

PART 2, CHAPTER 13

FLOODPLAINS

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PART 2, CHAPTER 13

FLOODPLAINS

13.1 OVERVIEW

Pursuant to **23 United States Code (U.S.C.) § 327** and the implementing Memorandum of Understanding (MOU) executed on December 14, 2016, the Florida Department of Transportation (FDOT) has assumed and Federal Highway Administration (FHWA) has assigned its responsibilities under the **National Environmental Policy Act (NEPA)** for highway projects on the State Highway System (SHS) and Local Agency Program (LAP) projects off the SHS (**NEPA** Assignment). In general, FDOT's assumption includes all highway projects in Florida which source of federal funding comes from FHWA or which constitute a federal action through FHWA. **NEPA** Assignment includes responsibility for environmental review, interagency consultation and other activities pertaining to the review or approval of **NEPA** actions. Consistent with law and the MOU, FDOT will be the Lead Federal Agency for highway projects with approval authority resting in the Office of Environmental Management (OEM).

This chapter outlines the procedure for evaluating project impacts on 100-year (base) floodplains, and provides guidance on how to document floodplain analysis in the Environmental Document to comply with **23 Code of Federal Regulations (CFR) Part 771** and applicable regulations, guidance, and Executive Orders (EO).

Protection of floodplains and floodways is required by **Executive Order 11988: Floodplain Management; USDOT Order 5650.2, Floodplain Management and Protection;** and **Federal-Aid Policy Guidance on Location and Hydraulic Design of Encroachments on Flood Plains, 23 CFR Part 650A**. The intent of these regulations is to avoid or minimize highway and land use development encroachments that reduce storage and increase water surface elevations within base floodplains. Where encroachment is unavoidable, the regulations require FDOT to take appropriate measures to minimize or mitigate impacts. Further guidance for implementation of **Executive Order 11988: Floodplain Management** can be found in the **Guidelines for Implementing Executive Order 11988, Floodplain Management**.

Location hydraulics studies required by **23 CFR Part 650A** must be prepared during the Project Development and Environment (PD&E) Study commensurate with the level of encroachment to allow consistent evaluation and identification of impacts. The results of location hydraulic studies should be documented in the **Location Hydraulics Report (LHR)**. The **LHR** must be reviewed by the District Drainage Engineer to verify that all base floodplains are identified and the **LHR** is consistent with existing basin and floodplain management program. The results of the location hydraulic studies should be briefly summarized in the Environmental Document and considered when making the **NEPA** decision.

13.1.1 Definitions

Base Flood - The flood or tidal event having a 1% chance of being equaled or exceeded in any given year (commonly known as a 100-year flood).

Base Floodplain - The area subject to flooding by the base flood.

Direct Effects – Impacts which occur as a direct result of an action and occur at the same time and place as the action.

Encroachment - Activities or construction within the floodplain including fill, new construction, substantial improvements, and other development.

Floodplain - Any land area susceptible to being inundated by floodwaters from any source.

Flood Receptor -The entity that may be harmed (e.g., a person, property, habitat), by flood.

Hydraulic Capacity - Measure of the volume of water which can pass through a given structure or culvert or measure of the volume and flow of water within a watercourse.

Impact - The effect of an encroachment upon the human, natural or physical environment.

Indirect Effects – Impacts which are reasonably foreseeable effects that occur because of an action but occur later in time or are removed from the action location.

Natural and Beneficial Floodplain Values - Include but are not limited to fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge.

Regulatory Floodway - The floodplain area that is reserved in an open manner by federal, state or local requirements, i.e., unconfined or unobstructed either horizontally or vertically, to provide for the discharge of the base flood so that the cumulative increase in water surface elevation is no more than a designated amount [not to exceed 1 foot as established by the Federal Emergency Management Agency (FEMA) for administering the National Flood Insurance Program (NFIP)].

Risk - The consequences associated with the probability of flooding attributable to an encroachment, including the potential for property loss and hazard to life during the service life of a facility.

Support Base Floodplain Development - The process to encourage, allow, serve, or otherwise facilitate additional base floodplain development. Direct support results from an encroachment, while indirect support results from an action out of the base floodplain.

13.2 PROCEDURE

Potential floodplain impacts shall be assessed for all FDOT projects which involve activities or construction near or within the floodplain. Each project alternative should be analyzed for potential floodplain encroachment and the resulting impacts (positive, negative and indirect impacts) must be documented in the **LHR** (as applicable) and briefly summarized in the Environmental Document. Consideration should also be given to indirect and cumulative impacts to floodplain, as appropriate.

