged to apply the public notice procedures and alternate site and action evaluations to actions proposed out of the floodplain which will result in impacts to the floodplain. It has been recognized that public input in agency decision-making processes through NEPA has improved the environmental soundness of these decisions. It is even more reasonable to apply the alternate site and action evaluation to actions taking place outside the floodplain. The evaluation of alternatives to the proposed action as discussed in Step 3, provides a better opportunity to explore the range of possibilities for avoiding adverse impacts to or within the floodplain than the more narrowly focused concepts of minimization, restoration and preservation discussed in Step 5. For example, the

overall costs involved in locating a highway interchange, sewer interceptor line, airport facility, etc., at a location less directly affecting the floodplain could be less than the costs incurred in attempting to minimize the impacts of the proposed action and to restore and preserve floodplain values.

#### 4.B. Lives and Property

After determining that a proposed action is in the base floodplain, the risk to lives and property involved in using that site must be determined. This requires an understanding of the magnitude and consequences of flooding that can be expected.

##### 4.B.1. NATURE OF HAZARD AND RISK

Two basic types of floods are used in determining flood hazards: observed or historic floods and probability floods.

*Historic Floods:* Often these can be the basis for deciding whether a proposed site is in a hazardous area. However, the fact that a certain level of flooding has been observed indicates little about how floods are likely to occur in the future. Even where records extend over a long period of time, the highest observed flood must not be used as the only guide for decision-making. With very few exceptions, flooding at any site can be expected to reach higher levels than those previously recorded because larger storms, urbanization, flood plain encroachment, or other factors affect flooding.

*Probability Floods:* These are statistically derived floods. The one percent chance (100-year or base) flood is the term which describes the magnitude of flooding used by FIA as the minimum acceptable level to which a community must regulate the floodplain in order to qualify for the National Flood Insurance Program. As stated previously, this magnitude flood has a one percent

chance of being exceeded in any one year period. The likelihood of exceeding the one percent chance flood magnitude increases with time periods longer than one year. For example, the probability is about one in four that the one percent chance flood will be exceeded during the life of a 30-year mortgage.

Large floods occur each year in many parts of the United States. No part of the country is immune from large floods. Consequently, it has become standard practice for agencies dealing with flood problems to calculate elevations of a greater flood to indicate the range of flooding which can and will occur.

##### 4.B.2. HIGH HAZARD AREAS

High hazard areas are those portions of riverine and coastal floodplains nearest the source of flooding. These are the frequently flooded areas that become arenas of major flood dynamics during large floods. Here, flood-waters exert their maximum pressures, erosion is greatly accelerated and loss potential is increased. Additionally, these are the areas of coastal and riverine floodplains within which many of the most critical floodplain values are concentrated. In riverine situations, the high hazard area is that portion of the floodplain where impedance to flood flow resulting from man's occupancy can increase flood heights and consequently the area subject to flooding. In coastal floodplains, the high hazard area is usually confined to the beach area in front of high bluffs or the crest of primary or foredunes, where wave impact is the most significant inducing factor. In light of the high loss potential and the likelihood of significant adverse effects to floodplain values associated with the conduct, support or allowance of actions in these portions of the floodplain, the agencies

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must rigorously apply the Order's charge to avoid these areas.

### 4.B.3. EVALUATION OF FLOOD HAZARD

Evaluation procedures must be established in writing by all agencies. This evaluation serves to express clearly the hazard involved and provides the basis for carrying out the succeeding phases of the analysis. Key questions which must be addressed by the agencies in establishing their regulations/and procedures for the evaluation of flood hazard include the following:

- Is the proposed action to be located in the floodway portion of the riverine floodplain, or the coastal high hazard area?
- Is the proposed action in a flood-fringe area such as the flood-fringe portion of a riverine floodplain or the backwater areas of a coastal floodplain?
- Is the flood hazard aggravated by the presence of, or potential for, destructive velocity flows, flood-related erosion, subsidence or sinkholes, or other special problems?
- Is there a combination of flood sources present which may flood simultaneously in the area (e.g., river and ocean, or shallow overland runoff and river, etc.)?

### 4.C. Natural and Beneficial Floodplain Values

Water and the adjacent floodplain exist in nature in a state of dynamic equilibrium. If one part of a coastal or riverine system is disturbed, the entire system usually readjusts toward a new equilibrium. The environmental effects of this readjustment may affect areas far from the original site of the disturbance and can last for decades. Thus, floodplain actions must be viewed with caution and a careful assessment made of their impact on natural and beneficial floodplain values.

Floodplains in their natural or relatively undisturbed state serve water resources values (natural moderation of floods, water quality maintenance, and groundwater recharge), living resource values (fish, wildlife, and plant resources), cultural resource values (open space, natural beauty, scientific study, outdoor education, and recreation), and cultivated resource values (agriculture, aquaculture, and forestry).

### 4.C.1. WATER RESOURCES

Floodplains provide for the natural storage of surface and ground waters and the natural improvement of water quality.

*Natural Moderation of Floods:* The characteristics of the floodplain and of flooding are closely interdependent. Floods shape floodplain topography, soils, and ecology. In turn, the physical characteristics of the floodplain shape flood flows. Except for some steep valley and coastal bluff situations, naturally vegetated floodplains can provide a broad area to spread and slow floodwaters, thereby reducing velocities and flood peaks. Stream meander, dune formation in coastal areas and other natural processes which reduce the force of floodwaters are also accommodated in undisturbed floodplains.

Floodplain encroachment modifies these processes. The effects of such modification are complex and not fully understood. Although in some cases encroachments may interact with natural processes to aid in the reduction of flood forces, their predominant effect has been to aggravate the flood hazard.

In coastal floodplains natural barriers exist in the form of sand dunes and certain vegetation, e.g., mangrove stands, which reduce the impact of high tides and storm surges. Alteration or removal of the barriers themselves, or the vegetative and drainage systems which sup-

port them, reduces or eliminates their role in the reduction of flood forces. In addition, excessive withdrawal of groundwater may result in land subsidence thereby increasing flood depths and exposing greater areas to flooding.

*Water Quality Maintenance:* Floodplain vegetation functions in maintaining the physical and chemical integrity of the water that ultimately supports biological communities. Runoff is slowed by vegetation, allowing the water to deposit not only sediments originating on land but also those scoured from the channel bank and bed. Sediment deposition may add rich nutrients to the floodplain soil and keeps sediment-associated pathogens from the water.

However, siltation can destroy biological communities supported on the floodplain because it contributes to eutrophication (nutrient overloading), decreased dissolved oxygen, increased water temperature, and serious impairment of photosynthetic productivity. Vegetation shades stream banks and decreases daily water temperature fluctuations thereby alleviating temperature stress to the biota. Vegetation slows the flow of water and provides slack waters that give the aquatic biota a greater chance to survive flooding. In addition, flood-plain storage and vegetation reduces siltation in downstream reservoirs.

