

SAN FRANCISCO WATERFRONT COASTAL FLOOD STUDY, CALIFORNIA

APPENDIX L NONSTRUCTURAL IMPLEMENTATION PLAN

JULY 2026

USACE TULSA DISTRICT | THE PORT OF SAN FRANCISCO



**US Army Corps
of Engineers** 



Table of Contents

Acronyms and Abbreviations.....	iii
1.0 Definitions.....	1
2.0 Introduction.....	5
2.1 Recommended Plan.....	6
2.2 Preliminary Eligibility	10
2.3 Proposed Nonstructural Measures.....	10
2.3.1 Dry Floodproofing of Eligible Nonresidential Structures	10
2.3.2 Wet Floodproofing of Eligible Nonresidential Structures	11
2.4 Public Education and Engagement	12
3.0 Process for Dry Floodproofing of Eligible Nonresidential Structures	13
3.1 Nonresidential Preliminary Eligibility	14
3.2 Second Stage of Eligibility Determinations.....	14
3.3 Dry Floodproofing Eligible Costs	16
3.4 Dry Floodproofing Ineligible Costs	17
3.5 Relocation Assistance	18
3.6 Real Estate Required for Dry Floodproofing.....	18
4.0 Process for Wet Floodproofing of Eligible Nonresidential Structures.....	19
4.1 Preliminary Eligibility	20
4.2 Second Stage of Eligibility Determinations.....	20
4.3 Wet Floodproofing Eligible Costs	20
4.4 Wet Floodproofing Ineligible Costs.....	20
4.5 Relocation Assistance	21
4.6 Real Estate Required for Wet Floodproofing.....	21
5.0 Adaptation Tracking and Strategies.....	22
6.0 Flood Risk Reduction Actions to be Taken by the Non-Federal Sponsor	22
7.0 Performance of Work	23
8.0 Implementation Tasks and Cost Estimate Assumptions.....	24
9.0 Methods for Scheduling and/or Prioritizing	27
9.1 Clustering	28
9.2 Flood Risk-Level	28
9.3 First-Come, First-Served	28

10.0	Operation, Maintenance, Repair, Replacement, and Rehabilitation	28
10.1	Non-Federal Sponsor	28
10.2	Nonresidential Structure Owners	29
11.0	References	30

List of Tables

Table L-1:	Recommended Plan Nonstructural Features	6
Table L-2:	Advantages and Disadvantages of Dry Floodproofing	11
Table L-3:	Advantages and Disadvantages of Wet Floodproofing	12
Table L-4:	Building Category Assumptions to Inform Cost Estimate	25

List of Figures

Figure L-1:	Nonstructural Plan Features	9
-------------	-----------------------------------	---

Acronyms and Abbreviations

Acronym	Definition
AEP	Annual Exceedance Probability
ASTM	American Society for Testing and Materials
BFE	Base Flood Elevation
CFR	Code of Federal Regulations
ER	Engineer Regulation
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FFE	First Floor Elevation
HTRW	Hazardous, Toxic, or Radioactive Waste
IRC	International Residential Code
MAP	Monitoring and Adaptation Plan
NCC	Notice of Construction Completion
NFIP	National Flood Insurance Program
NFS	Non-Federal Sponsor
OMRR&R	Operations, Maintenance, Repair, Rehabilitation, and Replacement
PDT	Project Delivery Team
POSF	Port of San Francisco
PPA	Project Partnership Agreement
RSLC	Relative Sea Level Change
SFWCFS	San Francisco Waterfront Coastal Flood Study
SFHA	Special Flood Hazard Area

Acronym	Definition
URA	Uniform Relocation Assistance and Real Property Acquisition Act
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code

1.0 Definitions

Term	Definition
Annual Exceedance Probability (AEP)	AEP means the probability that a given rainfall total accumulated over a given duration will be exceeded in any one year or the probability of a given stage at a given location will be exceeded in any one year. When used in reference to stage, this is the stage produced by the hydraulic model for the associated annual exceedance probability rainfall inputs.
Base Flood	The term “base flood” is defined by the National Flood Insurance Project as the “flood having a 1 percent chance of being exceeded in any given year and is also called the .01 annual exceedance probability flood”.
Base Flood Elevation (BFE)	The computed elevation to which floodwater is anticipated to rise during the base flood. The BFE is shown on the community’s Flood Insurance Rate Map.
Dry Floodproofing	Dry floodproofing consists of sealing all areas of a structure up to a maximum of approximately 3 feet above ground level to reduce flood damage by making walls, doors, windows, and other openings resistant to penetration by water. Walls are coated with sealants, waterproofing compounds, or plastic sheeting. Back flow from water and sewer lines is prevented by installing mechanisms such as drain plugs, standpipes, grinder pumps, and back-up valves. Openings, such as doors, windows, sewer lines, and vents, may also be closed temporarily with sandbags or removable closures, or closed permanently.
Economically Justified	The floodproofing measures proposed for the structure must be economically justified based on an aggregation or sub-aggregation level that are anticipated to be avoided over the 100-year period of analysis (years 2040-2140) unless they have been identified eligible based on social vulnerability criteria and included in the next highest aggregation regardless of economic justification.
Elevation (of structure)	The entire foundation of the residential structure will be lifted and placed on a new foundation (i.e., columns, piers, posted or raised foundation walls) so that the lowest habitable finished floor is above the design water surface elevation. All utilities and mechanical equipment, such as air conditioners and hot water heaters, will also be raised to this elevation. This

Term	Definition
	measure is applicable to permanent residential structures only. The nonstructural plan does not include elevation of residential structures.
Eligible Structures	Structures that are determined by the U.S. Army Corps of Engineers to be eligible for floodproofing or elevation after the completion of the investigations and analyses as described herein in the secondary eligibility description.
First Floor Elevation (FFE)	FFE refers to the height of the first lowest floor of the structure above the adjacent grade. The higher the FFE of a structure, the less likely that flood damage to the structures will occur.
Floodproofing	As defined by the Federal Emergency Management Agency in Title 44 Code of Federal Regulations (CFR), Chapter 1, Part 59, "floodproofing" means any combination of structural and nonstructural additions, changes, or adjustments to structures that reduce or eliminate flood damages to real estate or improved real property, water and sanitary facilities, structures, and their contents.
Hazardous, Toxic, and Radioactive Waste (HTRW)	HTRW means hazardous, toxic, and radioactive waste as more specifically defined in Engineer Regulation (ER) 1165-2-132, "Hazardous, Toxic, and Radioactive Waste (HTRW) Guidance for Civil Works Projects".
Historic Structure	listed individually in the National Register of Historic Places (maintained by the Department of the Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register; (2) certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district; (3) individually listed on a state inventory of historic places with historic preservation projects which have been approved by the Secretary of the Interior; and (4) individually listed on a local inventory of historic places in communities with historic preservation projects that have been certified either by (a) an approved state project as determined by the Secretary of the Interior or; (b) directly by the Secretary of the Interior in states without approved projects.