Evaluation of potential floodplain impacts involves the following activities:

1. Determine if a project is located in or will affect the base floodplain.
2. Conduct early public involvement and interagency coordination.
3. Identify and evaluate practicable alternatives to locating in the base floodplain, including alternative sites outside of the floodplain.
4. Identify impacts (direct and indirect) of the project on the floodplain.
5. If impacts cannot be avoided, develop measures to minimize the impacts; and measures to restore and preserve the floodplain, as appropriate.
6. Re-evaluate alternatives to determine if locating the project in the floodplain is still practicable.
7. Document the results in the **LHR** and Environmental Document, and present the findings to the public.

13.2.1 Determine Level of Analysis

The level of assessment and documentation for potential impacts to floodplains during the PD&E phase depends on the significance of the base floodplain encroachments. Detailed floodplain evaluations are generally not warranted for transportation projects not qualifying for screening in the FDOT's Efficient Transportation Decision Making (ETDM) Environmental Screening Tool (EST) [typically Type 1 Categorical Exclusions (CEs) and Non-Major State Actions (NMSA)], or where there is no floodplain involvement. In these projects, reviewing the Federal Emergency Management Agency (FEMA) **Flood Insurance Rate Maps (FIRM)** and identifying if any cross drains culverts are to be modified may be sufficient. See [Part 1, Chapter 2, Class of Action Determination for Federal Projects](#) for more guidance on how to document floodplains on Type 1 CE projects.

Transportation projects qualifying for ETDM screening generally are more complex. In accordance with [Part 1, Chapter 2, Class of Action Determination for Federal Projects](#), qualifying projects must complete the ETDM Programming Screen and may also have completed the Planning Screen.

The Project Manager should coordinate with the regulatory and resource agencies, and local agencies throughout the project development process. Coordination with these agencies is useful in identifying floodplain issues, environmental data, and local drainage or watershed specific studies in the project area. Additionally, the Project Manager should coordinate with the District staff such as District Drainage Engineer, District Permit Coordinator, District Environmental Office staff, and others who may be involved in the project.

1. **Planning Screen Evaluation** - Prepare Preliminary Environmental Discussion (PED) in accordance with [Part 1, Chapter 3, Preliminary Environmental Discussion and Advance Notification](#). Include a discussion about known potential project involvement with floodplains, drainage basins/watershed and receiving water bodies and their designations.

Review information available in the Planning Screen regarding the location of floodplains as identified by FEMA **FIRM**, the locations of Special Flood Hazard Areas (SFHA), and Flood Insurance Study (FIS). Review specific information about areas of flood hazards that were provided by the Environmental Technical Advisory Team (ETAT).

2. **Programming Screen Evaluation** - Include discussion about known potential project involvement related to the floodplain, drainage basins and receiving water bodies [based on information obtained in the Planning Screen (if completed) and the District familiarity with the project area in the PED and the Advance Notification (AN), as appropriate.

After screening is completed, review ETAT comments related to the floodplain from the **Programming Screen Summary Report**. Use this information to determine the level of potential floodplain impacts and how they may be evaluated and mitigated in the PD&E Study. Begin to evaluate and document existing conditions for use in the floodplain analysis.

3. **PD&E Evaluation** - Review the **Programming Screen Summary Report** for ETAT comments for floodplain issues as well as ETAT comments on other issues that may concern possible floodplain impact and drainage designs, such as “Coastal and Marine” and “Wetlands and Surface Waters”. The Water Management Districts (WMDs) comments may reference a recent drainage study as being the best available information, which may supersede existing floodplain maps. Verify if the modeling in the WMD drainage study was performed to certain standards, such as FEMA guidelines.

The impacts of the project on floodplain must be understood before the preferred alternative is selected. Complete the appropriate level of analysis and documentation based on the project context, anticipated impacts, and outcome of any resource agency coordination. There are four categories of encroachments as they pertain to base floodplain involvement: no involvement, no encroachment, minimal encroachment, and significant encroachment (see [Section 13.2.2](#)). The

Project Manager should make preliminary determination of the level of floodplain encroachment and the type of documentation necessary for **LHR** based on field review, ETDM screening results and consultation with the District Drainage Engineer.

Where floodplain impacts will occur, the analysis must be sufficient to determine the level of impacts and whether they will be significant. The analysis will be documented in the **LHR**. Document floodplain commitments in the Environmental Document and transmit to the next phase of project development in accordance with [Procedure No. 650-000-003, Project Commitment Tracking](#) and [Part 2, Chapter 22, Commitments](#). See [Section 13.2.4.3](#) for documentation of floodplain impacts in the Environmental Document.