*Groundwater Recharge:* An additional value of floodplain vegetation's role in slowing runoff is in groundwater recharge. Slowing the floodwater allows it to infiltrate through the generally porous floodplain soil. Base streamflow and the level of standing water bodies is regulated naturally by groundwater. During periods of excessive precipitation, runoff enters the groundwater system as well as stream channels and standing water bodies, thereby reducing peak flows; during

the dry season, water generally flows from the groundwater system into surface waters, augmenting low flows.

#### 4.C.2. LIVING RESOURCES

The Nation's coastal and riverine floodplains support large and diverse populations of flora and fauna which represent valuable, renewable resources of great importance to man.

The floodplain is biologically very productive because it is here that land and water meet and the elements of both terrestrial and aquatic habitats interact. For example, unspoiled tidal marshes rank well above intensively farmed croplands in the magnitude and diversity of biological productivity. Marsh-rimmed estuaries and adjacent floodplains are vital to marine fisheries as breeding, nursery, and feeding grounds. Inland ponds, potholes, marshes and other wetland areas may provide highly important habitat for waterfowl and other wildlife.

Fish and wildlife resources are highly susceptible to man-induced disruption of the floodplain because of their high sensitivity to the resulting impacts. For example, drainage of wetlands, channelization of natural water courses, clearing of vegetation, especially bottomland forests, all have short and long term indirect impacts on plant and animal communities. Other changes that limit food, water supplies, or protective cover have similar effects. Modification of the floodplain at one location can affect living resources elsewhere on the floodplain.

#### 4.C.3. CULTURAL RESOURCES

Floodplains contain cultural resources important to the Nation and to individual localities. They provide many cultural values if left in their natural state. Because native American settlements and early cities were

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located along coasts and rivers for access to water transportation, supply, and power, floodplains include most of the Nation's earliest archeological and historical sites. In addition to cultural richness, floodplains may be valuable sources for scientific research. For example, because they may contain unique habitats, they are ideal areas for ecological study. Floodplains are used for open space and green belt parks in cities to vary the pattern of the urban scene, to absorb noise, to clean air, to lower air temperatures, and to serve as nature centers and outdoor experience labs. Floodplains are often attractive areas, a base for recreation (hiking and camping), and a base for water-oriented sports such as boating and swimming. In addition, floodplain wildlife resources can be managed for recreational hunting and fishing. Where they remain in essentially pristine condition, floodplains can be valued as a part of the "wilderness experience" so important to the American Culture.

#### 4.C.4. AGRICULTURAL, AQUACULTURAL, AND FORESTRY RESOURCES

Floodplains generally provide excellent resources for agricultural, aquacultural and forestry production.

The natural processes of sediment renewal which take place in floodplains replenish soil and their nutrients. Thus with proper management, floodplain soils generally require less artificial fertilization than upland sites. Level or gently rolling floodplain terrain facilitates agricultural operations. Surface and groundwater sources are usually easily accessible. Well-drained, deep soil suitable to most economic crops are often prevalent in the floodplain. Soils well suited to speciality crops are also found on floodplains (e.g., the poorly

drained areas of the Sacramento Valley where rice is a major crop).

However, certain agricultural uses and practices in the floodplain may adversely affect natural floodplain values. They may be incompatible with wildlife production; may induce aggravated erosion and sedimentation; or may result in the drainage of inland and tidal wetlands to increase the amount of arable land. Excessive fertilization and poor feedlot practices can result in nutrient pollution in local water bodies. Thus, proper management practices are essential where agriculture is proposed in sensitive floodplain areas.

The use of floodplain areas for aquacultural operations has grown into a viable industry producing a wide variety of aquatic crops. Aquaculture is subject to similar limitations to those noted for agriculture, but if properly managed, it can be compatible with the natural values of floodplains, and may offer opportunities for the restoration of damaged floodplain values.

Many of the Nation's valuable forest resources are found within floodplains. Bottomland hardwoods and other riparian species (those which can only flourish in close proximity to water) are important to the timber industry and the overall economy of the country. Thus, sound management of forest resources in the floodplain is also essential.

#### STEP 5—MINIMIZE, RESTORE, PRESERVE

The requirements of the Order to minimize, restore, and preserve apply if a proposed action will result in harm to or within the floodplain. The term "harm," as used in the context of the Order, applies to both lives and property (Step 4.B.), and natural and beneficial floodplain values (Step 4.C.). The concept of minimization (Step 5.A.), applies to

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harm. The concept of restoration and preservation (Step 5.A.) applies only to floodplain values. Step 5.C. discusses some mechanisms which may be applied to achieve these three requirements.

### 5.A. Minimize

Minimize is a demanding standard and requires the agency to reduce harm to the smallest possible degree, thus establishing a far more rigorous standard than other terms which often are used in similar contexts, e.g., alleviate (to lessen), mitigate (to moderate the severity of), ameliorate (to improve), etc. From the standpoint of lives and property, potential harm to or within the floodplain must be reduced to the smallest possible amount or degree. The goal is to avoid increasing the flood loss potential associated with the level of the base flood prior to the proposed action. Where a critical action is proposed (see Step 2.C.) the goal is associated with higher levels of flooding. Similarly, from the standpoint of floodplain values, minimization requires that harm to such values be reduced to the smallest possible amount or degree. The Order's requirement to minimize potential harm applies to (1) the investment at risk, or the flood loss potential of the action itself, (2) the impact the action may have on others, and (3) the impact the action may have on floodplain values. The agencies must specify in their regulations and procedures, how actions will be designed and modified to minimize harm to or within the floodplain. (Also see page 1-4 on the requirements to minimize harm.)

### 5.B. Restore and Preserve

In the context of this Order, "restore" focuses upon conditions existing as a result of prior actions, while "preserve" focuses upon the impacts of a proposed action.

Restore means to reestablish a setting or environment in which the natural and beneficial floodplain values can again operate. Where floodplain values have been degraded by past actions, the agency must identify, evaluate, and implement measures to restore the values diminished or lost. The functions of many of the Nation's degraded floodplains can be partially or fully restored through remedial action.

Preserve means to prevent modification to the natural floodplain environment, or to maintain it as closely as possible to its natural state. This term applies foremost to floodplains showing little or no disruption by man. If an action will result in harm to or within the floodplain, the agency must design or modify the action to assure that it will be carried out in a manner which preserves as much of the natural and beneficial floodplain values as is possible.

### 5.C. Methods to Minimize, Restore and Preserve

A wide range of methods have been developed over time to minimize harm to lives and property from flood hazards. In the recent past, other methods directed toward minimizing harm to natural and beneficial environmental values, including those associated with the floodplain, have also been developed. The technology and methodologies for achieving restoration and preservation are not as well documented nor understood, but currently are receiving increasing attention. The tools and approaches, which are directed toward attaining these three goals of the Order, should be considered and applied at all stages of a proposed action, as appropriate, e.g., during the planning, design, construction, operation and maintenance of a proposed project.

Although the Order emphasizes avoidance of the floodplain as the

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preferred manner for meeting its intent to avoid harm to or within the floodplain, the following examples are provided as additional guidance. The agencies should not be limited by the scope and level of detail of these examples.

