

CHAPTER 12. FLOODPLAINS

1. INTRODUCTION AND DEFINITIONS.

a. **Actions in floodplains.** To meet Executive Order 11988, *Floodplains*, and the U.S. Department of Transportation (DOT) Order 5650.2, *Floodplain Management and Protection*, all airport development actions must avoid the floodplain, if a practicable alternative exists. If no practicable alternative exists, actions in a floodplain must be designed to minimize adverse impact to the floodplain's natural and beneficial values. The design must also minimize the potential risks for flood-related property loss and impacts on human safety, health, and welfare.

b. **Floodplains or base floodplains.** The Executive Order applies to "floodplains", while DOT's Order applies to "base floodplains." Review of the definitions for these terms suggests they are essentially the same. That is, floodplains or base floodplains are the lowlands and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, at a minimum, that are prone to the 100-year flood. To determine if an action encroaches on the base floodplain, use the applicable FEMA-developed Flood Insurance Rate Map (FIRM) or draft FIRM as the primary information source. FEMA publication No. 258, *How to Use a Flood Map to Determine Flood Risk for a Property*, provides information on interpreting FIRMs. If a FIRM is not available, use a Flood Hazard Boundary Map (FHBM) or contact the U.S. Army Corps of Engineers (Corps), the Tennessee Valley Authority (TVA), the National Resources Conservation Service (NRCS), the U.S. Geological Survey (USGS), or State or local floodplain management agencies for help in determining floodplain involvement.

c. **The 100-year flood.** This is a flood having a 1 percent chance of occurring in any given year. Zones A and V of a Flood Insurance Rate Map (FIRM) encompass the area comprising the 100-year floodplain.

d. **Encroachment.** This is an action within the limits of the base floodplain.

e. **Significant encroachment.** Based on DOT policy, a significant encroachment would occur when the encroachment would result in one or more of the following impacts:

- (1) a high likelihood of loss of human life;
- (2) substantial encroachment-associated costs or damage, including adversely affecting safe airport operations or interrupting aircraft services (e.g., interrupting runway or taxiway use, placing another facility such as a NAVAID out of service, placing utilities out of service, etc.); or
- (3) a notable adverse impact on the floodplain's natural and beneficial floodplain values.

f. **Practicable alternative.** This is an alternative that is capable of being built within natural, social, and economic constraints (DOT Order 5650.2, paragraph 4.m.). Selection of this alternative is the Federal agency’s responsibility. Note that the practicable alternative outside a floodplain must be selected if it is practicable, but that decision must be made after considering other factors (see 5.f. of this chapter). Note that a practicable alternative may include conducting a proposed action outside the floodplain, using other means to accomplish the same purpose as the action, or doing nothing. If no alternatives exist outside the floodplain, other sites within the floodplain may be more desirable due to lesser impacts. The agency shall explain why the action must be in the floodplain.

2. APPLICABLE STATUTES AND IMPLEMENTING REGULATIONS.

APPLICABLE STATUTES AND IMPLEMENTING REGULATIONS	SUMMARY DESCRIPTION	OVERSIGHT AGENCY
Executive Order 11988, <i>Floodplain Management</i> , May 24, 1977 (42 Federal Register (FR) 26951)	The objective of this Order is to preserve and restore the natural and beneficial values floodplains provide. The Order directs Federal agencies to take actions to reduce the risk of flood loss, minimize flood impacts on human safety, health, and welfare and restore and preserve floodplain natural and beneficial values. To do this, the Order bans approving activities in a floodplain unless: <ul style="list-style-type: none"> • no practicable alternative exists; and • measures to minimize unavoidable short-term and long-term impacts are included. 	Federal Emergency Management Agency (FEMA) and FAA
DOT Order 5650.2, <i>Floodplain Management and Protection</i>	Contains DOT policies and procedures for carrying out Executive Order 11988.	DOT/ FAA
Federal Emergency Management Agency (FEMA) <i>Protecting Floodplain Resources: A Guidebook for Communities</i> , 1996	Provides guidance on how communities can avoid and minimize impacts to floodplains.	FEMA
<i>Floodplain Management, Guidelines for Implementing Executive Order 11988</i> , dated February 10, 1978 (43 FR 6030)	Provides guidance adopted by the Water Resources Council to assist agencies in preparing their regulations and procedures for implementing the Executive Order.	FEMA and the Interagency Task Force on Floodplain Management.

