

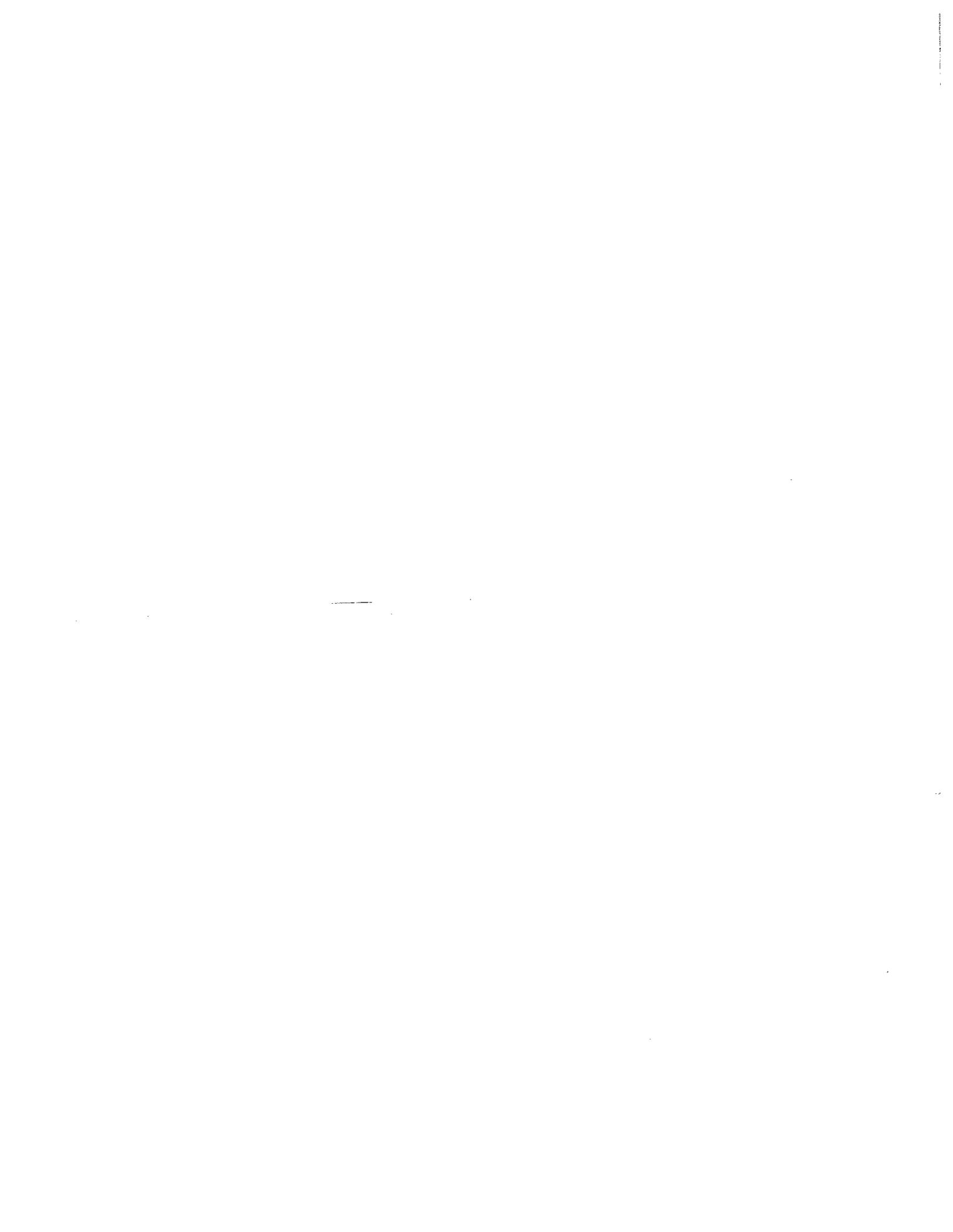
Revised Flood Plain Management Regulations of the  
National Flood Insurance Program

Final Environmental Impact Statement

SEPTEMBER 1976

Prepared by:

Office of Flood Insurance  
Federal Insurance Administration  
U. S. Department of Housing and Urban Development  
451 7th Street, S. W.  
Washington, D. C. 20410



U. S. H.U.D., FEDERAL INSURANCE ADMINISTRATION  
FINAL ENVIRONMENTAL IMPACT STATEMENT  
REVISED FLOOD PLAIN MANAGEMENT REGULATIONS

Summary Sheet

- I. Draft ( ) FINAL ( x )
- II. FEDERAL INSURANCE ADMINISTRATION
- III. ADMINISTRATIVE ( x ) LEGISLATIVE ( )
- IV. Brief Description of Action

Proposed for promulgation are revisions to the regulations of the National Flood Insurance Program that deal specifically with flood plain management requirements. All areas of the country would be affected; approximately 24,000 local jurisdictions are partially flood-prone. The revised regulations, upon which this statement is based, are to be found as Appendix A to this statement.

V. Summary of Environmental Impact

The regulations provide for the reduction or avoidance of adverse impacts caused by unwise development of the Nation's flood plains upon the natural, man-made and social environments.

Implementation of the regulations will benefit water quality, wildlife and fisheries, riparian vegetation, wetlands and aesthetic values. Society will benefit from a more equitable allocation of flood hazard mitigation costs and from the reduction of flood disaster assistance and recovery outlays. The protection afforded by the Program's performance standards and the availability of flood insurance within

communities implementing the Program regulations will benefit property owners in flood hazard areas, as well as the community itself.

Implementation of the regulations will result in some adverse impacts.

Administrative costs will be incurred by the taxpayer through implementation of the Program at the Federal, State, and community levels, and opportunity costs will be experienced by communities and all categories of public and private property owners associated with flood hazard areas. The property owner will also incur a cost in purchasing insurance and in elevating or floodproofing new construction in accordance with the required performance standards. To the extent that fill is used to elevate structures in flood hazard areas in compliance with the required performance standards, wetlands may be negatively impacted, and valley storage capacity reduced.

## VI. List of Alternatives Considered

### A. Implementation of the National Flood Insurance Program

1. No Action.
2. More stringent regulatory standards, less stringent regulatory standards, or maintain current standards.
3. Modifications in the implementation of the Program.
4. Prohibition of all development in flood hazard areas.

### B. Other adjustments to the flood hazard

1. Modify the flood event.
2. Modify human use of flood hazard areas.
3. Modify the loss burden.

VII. Sources from which written comments were requested

The draft environmental statement and proposed regulations were sent to numerous Federal, State and local agencies, private organizations, and individuals. Subsequent to their distribution, over 500 written responses ranging from one paragraph to over 100 pages were received on the proposed regulations, while over 50 were received on the draft environmental statement. Additionally, during June and July of 1975, public hearings on the proposed regulations were conducted in eight major cities nationwide. Presentations by individuals attending those hearings generated over 2,500 pages of testimony of which a limited amount addressed the draft environmental statement.

A discussion of the major issues identified from these comments and certain additional comments not specifically dealt with under these general headings is found in Section VI of this statement. Section VI D contains all submitted comments received which pertain specifically to the draft environmental statement.

Comments were requested from the following agencies:

Federal

- U.S. Environmental Protection Agency
- Department of the Army, Office of the Chief of Engineers
- Department of Commerce, Assistant Secretary for Science and Technology
- Department of the Interior, Office of the Secretary
- Energy Research and Development Administration
- Missouri River Basin Commission
- New England River Basin Commission
- Ohio River Basin Commission
- Tennessee Valley Authority
- National Capital Planning Commission

State

Connecticut Department of Environmental Protection  
Louisiana Wildlife and Fisheries Commission  
Maryland Department of Natural Resources  
Michigan Department of Natural Resources  
Ohio Department of Natural Resources  
Pennsylvania Department of Community Affairs  
Rhode Island Department of Administration  
Texas Water Development Board  
Utah Department of Natural Resources  
Washington Department of Ecology

Other

Houston, Texas, Chamber of Commerce  
Environmental Defense Fund

VIII. Date Draft Environmental Statement Made Available to Council on  
Environmental Quality and the Public: November 1974.

Date Final Environmental Statement Made Available to Council on  
Environmental Quality and the Public: September 1976.

Office of Flood Insurance  
Federal Insurance Administration  
Department of Housing and Urban Development  
Washington, D. C.

Final Environmental Statement  
on Flood Plain Management Regulations

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- B. A Brief History of the National Flood Insurance Program.
- C. Selective List of Reference Materials.
- D. Supportive Materials.
  - 1. Annual Report Form.
  - 2. Draft Agreement Between the Federal Insurance Administration and the Office of Coastal Zone Management in NOAA.
  - 3. Draft Understanding Reflecting the National Flood Insurance Program and EPA's Water Quality Management Program's Interests.
  - 4. Mandatory Purchase of Insurance Guidelines.
  - 5. References in Title 24 of the Code of Federal Regulations Relating to the National Flood Insurance Program.



Office of Flood Insurance  
Federal Insurance Administration  
Department of Housing and Urban Development  
Washington, D. C.

Final Environmental Statement  
On Revised Flood Plain Management Regulations  
for the National Flood Insurance Program

INTRODUCTION

The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a federally-subsidized program, initially authorized by Congress through the National Flood Insurance Act of 1968, to protect property owners who up to that time were unable to secure coverage through the private insurance industry. The Program, for the first time, made flood insurance available to individuals at affordable rates. In return for the Federal subsidy, local governments are required to adopt certain minimum flood plain management measures to reduce or avoid future flood damage to new construction within their flood-prone areas.

In December 1973, Congress passed the Flood Disaster Protection Act, (P.L. 93-234) greatly expanding the available limits of flood insurance coverage and imposing two new requirements on property owners and communities. First, after March 1, 1974, property owners in communities where flood insurance is being sold must purchase flood insurance to be eligible for any new or additional Federal or federally-related financial assistance for acquisition or construction purposes related to any buildings located

in areas identified by HUD as having special flood hazards. Second, all identified flood-prone communities must enter the program by July 1, 1975, or within one year after the hazard area has been identified, whichever date is later, in order to continue to receive Federal or federally-related financial assistance in the identified special flood hazard areas, for acquisition or construction purposes. (additional discussion of these aspects is found in Section G). A more extensive history and description of the Program is included in Appendix B.

### The Setting of the Flood Plain Management Regulations

In order to better understand the setting of the flood plain management regulations of the National Flood Insurance Program, this section deals with the role of the flood plain, and the flood occurrence; the effects of the introduction of man's influence into the flood plain, and his adjustments to the flood occurrence.

The streambed and the flood plain lands immediately adjacent to it are integral parts of every natural watercourse. The flood plain is formed from sediment deposit or removal accompanying the natural, intermittent overflow of the stream above its ordinary bed. The flood plain acts as a natural reservoir and temporary channel for the excess water.

In the economy of nature, the channel efficiently conveys the day-to-day flow and the flood plain is used only in rarer events. Coastal lands such as bars, ridges, and deltas that are formed by the coastal current occupy a position relative to the sea that flood plains do to rivers. Typically, a river uses some portion of its flood plain about once every 2 to 3 years. At

average intervals of 25, 50, or 100 years the river may inundate its entire flood plain to a considerable depth. Flood-prone lands are not restricted to broad alluvial plains. Following cloud bursts, passive, usually dry, streambeds in arid regions can be transformed into raging torrents capable of inflicting major flood damage.

In the natural setting and in the absence of man, flooding occurs; but there is no flood hazard. It is only with the introduction of human encroachment into the flood plain that a hazard is established and the problem of flood damage arises. As man-made development is introduced into the natural flood plain, it may so encroach upon the watercourse as to retard its capacity to pass flood flows. The effects on the community itself, as well as on any upstream or downstream adjacent communities, will be to increase flood crests, decrease velocities and subject additional areas to flooding. Since valley storage may be decreased, downstream communities could experience potentially higher flood levels.

Encroachment into coastal flood plains may also have damage inducing effects.

The damage or elimination of natural physical features having flood damage mitigation potential during and subsequent to the process of development increases the coastal area subject to inundation and minimizes or eliminates the protective potential of such natural barriers.

The negative impacts resulting from unregulated development of the flood plain affect the social, man-made and natural environments. The loss of lives and property as a direct result of floods is well documented and takes the form outlined in Section II A2, while inappropriate development contributes directly to a threat to and the disruption of the flood plain as a natural ecosystem.

Human use of the flood plain implicitly involves accepting flood damages or attempting to prevent or reduce them. Congressional intent, expressed in the Omnibus Flood Control Act of 1936, recognized the threat to lives and

property caused by unwise flood plain development and eliminated the choice of simply accepting flood losses. The Act directed Federal efforts toward reduction of such loss by placing emphasis on control of flood waters through the use of structural works. Since 1936, the Federal government has spent an estimated \$9 billion on flood control works. Despite this effort, annual losses from floods continue to increase largely as a result of man's failure to recognize the function of the flood plain. This tendency toward increasing losses was analyzed in the Senate Committee on Banking and Currency's Committee Report on Insurance and Other Programs of Financial Assistance to Flood Victims (1966). The study pointed out that:

"In spite of flood protection programs of the past 30 years, the average annual flood hazard is now greater than before such programs began because people have moved themselves and their property into flood-prone areas faster than flood protection works have been built. Many factors have been responsible for this development of flood-prone areas -- the general growth of population, income and wealth, among others; but it is also clear that the substantial separation of costs from benefits -- whereby the general public bears most of the costs of flood protection works while individual members primarily receive the gains -- has been a major factor encouraging such development."

Thus, it became clear that there was a need for a new approach to dealing with the flood hazard. Recognition of this need was expressed by Congress in a series of legislative efforts exemplified by the National Flood Insurance Act of 1968, the Flood Disaster Protection Act of 1973, the recent Water Resources Development Planning Acts as well as Section 406 of the Disaster Relief Amendments of 1974 and Section

73 of the Rivers and Harbors Act of 1974, etc., and in the Executive Branch by the promulgation of Executive Order 11296, August 12, 1966.

An increased understanding of the effects of our principal reliance on one flood plain management tool--the use of protective works--led the Federal government through the above-referenced legislation, to emphasize the full range of alternatives for dealing with the flood hazard, with special emphasis being given to flood plain regulation and insurance coverage for structures in flood hazard areas. The developing emphasis on a non-structural regulatory approach to flood hazard mitigation has also arisen from the Congressional intent to limit activities constituting a major capital and energy investment at a time when awareness of the scarcity of Federal resources is most acute, and to limit investments which frequently have adverse environmental impacts and initiate considerable environmental opposition.

Nevertheless, it should be noted that Congress has continued to support programs for essential flood control works where topography and land form or local land development patterns render non-structural adjustments, by themselves, ineffective, and where such controls are properly related to an overall flood plain management program. It is only in these limited circumstances, however, where the structural control alternative alone, among the complex of flood plain management tools, proves feasible, that Congress encourages the initiation of further structural control projects. Congressional intent, here, reflects the growing recognition that, generally, the aggregate of private and social benefits are greater where non-structural flood plain management tools are utilized.

Specifically, the ongoing development of a new policy expressing this intent is reflected in legislation directed toward those Federal agencies which fund, invest in, and construct water resources projects. The Water Resources Development Act of 1974 (P.L. 93-251) calls for an in-depth review of planning

principles, objectives and standards for water resources investment, of the discount rate to be used in evaluating such projects and of the opportunities for requiring more realistic cost-sharing by the beneficiaries of such investments. There is evident in such legislation an increasing emphasis on non-structural approach, such as the flood plain management regulatory approach, to flood hazard mitigation as provided under the National Flood Insurance Program.

## I. DESCRIPTION OF ACTION

The proposed action is the publication of revisions to existing regulations of the National Flood Insurance Program that relate to flood plain management in order that these regulations will better reflect experience gained in the administration of the Program and to conform to the requirements of the 1973 statutory amendments. In order to maintain coherence in the presentation of this assessment, it was not possible to deal solely with the revisions to the existing regulations. As noted in the Preamble to the revised regulations, the revision of the flood plain management Parts of the regulations required certain conforming changes in other Parts. Therefore, for the assessment to effectively deal with all appropriate impacts, it was necessary that it discuss all of the NFIP regulations which relate to flood plain management. The Preamble presents a discussion of the major revisions as well as the substantiation of the acceptance or rejection of public comments received after proposed rulemaking was published on the revised regulations on March 26, 1975. Reference to it will be helpful in identifying the major revisions. Similarly, to the degree that the flood plain management and flood insurance purchase requirements of the NFIP are interrelated, the insurance aspects of the Program received consideration in the assessment. Thus, what follows is a general description of the NFIP regulations as they will exist with the revisions incorporated and with special emphasis given to the flood plain management aspects.

The flood plain management regulations generally impose certain controls and restrictions on new development in the flood plain in order to protect residents and their property from flood damage. The combination of these controls and full actuarial insurance rates for new construction will reduce an unwarranted burden upon the majority of the Nation's taxpayers and discourage irresponsible construction in flood-prone areas.

A subsidized insurance Program with no flood plain management controls would amount to another disaster relief program which in the past has led to unwise reconstruction in the Nation's flood plains. With adequate flood plain management, however, there is hope of eventually reducing the tax burden, while at the same time providing protection at low cost to those who built in flood hazard areas without fully knowing or understanding the consequences.

The minimum requirements governing the adequacy of the flood plain management measures for flood-prone areas adopted by a community depend on the kind of hazard present in the community and the amount of technical data formally provided to the community by the Federal Insurance Administrator. (Note: In accordance with its definition in Section 1909.1 of the regulations, "community" will be used throughout the text of this assessment to include States as well as local government entities. Further, it should be noted that the standards described below were developed from the perspective of local governments, yet they apply with equal force to State governments with respect to the regulation of their flood-prone property both as a condition to the purchase of a Standard Flood Insurance Policy and to the approval by the Administrator, under Part 1925 of the revised regulations, of a State self-insurance plan. It is acknowledged that differing procedures may be applicable to a State's adoption and administration of flood plain management regulations, as contrasted with the procedures typically utilized by local governments. Additional discussion of this issue is included in the Preamble to the revised regulations (Appendix A) and reference should be made to Sections 1910.11, 1910.12, 1910.13 and Part 1925).