### 5.C.1. NATURAL MODERATION OF FLOODS

- Minimize floodplain fills and actions that require fills such as construction of dwellings, factories, highways, etc.
- Require that structures and facilities on wetlands provide for adequate flow circulation.
- Use minimum grading requirements and save as much of the site from compaction as possible.
- Relocate nonconforming structures and facilities out of the floodplain.
- Return site to natural contours.
- Preserve free natural drainage when designing and constructing bridges, roads, fills, and large built-up centers.
- Prevent intrusion on and destruction of beach and estuarine ecosystems and restore damaged dunes and vegetation.

### 5.C.2. WATER QUALITY

- Maintain wetland and floodplain vegetation buffers to reduce sedimentation and delivery of chemical pollutants to the water body.
- Control agricultural activities to minimize nutrient inflow.
- Control urban runoff, other storm water, and point and nonpoint discharges.
- Control methods used for grading, filling, soil removal and replacement, etc., to minimize erosion and sedimentation during construction.
- Prohibit the location of potential pathogenic and toxic sources on

the floodplain, such as sanitary land fills and septic tank, etc.

### 5.C.3. GROUNDWATER RECHARGE

- Require the use of previous surfaces where practicable.
- Design construction projects for runoff detention.
- Dispose of spoils and waste materials so as not to contaminate ground or surface water or change land contours.

### 5.C.4. LIVING RESOURCES

- Identify and protect wildlife habitat and other vital ecologically sensitive areas from disruption.
- Require topsoil protection programs during construction.
- Control wetland drainage, channelization, and water withdrawal.
- Reestablish damaged floodplain ecosystems.
- Minimize tree cutting and other vegetation removal.
- Design floodgates and seawalls to allow natural tidal activity and estuarine flow.

### 5.C.5. CULTURAL RESOURCES

- Provide public access to and along the waterfront for recreation, scientific study, educational instruction, etc.
- Locate and preserve from harm historical cultural resources; consult with appropriate governmental agency or private group.

### 5.C.6. AGRICULTURAL RESOURCES

- Minimize soil erosion on cropped areas within floodplains.
- Control use of pesticides, herbicides, and fertilizer.
- Limit the size of fields, promote fence rows, shelter belts and strip-cropping.

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- Strengthen water bank and soil bank type programs to be consistent with alternate demands for the use of agricultural land.
- Minimize irrigation return flows and excessive applications of water.

### 5.C.7. AQUACULTURAL RESOURCES

- Construct impoundments to minimize any alteration in natural drainage and flood flow. Existing natural impoundments such as oxbow lakes and sloughs could be utilized under proper management.
- Limit the use of exotic species, both plant and animal, to those organisms already common to the area or those known not to compete unfavorably with existing natural populations.
- Discourage mechanized operations. Machinery such as dredges, weeders, and large-scale harvesting equipment may lead to environmental problems such as sediment loading to adjacent watercourses.

### 5.C.8. FORESTRY RESOURCES

- Control the practice of clear-cutting, depending upon the species harvested, topography, and location.
- Complement state law governing other aspects of harvest operations; proximity to watercourses, limits on roadbuilding, equipment intrusions, etc.
- Include fire management in any overall management plans. Selective fire use may reduce the probability of major destructive fires.
- Require erosion control plans on all timber allotments, roads, and skidways.

Implementing the above mechanism may be achieved through many types of administrative measures, depending in part upon the agency programs and authority.

Some examples are:

- Engineering and realty section standards and procedures.
- Contract, grant, loan, permit, and license stipulations.
- Application of appropriate encumbrances during land conveyance.
- Information transfer and education of employees and public.
- Delegation of responsibility for floodplain activities to a specific office with sufficient authority to play an active leadership role both within and outside of the agency.
- Systematic review of existing agency programs to identify opportunities for floodplain value preservation and restoration.
- Site surveys to identify opportunities for floodplain preservation and restoration; and
- Provision of coordination methods within and outside of agency to enable the implementation of unified floodplain management measures.

### STEP 6—REEVALUATE ALTERNATIVES

Having identified the impacts the proposed action would have on the floodplain (Step 4), methods to minimize these impacts, and opportunities to restore and preserve floodplain values (Step 5); the proposed action should now be reevaluated. For proposed actions in the base floodplain, the reevaluation should consider if the action is still feasible at this site. If not, consider limiting the action to make non-floodplain sites practicable. If neither is acceptable, the alternative is no action. If the proposed action is outside the base floodplain but has impacts which cannot be minimized (Step 5), consider whether the action can be modified or relocated to eliminate or reduce the identified impacts, or if

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the no action alternative should be chosen.

The reevaluation should also include a provision for comparison of the relative adverse impacts associated with the proposed action located in and out of the floodplain. The comparison should emphasize floodplain values. However, a site out of the floodplain should not be chosen if the overall harm is significantly greater than that associated with the floodplain site.

### 6.A. Location in the Base Floodplain

In determining whether the proposed action will be located in the base floodplain, the agency must ascertain that the floodplain site is the only practicable alternative. Further, the importance of the location, must clearly outweigh the requirements of the Order to:

- Avoid direct or indirect support of floodplain development wherever there is a practicable alternative;
- Reduce the risk of flood loss;
- Minimize the impact of floods on human safety, health and welfare; and
- Restore and preserve the natural and beneficial floodplain values.

### 6.B. Limit Action

If an action proposed to be located in the floodplain cannot satisfy the four requirements in Step 6.A., consider reducing the criteria for the proposed action. This would lower the threshold for what constitutes a practicable alternative. New alternative actions and sites could then be identified and previously rejected ones reevaluated for practicability based on scaled-down expectations.

### 6.C. No Action

If neither of the above courses of action are feasible, the agency

should reevaluate the no action alternative.

## STEP 7—FINDINGS AND PUBLIC EXPLANATION

If reevaluation results in the determination that there is no practicable alternative to locating in or impacting the floodplain, a statement of findings and public explanation must be provided for the proposed action. Each agency should explain how any tradeoff analysis was conducted by the agency in making its findings. Some existing agency public notice procedures may already satisfy part of the requirements of the Order (Section 2(a)(2)(ii)) through such mechanisms as OMB A-95 and NEPA procedures, or other public involvement programs. However, agency procedures must incorporate the development and issuance of a written statement of findings and public explanation which includes:

1. A description of why the proposed action must be located in the floodplain;
2. A description of all significant facts considered in making the determination including alternative sites and actions;
3. A statement indicating whether the actions conform to applicable State or local floodplain protection standards;

In addition, and in keeping with the concept of the overall public involvement process discussed in Step 2, the following items should be included in the statement of findings and public explanation:

4. A statement indicating why the NFIP criteria are demonstrably inappropriate for the proposed action;
5. A provision for publication in the FEDERAL REGISTER or other appropriate vehicle;
6. A provision for a brief comment period prior to agency action (15 to 30 days);

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7. A description of how the activity will be designed or modified to minimize harm to or within the floodplain;

8. A statement indicating how the action affects natural or beneficial floodplain values;

9. A statement listing other involved agencies and individuals.

### 7.A. Interagency Notice

Certain public review procedures already exist with which the Order's review requirements are to be integrated.