<p>Federal Emergency Management Agency (FEMA), <i>Further Advice on Executive Order 11988 Floodplain Management</i>¹</p> <p>[Note: Much of the information in this chapter is from this document. We include it as an aid in understanding the requirements of Executive Order 11988]</p>	<p>Provides guidance to Federal agencies by discussing specific and commonly occurring issues related to Executive Order 11988. It provides broad guidance in interpreting and using the Order.</p>	<p>FEMA and the Interagency Task Force on Floodplain Management.</p>
<p>State and local construction statutes</p>	<p>Provides area-specific regulations governing floodplain protection.</p>	<p>State and local agencies</p>

3. APPLICABILITY TO AIRPORT DEVELOPMENT ACTIONS. FEMA notes the more fiscal control an agency has over the disbursement of grants and loans the greater its responsibilities and involvement are in meeting the requirements of the Executive Order. In fact, strictest protection measures are often warranted for actions located directly in floodplains.² As a result, the environmental analysis of a proposed airport development action must include discussions of potential floodplain impacts if they would occur in the base floodplain. Typical airport actions which could result in floodplain impacts include: airside/landside expansion (new or expanded terminal and hangar facilities, new or extended runways and taxiways, navigational aids [NAVAIDS], etc.); land acquisition for aviation-related use, new or relocated access roadways, remote parking facilities and rental car lots; and significant amounts of construction/demolition activity.

a. Applicability. Among other things, improperly designed or constructed facilities in floodplains can increase upstream flood elevations, increase downstream peak flood flow volumes, or increase flood flow velocities. All of these increases have the potential to adversely affect people, their properties, and the environment. Therefore, FAA must meet the requirements of Executive Order 11988 and DOT Order 5650.2 when an action it approves or funds would occur within or affect the base floodplain. FAA must also comply

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http://www.gsa.gov/gsa/cm_attachments/GSA_BASIC/FEDERAL_EMERGENCY_MANAGEMENT_AGENCY_R2F-a8-k_0Z5RDZ-i34K-pR.pdf

²Further Advice on Executive Order 11988 Floodplain Management, pg. 26

with these Orders when it approves a lease to a non-Federal entity for a facility either located in the floodplain or one that directly or indirectly affects that floodplain. Environmental documents prepared for those actions must contain the information this chapter requires.

Compliance with this chapter is not required if:

(1) The action and its reasonable alternatives would not occur in the base floodplain, or if applicable, its buffer areas;

(2) The action and its reasonable alternatives would not directly or indirectly support floodplain development; or

(3) The only part of the transportation action or a reasonable alternative involves relocating people to existing housing located in the base floodplain. Before moving people in these cases, FAA must inform the relocated people that the replacement housing is in the base floodplain and offer them alternative, comparable housing outside the base floodplain to anyone seeking it.

Based on one or more of these factors, the environmental document should contain a Statement that the action and its reasonable alternatives will not be in the base floodplain. As a result, no further floodplain analysis is needed (per FAA Order 1050.1E, Appx. A, paragraph 9.2b).

b. Land leases to a non-Federal entity. Paragraph 12.d of DOT Order 5650.2 requires FAA to meet certain terms when it leases or disposes of land located in a base floodplain to a non-Federal entity. As appropriate, the responsible FAA official should:

(1) ensure the conveyance document identifies the uses that Federal, State, or local floodplain regulations restrict;

(2) attach other restrictions to the conveyance document addressing the non-Federal party's and any successors' proposed property uses to ensure those uses are consistent with the DOT Order, except as prohibited by law; and

(3) withhold the transfer of the property.

c. Applying Executive Order 11988 to major improvements or existing structures located in the base floodplain. Sometimes, an airport sponsor may wish to undertake major airport improvements or repair airport structures or facilities located in the floodplain that have sustained damage due to flood, fire, or other hazards. To meet applicable requirements of the Executive Order, the airport sponsor and responsible FAA official should coordinate early in project planning. In meeting the responsibility to apply the Order's requirements to existing structures, the approving FAA official should consider the following factors when deciding if it is prudent to undertake the proposed improvements or repairs:

(1) would the proposed action increase the useful life of the damaged facility?