Term	Definition
National Flood Insurance Program (NFIP)	The NFIP is a program that makes federally backed flood insurance available in those states and communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage. The program of flood insurance coverage and floodplain management administered under the Act and applicable Federal regulations promulgated in Title 44 of the Code of Federal Regulations, Subchapter B.
Non-Federal Sponsor (NFS)	The NFS is the cost-sharing partner for the study, design, and construction of the project, as well as for the operation, maintenance, repair, rehabilitation and replacement of the project. The NFS for this study is the Port of San Francisco, California.
Nonstructural Measures	Nonstructural floodproofing measures are permanent or contingent measures applied to a structure and/or its contents that prevent or provide resistance to damage from flooding. Nonstructural floodproofing measures differ from structural floodproofing measures (i.e., levees, floodwalls, etc.) in that they focus on reducing the consequences of damages from flood events by adapting the structure instead of focusing on reducing the probability of damages from flood events.
Nonstructural Plan	The combination of nonstructural measures (that are permanent or contingent measures applied to a structure and/or its contents that prevent or provide resistance to damage from flooding). Nonstructural Plan measures differ from structural measures in that they focus on reducing consequences of flooding instead of focusing on reducing the probability of flooding. Nonstructural measures reduce flood damage without significantly altering the nature or extent of flooding. The nonstructural measures for this report include floodproofing of eligible nonresidential structures.
Nonresidential	A nonresidential structure is a structure not herein defined as a Residential Structure.
Preliminary Structure Eligibility Criteria	To be considered preliminarily eligible for participation in the nonstructural plan, a structure must meet these criteria: The structure must have a FFE at or below the 1% AEP floodplain, based on the coastal flood risk potential in 2065 (25 years after the beginning of the 100-year period of analysis) at a specific location. For potential Subsequent Actions, the

Term	Definition
	applicable future year of reference will be adjusted based on the Monitoring and Adaptation Plan (Appendix G). The floodproofing measures proposed for the structure must be economically justified based on an aggregation or sub-aggregation level that are anticipated to be avoided over the 100-year period of analysis (years 2040-2140) unless they have been identified eligible based on social vulnerability criteria and included in the next highest aggregation regardless of economic justification.
Residential Structure	One- or two-family dwellings which are three stories or less in height intended for human habitation, for living, sleeping, cooking, or eating purposes, or any combination thereof as defined by the International Residential Code (IRC) Chapter 11 Section N1101.6. There are no known residential structures included in the nonstructural plan. Multifamily structures such as condominium and apartment buildings are grouped with nonresidential structures due to the size and nature of the structures that prevents them from being elevated or acquired.
Structural Plan	A combination of structural measures, which are physical modifications designed to reduce the frequency of damaging levels of flood inundation. For purposes of this report, these measures include ground improvements, concrete curbs, raised shorelines, seawalls, floodwalls, raised and rebuilt wharves, closure structures, and natural and nature-based features.
Special Flood Hazard Area (SFHA)	An area having special flood, mudflow or flood-related erosion hazards and shown on a Flood Hazard Boundary Map or a Flood Insurance Rate Map Zone A, AO, A1-A30, AE, A99, AH, AR, AR/A, AR/AE, AR/AH, AR/AO, AR/A1-A30, V1-V30, VE or V. The SFHA is the area where the NFIP's floodplain management regulations must be enforced.
Wet Floodproofing	Wet floodproofing is an alteration to a structure that prevents or provides resistance to damage from flooding while allowing floodwaters to enter the structure or area and equalize pressures on foundation walls or lower-level walls. A key feature associated with wet floodproofing are openings to allow floodwaters in, consisting of engineered flood vents in the structure walls.

2.0 Introduction

The San Francisco Waterfront Coastal Flood Study (SFWCFS) incorporates structural and nonstructural measures as part of the Recommended Plan. Once the study is complete, detailed plans and specifications for implementing nonstructural measures will be developed as part of the design phase of the project. The design phase occurs after completion of the feasibility report. In concert with structural measures, nonstructural measures will be a key component to reducing long term coastal storm risk and supporting sustainable development. The information in this nonstructural plan presents a strategy that may be used to implement nonstructural measures in support of the SFWCFS Recommended Plan.

This Nonstructural Implementation Plan describes the general process for the implementation of floodproofing measures to reduce the risk of flood damage to nonresidential structures caused by flooding, in general accordance with the July 22, 2024 Memorandum from Headquarters U.S. Army Corps of Engineers (USACE) *Guidance for Nonstructural Project Planning and Implementation*. USACE recognizes that there are unique challenges in the implementation of a nonstructural plan. The NFS, the Port of San Francisco (POSF), in conjunction with the City and County of San Francisco and local stakeholders, have also provided valuable information pertinent to the study.

USACE places a priority on continuing this coordination during the design phase and construction, and sharing lessons learned with other USACE teams. If necessary and advantageous, this could include updating the hydrology and hydraulics existing conditions modeling to incorporate newly built projects by the NFS or USACE that would change the flood risk for the study area. However, given the relatively small area and number of buildings included in the nonstructural plan, this may not be necessary to achieve the anticipated benefits of the Recommended Plan.

The anticipated duties and obligations of property owners are generally outlined in Sections 3, 4, and 7. Section 7 provides information on the generalized workflows of meeting eligibility requirements during the application, screening, and design-build phase of a single structure. However, some of this information may be modified in the design phase as the nonstructural plan is finalized.

Groups of structures have been evaluated to identify the most cost-effective means for risk reduction over time. Nonstructural measures can reduce risk in areas where a structural measure is not recommended at the time a subset of area assets are vulnerable. USACE reserves the right to determine the scale or timing of floodproofing that will ultimately be implemented at each structure location, including consideration of project costs and benefits. The nonstructural components are a relatively small component of the overall Recommended Plan because of the scale and use of structures in the area, which are not generally feasible for elevation.

The project area is currently subdivided into four distinct geographic areas or reaches for implementation and maps of these areas will be prepared and regularly updated to depict the current stage of structure floodproofing, eligible owner names, property line

boundaries, locations of HTRW, zoning districts, regulatory floodway boundaries, flood zones, and other important information.

Plan implementation will occur in increments over time as informed by the Monitoring and Adaptation Plan (MAP) (Appendix G). Following an initial design phase, the first interval may include all structures identified for First Actions. The timeframe is highly dependent upon the amount of funding allocated in any given year, the participation rate, environmental conditions, timely approval process of structures receiving nonstructural treatment, availability of floodproofing contractors, and expediency of submittal reviews and permit processing during the design and construction phases.

Additional information is provided in Section 7.

2.1 Recommended Plan

The Recommended Plan consists of two phases of intervention to reduce risk within the study area over a 100-year period of analysis. For analysis, the years 2040 and 2090 were used as approximate first and subsequent action years. The actual timing and implementation of First Actions will be dependent upon project funding and preconstruction activities, while timing of Subsequent Actions will be refined in response to monitoring of RSLC and other changing conditions. Recommended Plan First Actions are independent of the rate of RSLC.

The Recommended Plan includes floodproofing of 51 structures as part of the First Actions and an additional 67 structures as part of the Subsequent Actions, as shown in **Table L-1**. The First Action nonstructural plan structures were identified based on risk conditions through 2065 (25 years into the period of analysis), assuming USACE Intermediate RSLC. Subsequent Actions of the nonstructural plan may be deferred or implemented based on changing risk conditions as informed by the MAP (Appendix G).

Table L-1: Recommended Plan Nonstructural Features

Building Category	First Actions		Subsequent Actions		All Actions	
	Number of Structures	Total Area (sq. ft.)	Number of Structures	Total Area (sq. ft.)	Number of Structures	Total Area (sq. ft.)
Community	5	27,100	3	46,000	8	73,100
Critical Services	1	11,700			1	11,700
Industrial and Warehouse	12	353,100	21	682,700	33	1,035,800
Parking Garage			3	124,500	3	124,500
Large Multifamily and Office	3	20,800	16	570,000	19	590,800

Building Category	First Actions		Subsequent Actions		All Actions	
	Number of Structures	Total Area (sq. ft.)	Number of Structures	Total Area (sq. ft.)	Number of Structures	Total Area (sq. ft.)
Retail and Restaurant	30	235,900	24	588,000	54	824,700
Total	51	648,600	67	2,012,000	118	2,660,600

Property owners in the project area will be informed of the details of nonstructural measure implementation, including eligibility criteria, the eligibility process, and the related duties and obligations of USACE, POSF, and the property owner. Based upon present information, the anticipated duties and obligations are generally outlined below. However, some of this information may be modified as the study progresses and/or as the Nonstructural Implementation Plan is finalized during the design phase. While each building has been evaluated as part of this study, the government reserves the right to determine which measure will ultimately be implemented. Multiple floodproofing projects may be in construction concurrently.