#### 7.A.1. PROGRAMS SUBJECT TO OMB CIRCULAR A-95

For programs subject to OMB Circular A-95, the agency shall send a notice, not to exceed three pages in length including a location map, to the State and areawide A-95 clearinghouse for the areas affected. The notice shall include (as a minimum) 1, 2, and 3 from above. It would also be helpful to the reviewer, and consistent with the intent of the Order, to include items 4 through 9.

#### 7.A.2. OTHER PROGRAMS

For programs not subject to OMB-95 review procedures, agencies must develop procedures to provide for similar notice and explanation of why a proposed action is to be located in a floodplain. This notice must be circulated among agencies and also made available to the public for review.

### 7.B. Actions Subject to NEPA

For agency actions subject to NEPA which take place in the base floodplain, the public review requirements discussed above as set out in Section 2(b) of Executive Order 11514, as amended, should include the nine items listed in the introduction to this step. Section 2(a)(4) of the Order requires the same public

notice procedures for Federal actions in the floodplain even though impacts are not significant enough to require the preparation of an environmental impact statement (EIS) under Section 102(2)(C) of NEPA (Public Law 91-190).

Under NEPA procedures, a final EIS is circulated for public and interagency review and comment. A minimum of 30 days is required to allow a review and to receive responses from the public and governmental agencies. These comments must then be considered. The findings must be made in conjunction with a final agency decision, and the formal statement of findings required by the Order must be issued prior to initiating the proposed action. A final EIS should explain, if appropriate, why the responsible official has recommended or why the agency might support an action located in a floodplain.

### 7.C. All Actions Located in the Base Floodplain

A statement of findings (including the explanatory information discussed in 7.A.) must be issued by the agency head in compliance with Section 2(a)(2) of the Order. This applies to all proposed actions located within or impacting the floodplain, including proposed actions whose impacts are not significant enough or are not otherwise required to complete an EIS.

### STEP 8—IMPLEMENT ACTION

With the conclusion of the decision-making process described in Steps 1-7, the proposed action can be implemented. However, there is a continuing responsibility for insuring that the action is carried out in compliance with the Order. This is especially important for projects with long-term operation, maintenance and repair programs such as

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reservoirs or waste treatment facilities.

### APPENDIX A—FLOODPLAIN SERVICES AVAILABLE FROM LISTED AGENCIES

#### DEPARTMENT OF AGRICULTURE Soil Conservation Service (SCS)

As part of the SCS's Floodplain Management Assistance Program each State Conservationist carries out cooperative Flood Hazard Analyses upon request of local governments, in accordance with a Joint Coordination Agreement with the responsible State agency. SCS flood hazard reports contain floodplain delineations on aerial photomaps, flood profiles, and discharge and floodway data. In addition, SCS provides continuing technical assistance to local governments, after completion of a flood hazard or insurance study, to help them implement their local floodplain management program. Each SCS State Office has additional flood elevation and related floodplain data on file from Watershed Project and Resource and Conservation Development Project investigations, River Basins Surveys, and detailed soil surveys. If the State or field office address is not known contact: Chief, Floodplain Management and Special Projects Branch, River Basins Division, SCS: P.O. Box 2890, Washington, D.C. 20013. Telephone 202-447-7697.

#### DEPARTMENT OF THE ARMY Corps of Engineers

The Corps' separately funded Flood Plain Management Services Program has units in 47 District and Division offices located throughout the country which provide information and assistance in flood-related matters. They maintain a file of floodplain information, survey, and other reports containing floodplain delineations, flood profiles, and data

on flood discharges and hydrographs. Each office provides: (1) interpretations as to flood depths, velocities and durations from existing data; (2) develops new data through field and hydrologic studies for interpretation; and (3) provides guidance on adjustments to minimize the adverse effects of floods and floodplain development. If the nearest District office address is not known, contact Chief, Flood Plain Management Services (FPMS), U.S. Army Corps of Engineers, HQDA (DAEN-CWP-F), Washington, D.C. 20314, telephone 202/693-1691, or the nearest Division office.

North Atlantic Division, New York, NY, 212-264-7483  
South Atlantic Division, Atlantic, GA, 404-221-6702  
Southwestern Division, Dallas, TX, 214-767-2310  
South Pacific Division, San Francisco, CA, 415-556-5660  
Lower Mississippi Valley Division, Vicksburg, MS, 601-636-1311 Ext. 385  
Missouri River Division, Omaha, NB, 402-221-7270  
North Central Division, Chicago, IL, 312-353-6531  
Ohio River Division, Cincinnati, OH, 513-684-3012  
North Pacific Division, Portland, OR, 503-221-3823  
New England Division, Waltham, MA, 617-894-2400 Ext. 545  
Pacific Ocean Division, APO San Francisco, 808-438-2883

#### DEPARTMENT OF COMMERCE NOAA-National Weather Service

Floodplain information and interpretative assistance for specific points on larger rivers of the United States can be obtained from the National Weather Service. Information available consists of the flood stage for selected communities (the stage above which flood damage occurs), and historical flood information for that location. An annual publication entitled *River Forecasts Provided by the National Weather Service*, lists

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the points for which data are compiled and includes that flood stage at each point and the current year's maximum stage as well as the maximum state of record. This publication is for sale by the National Climatic Center of NOAA, Asheville, North Carolina 28801. The National Weather Service provides flood forecasts and warnings on larger rivers and provides flash flood warnings on smaller streams. Interested communities are assisted in establishing Flash Flood Warnings Systems.

For information and assistance contact the following National Weather Service Regional Offices:

Eastern Region, Garden City, NY, 212-995-8639  
Southern Region, Ft. Worth, TX, 817-334-2674  
Central Region, Kansas City, MO, 816-374-3229  
Western Region, Salt Lake City, UT, 801-524-5137  
Alaskan Region, Anchorage, AK, 907-265-4716  
Pacific Region, Honolulu, HA, 808-546-5680

Storm surge frequency information and interpretative assistance are available for the Gulf of Mexico and Atlantic coasts. Studies have been completed for the Gulf of Mexico coast from the Alabama-Florida border to southern Florida; and along the Atlantic coast from southern Florida to Cape Henlopen, the southern boundary of Delaware Bay. The National Weather Service also provides warnings of storm surges associated with tropical and extratropical storms. For storm surge frequency information and interpretative assistance contact: Chief, Water Management Information, NWS Office of Hydrology (W21), 8060-13th Street, Silver Spring, MD 20910. Telephone: 301-427-7543.

## DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

### Federal Housing Administration

The civil engineer at the 78 local or regional offices has specific knowledge of flood elevations for many urban locations and can provide knowledge of material available to assist in making a determination of floodplain location. The location of the nearest office may be obtained from one of HUD's 10 regional offices or by contacting: Federal Housing Administration, 451 7th Street SW., Washington, D.C. 20410. Telephone: 202-755-5111.