(2) would the proposed action maintain the investment at risk or increase the exposure of lives to flood hazard? and

(3) would the proposed action remove an opportunity to restore the natural and beneficial floodplain values?

4. PERMITS, CERTIFICATIONS, AND APPROVALS. Actions within a base floodplain (see 1.d. of this chapter) may require authorizations from the Corps, FEMA, and State or local agencies. Consultation with these agencies may be needed. These agencies are especially helpful in providing maps or other information delineating a floodplain of concern.

5. ENVIRONMENTAL COMPLIANCE PROCEDURES - ENVIRONMENTAL ANALYSIS.

a. General. As noted above, early consultation among FAA, the airport sponsor, FEMA and State and local governmental floodplain management agencies is important. It is often the most effective and efficient way to address floodplain issues or conflicts and develop ways to resolve them. The environmental document must identify the agencies responsible for floodplain protection, any Statements they make regarding an action's compliance with those regulations, and solutions developed to address floodplain issues.

b. Map sources. FIRMs, FHBMs, and Flood Insurance Studies are available from FEMA's Map Service Center. If FIRMs or FHBMs are not available, contact one of the other agencies identified in section 5.a. for flood hazard data.

c. When a sponsor selects a practicable alternative outside the floodplain after finding an encroachment would occur. Occasionally, an airport sponsor selects a location outside the floodplain after realizing the original location would encroach on the base floodplain. Here, the responsible FAA official must be sure the environmental document States the sponsor is no longer considering the original location because it encroached on the floodplain. In addition, the document should address the following information, as appropriate:

(1) the action would not adversely affect a floodplain's natural and beneficial values, property, or human life; and

(2) the action would not indirectly support floodplain development.

d. Factors to consider when evaluating practicable alternatives that avoid the floodplain. The responsible FAA official must ensure the practicable alternatives outside the base floodplain, including the No-Action Alternative, are evaluated. The policy in the DOT Order is to avoid, where practicable, encroachments by FAA actions. In considering site practicability, the responsible FAA official should address the following factors identified in

Section 3.A³ of *Floodplain Management, Guidelines for Implementing Executive Order 11988*:

(1) compatibility for airport purposes (topography, wildlife habitat, aviation hazards, etc.);

(2) social considerations, including aesthetics, historical or cultural importance, and land use patterns;

(3) economic aspects, including the costs for buying the alternative site, the cost to complete the action there, and any associated relocation necessary for the action to proceed; and

(4) legal requirements (e.g., deeds, leases, and other legal documents).

e. **Factors to consider when there is no practicable alternative outside the floodplain.** When, after re-evaluating all impacts, factors, and public comments, the official determines that alternatives outside the base floodplain are not practicable, the environmental document must contain a discussion about the alternatives the official considered in reaching that determination. The discussion should state that FAA analyzed other alternatives and explain why locating the action in the floodplain is the only practicable alternative. The explanation should include how FAA balanced the environmental, social, economic and engineering factors when selecting the practicable alternative. When making this evaluation, the official may wish to use following information and include a discussion in the environmental document's floodplain section:

(1) important factors FAA considered when selecting the proposed action as the practicable alternative;

(2) reasons FAA intends to fund or approve an action in the base floodplain or in an area that would affect the floodplain;

(3) each alternative considered and important factors that may make the alternative impractical;

(4) how the proposed action would affect the floodplain's natural values and proposed measures to minimize potential floodplain harm; and

(5) if National Flood Insurance Program (NFIP) criteria (44 CFR Part 60.3.) are applicable to the action.

³ 43 FR at 6044.

f. **Early public review of a finding of encroachment.** Section 2(a)(4) of Executive Order 11988 and paragraph 7 of DOT Order 5650.2 require agencies to provide the public an opportunity for early public review of *any* plan or proposal that would encroach on the base floodplain. This ensures the public has an early opportunity to review a proposal in the base floodplain, even if the proposal does not require an environmental impact statement (EIS). The following sections summarize how to provide information to the public.