## A. Flood Hazard Regulation

When a community has submitted an application to participate in the NFIP, but has not yet received a Flood Hazard Boundary Map (FHBM) delineating the special flood hazard area, it is required to adopt and enforce the following general flood plain management measures which are applicable throughout its entire jurisdiction. (It should be noted that these are performance standards; the development of specific implementation criteria is left to the discretion of the community which has the best knowledge of its own flood problem and administrative resources. At all times, however, technical assistance is available from FIA and the coordinating officials designated to carry out such responsibilities by each State government. Some of the following requirements are paraphrased; therefore, the appropriate section of the regulations is noted prior to each and should be referred to in Appendix A for the specific regulatory language).

When the FHBM is not yet available, the community must meet the requirements of Section 1910.3(a) as set out below:

1. (1910.3(a)(1)). Require permits for all proposed construction or new development to determine if it lies within a flood-prone area.
2. (1910.3(a)(2)). Review such development proposals to assure that all necessary Federal or State permits have been secured (e.g., Section 404 permits under the Federal Water Pollution Control Act Amendments of 1972).
3. (1910.3(a)(3)). Review all permit applications to assure that all new construction and substantial improvements be:
  - (a) Anchored to prevent displacement or collapse.
  - (b) Constructed with materials and utility equipment which are resistant to flood damage.

(c) Constructed according to methods and practices that minimize flood damage potential.

4. (1910.3(a)(4)). Review subdivision proposals and other proposed new development to determine whether such proposals will be reasonably safe from flooding. If a subdivision proposal or other proposed new development is in a flood-prone area, any such proposal shall be reviewed to assure that:

- (a) Such proposals are consistent with the need to minimize flood damage within the flood-prone area.
- (b) New or replacement utilities are located and constructed in a manner which will minimize or eliminate flood damage.
- (c) Adequate drainage is provided to reduce exposure to flood hazards.

5. (1910.3(a)(5)). Require new or replacement water systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters.

6. (1910.3(a)(6)). Require new or replacement sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters and require that on-site waste disposal systems be located to avoid impairment of them or contamination from them during flooding.

After receiving its FHBM, the community must continue to enforce the same controls within the area defined on the map, as well as the following additional requirements set out under Section 1910.3(b):

1. 1910.3(b)(3). Require that all subdivision proposals and other proposed new developments greater than 50 lots or 5 acres, whichever is the lesser, include the determination of base flood elevation data.

2. (1910.3(b)(4)). Obtain, review and reasonably utilize base flood elevation data from alternative sources, prior to its being provided by FIA through its Flood Insurance Rate Study, as criteria for requiring that all

new residential structures and substantial improvements to existing structures have their lowest floor (including basement) elevated to or above the base flood level, and new nonresidential structures and substantial improvements to existing ones have the lowest floor (including basement) elevated or floodproofed to or above the base flood level.

3. (1910.3(b)(5)). Obtain and record the lowest floor level when a permit is issued for new construction and substantial improvements for use in the determination of applicable flood insurance risk premium rates.

4. (1910.3(b)(6)). In riverine situations, notify adjacent communities and the State Coordinating Office prior to any alteration or relocation of a watercourse and submit copies of such notifications to FIA.

5. (1910.3(b)(7)). Require that the flood carrying capacity within the altered or relocated portion of any watercourse be maintained.

6. (1910.3(b)(8)). Require that mobile homes be anchored to resist flotation, collapse or lateral movement.

7. (1910.3(b)(9)). Require that an evacuation plan for all mobile home parks and subdivisions be filed with appropriate Disaster Preparedness Authorities.

Up to this point, the community has been participating in the Emergency Flood Insurance Program and has received none of the advanced technical data (i.e., base flood data, floodway or coastal high hazard area delineation) which becomes available upon conversion to the Regular Program with the completion of the Flood Insurance Rate Study and its accompanying Flood Insurance Rate Map (FIRM). After a community converts to the Regular Program, it must meet the requirements of either Section 1910.3(c), (d) or (e), depending upon the

type of information which the study provides. If the study provides only base flood data, the community must meet 1910.3(c); if it provides a floodway delineation which is typical in riverine situations, as well as the base flood data, 1910.3(d) must be met; if it provides a coastal high hazard area delineation for coastal areas subject to wave action, 1910.3(e) must be met; and in certain circumstances where communities include both riverine (floodway) and coastal high hazard areas, 1910.3(d) and (e) must be met.

The requirements of Section 1910.3(c) include those of Section 1910.3(b), as well as the additional requirements set out below:

1. (1910.3(c)(2)). Require that all new construction and substantial improvements of residential structures have the lowest floor (including basement) elevated to or above the base flood level.
2. (1910.3(c)(3)). Require that new construction and substantial improvements of nonresidential structures have the lowest floor (including basement) elevated to or above the base flood level, or floodproofed to or above that level.
3. (1910.3(c)(4)). Require that where floodproofing is used for structures in lieu of elevation, that a registered professional engineer or architect certify that the floodproofing methods used are adequate to withstand flood depths, pressures, impact and uplift forces and other forces associated with the base flood and record such certifications; or, submit to FIA for approval local regulations containing detailed floodproofing specifications which meet the watertight performance standards.
4. (1910.3(c)(5)). Require for new mobile home parks and subdivisions, expansion to existing ones and in those where access, utilities and pads are substantially improved, that stands and lots are elevated so that the lowest

floor of the mobile home will be at or above the base flood level, that adequate surface drainage and access for haulers is provided, and that where piles or columns are used for elevation, lots are large enough to permit steps, and piling foundations are stabilized and reinforced.

5. (1910.3(c)(6)). Require that mobile homes which are not to be located in mobile home parks or subdivisions meet the requirements of 1910.3(c)(5).

6. (1910.3(c)(7)). Require that in areas subject to shallow flooding that all new construction and substantial improvements have the lowest floor (including basement) elevated above the crown of the nearest street to the height specified on the FIRM.

7. (1910.3(c)(8)). Require that nonresidential structures in areas subject to shallow flooding be either floodproofed, or meet the above requirement of 1910.3(c)(7).

8. (1910.3(c)(9)). Require, until a regulatory floodway is designated, that, prior to that designation, no new construction or other development is permitted which, when combined with all other existing and anticipated development, will increase the water surface elevation of the base flood more than one foot at any point within the community.

The requirements of Section 1910.3(d) include the requirements of Sections 1910.3(c)(1-8), as well as those set out below:

1. (1910.3(d)(2)). Select and adopt a regulatory floodway based on the principle that the area chosen for the regulatory floodway must be designed to carry the waters of the base flood, without increasing the water surface elevation of that flood more than one foot at any point.

2. (1910.3(d)(3)). Prohibit encroachment, including fill, new construction and substantial improvements, and other development within the adopted regulatory floodway that would result in any increase in flood levels

within the community during the occurrence of the base flood discharge.

3. (1910.3(d)(4)). Prohibit the placement of any mobile homes, except in an existing mobile home park or subdivision, within the adopted regulatory floodway.

The requirements of Section 1910.3(e) include those of (c) (1)-(9) for the portions of the flood hazard area outside of the coastal high hazard area as well as the additional requirements set out below which are applicable within the coastal high hazard area:

1. (1910.3(e)(2)). Obtain the elevation of the lowest habitable floor of all new or substantially improved structures, for the determination of applicable flood insurance risk premium rates, and maintain records of all such information.

2. (1910.3(e)(3)). Provide that new construction is located landward of the reach of mean high tide.

3. (1910.3(e)(4)). Provide that (i) all new construction and substantial improvements are elevated on adequately anchored piles or columns, and securely anchored to such piles or columns so that the lowest portion of the structural members of the lowest floor (excluding piles or columns) is elevated to or above the base flood level and (ii) that a professional engineer or architect certify that the structure is securely anchored to adequately anchored piles or columns in order to withstand velocity waters and hurricane wave wash.

4. (1910.3(e)(5)). Provide that all new construction and substantial improvements have the space below the lowest floor free of obstructions or be constructed with "breakaway walls" intended to collapse under stress without jeopardizing the structural support of the structure so that the impact on the structure by abnormally high tides or wind-driven water is minimized. Such temporarily enclosed space cannot be used for human habitation.

5. (1910.3(e)(6)). Prohibit the use of fill for structural support.

6. (1910.3(e)(7)). Prohibit the placement of mobile homes, except in existing mobile home parks and mobile home subdivisions.

7. (1910.3(e)(8)). Prohibit man-made alteration of sand dunes and mangrove stands which would increase potential flood damage to existing structures.

#### B. Mudflow Hazard Regulation

Until a community has received mudslide hazard information from the Federal Insurance Administration, it must require the issuance of a permit for excavation, grading, fill, or construction in the community, if it has submitted an application to participate in the National Flood Insurance Program.

Data on mudslide hazards from other Federal or State agencies may be used initially until information is provided by the Administrator. Each permit shall be reviewed to determine if the proposed site and improvements will be reasonably safe from mudslides (mudflows) based on an evaluation of soil type and quality, evidence of ground water or surface water problems, thickness and quality of any fill, the overall slope of the site, and the weight which any proposed structure will impose on the slope.

If it is determined that a mudslide hazard may exist at a proposed site, the community shall require that:

1. A further site investigation is carried out by a qualified geologist or soils engineer.

2. The proposed construction will be protected from mudslide damage.

3. The proposed construction will not aggravate the existing hazard by either creating on-site or off-site disturbances.

4. Drainage, planting, watering and maintenance be such as not to endanger slope stability.

After the special mudslide areas have been delineated, the community is required to adopt and enforce a grading ordinance which must meet the following additional requirements:

1. To regulate the location of foundation systems and utility systems of new construction and substantial improvements;
2. To regulate the location, drainage and maintenance of all excavations, cuts and fills, and planted slopes;
3. To provide special requirements for protective measures, including but not necessarily limited to retaining walls, buttress fills, sub-drains, diverter terraces, benching, etc.; and
4. To require engineering drawings and specifications to be submitted for all corrective measures, accompanied by supporting soils engineering and geology reports. (Guidance may be obtained from the provisions of the 1973 edition of the Uniform Building Code, Sections 7001 through 7006, and 7008 through 7015).

#### C. Erosion Hazard Regulation

Erosion-prone communities are required to institute a permit system as a means of reviewing proposed construction for erosion dangers. Proposed site alterations must be reasonably safe from flood-related erosion, and improvements must not cause changes in barrier beaches, sand dunes, natural drainage channels, soil infiltration capacity, or otherwise aggravate the existing erosion hazard. Additionally, if a proposed improvement is found to lie in the path of flood-related erosion, or if it is found to increase the erosion hazard, the community must require the improvement to be relocated or that adequate protective measures be taken which will not aggravate the existing erosion hazard.

When the Administrator has identified an erosion-prone area in a community, the community must, in addition, require a setback for all new development from the ocean, bay, lake, river, or other body of water to create a safety buffer consisting of a natural vegetative or contour strip. This buffer will be designated by the Administrator according to the flood-related erosion hazard and erosion rate, in conjunction with the anticipated "useful life" of structures, and depending upon the geologic, hydrologic, topographic and climatic characteristics of the community's land. The buffer may be used for suitable open space purposes, such as for agricultural, forestry, outdoor recreation, and wildlife habitat areas, and for other activities using temporary and portable structures only.

#### D. Variance and Exception Procedures

The NFIP's flood plain management requirements are not imposed arbitrarily. Variance and exception procedures have been developed along with additional procedures to ensure against their abuse. A variance is a grant of relief by a community from the terms of its flood plain management regulations. An exception is a waiver from the provisions of Part 1910 of the regulations and is granted by FIA to a community thereby relieving it from a specific rule, regulation or other determination made to or by the Administrator.

##### 1. Variances

FIA regards all of the regulation's performance standards, and especially the 100-year frequency flood standard, as essential to assure reasonable protection to future construction from flood loss. At the same time, there is recognized the need to permit variances from the application of this standard in particular cases, primarily within areas that are almost entirely developed. The abuse of administrative relief procedures has traditionally

undermined community planning efforts. Ensuring against such abuse in the administration of the NFIP is especially difficult in light of the distance between the Federal and local government levels. FIA has attempted to deal with this issue through the development of certain monitoring mechanisms (see discussion of the annual report format, Section VI B2). However, the need to assure against abuse of the variance procedure is secondary to the constraint constituted by the actuarial rating system. Since the issuance of a variance from the regulation's elevation requirement results in expensive actuarial flood insurance rates, the property owner is subject to a cost directly related to the increased risk. Over the years, the cost will likely be far in excess of the one-time cost of elevating. This likelihood cannot be over emphasized; actuarial flood insurance rates increase sharply for each foot a structure is below the 100-year flood frequency level.

FIA does not set forth absolute criteria for granting variances. The community, after examining the applicant's hardships, will approve or disapprove a request. While the granting of variances generally is limited to lot size less than one-half acre, deviations from that limitation may occur. However, as the lot size increases beyond one-half acre, the justification for a variance issuance should significantly decrease. In all circumstances, FIA may review a community's justification for granting a variance and, if the community's evidence of unusual hardship or just and sufficient cause is found wanting through a pattern of variance issuances inconsistent with the objectives of sound flood plain management, FIA may institute suspensive action. Procedures for the granting of variances by a community are as follows:

- (a) Variances shall not be issued by a community for any new construction, substantial improvement, or other development in a designated floodway which would result in any increase in flood heights within the community during the occurrence of the 100-year flood discharge.
- (b) Variances may be issued by a community, without regard to the procedures set forth in this section, for the reconstruction or restoration of structures listed on the National Register of Historic Places or a State Inventory of Historic Places.
- (c) Variances may be issued by a community, in conformance with the procedures of paragraphs (d), (e), (f), and (g) of this section, for new construction and substantial improvements to be erected on a lot of one-half acre or less in size, contiguous to and surrounded by lots with existing structures constructed below the flood protection elevation.
- (d) Variances shall not be issued by a community except upon (i) a showing of good and sufficient cause, (ii) a determination that failure to grant the variance would result in exceptional hardship to the applicant, and (iii) a determination that the variance issuance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.

- (e) Variances may only be issued upon a determination that the variance shall be the minimum necessary to afford relief.
- (f) A community must notify the applicant that the issuance of a variance to locate a structure at an elevation below the 100-year flood level will result in increased actuarial rates for flood insurance coverage and that construction below the base flood level increases the risk to life and property.
- (g) A community must (i) include, within its Annual Report submitted to the Administrator, the number of variances issued, and (ii) maintain a record of all variances granted, including justification for their issuance.

## 2. Exceptions

An exception may be granted by the Administrator to the flood plain management requirements under the following conditions:

- (a) Basements below the 100-year level may be permitted if completely floodproofed, that is, made watertight. The requirement that basements allowed on an exception basis in residential structures must be completely floodproofed is necessitated by the need to take adequate measures to protect residents in areas of known flood risk, and by the fact that the flood damage potential to the contents of that portion of the structure which is allowed below grade would be very high in the absence of such a requirement. Further, the criteria set out in FPI and 2 of the U.S. Army Corps of Engineers' floodproofing manual require that additional steps be taken beyond ensuring the prevention of the intrusion of flood waters. Steps must be taken

to counteract the bouyant effects of the additional air space below grade which would tend to lift or d'splace the structure. Practical engineering procedures and methodologies to meet these requirements exist. The cost of compliance is the crucial consideration. In many circumstances, allowance of such an exception would be unrealistic from an economic standpoint. (FIA has, however, allowed such an exception where the predominant soil type precludes the intrusion of flood waters to such a high degree as to make construction costs practical). In effect, the cost of meeting the watertight requirement provides a disincentive to such exceptions which disincentive complies with the Congressional mandate to discourage further inappropriate investment in areas of known flood hazard.

- (b) Storm cellars below the 100-year level may be built and not be flood-proofed if used solely to provide storm protection. This specific exception is based upon a community's proven need for storm cellars as a means of shelter against recorded occurrences of tornado and other severe wind storm activity. Since certain adjustments to the existence of the flood hazard have been mandated by Congress within the identified special flood hazard areas of flood-prone communities, it would be inequitable to deny adjustments to other types of natural hazards such as high winds.

If an exception is granted for storm cellars as defined in FIA's regulations:

- (i) the use must be limited to a nonhabitable one;
- (ii) no Federal flood insurance will be made available on contents of space below the 100-year level;

- (iii) all electrical, heating and other mechanical equipment must be located above the 100-year level; and
- (iv) the design of that part of the structures must not undermine the integrity of the main structure during times of flooding.

#### E. Appeals Procedures

1. Under Section 201 of the Flood Disaster Protection Act of 1973, the Administrator is required to notify all known flood-prone communities of their identification as such and to give them an opportunity either to enter the National Flood Insurance Program or to establish that they are not flood-prone. Communities are given six months to appeal the finding that an area within the community is flood-prone.

2. Under Section 110 of the Flood Disaster Protection Act of 1973, communities may appeal from the scientific and technical standards used by FIA to determine the 100-year frequency flood elevation. This appeal relates only to the sufficiency and accuracy of the methods used.

#### F. Review of Community's Implementation of the Program Requirements

A number of mechanisms are either in effect or being developed by FIA to ensure that the flood plain management requirements of the Program are conscientiously implemented within participating communities. Both FIA's central office staff in the Review and Compliance Branch of the Flood Plain Management Division as well as field staff are involved in these efforts which are briefly outlined below.

a. Annual Report - Participating communities are required annually to submit to FIA for review a status report on their flood plain management activities during each calendar year. The format for the Annual Report has recently been revised and field tested in selected communities (see Appendix D. Exhibit 1). Comments on the new and more concise format have been positive. The general format of the Annual Report includes the following points:

(i) What physical changes have occurred in the community, if any, which might alter its flood hazard area delineation and, if any have occurred, what are those changes?