### Federal Insurance Administration

Request for insurance maps or studies should be addressed as follows:

(1) *FIA Mailing List.* Copies of new or revised FHBMs, FIRMs and FIS reports are distributed upon publication to organizations on the FIA mailing list. In requesting to be added to the mailing list, the agency should specify the number and distribution of maps required (for example, two copies of each map for Maine and New Hampshire communities to Boston regional office). Mailing list inquiries should be sent to:

Engineering Division, Federal Insurance Administration, Room 5150, HUD Building, 451 7th Street, SW., Washington, D.C. 20514, Telephone: 202-755-7510.

(2) *Requests for a Single Map.* Request(s) for a previously published FHBM or FIRM may be made by calling FIA's toll free number 800-424-8872 from outside of the Washington, D.C. area, or 755-9096 from within the Washington, D.C. area.

(3) *Flood Insurance Study Reports.* These detailed engineering reports are distributed to those on the mailing list when a FIRM is initially pub-

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llshed. However, because there has not been a recurring demand for this information, FIA does not have a system for supplying copies to interested organizations at a later date. Copies are available at: (1) FIA's Engineering Division (address above); (2) FIA Regional Offices (see list below) and (3) Chief Executive Officer of the local community within which the action is proposed to be carried out.

Region I—Boston, 617-223-2616

Region II—New York City, 212-264-4734

Region III—Philadelphia, 215-597-9581

Region IV—Atlanta, 404-257-2391

Region V—Chicago, 312-353-0757

Region VI—Dallas, 214-749-7412

Region VII—Kansas City, 816-374-2161

Region VIII—Denver, 303-837-5041

Region IX—San Francisco, 415-556-3543

Region X—Seattle, 206-442-1026

Requests for floodplain management services, and a list of experienced consulting engineers may be obtained from the Director, Floodplain Management Division, Federal Insurance Administration 451 7th Street, S.W., Washington, D.C. 20410. Telephone 202-426-1891.

### DEPARTMENT OF THE INTERIOR

#### Geological Survey

User Assistance Centers at 48 locations can provide (a) factual information on flood peaks and discharges, flood depths, and velocities, profiles of the water surface during major floods, areas inundated during major floods, time-of-travel of flood wave, and sediment transport data; (b) interpretive information regarding flood-frequency relations, estimates of 10-, 50-, 100-, and 500 years flood discharges, computed water surface profiles, and flood-prone areas delineated on topographic maps, in most communities in the United States, with known flood problems; and (c) assistance in minimizing flood losses by quickly identifying areas of potential flood haz-

ards. If the User Assistance Center address is not known, contact: Chief, Surface Water Branch, Water Resources Division, U.S. Geological Survey, National Center, Reston, VA. 22092. Telephone: 703-860-6837.

#### Bureau of Land Management

The Bureau of Land Management (BLM) has District Offices located in the 11 Western States and Alaska involved in land use planning for public lands. Floodplain protection and flood prevention is a significant element in the BLM planning system, and each District Office maintains a file of existing floodplain maps which are available for public inspection. If the location of the District Office is not known, contact: Bureau of Land Management, U.S. Department of the Interior, 18th & C Streets, NW., Washington, D.C. 20240. Telephone: 202-343-5717.

#### Bureau of Reclamation

The flood hydrologist at the seven regional offices has knowledge of flooding and flood elevation for related locations associated with Bureau projects and can provide interpretive assistance for existing data.

For information contact one of the seven regional or nearby project offices or the Flood Hydrology Section, U.S. Bureau of Reclamation, P.O. Box 25007, Denver Federal Center, Denver, CO. 80225. Telephone: 303-234-2035.

#### Fish and Wildlife Service

The Fish and Wildlife Service provides expertise on questions relating to fish, wildlife, and habitat resource, preservation, and maintenance. It functions through six regional, area and field offices. For information contact any of these offices, or the Fish and Wildlife Service, U.S. Department of the Interior, 18th and C Streets NW., Washing-

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ton, D.C. 20240. Telephone: 202-343-5715.

### TENNESSEE VALLEY AUTHORITY

Activities in water resources are confined to portions of the seven States in the Tennessee Valley Watershed. Since 1953, TVA has conducted a program of floodplain management assistance to local governments. Reports have been published for more than 130 communities, and have provided profiles and flood data to at least 70 others. Detailed information in files pertains to large floods which have occurred in the Valley since the 1930's, and in less detail, dating back to the large flood of 1867. TVA's Flood Plain Management Services Staff provides technical assistance to help those who propose developments in floodplains to use the floodplain wisely. Contact: Flood Plain Management Services, 100 Liberty Building, Tennessee Valley Authority, Knoxville, TN. 37902. Telephone: 615-632-4451.

### DELAWARE RIVER BASIN COMMISSION

The Commission maintains a file of floodplain information, delineation and flood data studies prepared by the Commission, Federal agencies and others. Where data exist, assistance with interpretation will be provided. Contact: Head, Branch of Operations, Delaware River Basin Commission, P.O. Box 7360, West Trenton, N.J. 08628. Telephone: 609-883-9500.

### SUSQUEHANNA RIVER BASIN COMMISSION

The Commission maintains a file of detailed hydrologic and hydraulic information for 245 basin communities studied under the National Flood Insurance Program for HUD. Limited additional hydrological data for other areas also is available. The Commission can provide general in-

formation and guidance on floodplain management measures. Contact: Chief, Planning and Operations, Susquehanna River Basin Commission, 1721 North Front Street, Harrisburg, PA. 17102. Telephone: 717-238-0425.

### STATES

Many (but not all) States have active floodplain management programs. They have on file or access to most floodplain information generated by Federal and State agencies, regional organizations, special districts and private consultants. State agencies are usually staffed and funded to: (1) coordinate floodplain management activities; (2) develop minimum standards for floodplain regulations; (3) assist local units of government (counties, cities, etc.) in developing floodplain management programs; and (4) interpret available floodplain information. For most States, the appropriate contact is the Department of Natural Resources or the Water Resources Division. At the substate level, regional agencies such as conservancy districts and multi-county planning agencies may be a source of floodplain data and interpretation.

### APPENDIX B—RELATED PROGRAMS AND REFERENCES Publications

Useful information on many of the subjects discussed in this document is found in the following publications, which describe programs and studies related to the objectives of Executive Order 11988:

"A Unified National Program for Managing Flood Losses," *House Document 465*, 89th Congress, 2nd Session. A report by the Task Force on Federal Flood Control Policy, August, 1966.

*Rules and Regulations of the National Flood Insurance Program.* 41-

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FR 207, Oct. 26, 1976, at CFR 1909, et seq. Copies of the rules and regulations can be obtained from the U.S. Department of Housing and Urban Development, Federal Insurance Administration, Washington, D.C. 20410.

*Regulation of Flood Hazard Areas to Reduce Flood Losses.* A 2-volume work published by the Water Resources Council in 1971-1972. It contains legal aspects of and draft legislation for riverine and coastal floodplain regulation programs of states and local governments.

*Flood proofing Regulations.* U.S. Army Corps of Engineers, June, 1972 (EP1165-2-314).

*A Unified National Program for Flood Plain Management.* U.S. Water Resources Council. July, 1976.

