

Draft Environmental Assessment

City of Pasadena

Street Drainage & Flood Mitigation
Project

HMGP-DR-4332-TX Project #7

Harris County, Texas

August 2020



FEMA

Federal Emergency Management Agency

Department of Homeland Security

800 N. Loop 288

Denton, TX 76209

FEMA Grant Application Number: DR 4332-TX-007

This Environmental Assessment was prepared by:

Berg♦Oliver Associates, Inc.
14701 St. Mary's Lane, Suite 400
Houston, TX 77079

Prepared for:

City of Pasadena
Public Works/Engineering
1149 Ellsworth Drive, 5th Floor
City of Pasadena, Texas 77506

Date: August 2020

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS.....	vi
1.0 INTRODUCTION.....	1
1.1 PROJECT AUTHORITY.....	1
1.2 PROJECT LOCATION.....	1
2.0 PURPOSE OF AND NEED FOR THE PROJECT.....	2
3.0 ALTERNATIVES.....	3
3.1 NO ACTION ALTERNATIVE.....	3
3.2 PROPOSED ACTION ALTERNATIVE.....	3
3.3 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD.....	4
3.3.1 100-Year Storm Sewer Systems.....	4
3.3.2 Channel Improvements to Vince Bayou and Little Vince Bayou.....	5
3.3.3 Proposed Improvements to Other Roadway Segments.....	5
3.3.4 Additional Drainage Facilities.....	5
4.0 AFFECTED ENVIRONMENT AND IMPACTS.....	5
4.1 PROJECT SETTING AND LAND USE.....	5
4.1.1 Geology and Soils.....	6
4.1.2 Prime and Unique Farmlands.....	7
4.1.3 Beneficial Landscape Practices.....	7
4.1.4 Air Quality.....	8
4.2 WATER RESOURCES.....	9
4.2.1 Surface Water.....	9
4.2.2 Groundwater.....	9
4.2.3 Floodplains.....	10
4.2.4 Waters of the United States (including Wetlands).....	11
4.3 BIOLOGICAL RESOURCES.....	13
4.3.1 Wildlife.....	13
4.3.2 Vegetation.....	14
4.3.3 Invasive Species.....	15
4.3.4 Essential Fish Habitat.....	15
4.4 CULTURAL RESOURCES.....	16
4.5 SOCIOECONOMIC DATA.....	19
4.6 ENVIRONMENTAL JUSTICE.....	20
4.7 TRAFFIC.....	21
4.8 NOISE.....	22
4.9 HAZARDOUS MATERIALS.....	23
4.10 SAFETY.....	25
4.11 MITIGATION MEASURES.....	25
5.0 CUMULATIVE IMPACTS.....	28
6.0 PUBLIC INVOLVEMENT.....	29
7.0 AGENCY COORDINATION AND PERMITS.....	30
8.0 REFERENCES.....	32
9.0 LIST OF PREPARERS.....	34

LIST OF TABLES

- Table 1: Soil Types within Proposed Project ROW
Table 2: Summary of Recorded Cultural Resources within 1.0 Mile of Project Area
Table 3: Demographic Characteristics of the Project Study Area
Table 4: Regulatory Database Facilities within Project Vicinity
Table 5: Summary of Mitigation Measures

LIST OF APPENDICES

- APPENDIX A LOCATION MAP, LIST OF PROJECT SITES, SITE PLAN, and TYPICAL SECTIONS
APPENDIX B SITE PHOTOGRAPHS
APPENDIX C TOPOGRAPHIC, SOILS, FLOODPLAIN, NWI, and WETLAND DETERMINATION AND CLASSIFICATION MAPS
APPENDIX D EIGHT-STEP NARRATIVE FOR FLOODPLAINS (EXECUTIVE ORDER 11988 AND 44 CFR, PART 9)
APPENDIX E AGENCY COORDINATION

ACRONYMS AND ABBREVIATIONS

ACS: American Community Survey	TWDB: Texas Water Development Board
amsl: above mean sea level	USACE: United States Army Corps of Engineers
APE: Area of Potential Effect	USCB: United States Census Bureau
ASTM: American Society for Testing and Materials	USFWS: U.S. Fish and Wildlife Service
BMP: best management practices	USGS: U.S. Geological Survey
BOA: Berg♦Oliver Associates, Inc.	UST: Underground Storage Tank
CAA: Clean Air Act	WOTUS: Waters of the U.S.
CWA: Clean Water Act	
CEQ: Council on Environmental Quality	
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act	
CFR: Code of Federal Regulations	
(C)LOMR: (Conditional) Letter of Map Revision	
DNL: Day-Night Average Sound Level	
EA: Environmental Assessment	
EIS: Environmental Impact Statement	
EO: Executive Order	
EPA: Environmental Protection Agency	
ERNS: Emergency Response Notification System	
ESA: Endangered Species Act	
FEMA: Federal Emergency Management Agency	
FIRM: Flood Insurance Rate Map	
FONSI: Finding of No Significant Impact	
FPPA: Farmland Protection Policy Act	
H-GAC: Harris-Galveston Area Council	
HHS: Health and Human Services	
HMGP: Hazard Mitigation Grant Program	
LMI: Low to Moderate Income	
LPST: Leaking Petroleum Storage Tank	
NAAQS: National Ambient Air Quality Standards	
NPDES: National Pollutant Discharge Elimination System	
NEPA: National Environmental Policy Act	
NMFS: National Marine Fisheries Service	
NFIP: National Flood Insurance Program	
NRCS: Natural Resources Conservation Service	
NRHP: National Register of Historic Places	
NWI: National Wetland Inventory	
PST: Petroleum Storage Tank	
RCRA: Resource Conservation and Recovery Act	
ROW: right-of-way	
SCS: Soil Conservation Service	
SHPO: State Historic Preservation Officer	
SW3P: Storm Water Pollution Prevention Plan	
TCEQ: Texas Commission on Environmental Quality	
TCMP: Texas Coastal Management Plan	
THC: Texas Historical Commission	
TMA: Transportation Management Area	
TPWD: Texas Parks and Wildlife Department	
TxDOT: Texas Department of Transportation	