The Project Delivery Team (PDT) anticipates that all buildings recommended for floodproofing in the Recommended Plan First Actions will be implemented over a 10-year period; however, the scale of the project is highly dependent upon the participation rate and the total implementation time is dependent on the amount of funding that is appropriated by Congress and contributed by the NFS for implementation in any given year.

At this stage of the study, the PDT has not defined what specific floodproofing treatment (e.g., wet versus dry, specific materials or techniques) will be used for different buildings or infrastructure, though preliminary assumptions by building category were applied to support cost estimation (Section 8.0). Buildings to receive floodproofing treatment are shown in **Figure L-1**. Details of infrastructure floodproofing will be revisited in the design phase.

The Recommended Plan also includes select building removal (demolition) and building elevation on raised ground in First Actions to accommodate construction of structural features. Because these features are an integral part of the structural plan and directly tied to its implementation, they are not considered part of the nonstructural plan, thus they are not considered in the Nonstructural Implementation Plan.

Participation in the nonstructural plan is voluntary. Participation in the plan does not guarantee reduced rates under the NFIP.

The traditional method of implementation per USACE guidance for Nonstructural Project Planning and Implementation is typically a USACE-led construction approach (2024). At this time, the nonstructural plan is expected to be performed through the traditional USACE-led construction approach. The NFS may investigate and consider in the design phase the implications of the necessary authorities and capabilities needed to efficiently and effectively manage the eligibility, outreach, and execution of the nonstructural

components of the Recommended Plan. The NFS has experience implementing similar or relevant programs, such as the Floodwater Grant Program (floodproofing), Mandatory Wood Frame (soft-story) Retrofit Program, and Federal Emergency Management Agency (FEMA) floodplain administration for the city and county. Should the agencies determine in the design phase that it would be advantageous for the NFS to lead nonstructural implementation, the NFS could enter into a Section 204 agreement with USACE to accomplish this.

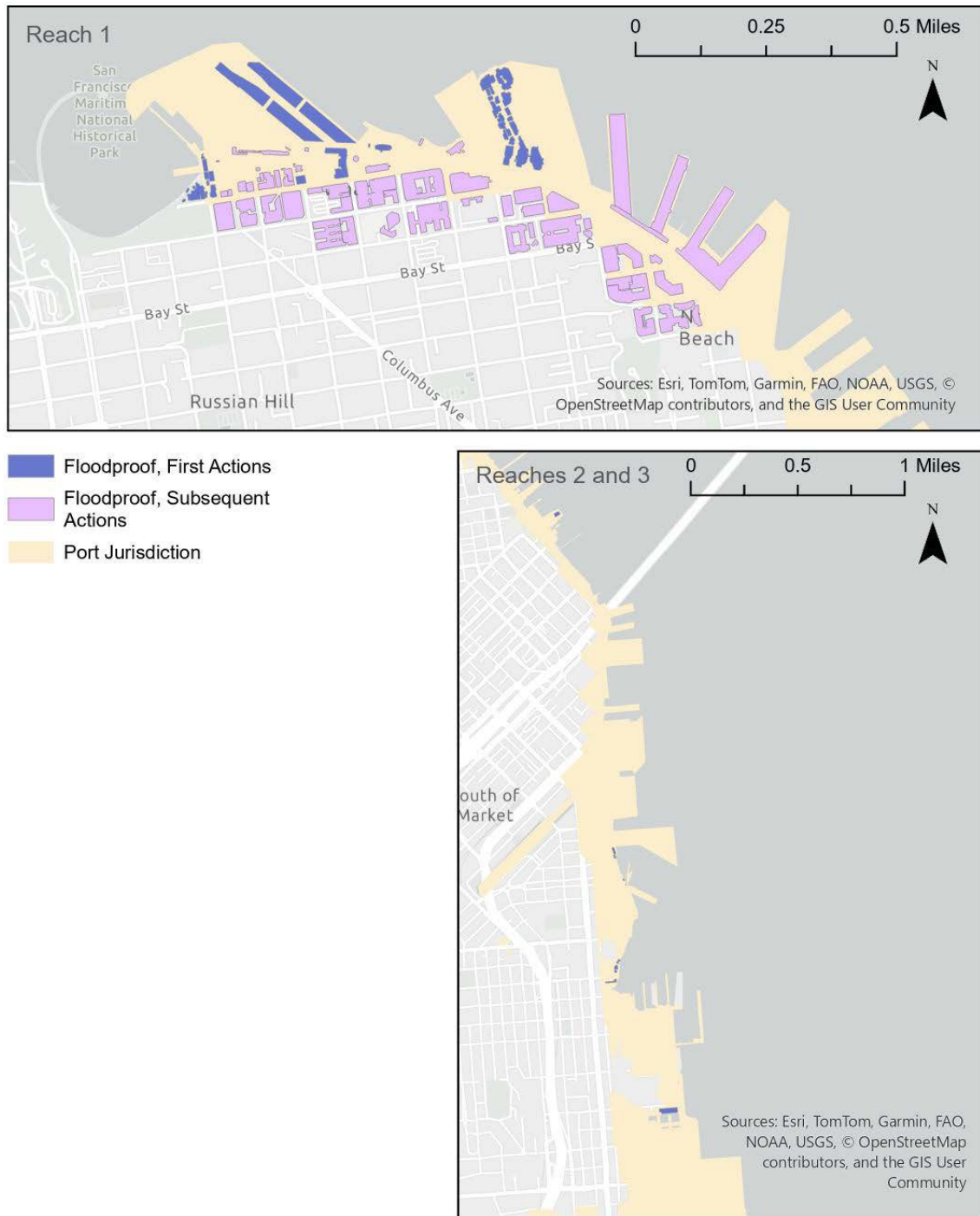


Figure L-1: Nonstructural Plan Features

2.2 Preliminary Eligibility

For a structure to be preliminarily eligible for inclusion in the nonstructural plan, the structure must have a FFE at or below the 1% AEP floodplain, based on coastal flood risk potential in 2065 (25 years after the beginning of the 100-year period of analysis) at a specific location. For potential Subsequent Actions, the applicable future year of reference will be adjusted based on the MAP (Appendix G).

Additionally, structures that have received prior financial assistance from a Federal agency or program for disaster assistance may not be eligible if assistance provided under this project would result in a duplication of benefits prohibited by the terms of the disaster assistance provided.

2.3 Proposed Nonstructural Measures

The Recommended Plan is currently based on the following measures, which will be refined as additional data becomes available throughout the design phase. Additional information regarding other nonstructural measures will be added, as appropriate, and as the plan evolves.

- Dry floodproofing of nonresidential structures (up to 3.0 feet above the ground surface elevation)
- Wet floodproofing of nonresidential structures

2.3.1 Dry Floodproofing of Eligible Nonresidential Structures

Dry floodproofing involves techniques applied to keep nonresidential structures dry by sealing the structure to keep floodwaters out. In dry floodproofing, the portion of a structure that is below the FFE (walls and other exterior components) is sealed to make it watertight and substantially impermeable to floodwaters. Such watertight impervious membrane sealant systems can include wall coatings, waterproofing compounds, and impermeable sheeting. Where found to be more suitable or cost effective, supplemental impermeable wall systems, such as cast-in-place concrete around an individual building or small group of buildings, sometimes referred to as a “perimeter ring wall,” may be substituted for floodproofing actions. Doors, windows, sewer and water lines, and vents are closed with permanent or removable shields or valves. The expected duration of flooding is critical when deciding which sealant systems to use because seepage can increase over time, rendering the floodproofing ineffective. Waterproofing compounds, sheeting, or sheathing may fail or deteriorate if exposed to floodwaters for extended periods. Sealant systems are also subject to damage (puncture) in areas that experience water flow of significant velocity, or ice or debris flow. The USACE National Flood Proofing Committee has investigated the effect of various depths of water on masonry walls. The results of their work show that, generally, no more than 3 feet (0.9 meter) of water should be allowed on a non-reinforced concrete block wall that has not previously been designed and constructed to withstand flood loads. Therefore, application of sealants and shields should involve a determination of the structural soundness of a building and its corresponding ability to resist flood and flood-related

loads. A Licensed Professional Engineer registered in California should be involved in any design of dry floodproofing mitigation systems so that they can evaluate the building to determine the appropriate height of dry floodproofing. Research in this subject area is available in *Flood Proofing Tests – Tests of Materials and Systems for Flood Proofing Structures* (USACE 1988). Some advantages and disadvantages associated with dry floodproofing are displayed in **Table L-2**.