*A Perspective on Flood Plain Regulations for Flood Plain Management.* U.S. Army Corps of Engineers, June, 1976 (EP1165-2-304).

*Elevated Residential Structures,* HUD, Federal Insurance Administration. September, 1976.

### Relevant Legislative Authority and Statement of Congressional Purpose for Minimizing Floodplain Encroachment

There is a large body of Federal legislation relevant to preservation or restoration of floodplains. Some of the major items of legislation are listed below.

#### *Title and Lead Agency*

Water Resources Planning Act (42 USC 1962), WRC  
Watershed Protection and Flood Prevention Act (16 USC 1001), SCS  
River and Harbor Act of 1899 (33 USC 001), COE  
Flood Control Act of 1944 (16 USC 460d, et al.), COE  
Flood Disaster Protection Act of 1973 (42 USC 4001),

Federal Water Pollution Control Act Amendments of 1972 (33 USC 1251), EPA  
Coastal Zone Management Act (16 USC 1451), OCZM  
Surface Mining Control and Reclamation Act of 1977, OSM  
"1890 Organic Act" of the National Weather Service (15 USC 311) NOAA  
National Environmental Policy Act (42 USC 4321), CEQ  
Wild and Scenic Rivers Act (16 USC 1271), NPS  
National Trail Systems Act (16 USC 1241), NPS  
Fish and Wildlife Coordination Act (16 USC 661) Fish and Wildlife Restoration Projects (16 USC 777 and 669), FWS  
Endangered Species Act (16 USC 1531), FWS  
The Wilderness Act (16 USC 1131), Various agencies  
Land and Water Conservation Fund Act (16 USC 4601), HCRS  
Antiquities Act of 1906 (16 USC 431), HCRS  
Archeological and Historic Preservation Act of 1974 (16 USC 469), HCRS

Agencies should consider reviewing this body of legislation, act by act, in light of the Order to uncover opportunities within their existing programs for protecting the natural and beneficial floodplain values under the powers of these acts as well as to uncover problem areas in meeting mandates (lack of guidance, ceiling, budgets, etc.)

### APPENDIX C—E.O.11988, FLOODPLAIN MANAGEMENT

Statement by the President  
Accompanying E.O. 11988. May 24, 1977

The floodplains which adjoin the Nation's inland and coastal waters have long been recognized as having special values to our citizens. They have provided us with wildlife habitat, agricultural and forest products, stable ecosystems, and park and recreation areas. However, unwise use and development of our riverine, coastal, and other floodplains not only destroy many of the special

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qualities of these areas but pose a severe threat to human life, health, and property.

Since the adoption of a national flood control policy in 1936, the Federal Government has invested about \$10 billion in flood protection works. Despite substantial efforts by the Federal Government to reduce flood hazards and protect floodplains, annual losses from floods and adverse alteration of floodplains continue to increase.

The problem arises mainly from unwise land use practices. The Federal Government can be responsible for or can influence these practices in the construction of projects, in the management of its own properties, in the provision of financial or technical assistance including support of financial institutions, and in the uses for which its agencies issue licenses or permits. In addition to minimizing the danger to human and nonhuman communities living in floodplains, active floodplain management represents sound business practice by reducing the risk of flood damage to properties benefiting from Federal assistance.

Because unwise floodplain development can lead to the loss of human and other natural resources, it is simply a bad Federal investment and should be avoided. In order to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative, I have issued an Executive order on floodplain management.

### E.O. 11988—Floodplain Management

By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in furtherance of

the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*), the National Flood Insurance Act of 1968, as amended (42 U.S.C. 4001 *et seq.*), and the Flood Disaster Protection Act of 1973 (Public Law 93-234, 87 Stat. 975), in order to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative, it is hereby ordered as follows:

SECTION 1. Each agency shall provide leadership and shall take action to reduce the risk of flood loss to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

SEC. 2. In carrying out the activities described in Section 1 of this Order, each agency has a responsibility to evaluate the potential effects of any actions it may take in a floodplain; to ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management; and to prescribe procedures to implement the policies and requirements of this Order, as follows:

(a) (1) Before taking an action, each agency shall determine whether the proposed action will occur in a floodplain—for major Federal actions significantly affecting the quality of the human environment, the evaluation required below will be included in any statement prepared

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under Section 102(2)(C) of the National Environmental Policy Act. This determination shall be made according to a Department of Housing and Urban Development (HUD) floodplain map or a more detailed map of an area, if available. If such maps are not available, the agency shall make a determination of the location of the floodplain based on the best available information. The Water Resources Council shall issue guidance on this information not later than October 1, 1977.

(2) If an agency has determined to, or proposes to, conduct, support, or allow an action to be located in a floodplain, the agency shall consider alternatives to avoid adverse effects and incompatible development in the floodplain. If the head of the agency finds that the only practicable alternative consistent with the law and with the policy set forth in this Order requires siting in a floodplain, the agency shall, prior to taking action, (i) design or modify its action in order to minimize potential harm to or within the floodplain, consistent with regulations issued in accord with Section 2(d) of this Order, and (ii) prepare and circulate a notice containing an explanation of why the action is proposed to be located in the floodplain.

(3) For programs subject to the Office of Management and Budget Circular A-95, the agency shall send the notice, not to exceed three pages in length including a location map, to the state and areawide A-95 clearinghouses for the geographic areas affected. The notice shall include: (i) the reasons why the action is proposed to be located in a floodplain; (ii) a statement indicating whether the action conforms to applicable state or local floodplain protection standards and (iii) a list of the alternatives considered. Agencies shall endeavor to allow a brief comment period prior to taking any action.

(4) Each agency shall also provide opportunity for early public review of any plans or proposals for actions in floodplains, in accordance with Section 2(b) of Executive Order No. 11514, as amended, including the development of procedures to accomplish this objective for Federal actions whose impact is not significant enough to require the preparation of an environmental impact statement under Section 102(2)(C) of the National Environmental Policy Act of 1969, as amended.

(b) Any requests for new authorizations or appropriations transmitted to the Office of Management and Budget shall indicate, if an action to be proposed will be located in a floodplain, whether the proposed action is in accord with this Order.

(c) Each agency shall take floodplain management into account when formulating or evaluating any water and land use plans and shall require land and water resources use appropriate to the degree of hazard involved. Agencies shall include adequate provision for the evaluation and consideration of flood hazards in the regulations and operating procedures for the licenses, permits, loans or grants-in-aid programs that they administer. Agencies shall also encourage and provide appropriate guidance to applicants to evaluate the effects of their proposals in floodplains prior to submitting applications for Federal licenses, permits, loans or grants.

(d) As allowed by law, each agency shall issue or amend existing regulations and procedures within one year to comply with this Order. These procedures shall incorporate the Unified National Program for Floodplain Management of the Water Resources Council, and shall explain the means that the agency will employ to pursue the nonhazardous use of riverine, coastal and other floodplains in connection with the

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activities under its authority. To the extent possible, existing processes, such as those of the Council on Environmental Quality and the Water Resources Council, shall be utilized to fulfill the requirements of this Order. Agencies shall prepare their procedures in consultation with the Water Resources Council, the Federal Insurance Administration, and the Council on Environmental Quality, and shall update such procedures as necessary.