1.0 INTRODUCTION

1.1 PROJECT AUTHORITY

The City of Pasadena is proposing a drainage/flood mitigation project within the City of Pasadena, Harris County, Texas (see **Appendix A: Location Map**). Elevations within right-of-way (ROW) at selected roadways will be lowered to create storm water storage, and along with the installation of detention ponds, these proposed improvements will provide flood mitigation at the project sites and their surrounding areas. The City has been granted funds for the project from the Federal Emergency Management Agency (FEMA) under the Texas Division of Emergency Management (TDEM) Hazard Mitigation Grant Program (HMGP) under project number FEMA-4332-DR-TX Project #007.

In accordance with Title 44 of the Code of Federal Regulation (CFR) for Federal Emergency Management Agency (FEMA), Subpart B, Agency Implementing Procedures, Part 10.9 (Preparation of Environmental Assessment), this Environmental Assessment (EA) has been prepared pursuant to Section 102 of the National Environmental Policy Act of 1969 (NEPA), as implemented by regulations promulgated by the President's Council on Environmental Quality (CEQ); Title 40 CFR Parts 1500-1508. The purpose of this EA is to analyze the potential environmental impacts of the proposed project.

1.2 PROJECT LOCATION

The project location consists of approximately 27 linear miles of primarily residential street segments and eight undeveloped city lots encompassing approximately 7.7 acres within the City of Pasadena, Harris County, Texas (see **Appendix A: Location Map**). The project area is generally bounded by SH 225 to the north, Beltway 8 to the east, Spencer Highway to the south, and the city limit along Scarborough Lane and Allen Genoa Road to the west. Refer to **Appendix A** for a tabular listing of proposed site locations with subsequent revisions noted. The modifications to the original project footprint are based on factors, including design and environmental, considered during the project development process. Representative photos of the project area are presented in **Appendix B: Site Photographs**.

The project boundary borders a variety of land uses: commercial north of SH 225 and west of Red Bluff Road; light industrial and industrial (primarily chemical and petroleum plants) east of Red Bluff Road; a large detention pond west of Scarborough Lane; recreational, residential, and commercial west of Allen-Genoa Road; commercial south of Spencer Highway; and commercial, light industrial, and some residential east of Beltway 8. Vacant properties are also interspersed along the project boundary. The project sites (streets and pond locations) are City of Pasadena property, and no additional property/ROW is required. The proposed project is located within the Houston District of the Texas Department of Transportation (TxDOT) and within the Houston-Galveston Area Council (H-GAC) Transportation Management Area (TMA).

2.0 PURPOSE OF AND NEED FOR THE PROJECT

FEMA's Hazard Mitigation Grant Program (HMGP) provides grants to state and local governments to implement long-term hazard-mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property because of natural disasters and to enable implementation of mitigation measures during the initial recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

A large portion of the City of Pasadena is vulnerable to flooding from significant rainfall events, including hurricanes, because of poor historic land development design and subsidence. Prior to the establishment of the National Flood Insurance Program (NFIP), local residential development used sheet flow collection without adequate roadway drainage systems, and homes were constructed at street level rather than elevated. Additionally, the Harris Galveston Subsidence District reports that the Pasadena region experienced six to nine feet of subsidence during the 20th century. The subsidence resulted in the creation of a 500-year floodplain in the area.

When significant rainfall events occur, sheet flow develops and courses across the project area. The existing storm sewer systems have insufficient capacity to handle excessive drainage, resulting in area flooding. Though the main waterways – Vince Bayou, Little Vince Bayou, Cotton Patch Bayou, and Glenmore Ditch – and their tributaries within the project boundary have the capacity to convey storm water from normal rainfall events, substantial inflow from heavy drainage breaching the local storm sewers can overwhelm them and flood the project area. Therefore, flood control is currently limited, and the flooding poses a risk of loss of life and damage to residences, businesses, government facilities, and personal property.