13.2.2 Location Hydraulic Studies and Report

Title 23 CFR Part 650A requires location hydraulic studies for all alternatives containing floodplain encroachments and for those actions which would support base floodplain development, commensurate with the significance of the risk or environmental impact. These studies must include discussion of the following:

1. Evaluation and discussion of the practicability of alternatives to any longitudinal encroachments
2. Discussion of the following items, commensurate with the significance of the risk or environmental impact, for all alternatives containing encroachments and for those actions which would support base flood-plain development:
 - a. The risks associated with implementation of the action.
 - b. The impacts on natural and beneficial floodplain values.
 - c. The support of incompatible floodplain development.
 - d. The measures to minimize floodplain impacts associated with the project.
 - e. The measures to restore and preserve the natural and beneficial floodplain values impacted by the project.
3. Shall include evaluation and discussion of the practicability of alternatives to any significant encroachments or any support of incompatible floodplain development.

To satisfy the requirement of preparing a location hydraulic studies for all alternatives containing floodplain encroachments, FDOT requires a **LHR** to be prepared for any Type 2 CE, Environmental Assessment (EA), Environmental Impact Statement (EIS), or State Environmental Impact Report (SEIR) project that has a potential to encroach on the base floodplain, pursuant to **23 CFR Part 650A**, see [Section 13.2.2.5](#) for additional information. A **LHR** is not typically required for Type 1 CE or for NMSAs. The **LHR** describes the types of construction activities near floodplains and includes a description

of the measures to avoid or minimize floodplain impacts associated with the project. The District Drainage Engineer or designee must review the **LHR** and verify that all base floodplains are identified and the **LHR** is consistent with existing basin and floodplain management program. Additionally, the project manager or designee should consult with local natural resource and floodplain management agencies when a hydraulic study shows an impact to the floodplain.

The information contained in the **LHR** is site specific, but the level of floodplain analysis is dependent upon the flood risk associated with each type of encroachment. Use of detailed calculations for every drainage structure associated with a project is not usually necessary and should be avoided, unless the project is accelerated and includes design phase activities with the PD&E Study or detailed calculations are required to develop the preferred roadway alternative for a new alignment. The encroachment types are listed below:

1. **No Involvement** - No involvement means that there are no floodplains in the vicinity of the project alternatives.
2. **No Encroachment** - No encroachment means that there are floodplains in the vicinity of the project alternatives, but there is no floodplain encroachment.
3. **Minimal Encroachments** - Minimal encroachments on a floodplain occur when there is floodplain involvement but the impacts on human life, transportation facilities, and natural and beneficial floodplain values are not significant and can be resolved with minimal efforts. Normally, these minimal efforts to address the impacts will consist of applying FDOT's drainage design standards and following the WMD's procedures to achieve results that will not increase or significantly change the flood elevations and/or limits.
4. **Significant Encroachments** - A highway encroachment and any direct support of likely base floodplain development that would involve one or more of the following construction or flood related activities:
 - a. A significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles or which provides a community's only evacuation route
 - b. A significant risk including the potential for property loss and hazard to life
 - c. A significant adverse impact on natural and beneficial floodplain values

When the project causes significant encroachment on a floodplain a risk analysis is required to establish a level of risk allowable for a project area and to design the alternative to that level.

Note that even though the amount of floodplain involvement could be small, the impacts may be important or notable enough to be considered a significant encroachment.

It is possible that a project will involve more than one type of encroachment. When this occurs, it is necessary to include information that addresses each of the encroachment types in the **LHR**.

13.2.2.1 Location Hydraulic Study

Every wetland and cross drain has an associated floodplain; however, it is not necessary to evaluate the hydraulic impacts of each one. The impacts to flood elevations and limits are minimized by designing cross drain facilities in accordance with the [FDOT Drainage Manual, Topic No. 625-040-002](#). Only those alternatives or design features that may create substantial differences in flood elevations and limits should be evaluated. For projects or alternatives that would not create substantial changes in the flood elevations, include a statement in the **LHR** indicating that the drainage features will be designed in accordance with the [FDOT Drainage Manual, Topic No. 625-040-002](#), and no adverse impacts to floodplains are anticipated as a result of the project. See [Figure 13-1](#) for sample statements to be included in the **LHR** and Environmental Document.

The expected change in flood elevations due to a project must be estimated to perform the appropriate level of risk evaluation, see [Section 13.2.2.4](#). Alternatives that avoid longitudinal encroachment of the floodplain will include evaluation and discussion of the practicability of the alternatives. New alignment alternatives usually require a preliminary evaluation to determine hydraulic capacity for anticipated bridge/culvert size. When new alignments include longitudinal encroachments, they should be analyzed to determine any increase in the base flood elevation. On existing alignments, the possibility of decreased hydraulic performance of existing structures requires an evaluation to determine the change in the base flood elevation upstream (and downstream where appropriate).

If the hydraulic evaluation determines that flood elevations will not change significantly, no further evaluation is needed and the encroachment should be minimal.