Table L-2: Advantages and Disadvantages of Dry Floodproofing

Advantages	Disadvantages
Reduces the flood risk to the structure and contents	Requires ongoing maintenance
May be less costly than other retrofitting measures	Usually requires human intervention and adequate warning time for installation of barrier elements
Does not require the extra land that may be needed for floodwalls or reduced levees	May not provide protection if measures fail or the flood event exceeds the design parameters of the measure
Retains the structure in its present environment and may avoid significant changes in appearance if of masonry construction	May result in more damage than flooding if design loads are exceeded, walls collapse, floors buckle, or experiences uplift
	May adversely affect the appearance of the building if shields are not aesthetically pleasing
	May not reduce damage to the exterior of the building and other property features

2.3.2 Wet Floodproofing of Eligible Nonresidential Structures

Wet floodproofing involves techniques designed to permit floodwaters to enter a structure by elevating mechanical and electrical components above the design floodwater elevation. Damage from flooding is reduced, making the structure more resilient to floodwaters and allowing the structure to be cleaned and returned to service more quickly. Wet floodproofing prevents unbalanced hydrostatic pressure on foundation walls and support systems by equalizing interior and exterior water levels. Some advantages and disadvantages associated with wet floodproofing are displayed in **Table L-3**.

Table L-3: Advantages and Disadvantages of Wet Floodproofing

Advantages	Disadvantages
Reduces the recovery time needed to return a structure to service.	Usually requires a flood warning to prepare the building and contents for flooding.
Prevents unbalanced hydrostatic pressure on walls.	Requires human intervention to evacuate contents from the flood-prone area.
Costs less than other measures.	Usually requires human intervention and adequate warning time for installation of protective measures.
Retains the structure in its present environment and may avoid significant changes in appearance.	Results in a structure that is wet on the inside and possibly contaminated by sewage, chemicals, and other materials borne by floodwaters and may require extensive cleanup.
	May require ongoing maintenance to keep in operable condition.

2.4 Public Education and Engagement

USACE and/or the NFS will engage in a public education campaign to inform property owners and any impacted renters of the nonstructural plan including, but not limited to:

1. Eligibility criteria
2. The application process
3. Responsibilities of property owners to clear title and remediate contaminated properties
4. Other key information about the project

USACE and/or the NFS will prepare and distribute written materials such as project information pamphlets, letters of invitation to participate, and public meeting notices. In addition, USACE and/or the NFS will issue press releases; hold public meetings; make presentations to homeowner's associations, business districts, advisory committees, and other civic groups and organizations; and utilize a variety of social media and other public relations methods to inform property owners and tenants of the project.

To maximize community understanding, acceptance, and participation in the Nonstructural Implementation Plan, it is imperative that NFS and local agencies communicate the benefits of the plan and project. Local community involvement is a requisite for success. Familiarity with local political and community leaders will likely improve residents' level of comfort, trust, and understanding of the project goals, objectives, and benefits.

3.0 Process for Dry Floodproofing of Eligible Nonresidential Structures

Dry floodproofing consists of sealing all areas below the flood risk reduction level of the nonresidential and nonresidential portions of mixed-use structures to make walls, doors, windows, and other openings impermeable to water penetration and watertight to ensure that floodwaters cannot get inside. Based on NFIP testing conducted at the Engineering Research and Development Center, dry floodproofing can generally only be performed on the walls and portions of a conventionally built structure from the ground level to up to 3 feet above ground level. Walls are coated with sealants or waterproofing compounds, or plastic sheeting is placed around the walls and covered. Back-flow valves from water and sewer lines prevention mechanisms such as drain plugs, standpipes, grinder pumps, and back-up valves are installed. Openings, such as doors, windows, sewer lines, and vents may also be closed temporarily, with sandbags or removable closures, or permanently sealed.

Dry floodproofing generally consists of the following components:

- Construction of an impermeable barrier, which is attached to the existing foundation, 3 feet above grade around the entire building perimeter
- Development/design of deployable and/or permanent barriers at door, window, or other foundation openings that are within 3 feet of grade
- Installation of back-flow preventors and/or valves on utility lines as necessary
- Relocation, rearrangement, and/or elevation of all utility lines as necessary and performance of disconnections and subsequent reconnections post flood proofing activities
- Installation of sump pumps and sub-drains (as necessary)
- Installation of water-resistant material, water resistant window coverings, waterproof adhesives, sealants and compounds, and floor drains
- Removal of any trees that restrict the dry floodproofing of a structure
- Use of temporary site protection measures during site work
- Use of site grading and site restoration including grading landscaping to preconstruction conditions (but it cannot adversely affect drainage of adjacent properties)

Dry floodproofing of nonresidential structures must be performed in accordance with engineering and design standards and building codes. Applicable design standards and building codes are summarized and compiled within the NFIP Technical Bulletin (TB) 3-93, Nonresidential Floodproofing—Requirements and Certification, and Title 44 Code of Federal Regulations (CFR) Part 60.3(b)(5) and (c)(4).

3.1 Nonresidential Preliminary Eligibility

The structure must be defined as nonresidential to qualify for floodproofing. Nonresidential structures are those not herein defined as residential as defined by IRC Chapter 11 Section N1101.6. Multifamily structures such as condominium and apartment buildings are grouped with nonresidential structures due to the size and nature of the structures that prevents them from being elevated or acquired. Additionally, it must meet the requirements listed in Section 2.2 and the following:

- Structure is in an area where there is low velocity flooding (less than 3 feet per second), and the flooding is not flashy (more than 1 hour of warning).
- Structure does not have crawl foundation or basement.

3.2 Second Stage of Eligibility Determinations

This subsection contains a general description of the process that will apply to willing owners of preliminarily eligible structures. Participating owners of eligible structures must complete and submit an application to USACE, but the processing, investigation, and verifying tasks for final eligibility may be shared between USACE and the NFS depending on the NFS's capability. Incomplete applications or applications that contain false or misleading information or substantial errors will not be processed until all required information is obtained and verified to be accurate.

Owners of preliminarily eligible structures that do not want their structure dry floodproofed may elect not to participate. USACE and the NFS will defer any further action on that structure until such time as the property owner elects to participate within the identified registration timeframe as discussed in Section 7. If there is a title transfer (i.e., the structure is sold or there is a donation, succession, foreclosure, etc.) and the project remains authorized and funded, the new owner(s) may elect to participate. A property owner may elect not to participate at any time prior to the issuance of right-of-entry for construction. For properties with multiple owners, all owners must consent in writing to the floodproofing of the structure during the application process. Because the Nonstructural Implementation Plan requires voluntary participation, no exercise of eminent domain by the NFS or USACE is necessary.