The Drainage/Flood Mitigation Program (Drainage Program) was established by the City of Pasadena as a benchmark for the protection of the lives of its citizens affected by flooding events and for the sustainability of the NFIP. The Drainage Program focuses on Low- to Moderate-Income (LMI) areas in and outside the 100-year floodplain that generally hold lower Benefit-Cost Ratios (BCRs) and need advocate support to promote critical restoration. The Drainage Program assessed LMI areas for flooding susceptibility and maximum impact for mitigation and identified 8,600 acres that had experienced flash flooding. Approximately 85% of this acreage is located outside the established floodplains and pose the greatest exposure of liability to the NFIP (providing flood insurance policies below \$500/year).

The Greater Houston/Harris County Area Drainage Systems are heavily dependent on the Houston Ship Channel. In this path, City of Pasadena properties currently experience flash flood tail waters of about one-foot depth from the greater region. The City of Houston, Harris County, Harris County Flood Control District (HCFCD), and TxDOT are planning the coordinated submission of flood control projects to consolidate floodwaters toward the Houston Ship Channel from all major channels and water resources as distant as the Addicks and Barker Reservoirs. The addition of multiple upstream drainage projects from the Houston Metroplex will likely result in greater flood potential for downstream cities, including the City of Pasadena.

The purpose of the project is to provide flooding mitigation for the City of Pasadena, particularly for flood-prone areas located outside of the floodplain in LMI neighborhoods. The City aims to reduce or eliminate flood losses to residential and commercial properties and protect the lives of those affected by flooding events.

3.0 ALTERNATIVES

3.1 NO ACTION ALTERNATIVE

Under the No Action Alternative, nothing would be done to improve drainage structures or minimize flooding in Pasadena. The No Action Alternative would not meet the proposed project's purpose and need. The existing drainage facilities (i.e., the storm sewer systems and waterways) are insufficient during significant rainfall events and cause the project area to be vulnerable to flooding. The No Action Alternative would require more maintenance to keep the drainage facilities intact and functional, while posing a continued increased risk of flooding dangers to government facilities, residential and commercial properties, and individuals. The NFIP would be exposed to liability; potential disbursements (for damage claims through low-cost policies covering areas outside of floodplains but prone to flooding) would exceed policy costs by a factor of twenty.

3.2 PROPOSED ACTION ALTERNATIVE

Under the Proposed Action Alternative, the City of Pasadena proposes to lower the elevations, by one to two feet, of approximately 27 linear miles of various local street segments within existing ROW and construct eight new detention ponds, ranging in size from 3 acre-feet to 7 acre-feet, at City-owned properties. The original project footprint was revised as the project development process progressed. Factors, including design and environmental concerns, were considered. The proposed streets and ponds are shown and listed in **Appendix A**.

Lowering the selected roadway segments will create critical storm water storage along those corridors. Along with the installation of detention ponds within the project area, these proposed improvements, in conjunction with the enforcement of minimum slab elevations for new construction, will lower floodwater surface elevations to below existing structure slab elevations.

The proposed project will involve:

- Removing existing roadway pavement, sidewalks, vegetation (i.e., trees, shrubs, grass, etc.), and storm water drainage systems;
- Relocating existing utilities, where necessary;
- Installing new internal collection storm sewers, sized for a 3-year storm intensity, with culverts ranging in size from 18- to 60-inch diameter reinforced concrete pipes, inlets, manholes, junction boxes, flap gates, and other associated appurtenances;
- Lowering existing roadways and reconstructing same using reinforced concrete pavement with two 15-foot travel lanes (including 6-inch curbs along both sides of roadways) for a total width of 30 feet from back-of-curb to back-of-curb;

- Constructing 5.5-foot wide sidewalks at grade with occupied structures (including 6-inch thick retaining walls) along both sides of reconstructed streets;
- Erecting engineered anchored retaining walls, up to two feet in height, with texture, pattern, and/or color consistent with others in the City, along the street edge of sidewalks to provide slope stability for the wall design envelope created by the grade separation caused by lowering the roadways;
- Revegetating areas behind the retaining walls to ROWs with sod to prevent erosion from the properties into the roadways;
- Reconstructing and transitioning driveways from new roadways to adjacent properties;
- Constructing new detention ponds (lined with hydro-mulch and sod) at open area locations with a 4:1 maximum side slope and an earthen or concrete swale at each channel bottoms; and
- Establishing a new app-based, solar-powered flood notification system with installation of its infrastructure, including water sensors and LED signage, amid the proposed roadways and storm sewers, to alert residents to move their vehicles from flood-prone streets.

No new outfalls will be required for the proposed detention ponds or storm sewer systems. The ponds and storm sewers will tie into existing outfalls to minimize downstream impacts and reduce the need for interagency approvals, thereby expediting the construction and implementation of the project's flood control measures.

The Proposed Action Alternative will not require additional ROW or easements and will be constructed on properties owned by the City of Pasadena. Deep utility lines minimize the requirement of relocating existing subsurface utilities. No structures will be demolished or displaced as part of the proposed project. Under the City's oversight, the construction contractor will be responsible for the proper management of spoils (excavated soil, hazardous waste, etc.), including the disposal of the materials at authorized commercial facilities meeting local, state, and federal regulations. If a proposed disposal site poses a potential environmental concern, such as encroachment within the 100-year floodplain or wetland areas or lack of required agency clearance, the contractor will perform the necessary actions to comply with the applicable regulations before the site is utilized.