(ii) What is the number of building permits granted by the community for new construction in the flood hazard area?

(iii) How many variances were granted by the community within the flood hazard area?

The purpose of these questions is two-fold:

(i) to determine if there have been sufficient physical changes within the community to warrant a restudy; and

(ii) to determine if a community has granted a disproportionate number of variances for new construction in the flood hazard area.

Where the former is the case, the need for a restudy will be evaluated; where the latter is the case, further investigation will be initiated. Such communities will be required to explain their criteria for granting variances and to justify the reasons they have granted so many. The results of this inquiry will determine the necessity for and the type of action to ensure that their flood plain management regulatory efforts reflect the need to minimize unwise development.

b. State and Regional Coordination - Each state has designated an agency within it to coordinate the activities of the Flood Insurance Program in that State selected officials assist communities in qualifying for the Program and in adopting and enforcing the required flood plain management regulatory measures. FIA has ten regional offices with field staff working directly with communities to observe and assist in their enforcement efforts.

c. FIA investigates enforcement issues and complaints from citizens, interest groups, and others, and is currently developing a variety of additional enforcement-related mechanisms and approaches. The Community Assistance and Program Evaluation procedure is designed to aid participating communities in their administrative and enforcement efforts. FIA staff will spend up to a full day with local officials discussing enforcement and administrative issues, inspecting flood hazard areas and providing technical assistance. Currently under consideration are enforcement guidelines designed to aid communities in their enforcement efforts and to ensure their adequacy. Sample penalty provisions will accompany the guidelines for inclusion in community flood plain management measures. A number of publications are also under consideration which would deal with consumer education and the involvement of citizens in enforcement efforts.

#### G. Suspension Procedure

A community eligible for the sale of flood insurance is subject to suspension from the program for failing to submit applicable flood plain management regulations within six months from the date it receives notification of a final determination.

Communities which fail to adequately enforce their adopted flood plain management regulations are also subject to suspension.

#### H. Community Participation and the Insurance Purchase Requirement

The Flood Disaster Protection Act of 1973 requires the purchase of flood insurance on and after March 2, 1974, as a condition of receiving any form of Federal financial assistance for acquisition or construction purposes with respect to structures located within an identified special flood, mudslide (i.e., mudflow), or flood-related erosion hazard area of any community participating in the Program. The purchase of flood insurance is also required on or after March 2, 1974, as a condition of obtaining a loan or an increase, extension or renewal of a loan from a federally-supervised, regulated, approved or insured lending institution where the loan is secured by improved real property or a mobile home located or to be located within an identified special flood, mudslide (i.e., mudflow), or flood-related erosion hazard area of a community participating in the program. The Act also requires that on and after July 1, 1975, or one year after a community has been formally notified of its identification as a community containing one or more special flood, mudslide (i.e., mudflow), or flood-related erosion hazard areas, whichever is later, no such Federal financial assistance or federally-related secured loans shall be provided within such an area unless the community in which the area is located is then participating in the program. The latter prohibition of federally-related secured loans does not apply to: (1) any loan made to finance the acquisition of a residential dwelling occupied as a residence prior to March 1, 1976, or one year following identification of the area within which such dwelling is located as an area containing special flood hazards, whichever is later, or made to extend, renew, or increase the financing or refinancing in connection with such a dwelling, (2) any loan, which does not exceed an amount prescribed by the Secretary, to finance the acquisition of a

building or structure completed and occupied by a small business concern, as defined by the Secretary, prior to January 1, 1976, (3) any loan or loans, which in the aggregate do not exceed \$5,000, to finance improvements to or rehabilitation of a building or structure occupied as a residence prior to January 1, 1976, or (4) any loan or loans, which in the aggregate do not exceed an amount prescribed by the Secretary, to finance nonresidential additions or improvements to be used solely for agricultural purposes on a farm.

A State may receive an exemption from the insurance purchase requirement. To do so, it must have in effect a self-insurance plan which covers all state-owned property in FIA - identified special hazard areas and which meets the criteria set forth in Part 1925 of the revised regulations. The self-insurance plan coverage substitutes for the purchase of the Standard Flood Insurance Policy only after it has received formal approval by the Administrator.

#### I. Coordination

FIA coordinates the flood plain management aspects of the NFIP with other Federal agencies, as well as with state, regional and local organizations to ensure consistency among their flood plain management efforts. FIA also coordinates with other Federal agencies to ensure consistency with the flood insurance and lending requirements of the Program as they relate to the approval of Federal financial assistance for acquisition or construction purposes in identified flood hazard areas (see part H, above). Further, FIA requires that certain actions be taken and encourages others on the part of participating communities to coordinate their activities with neighboring communities and regional and state flood plain management efforts.

## 1. Flood Plain Management

FIA works closely with other agencies involved in flood damage reduction efforts to ensure that consistency is achieved among these efforts. A number of formal and informal interagency agreements and understandings exist and are being developed which relate to technical, administrative and policy matters. An agreement being finalized with NOAA's Office of Coastal Zone Management, for instance, clarifies coordination principles between the two agencies for flood damage reduction and erosion control efforts in the Nation's coastal zone (see Appendix D, Exhibit 2). A similar agreement is being developed between the NFIP and EPA's Water Quality Management Program (see Appendix D, Exhibit 3). FIA also makes use of the environmental impact statement process under NEPA to review flood control projects and program impact statements for efforts related to hazard mitigation.

Within HUD, the regulations of the Federal Disaster Assistance Administration have been revised to require that their staff work closely with FIA's field staff to ensure that consideration is given to the NFIP requirements when reviewing disaster assistance project applications. HUD's comprehensive Planning Assistance Program regulations, which are currently being revised, will reflect the Program's requirements, thus providing one mechanism for the development of regional approaches to flood plain management. Another such tool is provided by the procedures set out in Section 1909.2(i) of the revised regulations which outlines the NFIP's responsibilities under the A-95 clearinghouse procedures set up by the Office of Management and Budget. These procedures provide clearinghouses nationwide, with the opportunity to review

and comment on community flood plain management regulations adopted to meet the NFIP requirements. This procedure allows for the integration of local flood plain management efforts into area-wide and regional land use plans.

FIA coordinates the flood plain management aspects of the NFIP with States through State Coordinating Officials designated by each State Government for a number of purposes including maintaining consistency with their flood plain management plans, policies and regulations. When the NFIP regulatory requirements exceed those established by the States they provide a significant impetus for them to revise efforts which may be inadequate to deal with the flood hazard. Where the State's requirements exceed FIA's, a provision included in the revised regulations specifies that the more restrictive requirements take precedence. In these States, FIA works closely with the State Coordinating Officials to ensure that the NFIP regulatory requirements do not undermine higher standards which have been adopted to reflect information or knowledge of conditions that require, particularly for human safety, standards exceeding the NFIP minimum criteria.

FIA regional representatives -- the flood insurance specialists -- are available to complement or supplement the coordination efforts of state and local officials. This service is particularly helpful in basin-wide coordination where jurisdictions in more than one state are involved in mutual flood-related problems.

## 2. Insurance

In July of 1974, FIA published guidelines with respect to the mandatory purchase of flood insurance under Section 102 of the Flood Disaster Protection Act of 1973. The purpose of the guidelines is to provide guidance to the

many Federal agencies and private lending institutions responsible for the enforcement of the Act's flood insurance purchase requirements, which became effective on March 2, 1974. The guidelines are included as Exhibit 4 in Appendix D. An example of Federal agency's compliance with this requirement is included as Exhibit 5 in Appendix D. This is a list of references to the NFIP requirements (primarily the lending requirements) in all those regulations related to housing and urban development from Title 24 of the Code of Federal Regulations, Subtitle B.

### 3. Community Coordination Responsibilities

FIA requires that certain actions be taken and encourages others on the part of participating communities, to coordinate their activities with neighboring communities and regional and state flood plain management efforts. A participating community must notify adjacent communities prior to any alteration or relocation of a watercourse. It also is encouraged to notify adjacent communities prior to approval of any substantial commercial or industrial developments and large subdivisions proposed to be undertaken in a flood hazard area. In general, the community is encouraged to coordinate its flood plain management efforts with adjacent or otherwise affected communities when considering all proposals bearing on mutual flooding problems or those likely to have external flood-induced costs (see Planning Considerations 1910.22(c)(10), (17)).

In the early stages of the Program's implementation, a factor which acted against achieving the best coordination in administering the NFIP was encountered. Initially, participation in the Program and the study of communities had attempted to reflect the existence of substantial pressures

for development and a high degree of flood risk. This resulted in a scattered pattern of participation. Area or basin-wide participation offers the possibility that the flood damage reduction potential of the Program could be maximized if communities established their eligibility in the NFIP and were studied in sequence along a river or coast. In such an approach, technical data could be developed in a more systematic and consistent manner. In addition to these two influences, the necessity for communities to have specific regulatory enabling authority in order to participate in the Program also contributed to the unsystematic pattern of participation. FIA is bound to recognize individual political jurisdictions created by state law since the police power, which is necessary for the enactment of the NFIP's regulatory requirements, has been delegated by the states on the basis of local political boundaries.

Recently, certain administrative changes in the Program have allowed for increased consistency in this respect. The community's rate studies in some of the larger river basins are being carried out in sequence from the headwaters to the stream's mouth, and often in cooperation with River Basin Commissions. Further, the mechanisms discussed above are designed to allow for coordination between upstream and downstream communities, and the regulations' planning considerations also recognize this issue (see 1910.22(c) (10 and 17)).

#### J. Environmental Assessments

Certain activities carried out by FIA in the implementation and modification of its regulations could have significant impacts on the environment and are, therefore, subject to established evaluation procedures as set out in HUD Circular 1390.1, "Departmental Policies, Responsibilities and Procedures for

Protection and Enhancement of Environmental Quality." Actions such as that dealt with here, the publication of revised regulations, for instance, must be accompanied by a complete and fully comprehensive environmental evaluation, including formal review by affected organizations and individuals. These procedures have been established to facilitate and promote the Department's implementation of the National Environmental Policy Act of 1969. Exceptions from the flood plain management standards, as discussed above, must be accompanied by a Special Environmental Clearance which is a somewhat less involved evaluation of environmental impact. These procedures are detailed in Section 1910.6(b)(2) of the revised regulations.

K. Flood Protection Systems

A new provision is included in the revised regulations to reflect Section 1307(e) of Title XIII of the Housing and Urban Development Act as revised by the Community Development Act of 1974. The new provision (Section 1911.12) relates to flood protection systems involving Federal funds. If such systems, when completed, will alter the base flood level, FIA maps will be revised and all previously applicable actuarial rates would be modified to reflect the modified flood risk. This Section is intended to permit lower actuarial flood insurance rates for circumstances in which "adequate progress" has been accomplished toward the completion of a flood protection system involving Federal funds, and for which any delay in the completion was beyond the local community's control. FIA will require the enforcement of the flood plain management regulatory requirements which are applicable to Emergency Program communities when it has determined that "adequate progress" has been

accomplished toward the completion of a flood protection system involving Federal funds. The specific requirements are set forth in Section 1910.3(b)(9). (See Section II B5 for further discussion of this issue).

L. Planning Considerations for Flood-Prone Areas

The revised regulations are ordered so as to include the minimum flood plain management requirements which provide the basis for community's regulatory efforts first, with those measures which go beyond these minimum criteria, and fall into the category of "planning considerations," following them (see Section 1910.22). While adoption by a community of the criteria in this latter part is not mandatory, the community is required to fully evaluate each with a view toward their adoption as a part of an overall flood plain management effort. These criteria are included in the regulations to aid participating communities in the formulation and adoption of comprehensive management plans for flood risk areas. The "planning considerations" section encourages communities to permit only that development in flood hazard areas which is appropriate in light of the degree of risk, an acceptable social and economic use of the land in light of the risk, and does not aggravate the existing hazard. Communities are urged to preserve flood-prone land for open space use, relocate occupants away from flood-prone areas, and acquire land, land development rights and frequently damaged structures consistent with a policy of minimizing future losses. Among several additional considerations are included human safety; diversion of development to low-risk areas; both from a flood damage reduction standpoint, and in

light of the environmentally-sensitive nature of flood plain land; development of flood warning and emergency preparedness plans and alternative vehicular access and escape routes; coordination of development plans with neighboring community's flood plain management programs; requirement of setbacks, and the requirement of free board as an added margin of safety from floods exceeding the 100-year frequency recurrence interval.



## II. ANALYSIS OF ENVIRONMENTAL CONSEQUENCES

### A. Probable Impact of the Revised Regulations

In determining the probable impacts of the proposed action, the goals of the NFIP should be reiterated. As stated in the Introduction, the Program is directed not toward the prohibition of development, but rather toward encouraging the appropriate development of flood plain areas in light of the flood risk. Through the implementation of a number of performance standards for new construction, public facilities and subdivision developments, combined with specific insurance practices to indemnify residual risk, the Program is primarily designed to ensure flood damage reduction. Although the regulations do not expressly prohibit all flood plain development, the implementation of the Program does establish a number of disincentives to locating in areas of known flood risk.

First, its standards act as a disincentive to development. The Program's performance standards call for elevation and/or floodproofing of any new construction or substantial improvements in identified flood hazard areas. Further, the standards stipulate that in high hazard areas such as floodways and coastal high hazard areas where high velocity flow is usually concentrated, additional requirements reflecting the high degree of risk must be met.

Second, the Program's mandatory flood insurance purchase requirement acts as a disincentive to development. Flood insurance coverage is required as a condition for the receipt of Federal financial assistance for acquisition or construction purposes within FIA identified flood hazard areas. Since actuarial flood insurance rates (which can be prohibitive for buildings which are not constructed in light of the flood hazard) are applicable for any structure started after the effective date of the community's Flood Insurance Rate Map, the insurance purchase requirement discourages new construction.

Third, the identification of special flood hazard areas, in itself, acts as a disincentive to development. The identification of known flood hazard areas and the publication of this information in simplified and understandable form in communities nationwide is likely to give pause to prospective investors who otherwise might not be aware of the hazard when choosing a site for development.

The degree to which these constraints act on those proposing new development in identified flood hazard areas must be qualified by a number of factors. These include (1) the degree of flood risk, (2) the type of flooding (riverine or coastal) (3) the status of community's participation in the NFIP (Emergency or Regular Program) (4) the degree of development and development potential in the community and (5) effectiveness of the community's enforcement effort.

The degree to which these constraints act on those proposing new development in identified flood hazard areas is related to the degree of risk present at any specific location. For example, in a situation where a residence is proposed for construction close to a river where the 100-year flood level is several feet above existing grade, these constraints can be quite severe. The cost of insuring at actuarially determined rates, combined with the cost of meeting the flood plain management requirements can be expected to be substantial. Added to this would be the knowledge (made clear through the high actuarial rates) that a severe flood risk exists. As one moves away from the stream channel or coast, toward higher ground and areas of decreasing risk, the constraints remain effective, but become decreasingly rigorous.

The type of flood hazard present also has an effect upon the degree to which the Program's constraints are experienced particularly those which relate to the flood plain management regulatory requirements. These are most apparent in the floodway and coastal high hazard areas, although the type of flood problem differs considerably between the two. In these areas the actuarial insurance rates may be expected to be

highest and the regulatory requirements most rigorous. In fact, these requirements may disallow development altogether under certain circumstances. As noted in Section IA, no new development proposed in a floodway can be allowed if it would result in any increase in flood levels within the community during the occurrence of the base flood (see Section 1910.3(d) of the regulations). The need for this degree of regulation arises from the floodway's role in providing for the unimpeded passage of high flood flows. In coastal high hazard areas the regulatory requirements are more rigorous than in the backwater or fringe areas (i.e., building is not permitted in coastal high hazard areas unless located landward of mean high tide and then only when elevated on piles or columns with the lowest structural members of the floor system or outside wall above the base flood level). These additional safety measures are required in coastal high hazard areas to provide protection from the repeated impact of wind-driven waves on the walls of the structure.

It must be noted that although FIA's experience in administering the NFIP has supported the high degree of effectiveness of the Program's constraints in riverine floodway areas, conflicting results have been found in coastal flood plain areas. Recent research has questioned the effectiveness of the constraints in one area of the Northeast Atlantic Coast (Miller, 1975). The extent of this problem and its contributing factors are not fully known. FIA is studying the situation to determine the extent of the problem, its transferability to other coastal areas and appropriate methods of adjusting to it where necessary.

The effectiveness of these constraints is also influenced by the status in which a community is participating in the NFIP. The Program is currently administered in two phases, the initial phase or Emergency Program, and the final phase or Regular Program. It is in the latter phase that the constraints are most fully effective since an extensive technical Flood Insurance Rate Study

has been completed. This detailed study includes a delineation of the 100-year flood plain and any high hazard areas (i.e., coastal high hazard area, floodway), and base flood elevations which provide the basis upon which actuarial insurance rates and specific regulatory measures can be based. Prior to the receipt of this specific information, a community does not have the benefit of the Rate Study to provide a firm basis for carrying out an effective regulatory effort; nor is it possible for FIA to set insurance rates which reflect the degree of risk present.