Property owners will be required to grant a temporary right-of-entry to agents of USACE and the NFS to enter upon the property to conduct such investigations deemed necessary to determine final eligibility. These investigations may include building condition assessments, surveys, limited environmental testing and site assessments, inspections to verify current elevation and determine elevation requirements, and other activities deemed necessary by USACE to establish eligibility. Refusal to grant temporary right-of-entry to USACE and/or the NFS will constitute property owner election not to participate.

Title research will be completed by the NFS to confirm fee ownership (clear title) and the existence of leases, third party interests, and any liens, judgments, or mortgages on the property as discussed in Section 3.7. The property owner must provide satisfactory proof of ownership of the real property and the permanent structure to be floodproofed.

Proof of ownership must include an authentic Certificate of Title and a Certificate of Mortgage that identifies the names of all owners, real property and structure targeted for floodproofing, as well as any holders of any encumbrances against the property. All interested parties in the real property and structure targeted for floodproofing must consent in writing on a USACE designated form and mortgages may need to be subordinated.

The property must have clear title that is not subject to any outstanding right or interest that will present an impediment to the implementation of the project, including but not limited to property/boundary disputes, succession matters, etc. To that end, as one of the conditions of being determined to be eligible to participate in the project, the property owner will be responsible for clearing the title of all ownership issues, (in accordance with the conditions and requirements deemed necessary by USACE), at the property owner's sole expense. The failure of the property owner to provide clear title documentation and obtain the required consents of other interest parties to the satisfaction of USACE will result in a USACE determination of ineligibility.

USACE policy is no use of project funds for HTRW removal and remediation activities. Engineer Regulation (ER) 1165-2-132 and the American Society for Testing and Materials (ASTM) E 1527-21, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process (ASTM 1997) contain further information. Pursuant to ER 1165-2-132, HTRW Guidance for Civil Works Projects (26 June 1992), an ASTM Phase I Environmental Site Assessment (ESA) and asbestos investigation site reconnaissance will need to be conducted during the design phase and are part of the included project costs.

If the Phase I ESA identifies potential HTRW issues, the property owner would be notified that an ASTM E 1903-19 Phase II ESA would be required. The Phase II ESA and any HTRW remediation would be performed at the expense of the property owner prior to construction.

Additional requirements for dry floodproofing are:

- The structure is not located on Federal property or leased land.
- A condition assessment will identify any issues that are immediately inhibitive. The owner, at their expense, will need to rectify issues before being declared eligible. The floodproofing contractor will determine final viability of floodproofing.
- The property owner must provide tax assessor documentation that no taxes are due and payable on the property, as well as documentation from any holder of a mortgage that the mortgage is in good standing and that the mortgage holder does not object to the nonstructural project.
- The structure must have an approved sanitary disposal system and be following existing local and state health, building, and zoning codes as of the time of the structure floodproofing. Code compliance is the responsibility of the property owner (both for implementation and cost) as a matter of project eligibility.

- The implementation of nonstructural measures will not impact threatened or endangered species or their habitats.
- Implementing nonstructural measures will not require the filling of waters of the United States and will not result in any impact to wetlands.

3.3 Dry Floodproofing Eligible Costs

Dry floodproofing will require the issuance of state and local government permits prior to the commencement of any onsite construction. Elements of structure floodproofing work that are potentially eligible project costs include, but are not limited to, design costs; costs of title searches (in review of title information submitted by the property owner), surveys; costs of obtaining all required permits (i.e., zoning or land use approvals, environmental permits or required certifications, historic preservation approvals, and building permits); and the costs for the following tasks:

- Construction of an impermeable barrier, which is attached to the existing foundation, 3 feet above grade around the entire building perimeter
- Development/design of deployable and/or permanent barriers at door, window, or other foundation openings that are within 3 feet of grade
- Installation of back-flow preventors and/or valves on utility lines as necessary
- Relocation, rearrangement, and/or elevation of all utility lines as necessary and performance of disconnections and subsequent reconnections post flood proofing activities
- Installation of sump pumps and sub-drains (as necessary)
- Installation of water-resistant material, water resistant window coverings, waterproof adhesives, sealants and compounds, and floor drains
- Removal of any trees that restrict the dry floodproofing of a structure
- Use of temporary site protection measures during site work
- Use of site grading and site restoration including grading landscaping to preconstruction conditions (but it cannot adversely affect drainage of adjacent properties)
- Compliance with access requirements of applicable building and other codes (e.g., stairs with landings or guardrails) and/or the Americans with Disabilities Act
- Removal of debris (all demolition debris [hazardous and non-hazardous] to an approved landfill

Allowable relocation assistance funds for displaced tenants who are unable to occupy the structure during the floodproofing process in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs of 1970, Public Law 91-646, 84 Stat. 1984 (42 United States Code

[U.S.C.] 4601), as amended by the Surface Transportation and Uniform Relocation Assistance Act of 1987, Title IV of Public Law 100-17, 101 Stat. 246-256. Relocation assistance for tenants who cannot live in the structure during the floodproofing process, may include advisory services and eligible reasonable out-of-pocket expenses incurred during temporary displacement (e.g., moving and storage of household goods required to be removed during construction, temporary quarters, meals, etc.).

3.4 Dry Floodproofing Ineligible Costs

No Federal funds will be used to restore, replace, or repair a structure or bring a structure into compliance with applicable building and other codes. No additions to the habitable spaces of a structure (including but not limited to outbuildings, detached garages, sheds, etc.) will be permitted in the performance of the floodproofing work. In no event will the structure be floodproofed if USACE determines that the structure is not physically sound and/or capable of being raised safely. If additional work is required as a condition of building permit issuance, and if such work is not listed as eligible herein, the property owner will be required to fund and conduct such additional work.

Potential ineligible costs include but are not limited to:

- Any work that is not strictly necessary for the safe completion of dry floodproofing the structure.
- Any structural and system repair due to existing deficiencies, including foundations.
- Modifications or improvements to a septic system except for extension of lines from the raised structure to the existing system and back-flow valves.
- Cost for dry floodproofing more than 3 feet above ground level.
- Modifications to structures that are not attached to the eligible structure.
- Modifications to pools, spas, hot tubs, and related structures or accessories.
- Modifications to decks and patios not connected to or immediately adjacent to the structure except for modifications that are expressly required by building codes (e.g., stairways and landing modifications).
- Relocation of movable objects that restrict the dry floodproofing of a structure.
- The proper remediation, removal and disposal of environmental contaminants including but not limited to HTRW, lead, asbestos, and asbestos-containing materials in damaged or friable form. All HTRW remediation costs will be borne solely by the property owner.
- Costs associated with bringing a non-conforming structure into compliance with current building codes, housing codes, and/or other applicable codes.

3.5 Relocation Assistance

Tenants who are deemed to be temporarily “displaced” under the Uniform Relocation Assistance and Real Property Acquisition Act (URA) regulations, may be eligible for certain benefits in accordance with Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Projects of 1970, Public Law 91-646, 84 Stat. 1894 (42 U.S.C. 4601), as amended by the Surface Transportation and Uniform Relocation Assistance Act of 1987, Title IV of Public Law 100-17, 101 Stat. 246-256; 49 CFR 24; and HUD Handbook 1378 (collectively referred to as the URA). Appropriate advisory services, including reasonable advance written notice of:

- Date and approximate duration of the temporary relocation.
- Address of the suitable decent, safe, and sanitary dwelling to be made available for the temporary period.
- Terms and conditions under which the tenant may lease and occupy a suitable decent, safe, and sanitary dwelling in the building/complex upon completion of the project.
- Provisions of reimbursement, in accordance with the requirements of the URA including 49 CFR Part 24, Paragraph 24.402, for all reasonable out-of-pocket expenses incurred in connection with the temporary relocation.

In addition to relocation advisory services, residential displaced tenants may be eligible for other relocation assistance including relocation payments for moving expenses for the increased costs of renting a comparable replacement dwelling.

All temporary housing costs must be approved in advance in writing by USACE.