3.3 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

3.3.1 100-Year Storm Sewer Systems

Because of the nature of the proposed project, feasible drainage/flood mitigation alternatives were limited. This alternative would include constructing storm sewers for a 100-year storm frequency along the 27 linear miles of proposed project roadways. Pipe installation would be forced below existing outfall elevations and create a system under water (storm sewer siphon) that would require pumps and extensive maintenance. The option would provide for adequate drainage and not require additional ROW, but the cost would be twice that of the Proposed Action Alternative's construction cost estimate. The Benefit-Cost Analysis/Ratio (BCA/BCR) would not validate the cost effectiveness of this proposed flood mitigation option. Providing fewer linear miles (less than 27 miles) of 100-year storm sewers to meet budgetary limitations would not achieve the purpose of providing flood protection for the LMI Census Tracts located within the project area.

3.3.2 Channel Improvements to Vince Bayou and Little Vince Bayou

Improvements to Vince Bayou and Little Vince Bayou would not meet the purpose of providing improved flood control in a timely manner due to the lengthy approval timelines needed when coordinating with the HCFCD and United States Army Corps of Engineers (USACE), which have respective ownership and jurisdiction over the Vince Bayou and Little Vince Bayou channels. Major channel projects for Vince Bayou and Little Vince Bayou would be ineffective because flood elevations from White Oak, Buffalo, Brays, and Sims Bayous feed into the Houston Ship Channel and control Base Flood Elevations in Pasadena. Lesser channel improvements will be considered in the future under other grant sources for additional flood mitigation.

3.3.3 Proposed Improvements to Other Roadway Segments

Other roadway segments within the 8,600-acre flood-prone area and not listed in the roster of the Proposed Action Alternative were considered for the flooding mitigation improvements. It was determined that these locations would have inadequate or non-existent connectivity with the existing HCFCD channels and any available City of Pasadena drainage collection systems connected to these channels. Additionally, a number of adjacent streets would not have the hydraulic connectivity to these roadway sites to convey their floodwaters. The limited drainage network created by the street segments considered in this alternative would restrict the reach of impact and, therefore, not provide optimal or equitable flooding mitigation for the community.

3.3.4 Additional Drainage Facilities

As indicated in Appendix A: List of Project Sites, the original project footprint included detention pond site DMA2-2 adjacent to Vince Bayou at Memorial Park and pump station site DMC4-1 in Cotton Patch Bayou north of SH 225 and east of Olin Mathieson Road. Site DMA2-2 was found unfeasible; the natural ground elevation at this location was too low that the proposed detention pond would not be able to contribute any meaningful capacity. Site DMC4-1 posed a scheduling conflict for the project. The pump station could not be implemented in a timely manner due to lengthy approval timelines needed when coordinating with the HCFCD and USACE, which have respective jurisdiction over Cotton Patch Bayou.

4.0 AFFECTED ENVIRONMENT AND IMPACTS

4.1 PROJECT SETTING AND LAND USE

The proposed project is located within the City of Pasadena, Harris County, Texas, and is generally bound by SH 225 to the north, Beltway 8 to the east, Spencer Highway to the south, and the city limit along Scarborough Lane and Allen Genoa Road to the west. Land uses within the project limits include existing roadway ROW along the proposed roadway segments and undeveloped properties at the proposed detention pond locations. In the vicinities of the project sites, land use is predominantly residential; commercial, governmental (including City government buildings), institutional (schools), and recreational land uses are also found in the immediate areas. A 256-acre detention pond lies adjacent to the western boundary of the project area along Scarborough Lane. Several main waterways – Vince

Bayou, Little Vince Bayou, Cotton Patch Bayou, and Glenmore Ditch – are located in the project area. These waterways provide drainage from runoff and rainfall events for the local existing development. Land use in the surrounding vicinity of the proposed project is similar to that within the project area but with the addition of light industrial and industrial land uses (including distribution centers and chemical and petroleum facilities) north of SH 225. (See **Appendix A.**)

4.1.1 Geology and Soils

The U.S. Geological Survey (USGS) 7.5-minute topographic map (NGA Ref. No. USGSX24K34334) indicates the typical range in elevation for the project sites is between approximately 20 to 40 feet above mean sea level (amsl) with the exception of the proposed northern pond site adjacent to Vince Bayou (Pond DMA2-1), which ranges in elevation of approximately 7 to 25 feet amsl. (See **Appendix C.**) The surface topography of the proposed project area generally slopes northwest toward the Houston Ship Channel.