In the absence of the Rate Study during the Emergency Program, flood insurance is provided at subsidized rates and regulation is based on the Flood Hazard Boundary Map (FHBM). Prepared from the best available data, the FHBM is a preliminary delineation of special flood hazard areas within the community which have a definite likelihood of inundation. Since the FHBM is prepared using approximate methods, the flood plain management regulatory requirements at this stage are quite general. (See Section 1910.3(b) for these requirements and specifically 1910.3(b)(3) which requires the community to obtain and review such data from other sources and take reasonable measures to utilize such data until the Rate Study is completed). The Emergency Program, for this reason, may not constitute as great a disincentive to development as is presented in the Regular Program by the more stringent regulation based on the detailed information of the Flood Insurance Rate Map and Study. Similarly, the subsidized rates do not generally provide the disincentive to proposed development which the actuarial flood insurance rates effect (see discussion under Part B 4 of this Section).

Another factor which influences the effectiveness of the Program's constraints on flood plain development is the extent of development which has already taken place in the community. For the purposes of this analysis, extent of development will be categorized as rural - minimal development and little or no pressures for

more construction, suburban - moderate development and strong pressures for expansion and urban-almost completely developed and only rehabilitation or redevelopment is occurring.

The first of the Program constraints is the insurance purchase requirement. This can be avoided if no Federal financial assistance is needed for the proposed construction. There appears to be no relationship between the ability to find non-federal funding and the type of area in which the development is proposed. The impact of identifying areas subject to a special flood hazard is the second constraint on development. The presumption is that such identification will dissuade some developers from locating in the flood-prone areas. The extent of this impact is dependent on two factors. First, to what extent is the flood hazard already known by area residents? The greater the prior awareness the less the impact of FIA's identification will be. Second, how well will the identification be publicized? Of course, the greater the effort made to inform the public of where flooding is a hazard, then the greater the impact. It is likely that residents in a rural area would be somewhat more aware of the natural limitations of the land. This knowledge could be offset by the fact that most development would be undertaken by people from outside the area. The formal channels for dissemination of flood plain information are more varied in urban and suburban areas which are more likely to have access to daily newspapers, radio, and television. In contrast, informal systems of information distribution are more significant in rural areas which have a more stable and interwoven character. The third major constraint is the flood plain management regulations. The extent of development in a community does affect the operation of this constraint. Such regulations will have their greatest impact on minimizing flood damages in areas with relatively undeveloped flood plains. For it is in such areas that the potential developer will be

forced to take cognizance of the flood plain's negative features. In urban areas with more developed flood plains, it is the substantial improvement requirement which is of critical importance. Rehabilitation and reconstruction will be as common as new construction (see Part A2 of this section for additional discussion).

The extent and effectiveness of the implementation of the NFIP at the local level will effect the Program's ultimate success. The constraint which is most susceptible to administrative discretion is that presented by flood plain management regulations. It will be impossible to closely monitor the administration of over 15,000 local ordinances. The integrity of these measures will greatly depend on the administrative capability of the community and the spirit in which they are enforced. Communities with experience in enforcing regulatory measures (such as permits and codes) will be better prepared to deal with flood plain management standards. An administrative framework will already be in place, and professional staff with responsibilities for such functions will be available. The regulatory requirements of the NFIP may be a small, rural community's first experience with such measures. The day-to-day administration may prove more difficult than the initial passage of the ordinance. The shortage or absence of competent full-time staff to handle such matters may decrease the Program's effectiveness in those communities where the potential impact is greatest. These problems could undermine a community's regulatory efforts in the absence of either adequate technical assistance or appropriate inter-governmental coordination. Even if a community has the administrative capability to implement the regulations, a negative attitude towards flood plain regulations could jeopardize the Program's objectives. A community which values development or the absence of restrictions more highly than a reduction of flood losses will enforce flood

plain management standards only half-heartedly. The result will be a failure to realize all the potential environmental benefits. To effectively implement the Program, a community have to embrace the NFIA's goals and possess the ability to implement its requirements.



## 1. Impacts on the Natural Environment

The Program, in general, has the following impacts:

(a) The adoption and enforcement of adequate flood plain management regulations and the flood insurance purchase requirement may be expected to result in the mitigation of adverse environmental impacts associated with construction that otherwise would have occurred. The regulations and insurance requirement may induce prospective and existing residents to locate elsewhere on sites which are not flood-prone. In the short run, this will tend to preserve the flood plain in its present state of development. In the long run, it will decrease high intensity use through a gradual process of attrition. Although negative impacts on the flood hazard area will decrease with this trend, it is possible that some of the adverse impacts of development which would have occurred will simply be diverted elsewhere. It may be expected, however, in light of the recognized high sensitivity of flood plain ecosystems, that most areas to which flood plain development may be diverted will have a lesser degree of environmental sensitivity thereby resulting in a net beneficial impact on the natural environment from such displacement.

(b) The Nation's flood plains will gradually be converted to uses having a lower flood damage susceptibility than the high intensity uses which currently exist in many flood-prone areas. Since the regulations are directed primarily at structures, open space uses which do not require structures are thereby encouraged. Most significant among these are agricultural uses (general cultivation, grazing and forestry, etc.), low

intensity industrial uses (loading and parking areas, airport landing strips, etc.), recreational uses (parks, golf courses and nature preserves, etc.), and similar uses. It should be noted that, while open space uses present a more appropriate alternative for flood plain use than high intensity, flood damage susceptible ones, they are not entirely devoid of negative environmental impacts. For example, certain low intensity industrial uses incorporate extensive areas of impervious surface which decrease or eliminate the absorptive capacity of the natural surfaces and, thus, inhibit ground water recharge and increase runoff. Further, certain agricultural uses contribute to increased stream sedimentation, especially where poor cultivation practices are used, and contribute to water quality degradation through fertilizer and biocide pollution.

(c) Generally, water quality will be positively affected. The overall decrease in development and high intensity use of flood-prone areas will reduce construction phase water quality degradation. Further, the regulations require communities to ensure that sanitary sewage systems are designed to minimize or eliminate discharges from them into flood waters and that on-site waste disposal systems be located to avoid contamination from them during flooding.

(d) The overall decrease in development resulting from the implementation of the program is likely to encourage not only the preservation of common plants and wildlife, but also of unique and unusual natural features in the flood hazard area. It may be expected that, as an indirect impact, the program's implementation will encourage the preservation of coastlines, beaches, estuaries, wild and scenic rivers, marshes, tidelands, and aquifers.

As a direct impact, sand dunes and mangroves will be protected by specific regulatory language included in Section 1910.3 in light of their known flood damage mitigation potential.

From the ecological standpoint, it should be noted that, where the flood plain is allowed to revert to a more natural state, specie diversity, and in most cases biological productivity, will increase. In general, the greater the diversity and productivity of an ecosystem, the more stable it will be. Since the flood plain and wetland areas are a crucial link in the many floral and faunal life systems upon which man ultimately depends, maintenance of the natural integrity of these areas can be of critical importance.

(e) Both positive and negative impacts may be experienced by ecologically sensitive wetland areas such as marshes, sedge meadows, bogs, and swamps. The implementation of the regulations may be expected to decrease high intensity use which disrupts or destroys wetland areas. On the other hand, in those instances where fill is used in lieu of piles or columns to meet the elevation requirements of the regulations, wetland areas may be negatively impacted (for further discussion see Part B of this section).

(f) Where the flood plain management regulatory approach is applied, there will generally be less need for reliance on the structural approach to flood loss reduction which, especially in the case of large projects, frequently has significant adverse impacts on the natural environment. According to the Congressional intent discussed in the Introduction to this statement, the structural control alternative should be implemented only

where it is proven to be the only approach to flood loss mitigation which can be effective, and only when it is implemented as a part of an overall flood plain management plan. (See Part B2 of this section for a discussion of a possible opposing influence of the program's implementation).

The mudslide/grading/fill requirements of the Program have the following effects:

(a) The requirement that each proposed site or modification be reasonably safe from mudslides and the requirement that close scrutiny be given to construction in an area subject to mudslide hazard will have the effect of decreasing construction-induced mudslides.

(b) By requiring the adoption of a grading ordinance, which requires review, regulation, and certification of sub-surface construction and soil structure modification (i.e., excavations, foundations, and utility systems), mudslide potential should be minimized.

The erosion requirements of the Program have the following effects.

(a) The requirement that in erosion-prone areas no proposed site alterations or improvements shall cause any change in barrier beaches, sand dunes, natural drainage channels, soil infiltration capacity, or otherwise aggravate the existing erosion hazard will reduce the negative environmental impacts which would occur as a result of unsound development practices.

(b) The requirement to purchase insurance for new construction in erosion hazard areas will discourage unsound development in such areas since rates will be based on the degree of risk.

(c) The effect of the above requirements may be expected to limit development upon or seaward of primary dunes and/or secondary dunes. To the extent that such a decrease is experienced, construction impacts and encroachment on these fragile natural protective areas will decrease.

2. Impacts on the Man-Made Environment

(a) Construction Practices and Living Patterns

The performance standards, elevation and floodproofing requirements of the regulations will alter construction practices and living patterns in many communities having identified special flood hazard areas. Structures in flood hazard areas will be elevated through the use of piles, columns or fill, and they will be securely anchored to prevent displacement by flood waters. Construction materials which are resistant to flood damage will see increased use, and construction methods and practices will be altered to take into consideration the flood hazard (i.e., structures will have their longitudinal axes aligned parallel to the flow of flood waters, etc.).

b. Existing Development Patterns

Implementation of the regulations will decrease the amount and density of development in flood hazard areas, thereby decreasing congestion in highly developed areas. Since new development decreases the storage capacity of the flood plain, one effect of the regulations is to contain and gradually decrease the area subject to inundation.

c. Housing for the Handicapped

The use of elevated structures may effect the ingress and egress of those having physical limitations. However, structures can be designed to take this into consideration. FIA feels that structures should be constructed so as to be accessible to and usable by the physically handicapped. Depending on the specific situation, the installation of some type of lift or ramp structure may be appropriate. However, it would be inconsistent with the principles of sound flood plain management to sacrifice the safety of an entire structure and its occupants by placing it at an elevation below the 100-year frequency flood level. This is especially important where it is the intent to accommodate the handicapped who themselves can least afford to be exposed to this risk. Rather than alleviating a hardship for the handicapped, such construction practices would only increase the existing hazard.

d. Historic Structures

The Federal Insurance Administration has attempted to accommodate the intent of the National Historic Preservation Act of 1966 in both the flood plain management and insurance purchase requirements of the NFIP.

(i) Flood Plain Management Requirements

Through the application of the variance procedures set out in Section 1910.6 of the regulations (see Part I(D) of this text), the reconstruction, rehabilitation or restoration of an historic structure may be granted what is essentially a blanket exception from the required

performance standards. Although FIA encourages the fullest possible application of its standards, it is realized that strict compliance with these requirements could undermine the historic value of such structures. (Note: In cases where participating communities include the regulation's definition of "substantial improvement" in their regulatory measures, variances need not be required for historic structures since specific exclusionary language is included therein -- see Part e, below).

(ii) Insurance Requirements

Where Federal or federally-related financial assistance is required for the purchase or improvement of a structure listed on the National Register of Historic Places or on a State Inventory of Historic Places that is located in a flood hazard area, flood insurance must be purchased; but it may be purchased at subsidized rates for the first layer of coverage. (By statutory requirement, second layer coverage must always be priced at actuarial rates).

e. Existing Structures: Impact of the Substantial Improvement Definition

The thrust of the NFIP's flood plain management requirements is directed toward new investment in flood hazard areas and includes not only new construction, but also improvements to existing structures which surpass certain established thresholds. As defined in Section 1910.1 of the regulations, "substantial improvement" means any repair, reconstruction or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either (a) before the improvement is started, or (b) if the structure has been damaged, and is being restored,

before the damage occurred. For the purposes of this definition, "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The term does not, however, include any project for improvement of a structure either (1) to comply with existing state or local health, sanitary or safety code specifications which are solely necessary to assure safe living conditions, or (2) any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

The 50 percent threshold was chosen as a compromise between the extremes of prohibiting all investment which does not meet minimum flood plain management regulatory standards in identified special flood hazard areas, and allowing existing structures to be improved in any fashion without meeting any regulatory standards. The former alternative has associated with it the potential for causing hardship to those who have located in flood hazard areas without knowledge of the risk. These individuals could not improve their structures as damage or age contribute to their deterioration. The second alternative provides no mechanism to ensure that increased investment in flood hazard areas will receive needed protection from the flood risk, thus contributing to increased peril to life and property, the national flood loss potential and the burden of increasing disaster relief and recovery outlays. The 50 percent threshold was chosen when the Program's initial regulations were developed because it generally conformed with similar code standards in use at that time.

The substantial improvement definition impacts on three general types of alteration: (a) additions, (b) reconstruction, and (c) rehabilitation. However, the language of the definition limits the degree of latitude or flexibility which may be used in its application to the differing categories.

(i) The first general category, additions, is defined as alteration to an existing structure which results in any increase in its floor area. That is, under the present definition of "substantial improvement," if an existing structure in the flood plain is physically enlarged and the cost of the enlargement equals or exceeds 50 percent of the market value of the structure before enlargement, then the existing structure is considered to have been substantially improved and is subject to actuarial rates and flood plain management requirements. This regulation is permissive in that it allows the property owner to add a new room or two to an existing structure at any time without these additions meeting higher code standards. This is inconsistent with the principles of sound flood plain management to the extent that new additions to the structure may physically increase the existing flood hazard. For instance, the owners of the existing structure may not only be increasing their own risk, but it is quite possible that by making additions to the structure, they are also increasing the flood hazard for their neighbors and placing them in greater jeopardy. A major objective of the program is to discourage unwise construction in the flood plain. This compromise could work against this objective by allowing a person to enlarge a structure up to 50 percent of the cost of the structure on any number of occasions without taking any protective measures to minimize the potential of flood damage to this new construction.

(ii) The second category, reconstruction (of damaged structures), is constituted by the rebuilding of an existing structure which has been partially or completely destroyed by any cause, without increasing the floor area of the structure. Under the definition of "substantial improvement," if a partially destroyed structure is reconstructed and the cost of the reconstruction equals or exceeds 50 percent of the market value of the structure before the damage, then the rebuilt structure is considered a "substantial improvement" and is subject to actuarial insurance rates and the flood plain management requirements. The purpose of this provision is to assure that any major reconstruction effort in the flood plain is undertaken and carried out in such a manner that the potential for future flood damage is minimized. The rationale behind this regulation is to discourage the rebuilding of unprotected structures in areas of known flood risk. The purpose of this regulation is basic to the overall objectives of the program; however, this does not diminish the need to provide some mechanism to alleviate the individual's financial burden when rebuilding a partially destroyed structure in compliance with the higher code standards required by the NFIP. A recent revision of the "substantial improvement" definition addressed this issue by exempting costs involved in upgrading to meet code requirements. The implementation of the "substantial improvement" regulation, where it relates to reconstruction, may be expected to comprise no additional impacts to those set out elsewhere in this text.

(iii) The third category, rehabilitation, includes any improvements and repairs which are made to the interior and exterior of an existing structure, but which do not result in any increase in the floor area of the structure. According to the present definition of "substantial improvement," any rehabilitation of an existing structure, the cost of which equals or exceeds 50 percent of the market value of the structure, is treated as new construction and is subject to actuarial rates and the flood plain management requirements. This requirement follows from the NFIP's objective to discourage additional unwise investment in areas of known flood risk. By allowing existing structures to be rehabilitated without requiring them to be subject to the same constraints (i.e., flood plain management requirements and actuarial insurance rates) as new structures, FIA could be encouraging increased financial investment in the flood plain. On the other hand, existing structures which are rehabilitated will increase significantly in value, and yet these structures will still remain exposed to the same degree of risk as existed prior to their rehabilitation. Although continued investment may be allowed in areas of known flood risk, this impact must be balanced against the national goal of maintaining an adequate housing stock and the consideration that restraints on this type of improvement could contribute to further deterioration of marginal structures and resulting blight.

Further amendments to the "substantial improvement" definition which takes these impacts into consideration have been developed. The Federal Insurance Administrator will publish proposed revisions of the definition in the near future.

### 3. Impacts on the Social Environment

#### a. Community Services

(i) The identification of areas of known flood, flood-related, erosion and mudslide risk, which will be provided to all participating communities, serves to alert interested individuals to those areas where specific hazards exist. Further, the information services which accompany such delineations familiarize these individuals with safe building techniques and design aspects to protect against the hazard. This provides local public officials with the information necessary for guiding development and in recruiting and locating industry. Property owners and occupants can determine if their properties are subject to hazards and the severity of the risk. Developers are also benefited by such indications of the extent and severity of the hazard.

(ii) The regulations require communities to review building permits for proposed construction in identified flood hazard areas. Such a review may constitute a new service to the community or may provide an impetus to upgrade existing building codes. Further, the community is given an opportunity to review proposed development for impacts other than those which are strictly flood-related.

(iii) The requirement to construct utility lines so as to minimize their flood damage potential will ensure that gas, sewage and other line contents will remain contained in the event of flooding. In addition, services can be restored after a flood without the need for extensive repair or reconstruction.

(iv) The requirement to anchor structures (including mobile homes) in order to prevent flotation, collapse, or lateral movement will decrease environmental disruption in the event of flooding due to the decreased necessity for reclamation, reconstruction, and relocation of structures displaced by flood waters. It will also decrease the potential for increased flood heights resulting from the blockage of bridge and culvert openings by debris from displaced structures.

(v) The implementation of the regulations will, over time, reduce the population and investment at risk within participating communities. This will have a number of impacts on the community such as:

- (a) reduction of the threat to health, safety and welfare;
- (b) reduction of community expenditures for evacuation, relief, rehabilitation and reconstruction attendant to hazard occurrences; and
- (c) reduction of demands on emergency, relief and governmental organization.