3.6 Real Estate Required for Dry Floodproofing

The dry floodproofing of eligible nonresidential structures will require the NFS to acquire rights, including a standard right-of-entry for survey and exploratory work to determine the eligibility of the structure, a Participation Agreement, a non-standard estate in the form of a restrictive easement over the structure(s) and a non-standard Perpetual Access Easement. The Restrictive Easement and Perpetual Access Easement provide the necessary rights and restrictions to protect the Federal investment and will be submitted for approval by Headquarters USACE in accordance with USACE regulations during the design phase of the project. The contemplated perpetual easement will likely prohibit the grantors, heirs, successors, assigns, and all others from engaging in other uses of the structure or the land that would impair, contravene, or interfere with the integrity of the structure. Further, the perpetual easement would contain a reservation of rights and privileges in favor of the grantor(s), heirs, successors, and assigns, of all such rights and privileges that can be made of the property without interfering with or abridging the rights, and restrictions imposed, but subject to existing easements for public roads and highways, public utilities, railroads, and pipelines. The Perpetual Access Easement would also include a right of ingress and egress over and across the

land by the NFS for inspection and monitoring of the structure and land for the enforcement of the rights and prohibitions contained in the easement.

4.0 Process for Wet Floodproofing of Eligible Nonresidential Structures

Wet floodproofing prevents or provides resistance to damage from flooding while allowing floodwaters to enter the structure or area and equalize pressures on foundation walls or lower-level walls. A key feature associated with wet floodproofing are openings to allow floodwaters in, consisting of engineered flood vents in the structure walls. Per FEMA TB 7-93:

Flooding of a structure's interior is intended to prevent unbalanced hydrostatic pressure on the walls, surfaces, and supports of the structure by equalizing interior and exterior water levels during a flood. Inundation also reduces the danger of buoyancy from hydrostatic uplift forces. Such measures may require alteration of a structure's design and construction, use of flood-resistant materials, adjustment of building operation and maintenance procedure, relocation and treatment of equipment and contents, and emergency preparedness for actions that require human intervention.

Wet floodproofing of structures must be performed in accordance with engineering design standards and building codes. Applicable design standards and building codes are summarized and compiled within FEMA TB 1-93, Openings in Foundation Walls for Buildings Located in Special Flood Hazard Areas; FEMA 259, Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings; FEMA 348, Protecting Building Utilities from Flood Damage; and requirements pertaining to floodproofing of structures found in 44 CFR Part 60.3(b)(5) and (c)(4).

Wet floodproofing generally consists of the following components:

- Wet floodproofing of the structure
- Engineered flood vents
- Flood-resistant construction materials such as rigid foam board wall insulation or cement board and molding within the interior of the building
- Elevation and wet floodproofing of electric outlets
- Concrete floor treatment and interior wall and floor sealer/stains
- Exterior paint coatings
- Sand/water blasting or other manual removal of rusted coatings and application of epoxy coatings
- Elevation and wet floodproofing of mechanical and electrical equipment

- Connection, disconnection, and extension of utility connections for electrical power, fuel, incoming potable water, and wastewater discharge
- Removal of any trees that restrict access to floodproofing the structure
- Temporary site protection measures during site work
- Site grading and site restoration including grading landscaping to preconstruction conditions (but it cannot adversely affect drainage of adjacent properties)

4.1 Preliminary Eligibility

The structure must be defined as nonresidential to qualify for floodproofing. Nonresidential structures are those not herein defined as residential as defined by IRC Chapter 11 Section N1101.6. Additionally, it must meet the requirements listed in Section 2.2 and the following:

- Structure is in an area where there is low velocity flooding (less than 3 feet per second), and the flooding is not flashy (more than 1 hour of warning).
- Structure does not have crawl foundation or basement.

Wet floodproofing achieves flood damage risk reduction, but it is not recognized by the NFIP for any flood insurance premium rate reduction when applied to nonresidential and residential structures and may not be used under the NFIP for new or substantially damaged buildings located in a SFHA.

4.2 Second Stage of Eligibility Determinations

The secondary stage of eligibility determinations is the same as that presented in Section 3.2, except it is for wet floodproofing structures.

4.3 Wet Floodproofing Eligible Costs

The eligible costs for dry floodproofing are the same as presented in Section 3.3, except it is for wet floodproofing structures.

4.4 Wet Floodproofing Ineligible Costs

No Federal funds will be used to restore, replace, or repair a structure or bring a structure into compliance with applicable building and other codes. No additions to the habitable spaces of a structure (including but not limited to outbuildings, detached garages, sheds, etc.) will be permitted in the performance of the floodproofing work. In no event will the structure be floodproofed if USACE determines that the structure is not physically sound and/or capable of being raised safely. If additional work is required as a condition of building permit issuance, and if such work is not listed as eligible herein, the property owner will be required to fund and conduct such additional work.

Potential ineligible costs include but are not limited to:

- Any work that is not strictly necessary for the safe completion of wet floodproofing the structure.
- Any structural and system repair due to existing deficiencies, including foundations.
- Modifications or improvements to a septic system except for extension of lines from the raised structure to the existing system and back-flow valves.
- Cost for wet floodproofing more than 3 feet above ground level.
- Modifications to structures that are not attached to the eligible structure.
- Modifications to pools, spas, hot tubs, and related structures or accessories.
- Modifications to decks and patios not connected to or immediately adjacent to the structure except for modifications that are expressly required by building codes (e.g., stairways and landing modifications).
- Relocation of movable objects that restrict the wet floodproofing of a structure.
- Costs associated with bringing a non-conforming structure into compliance with current building codes, housing codes, and/or other applicable codes.

The proper remediation, removal, and disposal of environmental contaminants including but not limited to HTRW, lead, asbestos, and asbestos-containing materials in damaged or friable form. All HTRW remediation costs will be borne solely by the property owner.

4.5 Relocation Assistance

Relocation assistance requirements are the same as those described in Section 3.5.

4.6 Real Estate Required for Wet Floodproofing

The wet floodproofing of eligible nonresidential structures will require the NFS to acquire rights, including a standard right-of-entry for survey and exploratory work to determine the eligibility of the structure, a Participation Agreement, a non-standard estate in the form of a restrictive easement over the structure(s) and a non-standard Perpetual Access Easement. The Restrictive Easement and Perpetual Access Easement provide the necessary rights and restrictions to protect the Federal investment and will be submitted for approval by Headquarters USACE in accordance with the USACE regulations during the design phase of the project. The contemplated perpetual easement will likely prohibit the grantors, heirs, successors, assigns, and all others from engaging in other uses of the structure or the land that would impair, contravene, or interfere with the integrity of the structure. Further, the perpetual easement would contain a reservation of rights and privileges in favor of the grantor(s), heirs, successors, and assigns, of all such rights and privileges that can be made of the property without interfering with or abridging the rights, and restrictions imposed, but subject to existing easements for public roads and highways, public utilities, railroads, and pipelines. The Perpetual Access Easement would also include a right of ingress and egress over and across the land by the NFS for inspection and monitoring of the

structure and land for the enforcement of the rights and prohibitions contained in the easement.

5.0 Adaptation Tracking and Strategies

The Final Integrated Feasibility Report and Environmental Impact Statement and associated appendices detail how the Recommended Plan will effectively reduce flood risks in the study area and residual risk at those structures. The Recommended Plan's two-phase approach is designed to maintain effectiveness over time and clarifying Subsequent Actions based on the rate of RSLC and other changing conditions. Specific to the nonstructural plan, the MAP (Appendix G) will inform when and whether Subsequent Actions include floodproofing more structures in Reach 1 (lower rates of RSLC) or whether Subsequent Actions include a future structural action in Reach 1 (higher rates of RSLC).