If the hydraulic evaluation shows that flood elevations will increase either upstream or downstream, a location hydraulic study must be performed on the area impacted to evaluate the potential for flood impacts. The location hydraulic study should consist of a more detailed floodplain model to size proposed structures (bridges/culverts) appropriately. The model needs to identify the downstream constraint (tailwater limitation) that is affecting the floodplain stage and limits within the project. This information needs to be documented in the **LHR** to demonstrate the resulting impacts have been adequately addressed by the proposed design and the constraints are outside of the FDOT's control.

Additionally, the location hydraulic study should consist of an evaluation of the floodplain to determine any increase in the number of flood receptors and the increase in damage to flood receptors that will result from any increase in flood elevations. If necessary, appropriate coordination with FEMA, and local natural resource and floodplain management agencies should be initiated to adequately assess flood impacts.

Whenever it is determined that the project will involve a regulatory floodway, the District Drainage Engineer, or designee, must coordinate with local agencies and FEMA to ensure the project will be developed consistent with local floodway plans and floodplain management programs. This coordination effort and all associated drainage work must be documented in the **LHR** and summarized in the Environmental Document.

The impacts of each encroachment on natural floodplain values must be evaluated. After evaluating the impacts to the floodplain, a statement explaining the significance of any encroachments will be included in the **LHR** for each type of construction activity in the floodplain. Similar types of floodplain construction activities should be grouped together and the significance of their floodplain encroachments addressed accordingly. [Figure 13-1](#) provides several sample statements for use in the Environmental Document. The statements may be modified to fit the project activities and flood risk identified in the **LHR**.

13.2.2.2 Significant Encroachment

Evaluation to determine the significance of each encroachment should include assessment of construction or flood related impacts to lives, property, and transportation facilities that serve emergency vehicles or provide emergency evacuation. Additionally, the evaluation should include assessment of construction or flood related impacts to determine the potential for loss or gain to natural and beneficial floodplain values. The following floodplain values should be included in assessment:

1. Natural moderation of floods
2. Water quality maintenance
3. Groundwater recharge
4. Fish and wildlife habitat
5. Plants
6. Open space and natural beauty
7. Recreation
8. Agriculture and Aquaculture
9. Forestry

If floodplain analysis determines that the impacts to lives, property and floodplain values cannot be avoided, the District must develop measures to minimize and mitigate the impacts to the floodplain.

13.2.2.3 Only Practicable Alternative Finding

Pursuant to **23 CFR § 650.113**, a proposed alternative which includes a significant encroachment will not be approved unless it is the only practicable alternative. The finding of the only practicable alternative must be approved by FHWA. To obtain the finding, the District must provide the recommendation and supporting information to the District's FHWA Transportation Engineer with a copy to OEM. The only practicable alternative finding must be included in the final Environmental Document and must be supported by the following information:

1. The reasons why the proposed action must be located in the floodplain,
2. The alternatives considered and why they were not practicable, and
3. A statement indicating whether the action conforms to applicable State or local floodplain protection standards.

13.2.2.4 Risk Evaluation

Determination of floodplain encroachments should include an evaluation of flood-related risk to the project and surrounding environment. Evaluation of risk should include the following:

1. Risks to transportation infrastructure – road closure, repair costs.
2. Risks to highway users – loss of life, service disruption.
3. Risks to residents – damages, service disruption, property loss.

Typically, the level of risk is reduced through application of design standards and drainage design procedures when the project potentially encroaches into the floodplain. FDOT has established design parameters for the design frequency, backwater limitations, and limiting velocity, which are based on the importance of the transportation facility to the system and allowable risk for that facility. Additionally, design standards of other agencies that have control or jurisdiction over the waterway or facility concerned are considered in the evaluation.

To quantify the risk on project alternatives that encroach floodplains, FDOT uses risk assessment or risk analysis depending on the significance of floodplain encroachment. Risk assessment is performed for minimal encroachments while risk analysis is performed for significant encroachments that are anticipated to increase or substantially change floodplain elevations and/or limits. The cost and effort required for a risk analysis is considerably higher than for a risk assessment. Risk evaluation must be documented in the **LHR**. The District Drainage Engineer and Project Manager must review **LHR** and verify the determination of the significance of each floodplain encroachment and any risk evaluation.

Risk assessment is a subjective analysis of the risks resulting from various design alternatives, without detailed quantification of flood risks and losses. It may consist of developing the construction costs for each alternative, and subjectively comparing the risks associated with each alternative. A risk assessment is more appropriate for small structures, or for structures which size is not influenced by hydraulic constraints.

Risk analysis is an economic comparison of alternatives using expected total costs (construction costs plus risks costs) to determine the alternative with the least total expected cost to the public. It should include probable flood related costs during the service life of the facility for highway operation, maintenance, and repair, for highway aggravated flood damage to other property, and for additional or interrupted highway travel. See Chapter 4 of the [Drainage Design Guide](#) for more guidance on this evaluation.