(vi) Where communities experience a gradual transition of development patterns from higher to lower intensity uses as a result of the implementation of the regulations, additional park, recreational, parking areas, etc., will become available along with an attendant reduction in congestion.

b. Safety

(i) A major impact of the enforcement of the regulations is the resulting protection against loss of life and property in flood-prone areas which results from flood occurrences. Such damages may be either direct

or indirect (associated). Direct damage occurs in riverine and coastal flood plains when buildings and other structures, their contents, public utilities, agricultural crops, and livestock are damaged or destroyed by water. In some cases, this amounts merely to damage by inundation, while in others the velocity of the water adds to the destruction. Direct damage also includes the erosion or scouring of land and the deposition of infertile sediment in the inundated area. Floods also cause indirect or associated losses from disruption of economic activities. These may occur within the flood plain, in adjacent areas, and, in the case of great floods, at points far distant from the area of inundation. In addition, floods cause intangible damages, or those which it is not possible to measure in monetary terms. Loss of life and health, and mental anguish are the most important of these intangible damages. Akin to this is the hardship, fear and misery suffered by those whose homes lie in the path of flood waters.

(ii) The regulations provide protection against flood losses by requiring: (i) the elevation of residential structures beyond the reach of the 100-year frequency flood, and the elevation or floodproofing of nonresidential structures to or above that level; (ii) the use of flood resistant construction materials and construction methods and practices (such as the firm anchoring of structures to prevent dislocation) that minimize flood damage potential; (iii) the recognition, through strict regulation, of the extreme hazard involved in building in floodways or coastal high hazard areas; and (iv) the recognition of the need for flood warning and emergency preparedness plans.

c. Psychological Well-Being

(i) Residents and businessmen who build according to the regulations' performance standards are more secure in their knowledge that they have taken precautions against flood damage, and have the remaining risk insured.

(ii) To the extent that the regulations' standards reduce the flood damage potential to property and the loss of life from flood occurrences, the negative psychological impacts associated with them are minimized.

(iii) To the extent that the previously described substantial improvement requirement may result in a break up in cohesion of neighborhoods in identified flood hazard areas, this displacement of residents could have negative psychological impacts.

d. Aesthetics

(i) Commercial and residential structures built in compliance with the regulations can be aesthetically pleasing in addition to being functional, if well-designed. Although some of the older, more traditional, floodproofed or elevated structural designs were aesthetically unattractive, this has not always been the case, and need not be, as many of the newer designs prove. FIA is currently publishing a pamphlet based on a study by the American Institute of Architects illustrating variety of plans which provide for adequate flood protection while maintaining an aesthetically pleasing design. An illustrative manual resulting from this effort will be made available for use by Program participants, builders and other interested individuals and organizations.

(ii) Many of the low intensity uses which may be expected to be induced by the Program's implementation provide public benefits from an aesthetic standpoint. Most notably, parks and other recreational open space uses provide a more pleasing scene than is currently encountered in certain urban and suburban flood-prone areas which often are characterized by dilapidated structures, blight and congestion.

e. Economic Impacts of Program Implementation

The achievement of public and private benefits involves costs. The National Flood Insurance Program of 1968 envisioned the public benefits of flood loss reduction through flood plain management, insurance coverage for flood plain residents and reduced requirements for flood disaster relief and structural protection. To pay for these benefits the Congress was willing to incur

the public costs of subsidy for properties already in the flood plain, for delineating the special flood hazard areas, developing actuarial and chargeable rates and administering the Program. It also expected the Nation's communities to incur the costs incidental to regulation of their flood plains and the citizens of these communities the costs of flood insurance premiums and adjustment to local or State flood plain regulation. In effect the intent of the Congress was to achieve a reduction of flood losses and an internalization of much of the residual losses through insurance.

There is a growing body of evidence to support the conclusion that flood plain regulation yields major economic, social and environmental benefits and thus contributes to the Nation's objectives of economic efficiency, preservation of environmental quality and social well-being. Work is currently underway to integrate this evidence in an authoritative form.

As early as 1968, the United States Water Resources Council was able to conclude "it is anticipated that an effective flood plain management program will permit reductions in the levels of future damages to practical minimums while permitting reductions in the extent of structural programs for flood control" (The Nation's Water Resources, 5-2-10). Recent estimates indicate the increasing application of flood plain management to our Nations flood plains will achieve reductions of flood losses of 630 million dollars a year by 1985 and 1,350 million dollars a year by the year 2000 (WRC, unpublished internal report of the Flooding Technical Committee). These numbers do not measure the additional benefits in lives saved, economic disruption avoided, environmental quality preserved and social well being enhanced.

These economies are not inconsistent with those estimated in a 1975 FIA review which postulated disaster relief loans at 5% with no forgiveness and projected savings to the government from the Flood Insurance Program of \$80 million in FY 1980, and \$1 billion in FY 2000 with corresponding savings to flood disaster victims of \$211 million in FY 1980 and \$1.9 billion in FY 2000.

Originally, under the 1968 Act, communities could be admitted to the program only after a rate making study had been completed. Thus, in 1969, when Hurricane Camille devastated a number of Gulf Coast communities, only a handful of communities were in the Program. Congress reacted by enacting the Emergency Program under which communities could be enrolled upon application and commitment to enact and enforce land use and control measures to reduce the flood hazard.

Under the Emergency Program only subsidized flood insurance is available. This barred insurance for new structures in the flood plain i.e., built after the community entered the Program. A 1973 interpretation set December 31, 1974, or the effective date of the initial rate map, whichever is later as the boundary between existing structures and new structures. Although the statute is not specific that subsidized rates be applicable to new construction between the date the community enters the Program and the date the rate map is issued, the intent of the Congress has been so interpreted. Once a property is insured at subsidized rates it retains entitlement to such rates for the first layer of coverage.

It is this situation which entails a continuing and growing subsidy and which reinforces the due date of 1983 in increased outlays to accelerate the development of rate maps. Until the rate maps are issued this requirement for subsidy will be a growing public cost, nor

is it possible to require the full measure of loss reduction effort without precise delineation of the special flood hazard area and the elevation in that area of the 100 year flood. These public costs were consciously undertaken by the Congress in order not to deny insurance to property in the flood plain until the FIRM (Flood Insurance Rate Map) is issued, and to achieve some reduction in disaster relief. Given the objectives of the NFIP, these costs are necessitated because of the technical fact that the delineations and elevations are not automatically and immediately generated by the entry of the community into the Program.

It should be noted that some of the costs and benefits are immediate and that some of the costs and much of the benefits are deferred. The full benefits of flood plain regulation and of actuarial rates as disincentives to unwise construction in the flood plain may not be achieved for a number of years.

On the basis of the discussion above, this section illustrates some of the economic consequences of the NFIP's implementation. It draws general conclusions where possible and in all cases identifies and describes those aspects of the regulations which may be expected to have significant economic implications.

As was outlined in the introduction to the "Analysis of Environmental Consequences," the NFIP should produce an attrition in the frequently uneconomic occupancy of the Nation's flood-prone areas; it will require the individuals and organizations who use these areas to more squarely shoulder the true costs of this occupancy. At the minimum, the Program will retard the accelerating inappropriate development of the Nation's flood-prone areas.

Costs will be incurred in the individual and community adjustments to the forced recognition of the true costs of using flood hazard areas. The negative impacts will be predominately short term. The positive impacts will result from more efficient use of our resources, occupancy more appropriate to hazard areas, and from a more equitable assignment of the costs of using flood hazard areas to those who directly benefit from their use. These impacts will be short and long-term (for a concise listing of short and long-term impacts, see Section IV).

The Program will impact on the taxpayer in general. It will more specifically impact on flood-prone communities and on present and future owners of property located in flood hazard areas.

(i) Economic Impact of the Program on the Nation's Taxpayers

(a) The rigorous restrictions on construction in high hazards areas (floodway and coastal high hazard areas) and the more general flood plain management standards in flood fringe areas will reduce the amount of property that is vulnerable to extreme flooding conditions. In effect, this will retard and ultimately reverse the rapid growth in Federal disaster relief and recovery outlays funded through all of the taxpayers' dollars.

(b) Implementation of the NFIP is providing a public benefit through the development of technical data in an area which has been traditionally a weak point in dealing with the flood hazard area. Data on insurance loss experience is now being gathered in a systematic and complete manner since both the insurance industry and the

insured, as well as FIA, are concerned that losses are accurately estimated. Prior to the inception of the National Flood Insurance Program, flood loss data were usually compiled only following disastrous events, aggregated in rough estimates, or prepared for specific localities by agencies and organizations with differing interests with the growth of the NFIP and the heightened interest of the Water Resources Council, both individual property losses and aggregate estimates will be gathered in a more systematic and consistent manner. Hydrologic information for flood loss prediction will be systematically gathered and disseminated. This data base will provide significant benefits to the nation and will facilitate more effective adjustment to the flood hazard.

(c) Prior to the completion of a community's rate-making study, public subsidies are required for insuring existing structures in flood hazard areas. Such subsidy was authorized by the statute for existing properties so that the premiums paid by the property owner would be reasonable.—The Secretary encouraged private insurance industry pool (the National Flood Insurers Association) was established as the instrument to perform this function. The Act provided for a sharing of risk by the government and the insurance industry. Under the sharing formula, the Federal government's share is a function of the actual dollars required to indemnify policyholders for flood damage, what is actually collected as insurance premiums for the accounting period and the size of catastrophe reserves. The provision of subsidized rates was made to serve one of the underlying intents of Congress in enacting the Flood Insurance legislation; i.e. not to penalize those who had built in ignorance of the flood hazard and those who are adversely affected by the imprudent building of others. The National Flood Insurance Program was established with the provision of subsidized rates for existing developmen

The availability of subsidized flood insurance coverage under the Emergency Program, coupled with the general nature of the flood plain management standards required prior to completion of the rate-making study could provide an inducement to flood plain development. There is little evidence that this has occurred. This could increase the costs to the Nation's taxpayers by increasing flood damage-susceptible development. Section 1910.3(a) and (b) of the regulations require the review of building permits for structures and proposals for new developments to ensure that construction sites are reasonably free from flooding and that the materials and construction practices used take the flood hazard into account. The more rigorous elevation and floodproofing requirements, and floodway or coastal high hazard area requirements, do not become effective until the completion of the rate study.

These circumstances could provide an inducement for development; that is, the property owner, developer or community could be induced to "beat the deadline" of the completion of the rate-making study. This situation is not likely to produce seriously detrimental effects in the presence of a good faith enforcement effort on the part of the community and careful monitoring by FIA and State staff, especially where technical data in lieu of the final FIA Flood Insurance Study exists to provide a basis for local regulation. The importance of the technical data used in regulation cannot be overemphasized. From an implementation standpoint the effectiveness of a flood plain management regulation is directly

related to the amount and accuracy of the technical data upon which it is based. FIA has recognized this fact in its requirement that prior to the completion of a community's Flood Insurance Rate Study, the community must obtain, review and reasonably utilize any base flood elevation data available from a Federal, State or other source. (Additional discussion of these issues is included in the Introduction to this section).

(ii) Economic Impact on the Flood-Prone Community as a Whole

(a) Participating communities' regulatory efforts center on the requirement of building permits for proposed development in special flood hazard areas and the review of such permits to ensure that proposed development is reasonably safe from flooding. There is a cost incurred by a community in providing the time and personnel necessary to implement this requirement. This cost is largely related to the extent to which such a mechanism exists in a community prior to participation in the Program. (It has been our experience in administering the Program that a large number of communities already have established building permit systems with procedures and personnel active at the time of application for participation.)

Where this responsibility places a cost on the community, such costs may be compensated for through the charge of a permit fee. Where personnel may not be available to carry out this function, such as in small rural communities, it has been found that communities have entered into agreements with either a city or county government, or a group of other small communities, and designated an official between them to carry out this function. Again, the community within which the permit is

requested may charge a permit fee and apply it to the cost of maintaining an inspector. Regardless of the mechanism employed, operational costs may be expected to be compensated for through a reduction of post-flooding recovery costs resulting from the reduction in exposure to the flood risk.

It was noted on page 2 that a State's methods and resources for meeting its regulatory obligations are typically different from those of a local community. Regardless of the administrative mechanism used by a State, there may be expected to be some operational costs arising from the implementation of the regulatory requirements.

(b) If a community chooses not to participate in the Program, economic development in the flood hazard area may be severely restricted. It is presumably in the public interest that it be so. The impact of the proposed regulations on a given community will depend upon the extent of existing development, the extent of the area identified as flood-prone, the extent of development pressures, and the type of development therein. Generally, the withdrawal of any form of Federal financial assistance for the acquisition or construction of buildings in the flood hazard area will eliminate sources of money and thereby have strong tendency to decrease economic growth, employment, and that community's contribution to the national income. (It appears that the amount of money available from non-federally related financial intermediaries is limited). In the extreme case, there could be an outflow of economic activity and population from the community. It may be assumed that long before reaching that point where the economic loss incurred becomes substantial, a nonparticipating community would choose to enter into the Program.

(c) In a community which has no available area undeveloped, including its special flood hazard areas, the proposed regulations could impose serious restrictions on redevelopment. Although FIA is currently investigating this issue, there is as yet little information available, nor has any sophisticated methodology been developed for determining the effects of flood plain regulatory efforts on the relocation of development outside of the flood hazard area, either in fully developed communities or in communities with remaining developable areas. It may be anticipated, however, that costs will be incurred by the community in making services available for development in areas that are not flood-prone. Thus, the program's disincentives to further development in flood hazard areas may result in increased infrastructure expenses.

(d) The flood plain management and insurance purchase requirements of the Program apply primarily to new construction and substantial improvements to existing structures. Since the performance standards of the regulations may increase construction costs and since flood insurance coverage increases a firm's fixed costs as well as a homeowner's ongoing costs of ownership, the Program could have a dampening effect on investment in identified flood hazard areas.

The Program's implementation will cause potential investors to consider the investment proposition in the context the true costs of using a given hazard area. Investors will no longer be able to ignore the risk of flood damage in their investment decisions by implicitly transferring the risk to the taxpayer, who provides the wherewithal for Federal disaster relief.

As a result of safer, more appropriate construction motivated by the Program, as well as the insurance coverage, the Program could increase property values and result in a net increase in a community's tax base. On the other hand, the Program's tendency to discourage marginal investments may, on the balance, erode artificially inflated property values (see discussion, Section VI, B4) and decrease the tax base in the community's flood hazard areas. (However, a reduced tax base in flood hazard areas may be compensated for through increased investment elsewhere in the community). Where this second consequence is the case, a less inflated value of such properties may enable the community to purchase them for transfer to open space uses, as discussed in Section II-A-1.

(e) The Program's rigorous restriction of development in high hazard areas and its performance standards for construction in flood fringe areas will reduce flood disaster recovery costs and the need for reliance on structural protection works. A portion of both of these costs must be borne by the community. Further, since communities are required to coordinate certain of their flood plain management activities with neighboring communities (see Section I), the potential

for negative impacts resulting from one community's activities being experienced by another is reduced. (The main mechanism by which such potential negative impacts are decreased is the community's floodway designation responsibility as set out in Section 1910.3(d) (2) of the proposed regulations. This requirement prohibits encroachments which would result in any increase in flood heights during the recurrence of the 100-year flood discharge).

It must be emphasized in relation to the impacts outlined under (a-e) above, that since it is the community itself which determines how best to implement its flood plain management regulatory effort within the framework of the Program standards, it has the greatest degree of discretion in controlling the type and extent of impacts which will result. The greatest degree of control over any negative, short-term impacts which may result, and the direction of efforts to maximize the long-term potential for constructive adjustment to the flood hazard lies with the community itself and is a function of the community's effort to ensure the most positive outcome of any necessary trade-offs.

(iii) Economic Impact of the Program on the Individual Property Owner

The implementation of the Program in a community creates forces which have varying effects on the value of flood-prone land. As a preface to this discussion, it must be emphasized that the designation of an area as flood-prone, rather than necessarily diminishing or augmenting property values therein, forces recognition of true worth by appropriately shifting the flood risk from the general public to the

specific property owner. Where the delineation of the 100-year frequency flood plain has not been carried out, the risk of flooding is not public knowledge and may not affect property value and thus there exists an artificially inflated market value. (See discussion in Section VI-B4).

(a) Construction Costs

Compliance with the elevation, floodproofing, anchoring and other building criteria may increase construction costs. Such increased costs may discourage some developers, while those who choose to build will pass the increased cost on to the buyer. This may have the effect of decreasing the demand for the property. On the other hand, property values may increase since construction in accordance with established flood damage reduction procedures makes it safer against damage from future floods than property not so constructed. It should be noted that construction costs for elevation and floodproofing vary greatly in relation to a proposed site's proximity to the boundary of the 100-year flood plain and the type of structure.

(b) Insurance Coverage

The availability of flood insurance coverage may increase property value. Through such coverage, construction in special flood hazard areas is assured indemnification in the event that flood damage is experienced. However, the fact that insurance is required as a condition for making funds available for the purchase of property in identified special flood hazard areas (see part (d) below), may discourage a potential buyer. It may also, on the other hand, encourage such purchase because of the

low financial risk involved in light of the availability of subsidized flood insurance.

(c) Lending Institutions

After March 1, 1974, the flood insurance purchase requirement applies to all identified special flood hazard areas. If a community is not participating, there will be no Federal financial assistance available for acquisition or construction purposes for structures within the flood hazard area, including, for example, mortgages from federally-insured banks (for elaboration, see Section I, Part G). Thus, if a community is not participating in the Program, the value of flood-prone land could decrease.

FIA's experience has shown that on rare occasions certain lending institutions have taken steps to protect their investment which go beyond the basic requirement to purchase flood insurance. Although lending institutions may set whatever conditions they judge to be necessary upon the granting of loans, the statute requires only that they condition such loans on the purchase of flood insurance. However, on their own initiative, they may take whatever additional steps they deem necessary to protect their investment. If they choose to apply more stringent criteria, as a matter of bank policy, the value of property could decrease.