Recommended Plan First Actions do not vary based on rate of RSLC. Structures identified for floodproofing in First Actions were determined based on the 1% AEP inundation areas expected at 2065 for the USACE Intermediate RSLC curve. During the design phase, USACE and the NFS will update and refine the MAP, including the process to determine when and whether triggers are met to initiate Subsequent Actions.

The Recommended Plan is designed to vary the Subsequent Actions based on the evidence of RSLC increasing risk in the area. Accordingly, varying scales are designed to ensure risk reduction over time under variable risk conditions. USACE may consider a Post Authorization Change Report in compliance with ER 1105-2-100, Appendix G, such as a Validation Report if significantly changed conditions have been identified that cannot be addressed with the adaptations proposed within the formulation. This may identify that additional coordination/consultation may be required in accordance with the National Environmental Policy Act and National Historic Preservation Act.

6.0 Flood Risk Reduction Actions to be Taken by the Non-Federal Sponsor

The NFS will be required to undertake certain flood event risk reduction actions to comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12) (Section 402). These actions include, but are not limited to, actions to ensure the NFS develops, complies, monitors, and enforces floodplain management plans, regulations, building codes, land use and zoning regulations, and any other developmental controls that are consistent and compliant with the requirements of Section 402 and the regulations promulgated thereunder. In addition, the NFS will:

- Inform affected interests of the extent of protection afforded by the authorized plan not less than once each year.
- Participate in and comply with applicable Federal floodplain management and flood insurance projects.

- Comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), including the preparation of a floodplain management plan within one year after the date of execution of the Project Partnership Agreement (PPA); implementation of such plan not later than one year after completion of construction of the project, or functional elements of the project. The final authorized plan will be designed to reduce the impacts of future flood events in the project area, including but not limited to, addressing those measures to be undertaken by non-Federal interests to preserve the level of flood risk reduction provided by the completed project. The NFS will provide an informational copy of the plan to USACE once the plan is finalized.
- Publish floodplain information and provide the information to zoning and other regulatory agencies for use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with the completed project.

Additionally, the NFS will be obligated to prevent obstructions or encroachments on the properties that have been floodproofed (including prescribing and enforcing regulations to prevent such obstructions or encroachments).

7.0 Performance of Work

The traditional method of implementation per Headquarters USACE Guidance for Nonstructural Project Planning and Implementation, dated 22 July 2024, is typically a USACE-led construction approach. This method of implementation utilizes a Federal procurement process to obtain design and construction contractors for the various nonstructural measures. The Federal Government will procure contracts that will allow a contractor to perform nonstructural measures on multiple structures through series of one or more design-build task orders. The contractor will also be responsible for eligible work associated with the floodproofing including the final design of the nonstructural measure, obtaining the required local, state, and Federal permits, and all necessary elements to complete construction to desired intent.

At this time, the nonstructural plan is expected to be performed through the traditional USACE-led construction approach. Should the agencies determine in the design phase that it would be advantageous for the NFS to lead nonstructural implementation, the NFS could enter into a Section 204 agreement with USACE to accomplish this. The nonstructural portion of the Recommended Plan is a relatively small number of structures, many early structures are under NFS jurisdiction, and the NFS has past and current experience implementing similar or relevant programs. The NFS may investigate and consider in the design phase the implications of the necessary authorities and capabilities needed to efficiently and effectively manage the eligibility, outreach, and execution of the nonstructural components of the Recommended Plan.

The proposed method of implementation for the nonstructural plan is design-build delivery, where design and construction are combined in a single contract with a single contractor. This is subject to change in preconstruction engineering and design.

Currently, USACE only has authority to use "two-phase design-build" for Civil Works construction, which is a "design-build" method of construction contracting in which USACE selects a limited number of technically qualified offerors in Phase One to submit detailed price proposals in Phase Two.

It is anticipated that implementation of the nonstructural plan will occur within a decade of appropriation of funds. Following a design phase, there will be construction of the dry/wet floodproofing of nonresidential (including eligible multifamily) construction. The implementation plan assumes that the USACE-managed contractor would concurrently floodproof 5 to 12 structures per year. This timeframe is highly dependent upon the amount of funding allocated in any given year, the participation rate and environmental conditions, timely approval process of structures receiving nonstructural measures, and expediency of submittal reviews and permit processing during design and construction phases.

If there is a cost associated with the floodproofing that is coverable by the program, that cost would be paid by NFS and/or USACE and not by the property owner. The property owner would not be expected to pay the coverable cost and wait for reimbursement because direct payment to the contractor from USACE is anticipated.

A certificate of occupancy must be issued by the appropriate qualified building official with jurisdiction to certify that the floodproofing work was completed properly and in accordance with the final USACE approved plans and specifications. After final inspection, approval, and acceptance of the work by USACE, a Notice of Construction Completion (NCC) will be issued to the NFS, and the floodproofing work for the structure will be financially closed out by USACE. Section 10 provides details of the NFS and property owner responsibilities for Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) after project completion.

The amount of time for an owner to enter into an agreement when offered the opportunity for floodproofing will be determined during the design phase and refined as necessary during construction to try to increase participation rates. It will be subject to project duration and funding, which is in part dependent upon the participation rate.

8.0 Implementation Tasks and Cost Estimate Assumptions

The cost estimating approach utilizes a set of best estimate unit rates for the physical nonstructural floodproofing measures and a factor tied to asset value to estimate the approach for the cost of acquisition. These unit rates and factors have been developed by the PDT based upon input from other study teams, constructed projects, literature review, and guidance provided by the NNC.

To develop the physical nonstructural floodproofing measure unit rates, the general scope for each viable nonstructural measure was defined as shown in **Table L-4**, along with the unit rate applied in subsequent cost calculations. **Table L-4** presents high-level assumptions that informed the cost estimate for floodproofing across multiple building categories. Tasks and cost estimates are subject to significant change during the period between the signing of the Chief's Report and Congressional authorization and appropriation required to begin the project. Additional details on specific tasks, work

breakdown structure, and activity-specific costs will be developed by the PDT early in the design phase as part of the scoping and Project Management Plan development (in conjunction with execution of the Design Agreement or Project Partnership Agreement). All cost estimates are included in *Appendix C. Cost Engineering*.

Table L-4: Building Category Assumptions to Inform Cost Estimate

Building Category	Assumptions
Industrial and Warehouse (on Pier)	Category Description: Large industrial or storage structures located directly on piers or wharves over water. Perimeter Description: Truck bays and roll-up metal garage doors make up most of the perimeter, providing access to loading docks and storage areas. Metal service doors are also points of entry along sides of building. Windows at risk of flooding are minimal. Opening Types and Percentages: • Continuous Window Openings - Not Applicable • Standard Window Openings - 1% • Single Door Openings - 1% • Double Door Openings - Not Applicable • Large Gates - 15% Presence of Elevators/Mechanical Equipment: None Presence of Basements: None Floodproofing Type (tentative): Dry Floodproofing
Retail and Restaurant (on Pier)	Category Description: Commercial buildings, such as retail or restaurant spaces, situated on piers or wharves over water. Perimeter Description: Primary entrances are glass double doors or garage style roll-up doors. Metal service doors are often featured on back and sides of structure. Large glass windows are featured along front of structure. Opening Types and Percentages: • Continuous Window Openings - 2% • Standard Window Openings - 10% • Single Door Openings - 4% • Double Door Openings - 9% • Large Gates - Not Applicable Presence of Elevators/Mechanical Equipment: None Presence of Basements: None Floodproofing Type (tentative): Dry Floodproofing