The subject property lies on the Beaumont geological formation, as described in the Soil Survey of Harris County (SCS, 1976) and the Natural Resources Conservation Service (NRCS) online soil survey database. The majority of the proposed project is dominated by soil listed as Lake Charles-Urban land complex (Lu). Other soils within the project ROW are Bernard-Urban land complex (Bg) and Dylan clay, 3 to 5 percent slopes (DylC). (See **Table 1.**)

Table 1: Soil Types within Proposed Project ROW

Soil Type	Description	Hydric	Prime Farmland										
Lu – Lake Charles-Urban land complex, 0 to 3 percent slopes	<p>This soil complex generally consists of Lake Charles and similar soils (50%), Urban land (35%), and minor components (15%). This soil complex is moderately well drained. The main component (Lake Charles) has a high runoff with a depth greater than 80 inches to the water table. Its available water capacity is high and features no ponding or flooding. Urban land soil cannot be differentiated because of the disturbance and alteration of the soil. A typical soil profile is as follows:</p> <table border="0" data-bbox="443 1392 998 1539"> <tr> <td>Lake Charles</td> <td>Urban</td> </tr> <tr> <td><i>H1 - 0 to 10 inches: Clay</i></td> <td><i>H1 - 0 to 40 inches:</i></td> </tr> <tr> <td><i>H2 - 10 to 22 inches: Clay</i></td> <td>Variable</td> </tr> <tr> <td><i>H3 - 22 to 74 inches: Clay</i></td> <td></td> </tr> <tr> <td><i>H4 - 74 to 80 inches: Clay</i></td> <td></td> </tr> </table>	Lake Charles	Urban	<i>H1 - 0 to 10 inches: Clay</i>	<i>H1 - 0 to 40 inches:</i>	<i>H2 - 10 to 22 inches: Clay</i>	Variable	<i>H3 - 22 to 74 inches: Clay</i>		<i>H4 - 74 to 80 inches: Clay</i>		No	No
Lake Charles	Urban												
<i>H1 - 0 to 10 inches: Clay</i>	<i>H1 - 0 to 40 inches:</i>												
<i>H2 - 10 to 22 inches: Clay</i>	Variable												
<i>H3 - 22 to 74 inches: Clay</i>													
<i>H4 - 74 to 80 inches: Clay</i>													
Bg – Bernard-Urban land complex, 0 to 1 percent slopes	<p>This soil complex generally consists of Bernard and similar soils (55%), Urban land (35%), and minor components (10%). This soil complex is somewhat poorly drained with high runoff. The depth to the water table for the main component (Bernard) is about 18 to 30 inches. Characteristics for the Bernard soil also include no ponding or flooding and a high available water capacity. Urban land soil cannot be differentiated because of the disturbance and alteration of the soil. A typical soil profile is as follows:</p> <table border="0" data-bbox="443 1833 998 1890"> <tr> <td>Bernard</td> <td>Urban</td> </tr> <tr> <td><i>H1 - 0 to 6 inches: Clay</i></td> <td><i>H1 - 0 to 40 inches:</i></td> </tr> </table>	Bernard	Urban	<i>H1 - 0 to 6 inches: Clay</i>	<i>H1 - 0 to 40 inches:</i>	No	No						
Bernard	Urban												
<i>H1 - 0 to 6 inches: Clay</i>	<i>H1 - 0 to 40 inches:</i>												

Soil Type	Description	Hydric	Prime Farmland
	loam <i>H2 - 6 to 34 inches: Clay</i> <i>H3 - 34 to 65 inches: Clay</i>		
Dy1C – Dylan clay, 3 to 5 percent slopes	This soil generally consists of Dylan and similar soils (90%) and minor components (10%) of Vamont and Buna. This soil is moderately well drained with very high runoff. The depth to the water table is more than 80 inches. There is no ponding or flooding, and the available water capacity is low. A typical soil profile is as follows: Dylan <i>A - 0 to 4 inches: Clay</i> <i>Bw - 4 to 14 inches: Clay</i> <i>Bss - 14 to 16 inches: Clay</i> <i>Bkss - 16 to 80 inches: Clay</i>	No	No

No Action Alternative – Under the No Action Alternative, no construction would occur, and the risk of flooding in the area would continue.

Proposed Action Alternative – Under the Proposed Action Alternative, the proposed activities will consist of lowering the selected roadway segments from existing elevations by one to two feet and constructing eight detention ponds at various locations within the project area. Open excavations to remove and replace existing underground storm drainage systems with properly-sized systems will also be involved. Excavated soil and waste materials will be managed and disposed of in accordance with applicable local, state, and federal regulations. If contaminated materials are discovered during construction activities, then work will cease until appropriate procedures and/or permits can be implemented/obtained.

4.1.2 Prime and Unique Farmlands

The Farmland Protection Policy Act (FPPA) requires identification of proposed actions that would affect farmland. Projects considered exempt under the FPPA include those that are developed, urbanized, or zoned for urban use. Projects for which no additional ROW is required are exempt under the FPPA.

No Action Alternative – Under the No Action Alternative, no construction would occur, and there would be no impact to areas that contain prime farmland.

Proposed Action Alternative – Under the Proposed Action Alternative, construction will occur only within the existing City of Pasadena ROW (streets) and City-owned properties (ponds) throughout the project area. The project area is classified as developed and urbanized; therefore, the Proposed Action Alternative is exempt from the requirements of FPPA. No coordination with the NRCS is required.

4.1.3 Beneficial Landscape Practices

In accordance with the Executive Memorandum of August 10, 1995, all agencies shall comply with the NEPA as it relates to vegetation management and landscape practices for all federally-assisted projects. The Executive Memorandum directs that, where cost-effective and to the extent practicable, agencies will

(1) use regionally native plants for landscaping; (2) design, use, or promote construction practices that minimize adverse effects on the natural habitat; (3) seed to prevent pollution by, among other things, reducing fertilizer and pesticide use; (4) implement water-efficient and runoff reduction practices; and (5) create demonstration projects employing these practices.