13.2.2.5 Location Hydraulic Report

The LHR is prepared during the PD&E Study. The **LHR** should have headings and subheadings to effectively delineate the sections appropriate to the level of analysis. The cover page of the **LHR** should be prepared using **Technical Report Cover Page, Form No. 650-050-38** and contain the following standard statement:

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 and executed by FHWA and FDOT.

A sample **LHR** cover page is provided in [Figure 13-2](#).

The following describes the requirements necessary for the completion of the **LHR** for each level of significance of encroachment.

1. **No Encroachment or No Involvement** - For projects where the level of significance for the floodplain encroachment is No Encroachment or No Involvement, a location hydraulic report is not required and the review of the project alternatives is documented in the Environmental Document and the **Preliminary Engineering Report (PER)**.
2. **Minimal Encroachments** - If a project has minimal impacts due to floodplain encroachments, the **LHR** should describe the types of floodplain construction activities and measures to minimize project impact to floodplain. Any commitments made to restore and/or preserve floodplain should be documented in the Environmental Document.

The following items must be included in the **LHR** for all alternatives containing minimal encroachments. Each item should be discussed to a level that adequately addresses the environmental impacts and flood risks:

- a. General description of the project including location, length, existing and proposed typical sections, drainage basins, and cross drains;
 - b. Determination of whether the proposed action is in the base floodplain;
 - c. The history of flooding of the existing facilities and/or measures to minimize any impacts due to the proposed improvements;
 - d. Determination of whether the encroachment is longitudinal or transverse, and if it is a longitudinal encroachment, an evaluation and discussion of practicable avoidance alternatives;
 - e. The practicability of avoidance alternatives and/or measures to minimize impacts;
 - f. Impact of the project on emergency services and evacuation;
 - g. Impacts of the project on the base flood, likelihood of flood risk, overtopping, location of overtopping, backwater.;
 - h. Determination of the impact of the project on regulatory floodways, if any, and documentation of coordination with FEMA and local agencies to determine the requirements for the project to be developed consistent with the regulatory floodway;
 - i. The impacts on natural and beneficial floodplain values, and measures to restore and preserve these values (this information may also be addressed as part of the wetland impact evaluation and recommendations);
 - j. Consistency of the project with the local floodplain development plan or the land use elements in the Local Government Comprehensive Plan (LGCP), and the potential of encouraging development in the base floodplain;
 - k. Measures to minimize flood-plain impacts associated with the project, and measures to restore and preserve the natural and beneficial flood-plain values impacted by the project.
 - l. A map showing project, location, and impacted floodplains. A **FIRM Map** should be used if available. If not, other maps (e.g., US Geological Survey (USGS), U.S. Army Corps of Engineers (USACE), Soil Conservation Service (SCS), Bureau of Land Management, U.S. Forest Service, or best available information from the WMDs) may be used. Copies of applicable maps should be included in the appendix; and,
 - m. Results of any risk assessments performed.
3. **Significant Encroachments** - In addition to the items listed in the requirements for minimal encroachments, the following items must be included in the **LHR** for all

alternatives containing significant encroachments and for those actions which would support base flood development:

- a. Measures to minimize floodplain impacts associated with the project;
- b. The practicability of avoidance alternatives to significant encroachments or support of incompatible floodplain development;
- c. The hydraulic adequacy of existing structures;
- d. The frequency of traffic interruption due to flooding for the existing facility;
- e. When replacing structures and for structures proposed as alternatives on new alignments, discuss the requirements to meet hydraulic needs for the project;
- f. Drainage problems which would result from extending or replacing existing structures in addition to downstream tailwater constraints that affect the flood elevations within the project limits;
- g. Estimate both the existing floodplain volume (capacity) and the volume of the encroachment (this information can be estimated based on USGS Maps, FIRM Maps, LiDAR maps, existing drainage maps, or best available information from the WMDs; and
- h. Flooding impacts to private property both upstream and downstream.

If the project involves a bridge structure, and if a separate **Bridge Hydraulic Report (BHR)** is not prepared during PD&E, the following items must be addressed in the **LHR**:

1. Conceptual bridge length,
2. Conceptual scour considerations, and
3. Preliminary clearances both vertically and horizontally.

The scope of the **LHR** should be scaled to fit the scope and impacts of the project and should be coordinated with the District Drainage Engineer. Once the **LHR** is complete, its information is briefly summarized in the Environmental Document per [Section 13.2.4](#).

13.2.3 Bridge Hydraulic Report

BHRs are not normally completed during the PD&E phase of a project. However, a **BHR** may be prepared to determine the “hydraulic length” of the bridge or the length necessary to meet the hydraulic requirements. This is particularly important in situations where the bridge or culvert has a history of roadway overtopping. Correcting the overtopping usually involves raising the road and providing much larger hydraulic capacity through the bridge or culvert. This situation may be appropriate for a Risk Analysis to compare the

construction costs to risk costs. The construction costs should be documented in the Environmental Document. If bridge alternatives will be developed to avoid or minimize wetland impacts, then a **BHR** will analyze and document the costs and benefits of the additional bridge length, in accordance with Chapter 4 of the [FDOT Drainage Manual, Topic No. 625-040-002](#).