SEC. 3. In addition to the requirements of Section 2, agencies with responsibilities for Federal real property and facilities shall take the following measures:

(a) The regulations and procedures established under Section 2(d) of this Order shall, at a minimum, require the construction of Federal structures and facilities to be in accordance with the standards and criteria and to be consistent with the intent of those promulgated under the National Flood Insurance Program. They shall deviate only to the extent that the standards of the Flood Insurance Program are demonstrably inappropriate for a given type of structure or facility.

(b) If, after compliance with the requirements of this Order, new construction of structures or facilities are to be located in a floodplain, accepted floodproofing and other flood protection measures shall be applied to new construction or rehabilitation. To achieve flood protection, agencies shall, wherever practicable, elevate structures above the base flood level rather than filling in land.

(c) If property used by the general public has suffered flood damage or is located in an identified flood hazard area, the responsible agency shall provide on structures, and other places where appropriate, conspicuous delineation of past and probable flood height in order to en-

hance public awareness of and knowledge about flood hazards.

(d) When property in floodplains is proposed for lease, easement, right-of-way, or disposal to non-Federal public or private parties, the Federal agency shall (1) reference in the conveyance those uses that are restricted under identified Federal, State, or local floodplain regulations; and (2) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successors, except where prohibited by law; or (3) withhold such properties from conveyance.

SEC. 4. In addition to any responsibilities under this Order and Sections 202 and 205 of the Flood Disaster Protection Act of 1973, as amended (42 U.S.C. 4106 and 4128), agencies which guarantee, approve, regulate, or insure any financial transaction which is related to an area located in a floodplain shall, prior to completing action on such transaction, inform any private parties participating in the transaction of the hazards of locating structures in the floodplain.

SEC. 5. The head of each agency shall submit a report to the Council on Environmental Quality and to the Water Resources Council on June 30, 1978, regarding the status of their procedures and the impact of this Order on the agency's operations. Thereafter, the Water Resources Council shall periodically evaluate agency procedures and their effectiveness.

SEC. 6. As used in this Order:

(a) The term "agency" shall have the same meaning as the term "Executive agency" in Section 105 of Title 5 of the United States Code and shall include the military departments; the directives contained in this Order, however, are meant to apply only to those agencies which perform the activities described in Section 1 which are located in or affecting floodplains.

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(b) The term "base flood" shall mean that flood which has a one percent or greater chance of occurrence in any given year.

(c) The term "floodplain" shall mean the lowland and relatively flat areas adjoining inland and coastal waters including floodprone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

Sec. 7. Executive Order No. 11296 of August 10, 1968, is hereby revoked. All actions, procedures, and issuances taken under that Order and still in effect shall remain in effect until modified by appropriate authority under the terms of this Order.

Sec. 8. Nothing in this Order shall apply to assistance provided for emergency work essential to save lives and protect property and public health and safety, performed pursuant to Sections 305 and 306 of the Disaster Relief Act of 1974 (88 Stat. 148, 42 U.S.C. 5145 and 5146).

Sec. 9. To the extent the provisions of Section 2(a) of this Order are applicable to projects covered by Section 104(h) of the Housing and Community Development Act of 1974, as amended (88 Stat. 640, 42 U.S.C. 5304(h)), the responsibilities under those provisions may be assumed by the appropriate applicant, if the applicant has also assumed, with respect to such projects, all of the responsibilities for environmental review, decisionmaking, and action pursuant to the National Environmental Policy Act of 1969, as amended.

JIMMY CARTER.

The White House,  
May 24, 1977.

### APPENDIX D—E.O. 11990 PROTECTION OF WETLANDS Statement by the President Accompanying E.O. 11990

The Nation's coastal and inland wetlands are vital natural resources of critical importance to the people of this country. Wetlands are areas of great natural productivity, hydrological utility, and environmental diversity, providing natural flood control, improved water quality, recharge of aquifers, flow stabilization of streams and rivers, and habitat for fish and wildlife resources. Wetlands contribute to the production of agricultural products and timber, and provide recreational, scientific, and aesthetic resources of national interest.

The unwise use and development of wetlands will destroy many of their special qualities and important natural functions. Recent estimates indicate that the United States has already lost over 40 percent of our 120 million acres of wetlands inventoried in the 1950's. This piecemeal alteration and destruction of wetlands through draining, dredging, filling, and other means has had an adverse cumulative impact on our natural resources and on the quality of human life.

The problem of loss of wetlands arises mainly from unwise land use practices. The Federal Government can be responsible for or can influence these practices in the construction of projects, in the management of its own properties, and in the provisions of financial or technical assistance.

In order to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative, I have issued an Executive order on the protection of wetlands.

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### Executive Order 11990—Protection of Wetlands

By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*), in order to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative, it is hereby ordered as follows:

SECTION 1. (a) Each agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; and (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

(b) This Order does not apply to the issuance by Federal agencies of permits, licenses, or allocations to private parties for activities involving wetlands on non-Federal property.

SEC. 2. (a) In furtherance of Section 101(b)(3) of the National Environmental Policy Act of 1969 (42 U.S.C. 4331(b)(3)) to improve and coordinate Federal plans, functions, programs and resources to the end that the Nation may attain the widest range of beneficial uses of the environment without degradation and risk to health or safety, each agency, to the extent permitted by

law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use. In making this finding the head of the agency may take into account economic, environmental and other pertinent factors.

(b) Each agency shall also provide opportunity for early public review of any plans or proposals for new construction in wetlands, in accordance with Section 2(b) of Executive Order No. 11514, as amended, including the development of procedures to accomplish this objective for Federal actions whose impact is not significant enough to require the preparation of an environmental impact statement under Section 102(2)(C) of the National Environmental Policy Act of 1969, as amended.

SEC. 3. Any requests for new authorizations or appropriations transmitted to the Office of Management and Budget shall indicate, if an action to be proposed will be located in wetlands, whether the proposed action is in accord with this Order.

SEC. 4. When Federally-owned wetlands or portions of wetlands are proposed for lease, easement, right-of-way or disposal to non-Federal public or private parties, the Federal agency shall (a) reference in the conveyance those uses that are restricted under identified Federal, State or local wetlands regulations; and (b) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successor, except where prohibited by law; or (c) withhold such properties from disposal.

SEC. 5. In carrying out the activities described in Section 1 of this Order, each agency shall consider factors relevant to a proposal's

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effect on the survival and quality of the wetlands. Among these factors are:

(a) public health, safety, and welfare, including water supply, quality, recharge and discharge; pollution; flood and storm hazards; and sediment and erosion;

(b) maintenance of natural systems, including conservation and long term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources; and

(c) other uses of wetlands in the public interest, including recreational, scientific, and cultural uses.

SEC. 6. As allowed by law, agencies shall issue or amend their existing procedures in order to comply with this Order. To the extent possible, existing processes, such as those of the Council on Environmental Quality and the Water Resources Council, shall be utilized to fulfill the requirements of this Order.