No Action Alternative – Under the No Action Alternative, no construction or landscaping activities would occur.

Proposed Action Alternative – Landscaping included with this project will be in compliance with the Executive Memorandum and the guidelines for environmentally and economically beneficial landscape practices.

4.1.4 Air Quality

The Clean Air Act (CAA) requires that states adopt ambient air quality standards. The standards have been established in order to protect the public from potentially harmful amounts of pollutants. The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six air pollutants. These pollutants include sulfur dioxide (SO₂), particulate matter with a diameter less than or equal to 2.5 micrometers (PM_{2.5}), carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), and lead (Pb). The EPA has designated specific areas as NAAQS attainment or non-attainment areas. Nonattainment areas are areas that do not meet (or that contribute to ambient air quality in a nearby area that does not meet) the quality standard for a pollutant. Attainment areas are areas that meet ambient air quality standards. Harris County is part of the Houston-Galveston-Brazoria non-attainment region which is currently designated as a marginal non-attainment area for the 2008 8-hour ozone standard. The project area is in attainment or unclassifiable for CO, NO₂, SO₂, PM_{2.5}, and Pb.

No Action Alternative – The No Action Alternative would have no effect on air quality because no construction activities would occur.

Proposed Action Alternative – Under the Proposed Action Alternative, no long-term impacts to air quality will occur. Pollutant emissions from construction equipment may result in minor temporary effects to air quality in the area immediately surrounding the proposed construction activity. To reduce the short-term temporary impact to air quality, the construction contractors will be required to use misted water, when necessary, to minimize the generation of dust. Emissions from fuel-burning internal combustion engines (e.g., heavy equipment and earthmoving machinery) could temporarily increase the levels of some criteria pollutants, including CO, NO₂, O₃, PM_{2.5}, and non-criteria pollutants such as volatile organic compounds. To reduce emissions, fuel-burning equipment running times will be kept to a minimum, and engines will be properly maintained.

4.2 WATER RESOURCES

4.2.1 Surface Water

The Texas Commission on Environmental Quality's (TCEQ) 2014 Texas Clean Water Act Section 303(d) List (approved November 19, 2015) identifies impaired waters (i.e., water bodies that do not meet minimum standards in specific categories). There are four major waters located within the project area. Cotton Patch Bayou and Glenmore Ditch are not designated as impaired water bodies on the 303(d) list but do discharge into an impaired water body (the Houston Ship Channel, which is listed for bacteria, chlordane, dioxins, dieldrin, heptachlor epoxide, and PCBs in edible tissues as well as for toxicity of sediments). Although neither Vince Bayou nor Little Vince Bayou (within the project area) are listed on the 303(d) list, the segments of these waterways north of the project area (Vince Bayou Tidal from Houston Ship Channel confluence to SH 225 and Little Vince Bayou Tidal from Vince Bayou Confluence to SH 225) are designated as impaired water bodies on the 303(d) list; Vince Bayou Tidal is listed for bacteria, dioxins and PCBs in edible tissues, and toxicity of sediments while Little Vince Bayou Tidal is listed for dioxin and PCBs in edible tissues. The flow of surface water onto the project area appears to flow in a northwesterly direction toward the Houston Ship Channel.

The proposed project is located within the boundaries of a regulated Municipal Separate Storm Sewer System (MS4) of the City of Pasadena and Harris County.

No Action Alternative – The No Action Alternative would have no effect on surface water.

Proposed Action Alternative – Temporary short-term impacts to downstream surface waters may occur due to construction related storm water runoff. The four waters located within the project area discharge less than five miles downstream into waterway segments designated as impaired water bodies on the 303(d) list. The City of Pasadena will be required to prepare a Storm Water Pollution Prevention Plan (SW3P) and obtain a National Pollutant Discharge Elimination System (NPDES) permit. Implementation of appropriate Best Management Practices (BMPs) will be required at the construction locations. BMPs will be implemented in accordance with the permit. These BMPs will include review of construction plans and municipal inspection of construction activities; use of soil retention features and grass lined channels; installation of silt fences, sediment basins and rock dams; preserving natural vegetation, where feasible, and revegetating bare soils; and designating areas for vehicle maintenance, vehicle washing, and concrete washout. Portions of the proposed project site are designed to be covered with riprap or other concrete stabilization material. Periodic inspections of BMP controls will be conducted for their effectiveness, and maintenance will be performed as needed.

4.2.2 Groundwater

The major aquifers within the project area are the Chicot, Evangeline, and Jasper aquifers. The tops of the aquifers range approximately from just below ground surface to several thousand feet below ground surface. Few wells have been completed into the Jasper aquifer that is Pliocene to Miocene in age. The Chicot is the youngest aquifer and is Pleistocene to Holocene in age. The Chicot aquifer is divided into the upper and lower parts. The groundwater gradient of the aquifers is typically to the east/southeast.

The Chicot is considered to be all deposits from the top surface of the land to the Evangeline aquifer. The aquifers are composed of clay, sand and gravel which were fluvial, deltaic and shallow marine environments that are hydrogeologically connected. The aquifers are recharged from precipitation that falls on the outcrop areas of the formations.