On the other hand, the designation of an area as flood-prone does not necessarily result in a market devaluation of the property therein. Insurance protection may facilitate mortgage credit. Credit, in turn, assures a structure's marketability, which maintains the structure's market value.

Hence, adequately protected buildings may be more valuable than unprotected buildings in the flood plain. In addition, because flood insurance is made available for structures already existing in the flood plain, the financial risk associated with such a structure is reduced and the value of the structure is actually enhanced. Thus, since the lending institution receives these assurances that its loan is protected, there is little incentive for additional, prohibitive conditioning of loans.

B. Probable Adverse Environmental Impacts Which Cannot Be Avoided

1. Fill

The flood plain management regulations allow the use of fill for structural elevation in flood-prone areas except in floodways where its use would result in increased stage rise beyond the regulatory standards, and in coastal high hazard areas. However, after the effective date of the FIRM, even if fill is used, it will not exempt an individual from the insurance purchase requirement.

(a) The use of fill may have a degrading influence on wetlands. Its use imposes modifications on the natural environment which in most locations is unlikely to have more than a negligible impact. However, in wetland areas, relatively small inputs of fill can impair their natural functions. The more pronounced of these functions are maintenance of natural habitats, water quality and aquifer capacity. To the extent that fill is used in these sensitive natural areas, these functions will be negatively impacted -- at both the site where the fill is used and at its source. (See also Section VI B1).

(b) The use of fill increases turbidity and sedimentation in streams and other water bodies. During the period of construction and excavation, and until ground cover is reestablished both at the source of the fill and at the site where it is deposited, severe erosion may occur. Water-borne sediment produces turbidity and is deposited down-stream. Where sedimentation is significant, or where much of it is derived from nutrient-laden topsoil, water quality and aquifer infiltration capacity may be degraded.

It should be noted that specific reference is included in Section 1910.3(a)(?) of the regulations requiring communities to ensure that all required permits, including Section 404 permits under the Federal Water Pollution Control Amendments of 1972, are secured for all proposed construction or other development in the community. This requirement may be expected to aid in minimizing any possible negative impacts to sensitive natural areas which could arise from implementation of the NFIP. Further, FIA encourages the use of piles and columns for structural support purposes, and is providing a comprehensive publication which deals with the cost, design and construction of structures elevated in this manner. (See Part 2(c)(4)).

## 2. Structural Protection

The implementation of the Program may stimulate interest in structural protection works. Acting by itself, it may be expected that the Program's identification of flood hazard areas and the subsequent increase in community awareness of such risk would have only a slight tendency to stimulate interest in this alternative. However, the end result could be an increase in reliance on structural protection when coupled with (a) the general reluctance on the part of communities to implement regulatory measures, (b) the pervasive attitude that the technological approach is the only answer to flood problems, (c) the perception that communities can "shop around for the best deal" between various Federal and State agencies involved in the funding of these projects, and (d) the realization that in certain circumstances local topography or development trends decrease the feasibility of the regulatory approach.

Relative to the first two influences, (a and b), it has been recognized in recent research that communities are showing increased interest in adopting flood plain management measures, as well as other regulatory measures to protect life and property from all types of natural hazards (Baker and McPhee, 1975). The third influence (c), is also becoming of decreasing importance in light of the more critical scrutiny being given to proposals for protection works as a result of the directives set out by Congress in the Water Resources Development Act of 1974 and other legislation. Therefore, the major viable justification for reliance on protection works exists where the regulatory approach is rendered ineffective by substantial physical or developmental restraints. In such cases, the influence of the NFIP is a moot point. (For related discussions, see the Introduction and Part VI-B5).

The degree to which demand for structural protection is generated will be related to the cost-sharing policies which finally result from the current Water Resources Council investigation.

### 3. False Sense of Security

(a) A recognized problem exists in flood damage reduction activities which is experienced in both the establishment of design standards for protection works and in flood hazard area delineation for flood plain regulation. That is, a false sense of security may be fostered by the nationwide application of a specific standard. In the former case, property owners situated in a "protected area" below a dam built to provide protection from a specific design flood are subject to damage or injury from floods exceeding that capacity. It is recognized that no flood hazard area can be

completely protected, for economic reasons alone. Therefore, most protection works do not provide adequate protection from great and infrequent floods that exceed their design capacity. Similarly, property owners who have elevated or floodproofed their structures to the 100-year frequency flood level may feel that they are safe from any potential flood occurrence. This, however, is not the case. The NFIP regulations address this issue generally through emphasis that they set minimum safety standards and specifically by noting in Part 1910 that elevation beyond the minimum 100-year frequency flood elevation level provides an extra margin of safety from very severe flood occurrences which exceed the base flood level. FIA also identifies these areas of severe risk on its FIRM's (the 500-year frequency flood level is delineated on all Rate Maps).

(b) The revision to the regulations discussed in Part K of Section I will have a short-term negative impact which cannot be avoided. In the interim, between the time when the "adequate progress" threshold has been surpassed and the completed system becomes effective, the adjusted flood insurance rates and flood plain management requirements will not reflect the actual risk to which new development will be exposed. The alternative would be to require the most rigorous flood plain management regulatory and insurance purchase requirements for a period of time varying from a few months to a few years with full protection from flood waters up to the base flood level being provided through the system thereafter. Although flood damage potential is increased and development partially subsidized over the

short term, financial hardship associated with increased construction and insurance costs is avoided. This revision is specifically designed to provide relief only where delays in federally-funded projects are directly attributable to the Government.



#### 4. Subsidies

As indicated earlier in the discussion of the economic impacts of the National Flood Insurance Program, the original statute provided for subsidized rates for structures and their contents already located in the flood plain when the community entered the Program both to provide insurance coverage at rates that owners could afford for properties so located when the extent of their flood exposure may not have been known to them or may have been caused or aggravated by imprudent construction by others, and as a trade off for the community enacting and enforcing loss reduction measures.

The subsidization of these premiums represents a cost to the taxpayers of the Nation. In return, it was envisioned, property owners in the flood plain would be insured, flood losses would be reduced, requirements for taxpayer funded disaster relief would be reduced and the demand for structural protection, costly to the Government, would likewise be reduced.

The value of such properties would be enhanced by the availability or subsidized insurance mitigating any devaluation which might have occurred as a result of the identification of the property as flood-prone. New construction could only be insured at full actuarial rates.

With the 1969 amendments, designed to provide flood insurance coverage to eligible communities without waiting for the precise delineation of the flood hazard areas and the fixing of actuarial rates, coverage increased, although not to very great proportions, as did subsidy costs to the Government. The communities were required to institute a permit system and to consider all available flood hazard information in administering the system.

However, lacking actuarial rates, new construction in many thousands of communities was denied flood insurance coverage. The effect of a 1973

regulation was to provide first layer coverage at subsidized rates for all structures built before the community receives the official FIRM (Flood Insurance Rate Map). This action was codified by Congress in the 1973 Act. In addition, the Congress chose to provide subsidized rates to all construction started on or before December 31, 1974. Unless substantially improved or substantially rebuilt after a flood, these structures remain eligible for subsidized coverage.

The 1973 Act resulted in a rapid expansion of the Program. With over 14,000 communities in the Emergency Program, this provision of subsidized coverage to new construction becomes the source for a growing outlay. It is because of this growing outlay that the Congress has been asked to appropriate additional funds for rate and mapping studies to accelerate the conversion of these communities to the Regular Program and to make it possible for FIA to meet the 1983 deadline for the determination of actuarial rates for all eligible communities. The Congress has indicated its willingness to finance the subsidy so as not to deny insurance coverage to all new construction until actuarial rates have been developed.

To the extent that no flood hazard information is available to guide Emergency Program communities in administering their permit systems and/or they are less than diligent in such administration, it is possible, that unwise and flood exposed construction in the flood plain is encouraged. By itself this is contrary to the philosophy and broad purpose of the NFIP. Viewed in context, however, it is a cost assumed for the following: (1) insurance coverage (2) flood loss reduction (3) reduced disaster relief and (4) reduced demand for structural protection.

To hold these subsidy costs in bounds and eventually to reduce them, FIA is attempting to:

- (a) Accelerate flood insurance studies, without reducing their accuracy;

- (b) Seek quicker and more economical methods for performing such studies;
- (c) Increase technical assistance to communities in their flood plain management activities, and;
- (d) Increase its efforts to monitor compliance by communities with Flood Insurance Program regulations.

In addition, HUD has joined other agencies in an effort to update Executive Order 11296 so that the Federal government may by example stimulate these communities to do a better job in flood plain management. Similarly, it has joined in developing a Unified National Program for Flood Plain Management which should, when issued, encourage more effective flood plain management throughout the Nation.

### III. ALTERNATIVES TO THE PROPOSED ACTION

#### A. Implementation of the National Flood Insurance Program

##### 1. No Action

Section 1361(c) of the Flood Insurance Act of 1968, as amended, and Section 205(a) of the Flood Disaster Protection Act of 1973 authorize the Secretary of HUD to issue regulations necessary to carry out the purposes of the Acts and to periodically revise such regulations. The proposed regulations revise and update those currently in effect to reflect statutory changes and the continuing evaluation of the Program.

Generally, to the extent that the effective implementation of the Program would be curtailed by failure to improve the regulations to reflect increased knowledge of the flood hazard and the NFIP mechanisms for mitigating the hazard, this alternative could be expected to decrease the short-term negative impacts of the Program at the cost of its long-term benefits as summarized in Section VI. (Additional discussion of the revisions and their background is to be found in the Preamble to the regulations).

##### 2. More Stringent or Less Stringent Regulatory Standards

This alternative presumes there will be more stringent or less stringent regulatory standards than those currently in effect.

The 100-year frequency flood standard has provided the basis for regulating identified special flood hazard areas under the NFIP since its inception. Initial investigations into the most appropriate base flood standard were carried out in 1968 both by HUD in a seminar held at the University of Chicago in which Federal, State and local governments, private industry and the university community were represented, and by the U.S. Water Resources Council in a study prepared by the University of Wisconsin. Since that time the 100-year flood standard has been recognized by Congress as "reasonable and consistent with Nationwide standards

for flood protection" (Report of the Committee on Banking, Housing and Urban Affairs on the Flood Disaster Protection Act of 1973, p. 5), and is now used by virtually all agencies and 43 of the States for flood plain management regulation.

In discussing alternatives to the 100-year frequency flood standard, it is necessary to understand the purpose of having an elevation requirement. By requiring elevation to the 100-year level, those who are considering building in a special flood hazard area are put on notice that there is present an identified flood risk. Implicit in the use of this standard is the assumption that the costs of elevating a building to the 100-year flood level will be less than the benefits derived from such elevation. These benefits are constituted by reduced flood damage and lower actuarial flood insurance rates. Thus, the cost of elevating should be less than or equal to the resulting decrease in premiums for flood insurance coverage.

In deciding to use the 100-year flood frequency as a national standard, the underlying judgment was that, overall, the benefits of protecting to the 100-year frequency flood level or locating elsewhere outweighed the benefits of building in the flood plain without protection. It has not been possible to determine whether this assumption is valid. It is clear, however, that adoption of a more or less stringent flood frequency standard would not guarantee a maximization of net social benefits. Each would be too high in some cases and too low in others. Without strong evidence being developed to the contrary, changing the standard is not likely to improve the situation. On the contrary, opting for another standard at this point would be extremely costly in view of the administrative mechanism already in effect for several years under the NFIP.

The argument has been made that FIA should permit each community to regulate to the standard which is most appropriate for that community's flood hazard. Technical a reasonable argument can be made for this position. From an administrative point of view, and in terms of equitable treatment of some 20,000 communities, such a system

would be impossible to administer. FIA will never have enough engineers or compliance personnel to make such a system work. Actually any such system would require a complete recalculation of all actuarial rates.

Therefore, since with any nationally-applied building standard there will be instances in which its strict application would be inappropriate, administrative mechanisms which provide for some flexibility must be developed which take these situations into account. As discussed in Part I-D, detailed variance and exception procedures have been developed under the NFIP to provide relief in situations where strict adherence to the regulatory standards would cause unreasonable hardship. Further, in Section 1910.1(d), the NFIP regulations provide that in cases where a State or community has determined through technical analysis and their unique knowledge of past flood occurrences that a more restrictive standard is appropriate such standards will take precedence over the minimum criteria set out in Section 1910.3.

### 3. Modifications in the Implementation of the National Flood Insurance Program

This alternative assumes that the current framework for the implementation of the NFIP is not the optimal one to meet the intent of Congress in the flood insurance legislation. Modifications discussed are (a) elimination of the Flood Hazard Boundary Map (FHBM); (b) elimination of the Emergency Program (c) elimination of the flood plain management requirements of the program; (d) re-institution of a "voluntary" flood insurance program; (e) extension of the insurance purchase requirement; and (f) alteration of the subsidy of insurance rates.

The first alternative, the elimination of the FHBM, is the only one of the following six modifications in the implementation of the NFIP which could be carried out as an administrative action. Alternatives (b) through (f) are each beyond the current legislative authority of the Program, and would thus require statutory changes in order to become effective.

(a) Eliminate the Flood Hazard Boundary Map (FHBM), but retain subsidized insurance rates until completion of the rate study - it has been suggested that only those maps resulting from FIA's rate-making studies be used for delineating the

regulatory flood plain and that area within which flood insurance must be purchased.

This action would withhold needed information from property owners and local officials for a period of possibly several years while the rate study is being contracted, carried out, and reviewed. Although the FHBM does not provide specific elevations for various flood frequencies, its delineation of the flood hazard boundary gives an indication of the 100-year frequency flood level when shown on topographic maps or when transferred to the ground. This assists in the general consideration of appropriate uses or adjustments to the hazard. The FHBM provides property owners with part of the flood information needed for planning the appropriate use of undeveloped land and the best action for reducing damage potential of developed areas. The maps show whether or not their properties are subject to inundation and give some indication of the severity of the hazard. This action would also affect local community officials who are often aware that flood problems exist in their jurisdiction but do not know their location or magnitude. Concerned officials nationwide are requesting any data immediately available from agencies with technical expertise such as the U.S. Army Corps of Engineers. They want the best available information promptly to guide them in local development and in recruiting and locating industry. They cannot wait months or years. They want the best available data at this time and more complete information later as it can be provided. Further, without the delineation of that area subject to flood damage as provided by the FHBM's, participation in the Program and the purchase of insurance could be expected to drop with a concurrent increase in reliance on costly public disaster assistance.

(b) Eliminate the Emergency Program - it has been suggested that the combination of federally-subsidized insurance and only general flood plain management regulatory requirements as presented under the Emergency Program phase of the NFIP constitutes a "give-away" program. (See discussion under Economic

Impacts, part 1 (d)).

If action were taken to eliminate the Emergency Program, flood-prone communities could not enter the Program until completion of their rate studies. Experience to date indicates that limited available expertise in Federal technical agencies and private engineering firms, coupled with current lengthy review and appeal procedures, will result in substantial delays in the completion of rate studies. Thus, for communities not currently participating in the NFIP flood insurance availability could be denied for a period varying from 3-10 years. During this period, since subsidized flood insurance would not be available, reliance on disaster relief and structural flood plain management adjustments would be increased. Further, removal of the flood insurance purchase requirement and flood plain management requirements which exist under the Emergency Program would eliminate much of a community's incentive to implement even minimal flood plain management requirements such as those set out in Section 1910.3 (a and b).

(c) Elimination of the flood plain management regulatory requirements of the program - it has been suggested that the flood insurance purchase requirement alone, when based on actuarial flood insurance rates, would ensure that future development in flood hazard areas will be carried out in accordance with the degree of flood risk and would afford adequate protection to development in the Nation's flood plains.

This approach, taken alone, has serious flaws. First, even after actuarial rates become effective, only those individuals desiring Federal financial assistance are required to purchase flood insurance. Thus, to substitute the effects of actuarial rates for those of flood plain management regulations would eliminate control over certain new construction in the flood hazard area. Second, although dependence on actuarial rating alone might ensure the protection of individual structures themselves, there would be no mechanism under the NFIP provided to protect existing development against the aggravation of the hazard which

ensues from additional development in flood-prone areas. This kind of protection is currently afforded through the combination of appropriate flood plain management regulations and insurance subsidies for existing structures. Third, if an individual such as a developer is constructing buildings in flood hazard areas for sale to others, he may not wish to elevate or floodproof either to save additional costs or to under-emphasize the flood risk. Fourth, lending institutions and the insurance industry are wary of providing loan money or insurance coverage for development which is not carried on in compliance with measures designed to systematically reduce the risk. In fact, the lack of effective loss prevention measures was among the principal reasons why the insurance industry never provided flood insurance coverage under standard homeowner's policies.

The insurance industry recognized that effective loss prevention measures in the form of community flood plain management regulatory efforts would rarely materialize on a voluntary basis. Finally, while the concept of performing a cost-benefit analysis for any building proposal to determine the appropriate protection level seems to best maximize benefits, there are serious reservations associated with the implementation of such an approach in lieu of flood plain management regulatory measures. The reduction in insurance premiums is the basis for determining benefits. Actuarial insurance rates reflect the risk of flooding to which a structure is exposed, but they do not reflect the environmental impact of locating in the flood plain. The present problems with the degradation of our environment are indicative of our inability to fathom intricate natural interrelationships. While the economic concept of externalities takes care of known environmental considerations (at least to the extent that a monetary value can be given them) it does nothing to guarantee that as yet undiscovered impacts on the natural environment are given attention. Nor is it conceivable how individual cost-benefit analyses of individual building proposals could adequately deal with social costs, with the public interest

From a flood plain management standpoint, the environmentally correct elevation standard will always be greater than the standard which results from the purely economic comparison of the costs of elevating versus the decrease in insurance rates.

(d) Re-establish a voluntary flood insurance program-under the National Flood Insurance Act of 1968 (P.L- 90-448), the purchase of flood insurance by property owners to be voluntary, and there would be no conditions set on the receipt of Federal and federally-related financial assistance.