If the entire project consists of a bridge replacement with no other encroachments, then the requirements of the **LHR** must be included in the draft **BHR**.

When the draft **BHR** is prepared during the PD&E Study, its cover page shall contain the following standard statement:

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 and executed by FHWA and FDOT.

13.2.4 Environmental Document

13.2.4.1 Type 2 Categorical Exclusion

For a Type 2 CE, summarize the project involvement with the floodplain based on the results of floodplain analysis in the Floodplains Section of the **Type 2 Categorical Exclusion Determination Form** (See [Part 1, Chapter 5, Type 2 Categorical Exclusion](#)) and upload the **LHR**, **BHR** and any other supporting documentation into the StateWide Environmental Project Tracker (SWEPT). Sample statements that can be included in the form for projects with No Encroachment can be found in [Figure 13-1](#). The summary should at least answer the following questions:

1. Is there a floodplain within the vicinity of the proposed alternative(s)?
2. Will there be an encroachment or a benefit to the floodplain as a result of the project?
3. What type of encroachment impact will the preferred alternative have on the floodplain and what is the level of encroachment?
4. What measures have been taken to minimize and mitigate floodplain impacts associated with the project?

If there is regulatory floodway involvement then the supporting documentation to the **Type 2 Categorical Exclusion Determination Form** must address the project's consistency with the regulatory floodway's ability to discharge the base flood without cumulatively increasing the water surface elevation more than the designated height, and demonstrate coordination with FEMA and local floodway management agencies on the consistency issue. For additional information, see **FEMA Guidance for Flood Risk Analysis and Mapping, November 2016**.

13.2.4.2 State Environmental Impact Report

For SEIRs, include the results of the coordination in the Environmental Analysis section of the SEIR by summarizing the project involvement with floodplains and including documentation in the project file. See [Part 1, Chapter 10, State, Local Agency and Private Project Delivery](#).

1. **NoInv** is marked if there are no floodplains in the vicinity of the proposed alternatives.
2. **Enhance** is marked if the project will be a benefit to the floodplain, such as improving hydraulic opening on a bridge.
3. **No** is marked when there are floodplains in the vicinity but there are no floodplain encroachment impacts from the preferred alternative.
4. **Yes** is marked if there is a potential floodplains impact. Provide justification of decision in the Supporting Information column and supplement with attachments as necessary to substantiate the impact determination (see [Section 13.2.4.3](#)).

13.2.4.3 Environmental Assessment and Draft Environmental Impact Statement

The Floodplain section for an EA or Draft Environmental Impact Statement (DEIS) must include:

1. Identification of the geographic area of the base floodplain and a determination of whether the proposed action will encroach upon the base floodplain using available reference maps. The potential references include:
 - a. **FIRM** must be used, if available. The map reference number must be provided in the document. If the project is not in a FEMA-identified hazard area, **FIRM** will not be available and other sources should be used.
 - b. Other maps (e.g., USGS, USACE, SCS, Bureau of Land Management, U.S. Forest Service, or best available information from the WMDs) may be used.
 - c. Appropriate maps will be developed by the Drainage Engineer if no other maps are available.
2. An exhibit showing the relationship of each project alternative under study with each base floodplain and regulatory floodway involved.
3. If there is no encroachment on a base floodplain and the proposed action will not support development in the base floodplain, a statement to that effect will be provided (see [Figure 13-1](#) for sample statements).

4. If the project encroaches or supports base floodplain development within a base floodplain, discuss the following information for each proposed alternative that causes the impacts commensurate with the level of impacts:
 - a. Flood risks associated with, or resulting from, the proposed action.
 - b. Impacts on natural and beneficial floodplain values.
 - c. Degree to which the action provides direct effects or indirect effects in the support of development in the base floodplain, see [FDOT Cumulative Effects Evaluation Handbook](#).
 - d. The potential for significant interruption or termination of community's only evacuation route or facility for emergency vehicles.
 - e. Measures to minimize floodplain impacts associated with each alternative.
 - f. Measures to restore and preserve the natural and beneficial floodplain values that are impacted.

The EA or DEIS should briefly summarize the results of the **LHR**. The EA or DEIS should identify the number of encroachments and any support of incompatible base floodplain developments and their potential impacts. Where an encroachment results in substantial impacts or supports incompatible floodplain development, the EA or DEIS should provide more information on the location, impacts, and appropriate mitigation measures. The EA or DEIS should also include an evaluation and discussion of practicable alternatives to avoid or minimize such involvements.