The Evangeline Aquifer, corresponding to the Goliad Sand of the Willis and Fleming Formations, represents the principal subsurface water supply source for the City of Houston and surrounding communities. The aquifer is noted for its abundance of good quality groundwater and is considered one of the more prolific aquifers in the Texas Coastal Plain. Individual sand beds are characteristically tens of feet thick. Public water supply wells completed within the Evangeline Aquifer in this area are typically screened within a depth interval of 600 feet to 2,400 feet below ground surface.

No Action Alternative – No construction would occur, and there would be no impacts to groundwater.

Proposed Action Alternative – Construction activities will not reach a sufficient depth to impact groundwater; therefore, no adverse effects to groundwater are expected to occur. The proposed project is not expected to alter rainfall drainage patterns or contaminate or otherwise adversely affect the public water supply, water treatment facilities, or water distribution systems. If the Proposed Action requires additional excavation to groundwater depths, the City of Pasadena will consult the EPA and TCEQ to identify appropriate mitigation measures.

4.2.3 Floodplains

On May 24, 1977, President Jimmy Carter issued Executive Order (EO) 11988 (Floodplain Management), which requires federal agencies to avoid direct or indirect support of development within floodplains, whenever there is a practicable alternative. FEMA uses Flood Insurance Rate Maps (FIRM) to identify regulatory floodplains for the NFIP. Consistent with EO 11988, FIRMs were examined during the preparation of this EA.

The USGS 7.5-minute topographic map of the Pasadena Quadrangle (NGA Ref. No. USGSX24K34334) indicates the proposed project area ranges in elevation between approximately 20 to 40 feet amsl.

The City of Pasadena is a participant in the NFIP, which aims to reduce the impact of flooding on private and public structures by providing affordable insurance and by encouraging communities to adopt and enforce floodplain management regulations. The proposed project lies within FIRM Panel Nos. 48201C0905N and 48201C0915N (published May 2, 2019) as well as FIRM Panel Nos. 48201C0910M and 48201C0920M (published January 6, 2017). According to FIRM Panel Nos. 48201C0905N and 48201C0915N, portions of the project are located inside the 100-year floodplains of Vince Bayou and Little Vince Bayou. (See **Appendix C**.)

Under existing conditions, storm water flows are conveyed by Cotton Patch Bayou, Glenmore Ditch, Vince Bayou, and Little Vince Bayou into the Houston Ship Channel.

No Action Alternative – No construction would occur, and there would be no impacts to the floodplain. Flooding during significant rainfall events would continue.

Proposed Action Alternative – Although portions of the Proposed Action do lie within the 100-year flood zone, no adverse impacts to the floodplain are anticipated. No proposed work is anticipated to occur within the floodways. The proposed project will not increase Base Flood Elevations or violate applicable floodplain regulations and ordinances. Water surface elevations of water bodies in the project area will not be altered as part of this project. Appropriate coordination with the local Floodplain Administrator (including a Conditional Letter of Map Revision/Letter of Map Revision (CLOMR/LOMR)) will be performed prior to construction. The City of Pasadena must coordinate with the local floodplain administrator to obtain required permits prior to initiating work. Coordination pertaining to these activities and applicant compliance with conditions should be retained as part of the project file in accordance with HMGP instructions. The City of Pasadena must notify the public (Public Notice) of any work proposed in a wetland or floodplain, if that is the only practicable alternative. The Public Notice concerning the City of Pasadena Street Drainage and Flood Mitigation Project will be published together with the Notice of Availability of the draft EA for public review.

An Eight-Step Narrative for Floodplains has been performed. The results can be found in **Appendix D**.

4.2.4 *Waters of the United States (including Wetlands)*

Section 404 of the Clean Water Act (CWA) regulates the discharge of fill material into Waters of the U.S., including wetlands (WOTUS). The Act authorizes the issuance of permits for such discharges as long as the proposed activity complies with environmental requirements specified in Section 404(b)(1) of the Act. The USACE, under CWA authority, regulates fill within WOTUS, through general and individual permits. On May 24, 1977, President Jimmy Carter issued EO 11990, Protection of Wetlands, which directs federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands on federal lands.

The site was visited on June 6, 2019, by Mary-Claire Graham and Jeremiah Mathis of Berg♦Oliver Associates, Inc. (BOA). Using the diagnostic criteria set forth in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region to the Corps of Engineers Wetland Delineation Manual – Technical Report Y-87-1 (Version 2.0) for sampling hydrology, soils, and vegetation, the site was evaluated for the presence of wetlands that would be classified as jurisdictional WOTUS. As part of a comprehensive assessment of the property, upland (non-wetland) areas were identified and sampled according to the same aforementioned guidance manual. Based upon methodology described on page 63 of the Corps of Engineers Wetland Delineation Manual, transects must be performed on properties greater than 5 acres in size, though as described under Part IV: Section D: Subsection 2: 65: Step 3 of the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region to the Corps of Engineers Wetland Delineation Manual – Technical Report Y-87-1, there can be flexibility when site-specific conditions require modification of field procedures. With the use of infrared photography, aerial photography, and topographic maps, it was determined that transects were not needed for this particular project.