This action would have the effect of reinstating an administrative framework which has previously been proven to be ineffective in meeting the objectives set by Congress to minimize the loss of life and property resulting from the flood hazard. The National Flood Insurance Act of 1968 established what could be termed a "voluntary" flood insurance program. That is, the conditioning of the receipt of Federal and federally-related financial assistance, as discussed was not in effect. The findings of the Senate Committee on Banking, Housing and Urban Affairs in considering these purchase requirements established that "despite the efforts of FIA to carry out the Congressional intent for flood plain management regulatory measures in its administration of the Act, it became quite obvious that without mandating provisions to bring about these measures, no real accomplishment could be expected in this respect." The report found the voluntary nature of the Program's administration under the 1963 Act to be its major defect. FIA's early records reflect the experience of the commercial insurance industry. Few individuals secure coverage until they either are forced to do so or are in imminent danger of sustaining a severe loss. A similar principle applies to local community officials in choosing whether or not to enter the Program. They chose under the 1968 Act to ignore the likelihood of a major flood in order to avoid the short-term costs incurred in the implementation of the NFIP.

(e) Extend the insurance purchase requirement -- it has been suggested that all owners of structures be required to purchase flood insurance in order to gradually eliminate the need for costly disaster relief outlays.

One of the objectives of the NFIP is to provide a more appropriate alternative to reliance on disaster relief which represents a burdensome social cost. At present, only those who seek Federal financial assistance in special flood hazard areas must purchase insurance. This leaves two classes of structures dependent on disaster relief in the event of a flood.

First, there are those structures in special flood hazard areas already in place and those which do not require any Federal assistance. Since there is a strong likelihood that they will be flooded, requiring the purchase of flood insurance would reduce the need for disaster relief appropriations. To do so would necessitate developing specific administrative mechanisms and, moreover, the legislative authority of the NFIP would have to be expanded to require insurance for structures which now are granted relief from the insurance purchase requirement in order not to burden those who had built in flood hazard areas in ignorance of the risk. The Federal Disaster Assistance Administration and the Federal Insurance Administration have addressed this issue through the policy of extending flood disaster relief to uninsured structures only on the condition that flood insurance is purchased. (This policy now excludes individual property but applies to public and non-profit property).

Second, there are those structures outside the 100-year frequency flood plain for which insurance is never required. These structures are subject to floods of greater severity than the 100-year frequency flood. To eliminate the need for disaster relief, owners of all structures could be required to purchase insurance. At present, the minimum cost of a flood insurance policy is \$25.00 which can be

considerably more than the actuarial cost. (When the rates become low enough, the cost of writing the policy becomes greater than the cost of insuring the risk). Before requiring insurance to be purchased by everyone, it would be necessary to bring the cost in line with the degree of risk. Perhaps this could be done if the private insurance industry were assured there would be a vast number of such policies. Even more imposing difficulties associated with this approach would arise in relation to developing greater detail in hydrologic data and establishing risk premiums in those areas subject to flooding in excess of the currently used 100-year frequency flood standard. The cost of developing the necessary data would have to be weighed against the benefits arising from eliminating reliance on disaster relief.

(f) Alter the subsidy of insurance rates -- various suggestions have been made which relate to the present subsidization of insurance rates for existing structures.

There are several alternatives to the present policy of selling flood insurance at subsidized rates to any structure built before the effective date of the Flood Insurance Rate Map. There are two general groups of buildings which benefit from this subsidy. First, there are those structures which were built prior to the publication of the Flood Hazard Boundary Maps. Requiring owners of these structures to purchase flood insurance at actuarial rates would have penalized those who built prior to the time that information was made available delineating the 100-year frequency flood plain. They would not have had sufficient information upon which to determine the optimal first floor level for reasonable actuarial rates. This action would place an unwarranted financial burden on these property owners.

Rather than continuing this subsidy indefinitely into the future, however, some date for elimination of the subsidy could be set. To ease any burden to the property owner, the date could be set at the end of the expected life of the building and the subsidy gradually reduced over the ensuing years.

The second group of buildings aided by this subsidy is comprised of those buildings constructed after the publication of the Flood Hazard Boundary Map (FHBM) which delineates special flood hazard areas, and before the effective date of the Flood Insurance Rate Map (FIRM). As an alternative, any building constructed after the date of the FHBM could be made subject to actuarial rates when they become available. The effect of such a policy would be a halt construction in the special flood hazard area until completion of the ratemaking study. Builders would have no way of knowing how much to elevate proposed structures nor would they know how expensive flood insurance would be if no elevation were required.

Since there may be a period of several years before rate maps are available in some communities, builders have been given the same subsidized rates that apply to the first group mentioned above for the life of all structures built before completion of the rate study. In lieu of such generosity, a smaller subsidy might be granted for the second group. By making the subsidy less attractive, there would be correspondingly less incentive for someone to rush to build in the flood plain before the rate map becomes effective. If such an incentive exists, it is particularly harmful because the flood plain management requirements of the Emergency Program are less comprehensive than those required as part of the Regular Program.

#### 4. Prohibit All Development in the Flood Plain

It has been suggested that the most direct manner in which to meet the basic intent of the NFIP, the protection of life and property in flood hazard areas, would be to prohibit all development in the flood plain. Obviously, this approach is too simplistic; while it could maximize beneficial impacts on the natural

environment, negative impacts on the man-made and especially the social environment would in most cases heavily outweigh them, while legal restraints also make this approach infeasible.

The flood plain as a natural ecosystem would be protected against direct disruption and endangerment. At the same time, through the prohibition of all development, the opportunity to use that land for environmentally compatible uses would be lost. In the floodway, for instance, which can be the most ecologically sensitive area of riverine flood plains, almost any encroachment is prohibited by the stage rise regulatory requirements (see Part II (b)(v)). Non-structural, open space uses such as recreation and agriculture are allowed. While such uses may have certain adverse environmental impacts, they are not as severe as those associated with structural uses. Further, prohibiting environmentally unattractive uses from the flood plain does not preclude such uses from locating elsewhere. In some cases, negative environmental impacts may be greater at the alternate site. It must be realized that in environmental decision-making one cannot realistically attempt to eliminate all negative impacts, rather one must strive to minimize the potential harm. Furthermore, and perhaps most significant, it must be recognized that the outright denial of all development in flood hazard areas would raise the legal issue of an unconstitutional taking of property without just compensation.

#### B. Other Adjustments to the Flood Hazard

Between the two extremes of prohibiting all development in the Nation's flood plains, and bearing the losses resulting from taking no action to deal with the flood hazard, several alternatives are currently relied on, to one degree or another, for flood hazard mitigation. These include (1) control and protection works, (2) land use management, (3) floodproofing, (4) flood forecasting and warning, (5) insurance, and (6) relief and rehabilitation. These alternatives may be grouped into three general categories based on the direction of their efforts. The first

category stresses modification of the hazard itself; the second, modification of the human events system in the flood hazard area; and the third, modification of the losses resulting from the flood hazard.

1. The traditional approach to flood hazard mitigation in the U.S. has emphasized the control or modification of the flood event or its cause. Since the mid-1930's, approximately \$9 billion has been spent on flood protection and prevention measures (H.D. 465). These include engineering works (dams and reservoirs) to regulate river flow, levees and channel modifications to keep flood water out of specific areas, land treatment in upland watersheds to minimize run-off as well as weather modification to reduce or redirect precipitation.

(a) Impoundments - flood control dams and reservoirs are constructed to modify stream flow by storing and releasing water in regulated amounts. When properly constructed and managed with adequate flood water storage capacity, such control works are generally quite effective in preventing flood losses to existing property up to their design levels. While flood protection works reduce the risk to existing development, they have associated with them certain constraints which minimize their utility.

The construction, operation and maintenance of impoundments and the purchase of land for their siting, requires large capital investments. Individual beneficiaries from such works generally do not bear an adequate share of the costs. Most of these projects are implemented primarily at the public's expense. The construction of an impoundment has a tendency to increase development downstream. The protection of flood-prone land increases property values which provides an impetus to new development which may thus occur in areas where such use had previously been considered infeasible. Once development has occurred within protected areas, additional development may be attracted to adjoining

unprotected lands increasing net flood loss potential.

It should be noted that no flood hazard area is completely protected. Cost alone prohibits it. Therefore, most projects do not provide adequate protection from great and infrequent floods that exceed their design capacity. It has been estimated that 33 percent of the total flood damage incurred in the United States in the first half of this century resulted from the overtopping or failure of protection works (Holmes, 1961). Further, siting requirements for impoundments cannot always take into consideration a storm center which concentrates on areas between the protection work and developed areas downstream. Thus, the presence of protection works may create a false sense of security which acts to induce flood plain development.

Recently, a greater understanding of the role of flooding in the riverine ecosystem has underscored another drawback in reliance on impoundments for flood hazard mitigation. The presence of such protection works in the riverine ecosystem introduces the following influences:

(i) In and around the impoundment - stream regime (flow characteristics altered); floral and faunal production (plant, insect, fish and wildlife production modified); scenic and aesthetic (intrusion of imposing structure and attendant facilities on river valley); erosion and sedimentation (reservoir capacity loss and bank instability); water temperature and quality (temperature stratification, pollution and salinity buildup); land forms (construction and subsequent activity reshapes topography); recreational potential (free-flowing stream to slack-water uses), etc.

(ii) Downstream from the impoundment - stream regime (peak flow reduced, minimum flow increased, abnormal variations introduced); sediment transport (lower sediment load, extended sedimentation period); floral and faunal production (plant, insect, fish and wildlife production modified); water temperature and quality

(increased salinity); abnormal temperature fluctuation induced, etc

(b) Levees, dikes and floodwalls are structural protection work designed to keep flood flows out of protected areas while providing sufficient capacity in the stream channel to pass high flood flows. They are frequently effective, but share many of the constraints discussed under impoundments. Construction and maintenance is costly and they may require expensive pumping facilities to handle storm water behind them; they induce a false sense of security and are subject to failure and overtopping (it has been estimated that up to 40 percent of the losses suffered in Tropical Storm Agnes in 1972 were caused in this manner (White, 1975); they are aesthetically unattractive and cut off views and access; they are ecologically damaging since they increase velocity and flow as well as erosion; and by reducing valley storage capacity, they may increase the hazard to adjacent and downstream communities.

(i) Channel improvement is another local protection technique which consists of straightening, ~~deepening~~ and clearing the stream channel as well as grading and clearing stream banks. Channel capacity is increased and flood flows can be passed more readily providing protection to existing development. Again, cost is high and flood problems may merely be dislocated. From an aesthetic standpoint, channel improvements destroy the natural beauty of the stream and radically decrease productivity by eliminating floral and faunal habitats. Maintenance costs can be high if banks are not stabilized; however, this also presents an increased construction cost.

(c) Land Treatment - land treatment, or watershed treatment, has as one of its objectives the reduction of water and sediment run-off through a variety of conservation practices, timber and vegetation management procedures and structural measures. This approach can be effective in retaining runoff in the head water of a stream, thereby decreasing mainstream buildup of severe flood

flows with few negative associated impacts. Generally however, only a relatively small amount of flood water is affected; namely that which falls on the upland periphery of a watershed.

(d) Weather Modification - still in the experimental stage, this approach attempts to reduce severe flooding by modifying its cause. One application consists of inducing precipitation-laden air to drop its moisture before reaching an area where its addition would initiate or worsen a severe flooding situation. However, since protecting one area may increase the hazard to another, basin-wide coordination is required where this adjustment is applied.

2. The second category of flood damage mitigation adjustments addresses itself to the modification of flood damage-susceptible uses in flood-prone areas. Rather than attempting to modify flood flows which are a natural part of the hydrologic cycle, this approach attempts to keep potentially damageable uses out of the area of risk while relocating or providing warning and floodproofing measures for existing uses. Included here are flood plain regulation, community development policies, floodproofing and flood forecasting and warning systems.

(a) Flood plain regulation - the regulatory approach attempts to direct growth in the flood plain toward uses compatible with the risk, the intent being to reduce flood losses and increase the net benefits of flood plain use. Flood plain management regulations generally take the form of zoning ordinances, subdivision regulations, building or health codes, a combination of these measures, or special purpose flood plain ordinances.

(i) Zoning ordinances - zoning is a legal tool that is used by communities to ensure the safety of property for public health and welfare and the best use of available land. In the flood plain, zoning is used to restrict uses in the floodway (the high hazard portion of the flood plain) to those compatible with the risk, and to require floodproofing, elevation, or other protective measures for structures

within flood plain areas outside of the floodway.

(ii) Subdivision regulations - these regulations control the division of large parcels of land into smaller lots for the purpose of sale and improvements such as roads, sewers, water supply, and recreation areas all of which can be regulated to minimize exposure to flood damage. The subdivision of land is a first step in the development process and determines the framework within which actual construction will take place.

(iii) Building codes - building codes set standards for the construction of buildings and other structures. They can be used to reduce damages to buildings in the flood plain by ensuring that their elevation and design is compatible with the flood hazard.

(iv) Health codes - these measures established water and sewer facility standards and can be used to protect against health hazards during flooding.

(Note: In-depth discussion of the incentives and restraints relative to reliance on the regulatory alternative is included in the text of this assessment).

(b) Community development policies - although these policies differ from the traditional flood plain regulations discussed above, they can provide a basis for reducing flood loss potential and guide development in a manner that takes into account the flood hazard as well as the natural characteristics of the flood plain. These actions can originate at the local, State or Federal levels and are implemented through the design and location of utilities and services, through policies of open space and acquisition and easement, and through redevelopment or permanent evacuation.

(i) Public improvements - policy decisions which prevent the construction or extension of sewer and water lines and streets into undesirable or hazardous areas can limit development in high risk areas. The location of new streets, schools and other public facilities in areas other than those which are flood-prone can minimize

the flood risk.

(ii) Allocation of open space - nationwide, increasing emphasis is being placed on the need for recreational facilities and open space areas. Community decision-making which encourages the use of flood hazard areas for parks, playgrounds and picnic areas, etc., achieves a secondary benefit beyond flood damage prevention.

(iii) Public acquisition of flood-prone land - community policies which stress public acquisition of areas which are undesirable for intensive development represent an effective approach to the prevention of urban development in flood hazard areas while providing for a recognized public need. Public acquisition of flood-prone property for open space and recreation uses may be implemented through out-right land purchase, purchase of development rights and easement donation, lease back, sale back and other methods.

(iv) Redevelopment -redevelopment of marginal or deteriorating areas can offer communities the opportunity to purchase blighted property in flood-prone areas and to convert the property to uses consistent with the flood hazard.

(v) Removal of unsuitable uses - community policies which encourage the elimination of unsuitable or nonconforming uses and the gradual removal of buildings structurally unprotected from the flood hazard can also be effective in re-orienting the use of land in the flood plain.

(vi) Transfer of development rights - a relatively new concept being used by communities experiencing pressure from urbanization is to control the use of land through the transfer of development rights. This method allows property owners to transfer their development rights from unsuitable property to parcels of suitable lands in other sections of a community. As an incentive, higher density is sometimes permitted in these other sections. This transfer process has direct application to

protecting flood hazard areas from encroachment.

(vii) Comprehensive planning - under a community's comprehensive planning process long-range plans are made to accommodate projected needs for residential, commercial and industrial use of land. Communities can use this tool to determine the pressures for future flood plain development in view of community needs and to devise the best means of adjusting to them.

Little effort has been directed toward direct investigation of the impacts associated with reliance on development policies as an adjustment to the flood hazard. However, in light of their relatedness to regulatory measures; it may be assumed that similar incentives and restraints apply.

(c) Floodproofing - floodproofing measures can contribute to a decrease in flood risk and may be implemented by the individual or by a community, or State or Federal agency for new construction and existing structures. Provisions have been developed for implementation when a new structure is being built or for application when existing structures are repaired, remodeled or expanded. Provisions also exist for construction sites and for the contents of structures to either keep water out or to reduce the effects of water entry. An incentive to reliance on floodproofing is that it places the cost of adjusting upon the property and individuals at risk. Constraints on its implementation include its expense, which can be prohibitive; the lack of sufficient knowledge of appropriate techniques for its application; the need in some cases for a high degree of technical expertise for proper implementation; the fact that some floodproofing measures rely on accurate, timely flood warnings to be put into effect; and its tendency to induce a false sense of security.

(d) Flood forecasting and warning systems - flood forecasting and warning systems are aimed at ensuring that a community, and in turn the individuals within it, can implement short-term emergency actions to protect themselves and their property from imminent flooding. To the extent that such warnings are accurate and acted on with the appropriate set of responses, loss of life and property can be reduced and social disruption can be minimized. However, the effectiveness of this adjustment requires accurate technical determinations, reliable dissemination of information and rapid, effective interpretation and response on the part of public officials, flood plain residents, and emergency preparedness personnel. Since flood forecasting and warning systems are directed only toward immediate evacuation of flood hazard areas, they have no long-term impact on the pattern of occupancy of the flood plain which results in continuing flood losses.

3. The third category of flood hazard mitigation adjustments addresses itself to the redistribution of the loss burden. The individual having suffered a loss can either spread this loss over time or area, or can transfer a portion of the loss to the public. The main alternatives under this category are insurance, or relief and rehabilitation.

(a) Insurance - insurance performs the function of distributing the cost of losses suffered by a few to a larger group of people who share a similar risk. It allows the individual property owner to spread an uncertain but potentially large loss over a long period of time. In this manner, insurance offers a means of assuring economic stability and rapid recovery to prevent disruption of society. (A further discussion of reliance on the insurance adjustment is included in Appendix B).