(1) an action encroaching on the base floodplain. FAA or the sponsor should tell the public the proposed action includes an encroachment by identifying the encroachment in a public hearing presentation (see section 1.d. of this chapter);

(2) an action significantly encroaching on the base floodplain. If a proposed action or a reasonable alternative includes a significant floodplain encroachment (see section 1.e. of this chapter), any public notices, notices of opportunity for a public hearing, public hearing notices, or notices of environmental document availability shall tell the public the proposed alternative includes a significant floodplain encroachment.

(3) Notice content. FEMA suggests that any notice contain the following information:⁴

(a) the proposed action's purpose;

(b) a description of the proposed action;

(c) a Statement that the airport sponsor is seeking FAA funding or approval of an action occurring in the base floodplain or an action that would affect that floodplain;

(d) the location of the proposed action (a map or another descriptor adequately defining the location is helpful);

(e) if hazards to aircraft safety exist, describe the type and extent of the hazard the action would involve;

(f) describe the affected floodplain's existing natural and beneficial values;
and

(g) provide the name and telephone number of the responsible FAA official from whom the public may obtain information about the encroachment or to whom the public may send comments.

⁴ *Further Advice on Executive Order 11988 Floodplain Management*, pg. 9

g. Public notice of an agency's intent to authorize an action in the base floodplain. Paragraph 7(b) of the DOT Order requires that public notices identify significant encroachments. FEMA suggests that any final notice of an agency's intent to authorize an action in a floodplain (which could be the EIS, FONSI or ROD) include the following information⁵:

- (1) a statement of the action;
- (2) a statement about why the agency decided to fund or approve the action in the floodplain or in an area affecting the floodplain;
- (3) a description of the important facts considered in arriving at the decision and the alternatives considered;
- (4) a statement about how the action would affect or be affected due to its location in the floodplain;
- (5) a list of measures that will be taken to minimize harm to the floodplain; and
- (6) a statement that the action would be taken in compliance with State and local flood protection standards; and
- (7) a map showing where the action would be located and where the map is available for review.

h. Floodplain finding. The FAA shall not select or approve a preferred alternative involving a significant encroachment, unless the responsible FAA official can make a written finding that the proposed significant encroachment is the only practicable alternative. The official should use his or her discretion when determining the practicability of an action that would significantly encroach on the base floodplain. This requires a careful balancing and application of environmental, social, economic, and engineering considerations. However, the official should give special weight to floodplain management concerns. The environmental document must include the following information or present it as an attachment:

- (1) A description of why the proposed action must be located in the floodplain, including a discussion of reasonable alternatives and why they were not practicable; and
- (2) A Statement indicating that the action conforms to applicable State and/or local floodplain standards.

⁵ *Further Advice on Executive Order 11988 Floodplain Management*, pg. 10

FAA must provide the above finding, within or together with a final EIS prepared for the proposed action, to State and area wide clearinghouses and other interested parties.

i. **Using NEPA documents to meet public notice requirements for an action encroaching on a floodplain.** FAA may use the NEPA process to meet the public notification requirements for an action encroaching on a floodplain.

(1) An actions involving a Finding of No Significant Impact (FONSI). The Notice of the FONSI's Availability (see Order 5050.4B, paragraph 807) as well as notification meeting the requirements described in sections 5.f.(1) & (2) of this chapter will meet the DOT Order's public notice requirements. The Notice should appear in a local newspaper of general circulation.

(a) A FONSI for an action involving an encroachment. The Notice should note the action involves an encroachment.

(b) A FONSI for an action involving a significant encroachment. The Notice should state the action involves an encroachment and contain the information noted in 5.f.(3)(a)-(g) of this chapter.

(2) An action requiring an Environmental Impact Statement. An EIS as well as notification meeting the requirements described in sections 5.f.(1) & (2) of this chapter will meet the public notice requirements. For significant encroachments, the EIS should contain the information noted in sections 5.f.(3)(a)-(g) of this chapter.