Building Category	Assumptions
Industrial and Warehouse (on Land)	Category Description: Ground-based industrial or warehouse facilities used for manufacturing, storage, or distribution. Perimeter Description: Garage doors are present along sides of buildings. Metal service doors are also points of entry along sides of building. Windows are minimal. Opening Types and Percentages: • Continuous Window Openings - Not Applicable • Standard Window Openings - 1% • Single Door Openings - 2% • Double Door Openings - 1% • Large Gates - 2% Presence of Elevators/Mechanical Equipment: None Presence of Basements: None Floodproofing Type (tentative): Dry Floodproofing
Retail and Restaurant (on Land)	Category Description: Ground-based commercial structures, including retail and restaurant spaces. Perimeter Description: Primary entrances are glass double doors or garage style roll-up doors. Metal service doors are often featured on back side of structure. Large glass windows are typically present along fronts of structure. Opening Types and Percentages: • Continuous Window Openings - 8% • Standard Window Openings - 11% • Single Door Openings - 2% • Double Door Openings - 4% • Large Gates - 2% Presence of Elevators/Mechanical Equipment: None Presence of Basements: None Floodproofing Type (tentative): Dry Floodproofing
Large Multifamily and Office (on Land)	Category Description: Buildings primarily used for housing or professional services, including apartments condos, hotels, and office spaces. Perimeter Description: Primary entrances are glass double doors or glass single doors. Metal service doors are also present as secondary entrances often featured on back or sides of structure. Parking garages may be present. Opening Types and Percentages: • Continuous Window Openings - Not Applicable

Building Category	Assumptions
	- Standard Window Openings - 25% - Single Door Openings - 2% - Double Door Openings - 2% - Large Gates - 9% Presence of Elevators/Mechanical Equipment: Yes Presence of Basements: None Floodproofing Type (tentative): Dry Floodproofing
Community (on Land)	Category Description: Structures serving as gathering spaces for social, cultural, or recreational activities, such as churches, clubhouses, or community centers. Perimeter Description: Primary entrances are typically glass double doors. Structures may have secondary entrances, such as side or back doors. The perimeter may feature large windows or glass walls. Opening Types and Percentages: - Continuous Window Openings - 1% - Standard Window Openings - 12% - Single Door Openings - 1% - Double Door Openings - 6% - Large Gates - Not Applicable Presence of Elevators/Mechanical Equipment: None Presence of Basements: None Floodproofing Type (tentative): Dry Floodproofing
Parking and Garages (on Land)	Category Description: Mostly open-air structures utilized for vehicle parking. Perimeter Description: Primary entrances are wide, open vehicle access points. Secondary entrances for pedestrians include metal service doors or stairwell access points. Opening Types and Percentages: Opening types not applicable because these buildings will be utilizing wet floodproofing measures Presence of Elevators/Mechanical Equipment: Yes Presence of Basements: None Floodproofing Type (tentative): Wet Floodproofing

9.0 Methods for Scheduling and/or Prioritizing

The scheduling and/or prioritization of structure floodproofing will be subject to the availability of Federal funds. The strategy will be refined during the design phase, as

additional information provides opportunities for cost efficiencies or issues with local contractor capacity. Some methods for scheduling or prioritizing nonstructural work that will be considered as part of the prioritization process are noted in the following subsections. However, additional methods of scheduling or prioritizing such work may also be considered. This applies to structures identified as preliminarily eligible for nonstructural treatment within Recommended Plan First Actions. A similar method may be used for Subsequent Actions, dependent on the MAP (Appendix G).

9.1 Clustering

If numerous property owners (and tenants, where applicable) in a contiguous neighborhood or subdivision agree to participate, that area could be targeted for priority in structure floodproofing implementation. A focus on clustered properties can create a ranking hierarchy of which properties to address first. This approach could rank efficiency as the main factor in determining which eligible properties should be prioritized. Other prioritization criteria may also be considered.

9.2 Flood Risk-Level

Willing property owners may not exist in clusters. In such cases, an alternative option is to focus on the willing property owners who have structures that exhibit the highest risk for flood damages. This approach will rank risk exposure as one of the main factors in determining which eligible properties should be prioritized.

9.3 First-Come, First-Served

This approach would involve creating a list of eligible structures that will be ranked based on how quickly floodproofing contractors can be procured and the processing of applications and the finalization of eligibility determinations. This approach would help ensure that resources will be used effectively by focusing on properties that have owner support for floodproofing.

10.0 Operation, Maintenance, Repair, Replacement, and Rehabilitation

The OMRR&R Manual will be developed in collaboration with the NFS after the project is completed but prior to the NCC. USACE will have no operation and maintenance responsibilities.

10.1 Non-Federal Sponsor

For all structure types, OMRR&R costs for the NFS will be confined to regular, periodic surveys and site visits of structures where the Recommended Plan measures have been applied to determine that the requirements of the OMRR&R Manual are being met. Once a NCC has been issued by USACE, the NFS's obligations for operation and

maintenance for the subject structure exist in perpetuity or until such time as the structure no longer exists or the project is de-authorized by Congress.

Enforcement of restrictive easements is the sole responsibility of the NFS. Every 10 years, the NFS will provide notice to project participants that the structure on the property was floodproofed by the USACE and notice of the easements encumbering the property and the restrictions thereon. On a rotating schedule, every 5 years, the NFS will conduct physical inspections to ensure that the owners, their heirs, and assigns, are following the terms and conditions of the executed agreements. When available, the NFS will also make efficient use of monitoring that is already being conducted by local cities or counties, FEMA, or state agencies. The inspections will determine among other things, that no part of the structure located below the level of the lowest habitable finished floor has been converted to a living area for human habitation or occupancy, or otherwise altered in any manner that would impede the movement of waters beneath the structure.

The NFS will utilize GIS or a sharable database to track surveys and violations. The NFS may use existing tracking tools or those from local, state, or Federal agencies if they exist. The NFS will provide updates to the executing USACE district every 5 years after surveys have been completed.

If a potential violation of the terms of the easement is discovered, the NFS will coordinate with the local government, as appropriate. Notification will also be provided to the FEMA regional office. Resolution may be deferred to a local government if there are sufficient mechanisms for enforcement and resolution. However, the NFS will still issue a notice of violation and will inform the property owner that the issue must be resolved with the local government or legal action may be taken to recover the funds expended by the Federal Government. While this is a NFS responsibility, the government, in its sole discretion, always retains the right to step in to operate and maintain the project, which does not relieve the NFS of its obligations or preclude the government from pursuing any other remedy at law or equity to ensure faithful performance under a project's agreement.

USACE will have the right, but not the obligation, to perform its own inspections of the floodproofed structures and lands acquired pursuant to the project.

10.2 Nonresidential Structure Owners

The property owner obligations for operations and maintenance of floodproofing measures are crucial to ensure their effectiveness and longevity. For dry floodproofing systems, which typically consist of permanent wall systems, regular maintenance is necessary to prevent damage and ensure proper functioning. For example, weep holes in the masonry walls may need to be regularly cleaned out to allow moisture in the wall cavity to drain, preventing water accumulation and potential damage. Or sealant coatings may need reapplication every 5-10 years. In addition, deployable systems such as opening covers will require regular inspection and maintenance to ensure they remain functional during floods. This may include replacing worn-out components like gaskets, spare panels, and hardware. The specific operations and maintenance

requirements will depend on the type of system installed, but common tasks may include:

- Replacing sealant materials used to seal the structure
- Deploying opening covers during floods
- Inspecting and replacing deployable system components as needed
- Cleaning weep holes to maintain drainage
- Providing spare parts and components, such as extra gaskets and panels, to ensure timely repairs and replacements.

It will be essential for the property owner to follow the manufacturer's recommendations and develop a routine maintenance schedule to ensure the floodproofing system remains effective and functional over time.

11.0 References

U.S. Army Corps of Engineers (USACE). 1988. *Flood Proofing Tests – Tests of Materials and Systems for Flood Proofing Structures*.

U.S. Army Corps of Engineers (USACE). 2024. *Nonstructural Project Planning and Implementation*. Memorandum. Headquarters USACE. July 22.