(b) Relief and rehabilitation - similar to the insurance adjustment, this alternative also provides a means of spreading the loss. This is generally carried out through a public subsidy and takes the form of low interest loans, grants and

loan forgiveness. A number of Federal agencies and programs have been established to provide such services. The provision of some type of relief to the victims of catastrophic loss, which has been an integral part of the traditional humanitarian approach to flood hazard mitigation, can be expected to continue as long as damage-susceptible uses exist in flood hazard areas. However, in lessening the burden of catastrophic flood losses to the flood plain resident, the cost to the general public, which shares only a small portion of the risk, is increased. Further, the perception that "the government will bail one out" when damage is experienced may discourage the adoption of long-term solutions and thus set the stage for future disasters by entrenching unwise development patterns in the flood plain.

Three types of modifications have been discussed as possible alternatives in adjusting to the flood hazard; modification of the loss experience, the flood hazard, or the human events system. Fundamentally different perceptions of the environment underlie each choice. Focusing attention on easing the experience of suffering flood damages shows a certain lack of awareness of environmental processes. The flood hazard is either not recognized, or its presence is ignored. There is no attempt by man to fit his actions into an environmental framework; on the other hand, there is no conscious effort to alter natural systems. The environment is seen only as a force to react to, not one which is considered when adjustments are contemplated. As a result, this strategy holds no potential for reducing flood damage which, of course, is the primary purpose of the National Flood Insurance Program.

Modification of the flood hazard is analogous to the structural approach to flood damage reduction. Such a strategy certainly can minimize the incidence of flood damage. However, there is evidenced in this approach the attitude that natural systems which interfere with man's activities should be altered to conform with man's needs. As we have begun to realize, manipulation of natural processes can

result in second and third order consequences whose adverse impacts far outweigh the benefit originally sought. Attempts to overcome natural forces are invariably more expensive than efforts to live with these forces. This results from both the initial cost of the project which alters the natural system so that it behaves in the desired manner and the cost of unforeseen environmental consequences. These consequences are difficult if not impossible to predict but are certain to result. The natural system as it exists is the result of millions of years of adjustments. Not only is the flood plain ecosystem radically transformed by the introduction of structural protection works, but so also are countless other systems which are closely interrelated to it. Significant alteration of systems which are the result of long-term processes of a gradation and degradation represents a serious disregard for natural systems.

The final alternative is to modify the human actions which expose man to the flood hazard. The underlying environmental philosophy of this alternative is the opposite to that in the previous case. Here the natural system's delicate balance is recognized and respected. Rather than altering the flood hazard, man alters his course of action in relation to natural events. Pursuing a non-structural approach to flood plain management is a way of minimizing impact on the natural environment.

Within such a policy there are a number of options. Under this approach, one would attempt to ensure that only those uses are allowed which have low flood damage potential and which are generally compatible with the flood plain's natural functions. One could also permit uses which are constructed in such a manner so as to minimize flood damage. However, in this latter case, certain implementation mechanisms may infringe upon the natural functions of the flood plain (i.e. fill used to elevate building may negatively impact wetland areas - see VI B1). Thus, even within the most environmentally acceptable option for the reduction of flood damage, there are varying degrees of sensitivity to the role of natural systems.

IV. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The revised regulations are designed to fulfill such purposes of the Act as protecting the short- and long-term health, safety and welfare of the public. However, in accomplishing these purposes, they may also be expected to create conditions which will place some short-term costs on the environment to ensure long-term productivity. This section reiterates the impacts of the program's implementation as discussed in the Analysis of Environmental Consequences. The impacts are summarized for presentation on the basis of whether they will be experienced over the short-term or over the long-term.

A. Short-Term

1. An increased cost of occupancy of flood hazard areas will result from the implementation of the program's performance standards and the insurance purchase requirement.

2. A reduction in developable land for high intensity uses may be experienced as a result of the high hazard area requirements and the cost of insurance and compliance with its performance standards.

(These impacts could cause a reduction in development leading to decreased tax base and employment either in an absolute sense, or from the standpoint of opportunity costs).

3. Increased administrative costs will fall on the community as a result of enforcing the flood plain management requirements.

4. Environmental costs as outlined previously under Section II D, "Adverse Environmental Impacts," will also apply over the short-term.

5. The population at risk will be reduced.

6. Property will be protected from the flood hazard through implementation of the program's performance standards and through the availability of insurance coverage.

7. There will be more equity in the allocation of resources in that individuals are compelled to recognize the true cost of flood plain occupancy and to base their investment decisions accordingly.

8. The true cost of flood plain occupancy will be placed on the individuals directly benefiting from that occupancy.

B. Long-Term

1. Damage to community tax base may be experienced (1 and 2 under "Short-Term" are also long-term in effect).

2. A decrease in the public subsidy of the Program will become possible as more insurance is sold.

3. Disaster assistance and recovery costs will decrease as the magnitude of the insurance in force increases and the effects of the regulatory standards are felt.

4. The impacts outlined in 5 - 8 above are also long-term in effect.

V. ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS WHICH WOULD RESULT FROM THE IMPLEMENTATION OF THE REGULATIONS

On the whole, implementation of the proposed regulations would not curtail the range of beneficial uses of the environment. As was discussed in Section II A of this statement, the implementation of the regulations will provide for some reversion of the flood plain land resource to uses which are the most appropriate in light of the existence of the flood hazard. The range of low flood damage susceptible uses, included under the heading of open space use, provide for a wide spectrum of beneficial uses.

## VI. CONSULTATION WITH OTHERS

The draft environmental statement was filed with the Council on Environmental Quality in November of 1974. Over 300 written responses were received on the proposed flood plain management regulations and on the draft environmental statement. As a result, a number of changes have been made in both. Comments on each were received from Federal, State and local levels of government, private and public service organizations, and individuals. All comments received from these sources are on file with the Director of the Flood Plain Management Division of the Office of Flood Insurance, Federal Insurance Administration in HUD, 7th and D Streets, S.W., Washington, D. C. 20410, and are available to the public during normal working hours.

### A. Review of Responses

A review of responses identified eight general issues of special concern or in need of further clarification. They are (1) wetlands, (2) variances and exceptions, (3) economic impact, (4) structural control, (5) flood plain storage capacity, and (6) Executive Order 11296. Further, there were a number of comments which were dealt with individually since they neither were appropriate for discussion in the text, nor did they fall into the eight summary categories above.

### B. Discussion of Issues

#### 1. Wetlands

a. One of the basic requirements of the regulations is that residential structures be elevated to or above the level of the 100-year frequency flood, and that nonresidential structures be either elevated

or floodproofed to or above that level. Accepted design standards and procedures recognize two basic approaches to meeting the elevation requirement. One comprises the use of piles or columns, while the other relies on the use of fill.

Comments dealing with the use of fill for elevation purposes have addressed the impact of its use on sensitive ecological areas such as wetlands. Rather than focusing their intent on the protection of wetlands, the National Flood Insurance Act of 1968, as amended, and the Flood Disaster Protection Act of 1973 direct their efforts toward decreasing the unwise occupancy and use of areas subject to flood damage. It may be expected, however, that since the Program's implementation brings into action a variety of influences which will act to discourage flood-damage susceptible uses in flood hazard areas which often encompass wetlands, an incidental effect of this trend will often be to decrease the man-induced disruption of these sensitive areas (see Section II of the text).

FIA discourages the use of fill in its identified special flood hazard areas through:

(i) prohibition of its use for elevation purposes in all identified coastal high hazard areas;

(ii) prohibition of its use in any designated floodway area if such use would result in any increase in the level of the 100-year frequency flood;

(iii) prohibition of its use in any identified special flood hazard area for which 100-year frequency flood elevation data has been developed but a floodway has not been designated, if such use would result in an increase in the level of the 100-year frequency flood in excess of one foot; and

(iv) encouragement of the use of piles or columns in all cases where the elevation of structures is required.

Certain economic considerations involved in the elevation of structures also tend to minimize reliance on the use of fill. Currently, a publication is being prepared for FIA by the American Institute of Architects which investigates a wide spectrum of approaches and designs to the elevation of structures and the costs involved in such flood damage reduction efforts. The study shows that generally (where elevation beyond 3 feet is required), the cost of elevation using fill exceeds that incurred when piles or columns are used.

In summary, implementation of the Program may be expected to decrease development in areas which often include wetlands. Specific prohibitions against the use of fill are included in the regulations that apply to those areas where wetlands are likely to occur (on lands in close proximity to rivers, streams, lakes and the ocean which are generally included in floodways or coastal high hazard areas). Practical and attractive alternatives exist to the use of fill, and these alternatives are often less expensive.

b. It was suggested that FIA explore the role which wetlands play as natural buffers in mitigating flood losses in coastal areas. Such an effort, it was suggested, should be directed toward developing language for inclusion in the regulations which would provide for the protection of wetlands to maintain their full capacity for such a mitigative role. Review of available data on this subject has shown that the inclusion of such a requirement would be premature at this time in light of the dearth of substantive data. Therefore, FIA is initiating studies into those areas which may hold the greatest potential for developing data to support the contention that the protection of wetlands would have flood mitigation potential. This study will evaluate the potential of wetlands to act as natural barriers in the coastal area.

## 2. Variances and Exceptions

Strict adherence to any regulations which set performance standards may cause extreme hardship under certain circumstances. Some administrative mechanism is necessary to deal with such hardships should they arise. Variances from the Program's flood plain management standards may be allowed by communities in cases of extreme hardship where just and sufficient cause exists. Similarly, an exception procedure has been established for communities where the adoption of the Program standards may cause for severe hardship or inequity.

These procedures recognize that unique situations exist which on occasion may present the overwhelming necessity to grant relief of some form to individuals or communities.

Generally, the comments received on the draft statement relative to variances and exceptions failed to consider both the need for an administrative relief mechanism in a regulatory program utilizing a nationally applied standard, and the criteria necessary for their use. The "Description of the Proposed Action," Part D includes a list of the requirements which must be met for variances to be granted to individuals, and notes the requirement for a comprehensive supportive study to back any request for a community exception.

Further, Part I specifies the requirement for a special environmental clearance in the case of community exceptions.

### 3. Economic Impact

As is apparent from the text of the Analysis of Environmental Consequences, some of the most significant impacts resulting from the implementation of the NFIP's regulatory provisions are experienced in the social environment. Several of the comments received on the Draft Statement relate to the issue of economic impacts. These comments were directed toward three areas. They dealt with (a) impacts on the Nation's taxpayers in general which were related to the cost of implementing the Program, (b) impacts on participating communities which were related to administrative costs and tax base, and (c) impacts on the individual property owner which were related to property values.

The costs of the NFIP's regulatory approach are focused in two somewhat distinct areas. First, there are administrative costs which result from delineation of the risk areas for regulation and the implementation of the regulations with attendant review and enforcement responsibilities. The capital investment here is small in relation to the flood problem. Second, there are opportunity costs which manifest themselves as forgone opportunities to make profits or invest in other enterprises (regulated flood plain lands often have a lower value than those which are unregulated).

Such regulation limits uses to those having a low flood damage susceptibility, such as recreational or agricultural uses which yield lower returns than high intensity residential or industrial ones. Therefore, there is an opportunity cost associated with the loss in land values and in income generated by land. However, as discussed Part IV of the text, these costs are primarily short-term and in the final analysis are not as severe as they first seem.

The crucial consideration which is often overlooked in analyzing the impact of flood plain regulation is that the high value attributed to intensively developed flood plain land and the high economic returns from their use are to a large degree artificially inflated and reflect a lack of perception of the hazard. When disaster strikes, high costs are incurred by the property owner and society in general in terms of decreased property values and disaster assistance outlays. Comparatively, over the long-term opportunity costs from flood plain regulation may be expected to be much smaller than for structural control

and relief programs. Of equal import is the fact that the NFIP's approach appropriately shifts the costs arising from the flood hazard from the general public, which currently absorbs almost all the costs of relief and protection, to the specific property owner.

As is discussed in the introduction to Part II of the text, and again in the Economic Impact section, the regulatory approach offers a long-term solution which protection and relief do not. The regulatory approach ensures that development in flood hazard areas moves toward flood-compatible uses. As regulations take effect, population and investment at risk will decrease and the potential for flood losses will be drastically reduced.

#### 4. Structural Control

The flood plain regulatory approach, as espoused by the NFIP, presents what in many cases is the most appropriate, cost effective method of flood hazard mitigation among the variety of tools for flood plain management purposes which are discussed in Part III B. Rather than directing its efforts toward the hazard itself through reliance on structural protection works, or attempting to spread the loss through disaster relief efforts, the regulatory approach attempts to minimize the inappropriate exposure of life and property to the risk, and applies the cost of the risk of flood occupancy to land owners in such areas.

A number of comments received on the draft statement related to the role of structural control works in communities participating in the NFIP. FIA policy relative to reliance on protective works reflects the intent of Congress as expressed in a number of recent legislative actions such as

those referenced in Appendix C. The developing trend in this legislation emphasizes a non-structural regulatory approach. This trend is combined with the intent to limit activities constituting major capital and energy investments at a time of acute awareness of the scarcity of Federal resources and the intent to limit investments which frequently have adverse environmental impacts and initiate considerable environmental opposition.

Essentially, then, protection works should be considered only where topography and land form and/or local development patterns negate the effectiveness of non-structural adjustments, and where such works are properly integrated into an overall flood plain management plan. Thus, Congressional intent reflects a growing recognition that generally, the aggregate of private and social benefits are greater where non-structural flood plain management adjustments are utilized.

Where protection works are providing protection to identified flood hazard areas, FIA gives full recognition to this fact in the development of its Flood Hazard Boundary Maps, Rate Maps and Rate Studies. Specific procedures have been developed and incorporated into Section 1916.5 of the revised regulations to provide for necessary revisions to these maps where flood hazard area delineations are altered by the influence of structural protection works.

##### 5. Flood Plain Storage Capacity

Concern was expressed by a number of commentors that the flood plain management requirements and administrative policies of the NFIP do not give adequate consideration to ensuring the maintenance of valley

storage capacity in riverine flood plain situations. Before discussing this issue, it should be noted that part 1(a) of this section (see ii, iii and iv) reference specific sections of the regulations which directly relate to the issue of maintaining valley storage.

The use of fill in the flood plain constitutes an encroachment that results in the loss of valley storage capacity which plays a significant role in mitigating flood flows. By reducing a river valley's tendency to attenuate flood flows, the loss of substantial valley storage capacity can increase flooding downstream by increasing peak flows. Loss of storage can also decrease the travel time of flood flows, and may or may not worsen the flood problem. (For example, if the peak flow from a tributary meet the flow of the main stream at its peak, flooding could be more severe, while if input of peaks into the main stream from its tributaries is staggered, the results could be less severe). Loss of storage capacity may also result in increased erosion due to increased depths and velocities of flood waters. Thus, although the volume of flow may remain the same, decrease in storage capacity can exacerbate the flood problem. It must be emphasized, however, that very significant amounts of fill are usually necessary to result in losses of valley storage of a magnitude that would create severe problems (this may not be the case where disposition of fill acts as a levee). Major local protection works such as levees or flood walls which remove large areas of storage from the flood plain have this effect. Prohibitive costs would be involved in achieving an equivalent effect by filling individual lots as a result of the NFIP's regulatory requirements. Therefore it is unlikely that the regulations will induce reliance on the use of fill to the extent that would result in significant decreases in valley storage throughout the Nation's riverine flood plains.

6. Executive Order 11296

A number of comments addressed the role of the NFIP in relation to Executive Order 11296, (Evaluation of Flood Hazard in Locating Federally Owned or Financed Buildings, Roads and Other Facilities, and in Disposing of Federal Lands and Properties), and HUD Secretary's Order #25, (Evaluation of Flood Hazards). Certain of these comments noted that the draft environmental statement did not address this issue, while others contended that the NFIP regulations do not reflect the restrictiveness of the Executive Order.

Both the Executive Order and the NFIP found their roots in H.D. 465, A Unified National Program for Managing Flood Losses, which was prepared in 1966 by a task force on Federal flood control policy and presented recommendations on how best to mitigate flood losses on a national scale. The thrust of each of these efforts is flood hazard mitigation. The former is directed toward the Federal executive agencies, while the latter addresses States and communities as well. It was hoped that through their combined efforts, the goals of H.D. 465 would be met. In the ten years following its publication, there has been significant headway made on the part of communities implementing flood plain management measures in order to establish eligibility for flood insurance. In many communities, however, even though local development is being regulated to meet the NFIP regulations, Federal structures are still being built without adequate consideration being given to the flood risk.

In March 1975, the Government Accounting Office documented the failure of Executive Order 11296 to attain its goal. It noted that the Executive Order has several weak points which hamper its effectiveness: (1) it relies on the use of weak and permissive language, (2) it lacks specific criteria (or reference thereto) for flood hazard evaluation and mitigation, and (3) it does not reflect new legislation having direct or indirect impact on flood hazard mitigation efforts. As a result of this report, effort has been made through the U. S. Water Resources Council to update and revise the Executive Order to take the shortcomings into account in a revised order which cannot be ignored by the Executive Agencies. The Council has drafted a revised order and has recommended its approval. FIA, through HUD's representative to the Water Resources Council, has worked diligently to assure that a revised order will provide that any disparity between Federal efforts and local community efforts is lessened, and moreover, to assure that the executive agencies take a leadership role in evaluating and mitigating flood hazards in the Nation's flood plains.

The NFIP regulations reflect both the intent and the word of Executive Order 11296. The guiding language in the Order's directive is found in the introduction to Section 1. Here it is required that: "The heads of the executive agencies shall provide leadership in encouraging a broad and unified effort to prevent uneconomic uses and development of the Nation's flood plains and, in particular, to lessen the risk of flood losses in connection with Federal lands and installations and federally financed or supported improvements." The Program's regulations seek the objective that only development which is adequately protected from the 100-year frequency flood by conforming to specific performance standards will be allowed in the Nation's flood plains.