6. DETERMINING IMPACTS.

a. **General.** When an airport action would occur in a base floodplain because there is no practicable alternative, the environmental document prepared for that action must address practicable alternatives considered, the action's direct and indirect floodplain impacts, and the action's potential to cumulatively affect the floodplain. The document must also name the State and/or local agencies having jurisdiction over the affected floodplain, summarize applicable local floodplain requirements, and briefly explain how the action would meet those requirements. The following sections consolidate information from DOT Order 5650.2 and provide information on how to assess floodplain effects. The environmental document must contain the appropriate information.

(1) Determining if a significant encroachment would occur. After determining the action must occur in the floodplain because there is no practicable alternative, determine the intensity of the encroachment and its impacts on the floodplain's natural and beneficial values. See section 1.e. of this chapter for more information about significant encroachments.

(2) Assessing impacts on human life and transportation facilities. Part of the significant encroachment definition in DOT Order 5650.2 includes impacts on human life and substantial encroachment-related costs or damage. This includes interruption of service on or loss of a vital transportation facility (e.g., runway, taxiway, NAVAID damage, etc.). Although these factors are parts of the definition, their involvement alone does not trigger a significant impact for NEPA purposes. Council on Environmental Quality (CEQ) regulations at 40 CFR 1508.14 State that "...economic or social effects, are not intended by themselves [emphasis added] to require preparation of an environmental impact Statement." As a result, FAA need not prepare an EIS for any action significantly encroaching on a floodplain but that does not have significant *environmental* effects. When a significant encroachment involves only a high likelihood of loss of human life or substantial encroachment-related costs or damage (see section 1.e.(2) of this chapter for examples), the responsible FAA official should ensure the environmental evaluation includes specific information addressing the proposed action's floodplain aspects. The document should include information showing that the approving FAA official has thoroughly considered the effects on human life and substantial encroachment-related costs and damage that would occur due to the action's floodplain location. The document should answer the following questions:

(a) Would flooding affect airport access roads thereby preventing passenger, visitor, or airport personnel from entering or exiting the airport?

(b) Would flooding affect aviation safety and the airport's use? To make this determination, address the loss or temporary shutdown of an airport facility (e.g., lighting, hangars, runways, taxiways, etc.). This discussion might address flood effects on the airport's ability to serve regional or national aviation demands, and the economic well-being of aviation-related businesses. For example, flood-induced closing of or damage to a runway at a major hub could disrupt regional passenger or cargo movements and adversely affect the area's economy.

(c) Would flooding cause flood-induced spills of hazardous material stored at the airport and their effects on human populations?

(3) Impacts to a floodplain's natural and beneficial values. Floodplains often support important ecological values benefiting the human and natural environment. Examples include a floodplain's capacity to: carry and store floodwaters; sustain agriculture, aquaculture, or aquatic or terrestrial organisms; provide for groundwater recharge; provide recreation opportunities; or maintain water quality. Note that secondary action-induced impacts on floodplains could also substantially reduce the floodplain's capacity to sustain these values.

(4) Factors to consider when assessing action impacts on a floodplain's natural and beneficial values. The responsible FAA official should use the following information in conjunction with other information in the environmental document addressing specific

resources when determining the intensity of impacts. Review section 7.a. of this chapter to decide the intensity of impacts.

(a) Agricultural activities. Floodplains are often valued due to their level topography and their fertile substrates. Would the proposed action or a reasonable alternative erode or contaminate floodplain substrate, thereby reducing the floodplain's agricultural value?

(b) Aquacultural activities. Due to their need for constant water supplies and specific water quality requirements, aquacultural activities often occur in or near floodplains. Would the proposed action or a reasonable alternative disrupt any of these activities?

(c) Aquatic or terrestrial organisms. Numerous aquatic and terrestrial species occupy floodplains due to their food, cover, and water. Would the proposed action or a reasonable alternative disrupt the floodplain's ability to provide needed food, cover, or water requirements needed to sustain the organisms?

(d) Flood control. Due to their expanse and obstructions, floodplains often slow flows or retain water, thereby lessening the probability of upstream or downstream flooding. Would the proposed action or a reasonable alternative cause flow alterations that result in unacceptable upstream or downstream flooding?