If an alternative encroaches upon a regulatory floodway, the following questions must be addressed in the EA or DEIS:

1. Can the highway encroachment be located so that it is consistent with the regulatory floodway? or
2. Can the regulatory floodway be revised to accommodate the project? (This typically involves a FEMA map revision.)

For each alternative encroaching upon a designated or proposed regulatory floodway, the EA or DEIS should provide a preliminary indication of whether the encroachment would be consistent with, or require a revision to the regulatory floodway. Engineering and environmental analyses should be undertaken, commensurate with the level of encroachment, to allow the appropriate evaluation of impacts. Coordination with FEMA and appropriate state and local governmental agencies should be undertaken for each regulatory floodway encroachment.

13.2.4.4 Finding Of No Significant Impact and Final Environmental Impact Statement

When the preferred alternative includes significant encroachments but the human environment is not significantly affected, the finding must be provided in the Floodplain section of an EA with Finding of No Significant Impact (FONSI).

If the preferred alternative includes significant encroachments that significantly affect the human environment, the Environmental Analysis Section and the Executive Summary of the Final Environmental Impact Statement (FEIS) must include an "Only Practicable Alternative Finding" required by **23 CFR § 650.113** and **Executive Order 11988** (See [Section 13.2.2.2](#)).

If the preferred alternative encroaches on a regulatory floodway, the FONSI or FEIS should discuss the consistency of the action with the regulatory floodway. If a regulatory floodway revision is necessary, the FONSI or FEIS should include evidence from FEMA and local or State agency indicating that such revision is acceptable.

If the project has no involvement with or is not located within a floodplain, a finding is still provided. See [Figure 13-1](#) for sample statements.

13.2.5 Public Involvement

In accordance with **Executive Order 11988**, the FDOT must provide public notice if there will be a significant floodplain encroachment. To comply, the District must include in its public workshop or hearing advertisements, a statement that the project involves encroachments on base floodplains and, if applicable, involvement with a regulatory floodway. At all public workshops, the District should include information concerning any anticipated floodplain encroachments. If a public hearing is held, the presentation at the public hearing must also include any anticipated floodplain encroachments.

13.3 REFERENCES

Federal-Aid Policy Guide 23 CFR § 650A.

<https://www.fhwa.dot.gov/legsregs/directives/cfr23toc.htm>

FEMA. Guidance for Flood Risk Analysis and Mapping, February 2019.

https://www.fema.gov/media-library-data/1556727028010-090889650cfe5ad6845c3f2f39863053/General_Hydrologic_Considerations_Guidance_Feb_2019.pdf

FHWA. Technical Advisory T6640.8A, Guidance for Preparation and Processing Environmental and Section 4(f) Documents.

<https://www.environment.fhwa.dot.gov/projdev/impTA6640.asp>

FDEP. website www.dep.state.fl.us/

FDOT. Efficient Transportation Decision Making (ETDM) Manual, Topic No. 650-000-002.

<http://www.fdot.gov/environment/pubs/etdm/etdmmanual.shtm>

FDOT. Cumulative Effects Evaluation Handbook

https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/environment/pubs/cee/cee-handbook-2012-12183b410b4f04cf44f9ae1972577be52ba0b7f4290ddf11467fa22acded398d0508237a15c0eac844e193040a3899bb074181367d98d3424bebaf8c94900a1fc4e3d3cf79554d674a32b92c6cada8dda3b623acecd439cc41f999178af94010a78d.pdf?sfvrsn=3c5d70cd_10

FDOT. Drainage Manual, Topic No. 625-040-002

https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/drainage/files/drainagemanual2020.pdf?sfvrsn=54b052a4_2

FDOT. Standard Plans for Road and Bridge Construction.

<http://www.fdot.gov/roadway/DS/17/STDs.shtm>

Guidelines for Implementing Executive Order 11988, Floodplain Management and Executive Order 13690, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input. October 8, 2015. <http://www.fema.gov/media-library/assets/documents/110377>

Memorandum of Understanding Between FHWA and FDOT Concerning the State of Florida's Participation in the Surface Transportation Project Delivery Program Pursuant to 23 U.S.C. 327, December 14, 2016.

<http://www.fdot.gov/environment/pubs/Executed-FDOT-NEPA-Assignment-MOU-2016-1214.pdf>

Presidential Executive Order 11988, Floodplain Management and Protection.

<http://www.whitehouse.gov/the-press-office/2015/01/30/executive-order-establishing-federal-flood-risk-management-standard-and-> or
<https://www.fema.gov/executive-order-11988-floodplain-management-0>

13.4 FORMS

[Technical Report Cover Page, Form No. 650-050-38](#)

13.5 HISTORY

1/7/2008, 8/17/2016, 6/14/2017: NEPA Assignment and re-numbered from Part 2, Chapter 24, 1/14/2019

Suggested Statements for Environmental Documents

The following sample summary statements may be appropriate for common types of base floodplain construction activities not resulting in significant floodplain impacts. These statements should be modified based on the results of the location hydraulic studies documented in the Location Hydraulics Report.