SEC. 7. As used in this Order;

(a) The term "agency" shall have the same meaning as the term "Executive agency" in Section 105 of Title 5 of the United States Code and shall include the military departments; the directives contained in this Order, however, are meant to apply only to those agencies which perform the activities described in Section 1 which are located in or affecting wetlands.

(b) The term "new construction" shall include draining, dredging, channelizing, filling, diking, impounding, and related activities and any structures or facilities begun or authorized after the effective date of this Order.

(c) The term "wetlands" means those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires

saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

SEC. 8. This Order does not apply to projects presently under construction, or to projects for which all of the funds have been appropriated through Fiscal Year 1977, or to projects and programs for which a draft or final environmental impact statement will be filed prior to October 1, 1977. The provisions of Section 2 of this Order shall be implemented by each agency not later than October 1, 1977.

SEC. 9. Nothing in this Order shall apply to assistance provided for emergency work, essential to save lives and protect property and public health and safety, performed pursuant to Sections 305 and 306 of the Disaster Relief Act of 1974 (88 Stat. 148, 42 U.S.C. 5145 and 5146).

SEC. 10. To the extent the provisions of Sections 2 and 5 of this Order are applicable to projects covered by Section 104(h) of the Housing and Community Development Act of 1974, as amended (88 Stat. 640, 42 U.S.C. 5304(h)), the responsibilities under those provisions may be assumed by the appropriate applicant, if the applicant has also assumed, with respect to such projects, all of the responsibilities for environmental review, decisionmaking, and action pursuant to the National Environmental Policy Act of 1969, as amended.

JIMMY CARTER

The White House,  
May 24, 1977.

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### APPENDIX E—E.O. 11514 PROTECTION AND ENHANCEMENT OF ENVIRONMENTAL QUALITY

Excerpts From E.O. 11514 (March 5, 1970), as Amended by E.O. 11991 (May 24, 1977), Secs. 2(g) and 3(h)

By virtue of the authority vested in me as President of the United States and in furtherance of the purpose and policy of the National Environmental Policy Act of 1969 (Public Law No. 91-190, approved January 1, 1970), it is ordered as follows:

Section 1. *Policy.* The Federal Government shall provide leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life. Federal agencies shall initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals. The Council on Environmental Quality, through the Chairman, shall advise and assist the President in leading this national effort.

Sec. 2. *Responsibilities of Federal agencies.* Consonant with Title I of the National Environmental Policy Act of 1969, hereafter referred to as the "Act", the heads of Federal agencies shall:

(a) Monitor, evaluate, and control on a continuing basis their agencies' activities so as to protect and enhance the quality of the environment. Such activities shall include those directed to controlling pollution and enhancing the environment and those designed to accomplish other program objectives which may affect the quality of the environment. Agencies shall develop programs and measures to protect and enhance environmental quality and shall assess progress in meeting the specific objectives of such activities. Heads of agencies shall consult with appropriate Federal, State and local agencies in carrying out their activities as they affect the quality of the environment.

(b) Develop procedures to ensure the fullest practicable provision of timely public information and understanding of Federal plans and programs with environmental impact in order to obtain the views of interested parties. These procedures shall include, whenever appropriate, provision for public hearings, and shall provide the public with relevant information, including information on alternative courses of action. Federal agencies shall also encourage State and local agencies to adopt similar procedures informing the public concerning their activities affecting the quality of the environment.

(c) Insure that information regarding existing or potential environmental problems and control methods developed as part of research, development, demonstration, test, or evaluation activities is made available to Federal agencies, States, counties, municipalities, institutions, and other entities, as appropriate.

(d) Review their agencies' statutory authority, administrative regulations, policies, and procedures, including those relating to loans, grants, contracts, leases, licenses, or permits, in order to identify any deficiencies or inconsistencies therein which prohibit or limit full compliance with the purposes and provisions of the Act. A report on this review and the corrective actions taken or planned, including such measures to be proposed to the President as may be necessary to bring their authority and policies into conformance with the intent, purposes, and procedures of the Act, shall be provided to the Council on Environmental Quality not later than September 1, 1970.

(e) Engage in exchange of data and research results, and cooperate with agencies of other governments to foster the purpose of the Act.

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(f) Proceed, in coordination with other agencies, with actions required by section 102 of the Act.

(g) In carrying out their responsibilities under the Act and this Order, comply with the regulations issued by the Council except where such compliance would be inconsistent with statutory requirements.

**Sec. 3. Responsibilities of Council on Environmental Quality.** The Council on Environmental Quality shall:

(a) Evaluate existing and proposed policies and activities of the Federal Government directed to the control of pollution and the enhancement of the environment and to the accomplishment of other objectives which affect the quality of the environment. This shall include continuing review of procedures employed in the development and enforcement of Federal standards affecting environmental quality. Based upon such evaluations the Council shall, where appropriate, recommend to the President policies and programs to achieve more effective protection and enhancement of environmental quality and shall, where appropriate, seek resolution of significant environmental issues.

(b) Recommend to the President and to the agencies priorities among programs designed for the control of pollution and for enhancement of the environment.

(c) Determine the need for new policies and programs for dealing with environmental problems not being adequately addressed.

(d) Conduct, as it determines to be appropriate, public hearings or conferences on issues of environmental significance.

(e) Promote the development and use of indices and monitoring systems (1) to assess environmental conditions and trends, (2) to predict the environmental impact of proposed public and private actions, and (3) to determine the effectiveness of

programs for protecting and enhancing environmental quality.

(f) Coordinate Federal programs related to environmental quality.

(g) Advise and assist the President and the agencies in achieving international cooperation for dealing with environmental problems, under the foreign policy guidance of the Secretary of State.

(h) Issue regulations to Federal agencies for the implementation of the procedural provisions of the Act (42 U.S.C. 4332(2)). Such regulations shall be developed after consultation with affected agencies and after such public hearings as may be appropriate. They will be designed to make the environmental impact statement process more useful to decisionmakers and the public; and to reduce paperwork and the accumulation of extraneous background data, in order to emphasize the need to focus on real environmental issues and alternatives. They will require impact statements to be concise, clear, and to the point, and supported by evidence that agencies have made the necessary environmental analyses. The Council shall include in its regulations procedures (1) for the early preparation of environmental impact statements, and (2) for the referral to the Council of conflicts between agencies concerning the implementation of the Nation Environmental Policy Act of 1969, as amended, and Section 309 of the Clean Air Act, as amended, for the Council's recommendation as to their prompt resolution.

(i) Issue such other instructions to agencies, and request such reports and other information from them, as may be required to carry out the Council's responsibilities under the Act.

(j) Assist the President in preparing the annual Environmental Quality Report provided for in section 201 of the Act.

(k) Foster investigations, studies,

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surveys, research, and analyses relating to (i) ecological systems and environmental quality, (ii) the impact of new and changing technologies

thereon, and (iii) means of preventing or reducing adverse effects from such technologies.

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For Further Information Contact:  
U.S. Water Resources Council  
2120 L Street, N.W.  
Washington, D.C. 20037  
(202) 254-6352