(e) Groundwater recharge. Waters flowing through floodplains often flow more slowly allowing water to seep through surface cracks and recharge aquifers. Would the proposed action or a reasonable alternative adversely affect aquifer recharge capabilities?

(f) Water quality. The natural flow of water over rough surfaces, through vegetation, and the natural biological and chemical processes found in floodplains reduce pollutant loads helping to maintain water quality. Would the proposed action or a reasonable alternative disrupt the floodplain's capacity to maintain desired water quality standards?

(5) Airport actions outside the base floodplain. Airport actions outside the base floodplain may adversely affect the floodplain's natural and beneficial values. As a result, FAA needs to assess those impacts as well. For example, action-related water quality impacts due to increased runoff from impermeable surfaces or changes in hydrologic patterns outside the floodplain may still affect aquatic or terrestrial populations using the floodplain. Review other chapters in the NEPA document to determine if an airport action outside a base floodplain would affect the floodplain's resources.

b. Floodplain protection standards. The environmental document should identify any State or local floodplain regulations and standards that must be met. This step is needed to provide information regarding whether the proposed action would conform to

applicable State or local floodplain regulations and standards. Identify the State and local agencies having jurisdiction. This is done normally via letters from FEMA, the Corps, or State or local agencies having jurisdiction for floodplain issues.

7. DETERMINING IMPACT SIGNIFICANCE.

a. General. After completing the analysis discussed in this chapter, use the findings to determine the degree of action-related, floodplain impacts. The responsible FAA official should consider the following factors in consultation with agencies having jurisdiction or special expertise about land use in the affected area.

ORDER 1050.1E THRESHOLD	FACTORS TO CONSIDER
<p>When notable adverse impacts on natural and beneficial floodplain values would occur.</p>	<p>For NEPA purposes, a significant impact would occur only when an action would cause notable adverse effects on the affected floodplain’s natural and beneficial values (see last bullet below and section 6.a.(4) of this chapter).</p> <p>For transportation purposes, the responsible FAA official must decide if a significant encroachment would occur to comply with DOT Order 5650.2, paragraphs 7.b and 9. To do so, the official must decide if the action would cause:</p> <ul style="list-style-type: none"> • a considerable probability of the loss of human life; • future, extensive damage or costs, including damage that would interrupt airport service or use of the proposed runway or other proposed airport facility; or • a notable, adverse effect on the affected floodplain’s natural and beneficial values. <p>Note: When a significant impact would not occur under NEPA, the responsible FAA official must ensure the environmental document discloses action-induced effects on human life, NAVAIDS, and transportation facilities. The official should ensure the document clearly states that those effects do not trigger a significant impact under NEPA.</p>

From: Table 7-1, FAA Order 5050.4B.

b. Mitigation. If no practicable alternative outside the base floodplain exists, Executive Order 11988 and DOT Order 5650.2 require FAA to minimize action-induced impacts on the base floodplain and, where practicable, to restore and preserve natural and beneficial floodplain values that are adversely affected by the action. A FONSI or EIS prepared for an action that would encroach on the base floodplain should contain measures that would minimize the action's impacts on floodplains. During the environmental review process, agencies having floodplain jurisdiction or expertise normally provide letters addressing floodplain effects. Often, those letters include recommended measures to mitigate those effects. An appendix to the environmental document should include copies of those letters. The environmental document should summarize the most important information in those letters and accurately cross-reference the appendix and pages in the appendix for further information. If the FAA or the sponsor does not adopt any recommended mitigation, the environmental document should clearly provide reasons why the mitigation was not adopted. In most cases, conceptual design as opposed to detailed engineering will be sufficient to help establish the adequacy of mitigation measures.

(1) Mitigation, in general. Mitigation measures may include:

- (a) construction controls to minimize erosion and sedimentation;
- (b) designing the facility to allow adequate flow circulation and preserve free, natural drainage;
- (c) using pervious surfaces where practicable;
- (d) controlling runoff;
- (e) controlling waste and spoils disposal to prevent contaminating ground and surface water (e.g., control the use of pesticides, herbicides; maintain vegetative buffers to reduce sedimentation and delivery of chemical pollutants to the water body);
- (f) employing land use controls (Executive Order 11988 directs Federal agencies to take floodplain management into account in evaluating land use plans and to require land and water resource use appropriate to the degree of hazard involved.).