1- PROJECTS WHICH WILL NOT INVOLVE ANY WORK BELOW THE 100 YEAR FLOOD ELEVATION

The following statement is used when the 100-year flood elevation is available from existing information, and it is evident that project will not involve any work below the 100-year flood elevation.

Although this project is located within the limits of the 100-year floodplain, no work is being proposed below the 100-year flood elevation and, thus, this project does not encroach upon the base floodplain.

2- PROJECTS WHICH WILL NOT INVOLVE THE REPLACEMENT OR MODIFICATION OF ANY DRAINAGE STRUCTURES

These projects must be on existing alignment. They may involve a change in the profile grade elevation of a magnitude normally associated with resurfacing. There are no known drainage problems within the limits of the project, or other factors that override the need for concurrent drainage improvements.

This project will not involve the replacement or modification of any existing structures, or the addition of any new drainage structures. Thus, this project will not affect flood heights or base floodplain limits. Additionally, the project will not increase flood risks or damage; and there will be no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.

3- PROJECTS INVOLVING MODIFICATION TO EXISTING DRAINAGE STRUCTURES

Work under this type of project will not involve the replacement of any existing drainage structures or the construction of any new drainage structures. Work will only involve modification of existing structures (e.g., extending cross drains, adding headwalls, or extending bridge piers). Projects that affect flood heights and flood limits, even minimally, may require further evaluation to support statements that emphasize the insignificance of the modifications.

Figure 13-1 Floodplain Statements

Modifications to existing drainage structures (SPECIFY e.g., extending cross drains, adding headwalls, or extending bridge piers) included in this project will result in an insignificant change in their capacity to carry floodwater. These modifications will cause minimal increases in flood heights and flood limits which will not result in any significant adverse impacts on the natural and beneficial floodplain values or any significant change in flood risks or damage. There will be no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes as the result of modifications to existing drainage structures. Therefore, it has been determined that this encroachment is not significant.

4- PROJECTS ON EXISTING ALIGNMENT INVOLVING REPLACEMENT OF EXISTING DRAINAGE STRUCTURES WITH NO RECORD OF DRAINAGE PROBLEMS

This type of work excludes replacement activities that would increase the hydraulic performance of existing facilities. Also, there should be no record of drainage problems and no unresolved complaints from residents in the area.

The proposed structure will perform hydraulically in a manner equal to or greater than the existing structure, and backwater surface elevations are not expected to increase. Thus, there will be no significant adverse impacts on natural and beneficial floodplain values. There will be no significant change in flood risk, and there will not be a significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.

5- PROJECTS ON EXISTING ALIGNMENT INVOLVING REPLACEMENT OF DRAINAGE STRUCTURES IN HEAVILY URBANIZED FLOODPLAINS

These projects include work in flood sensitive, heavily urbanized floodplains, where the conditions of flooding are largely attributable to the low-lying terrain. The work does not include those replacement structures that will reduce the hydraulic performance of existing facilities or a change in the profile grade when the existing grade is overtopped by an event below the 100-year storm. Replacement drainage structures are limited to hydraulically equivalent structures in most instances.

Replacement drainage structures for this project are limited to hydraulically equivalent structures which are not expected to increase the backwater surface elevations. The limitations to the hydraulic equivalency being proposed are basically due to restrictions imposed by the geometrics of design, existing development, cost feasibility, or practicability. An alternative encroachment location is not considered since it does not meet the project's purpose and need or is economically unfeasible. Since flooding conditions in the project area are inherent in the topography or are a result of other outside contributing sources, and there is no practical alternative to eradicate flooding problems in any significant amount, existing flooding will continue, but will not increase as the result of the construction of this project.

Figure 13-1 Floodplain Statements (Page 2 of 3)

Furthermore, the project will not affect existing flood heights or floodplain limits. There will be no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes as the result of construction of this project. Therefore, it has been determined that this encroachment is not significant.

In addition to the above statements, for those projects which do not involve regulatory floodways and do not support incompatible base floodplain development, the following positive statement can be added:

It has been determined, through consultation with local, state, and federal water resources and floodplain management agencies that there is no regulatory floodway involvement on the project and that the project will not support base floodplain development that is incompatible with existing floodplain management programs.

Figure 13-1 Floodplain Statements (Page 3 of 3)

LOCATION HYDRAULICS REPORT

Florida Department of Transportation

District X

Project Title

Limits of Project

County, Florida

Financial Management Number: XXXXX-X

ETDM Number: XXXXXX

Date

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 and executed by FHWA and FDOT.

Figure 13-2 Sample Location Hydraulics Report Cover Page