Note: Any selected mitigation should not pose a wildlife hazard, see FAA Advisory Circular 150/5200-33A, *Hazardous Wildlife Attractants on or near Airports*.

(2) Mitigation for human safety and substantial encroachment-related damages and costs. Mitigation measures should be developed to minimize impacts on human safety and minimize future damages or costs, including damages or costs to equipment, facilities, or structures. For example, if a proposed runway's elevation is below or at the 100-year flood elevation, consider raising the runway's elevation above the 100-year flood elevation to allow runway use during flooding.

(a) When building in the base floodplain, National Flood Insurance Program rules and regulations must be followed. This protects structures or facilities from flooding. It also minimizes changes in flood elevations that could harm the existing floodplain or upstream development. Measures such as building structures on piers are discussed in 44 CFR Section 60.3.

(b) When building in the base floodplain or repairing a facility already there, try to minimize flood damage to the proposed or existing facility. Include measures to protect the facilities or utilities from flood damage or to lessen potential flood damage. Design sufficient drainage to prevent flooding upstream or downstream structures and facilities.

(3) Mitigation for impacts to natural and beneficial floodplain values. Developing mitigation for such impacts requires understanding natural floodplain values and systems. Consulting with expertise agencies may be helpful. Here are a few examples of natural floodplain values and related mitigation.

(a) Agriculture. Reduce soil erosion in cultivated floodplains. Control herbicide, pesticide, or petroleum runoff from the airport.

(b) Aquaculture. Avoid planting non-native species that could compete with existing natural floodplain vegetation or attract wildlife hazardous to aviation. See FAA Advisory Circular 150/5200-33A, *Hazardous Wildlife Attractants on or near Airports*.

(c) Aquatic or terrestrial organisms. To reduce effects on organisms using the floodplain, minimize disturbing floodplain vegetation or design floodgates to allow natural tide changes or natural stream flows.

(d) Flood control. Reduce fill volumes in floodplains. Design structures to preserve existing flows and water surface elevations. Minimize soil compaction. Restore natural contour elevations provided they do not raise existing water surface elevations.

(e) Groundwater recharge. Use porous surface material where possible. Remove loose soil and waste material to avoid contaminating ground or surface waters that may feed recharge areas.

(f) **Water quality.** Preserve floodplain or wetland buffers. Reduce fertilizer or pesticide runoff. Control discharges from pipes or sheet flow. Use erosion control measures, including construction control measures to minimize erosion.

8. ENVIRONMENTAL IMPACT STATEMENT CONTENT.

a. **General.** FAA must prepare an EIS if mitigation will not reduce impacts below the significance threshold noted in section 7 of this chapter. FAA's EIS must analyze any action-induced significant impacts on a floodplain's natural and beneficial values. When FAA prepares an EIS to address significant floodplain impacts, the responsible FAA official should consider inviting Federal, State, or local agencies having floodplain expertise or jurisdiction to be a cooperating agency. As needed, the EIS should contain the information in items 8.b–d as well as that already discussed in this chapter.

b. **Other impact areas.** Normally, when a significant floodplain impact would occur, impacts to the floodplain's natural and beneficial values and induced development are involved. To avoid repeating information presented in other EIS chapters, the floodplain chapter should summarize those impacts and refer the reader to the specific pages of the EIS addressing the affected resources that provide more detail on the impact. Accurate cross-referencing is a must. For example, the floodplain chapter would note how changes to a wetland affects the wetland's flood storage capacity. As a result, water the wetland would normally retain for a given period would move more quickly to the floodplain. The EIS would note that action-induced changes to the wetland's flood storage would cause downstream flooding.

c. **Practicability of alternatives.** Discuss other considerations about the practicability of alternatives, if any were considered.

d. **Mitigation.** Include measures to minimize harm to the floodplain and, where practicable, to restore or preserve affected natural and beneficial floodplain values not previously considered. Include sponsor commitments to comply with special flood-related design criteria or protective conditions FAA, resource, or floodplain agencies determine necessary.

e. **Floodplain finding.** See section 5.h. of this chapter.