WOTUS were logged in the field during site reconnaissance. GPS satellite equipment was used to locate the boundary of the jurisdictional areas based upon the USACE Galveston District October 22, 2003 memorandum titled “SWG-Standard Operating Procedures (SOP); Recording Jurisdictional Delineations Using Global Positioning Systems (GPS)”. Collection of data was conducted on June 6, 2019, using a Trimble Geo-XT handheld GPS receiver. Jeremiah Mathis of BOA supervised collection of data to ensure that jurisdictional boundaries were properly documented.

Vegetation communities were evaluated and documented to delineate wetland and upland boundaries. Vegetation observed during the survey is described in the Vegetation section of this EA. Plant and soil descriptions and classifications, as well as hydrologic conditions, from each of the sample areas were recorded on USACE Atlantic and Gulf Coastal Region routine data forms.

The U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) Map of the project area was also reviewed to obtain information on existing and historical wetlands within the project vicinity. The NWI map shows that there are three WOTUS documented within the proposed project area. (See **Appendix C**.) The three WOTUS - Vince Bayou, Little Vince Bayou and Cotton Patch Bayou - were observed within the proposed project area during site reconnaissance and would be considered jurisdictional because of their direct surface connection to the Houston Ship Channel (Buffalo Bayou), which is a WOTUS. Vince Bayou, Little Vince Bayou, and Cotton Patch Bayou are identified on the Site Plan in **Appendix A**.

The site visit conducted on June 6, 2019 revealed that detention pond sites DMA2-3, DMA2-4, and DMB1-1 contained potentially jurisdictional adjacent wetlands. Detention pond sites DMB1-2 and DMC1-6 contained potentially non-jurisdictional isolated wetlands. A Wetland Determination and Classification Map illustrating the findings is provided in **Appendix C**.

No Action Alternative – No construction would occur, and there would be no impacts to WOTUS, including wetlands.

Proposed Action Alternative – Based on the findings of the June 6, 2019 wetland delineation, detention pond sites DMA2-3, DMB1-2, and DMC1-6 were removed from the project to avoid impacts to potential wetlands. At sites DMA2-4 and DMB1-1, the proposed detention ponds will be constructed adjacent to potentially jurisdictional wetlands to avoid direct impacts to wetlands.

Although the Proposed Action consists of lowering approximately 27 miles of existing roadways and constructing eight new detention ponds, no wetlands or other WOTUS will be directly impacted. No channel modifications are proposed for Vince Bayou, Little Vince Bayou, or Cotton Patch Bayou. None of the existing bridges and drainage culvert structures at proposed roadway site crossings in the project area will be altered or replaced under the proposed flood control project. Because no direct impacts are anticipated, no USACE verification or permitting will be required.

Minor, temporary impacts to nearby and adjacent wetlands and other WOTUS may occur due to the transport of sediment from disturbed soils by stormwater runoff during construction. The City of Pasadena would prepare a SW3P and obtain NPDES permit coverage prior to construction. Implementation of appropriate erosion and sediment control BMPs would be required during construction. Upon completion of construction activities, unpaved portions of the proposed project area would be revegetated with native seed mix to permanently stabilize soils.

4.3 BIOLOGICAL RESOURCES

The proposed project area is located in the City of Pasadena, much of which is paved or maintained as very short grasses, providing little to no wildlife habitat. Undeveloped wooded properties along Vince Bayou provide some habitat for urban wildlife.

4.3.1 Wildlife

The proposed project area is located in an area containing commercial and residential properties, with some city parks. Mammals likely to be found in the area include domestic dogs and cats, raccoons, opossums, rodents, and squirrels, although none were observed during site reconnaissance activities. Common reptiles in the county include snakes, alligators, and turtles. Frogs, toads, and other amphibians are also well distributed throughout the county. Various birds and turtles were observed within, or adjacent to, the proposed project area.

Congress passed the Endangered Species Act (ESA) in 1973 to protect and recover imperiled species and the ecosystems upon which they depend. The ESA is administered by the USFWS and the National Marine Fisheries Service (NMFS). Under the ESA, species may be listed as “endangered” or in danger of extinction throughout all or a significant portion of its range, or “threatened” or likely to become endangered within the foreseeable future. Under Section 7 of the ESA, FEMA is required to determine the impact that federal actions may have on federally-endangered or threatened species and consult with the USFWS or NMFS, when required. According to the USFWS endangered and threatened species list, there are four endangered or threatened species that have the potential to occur in Harris County. The Least Tern (*Sterna antillarum*), Piping Plover (*Charadrius melodus*), and Red Knot (*Calidris canutus rufa*) do not need to be considered because this is not a wind-related project. The Texas Prairie Dawn-flower (*Hymenoxys texana*) is not likely to occur in the project area because no poorly drained, sparsely vegetated to almost barren areas on slightly salty soils, or other primary habitat were observed in the project area. No critical habitat is designated in the project area (<https://ecos.fws.gov/ipac/>). The Bald Eagle, present in Harris County, has been delisted as a threatened or endangered species. Its recovery is being monitored; however, the eagle is still protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. A site visit conducted on June 6, 2019, did not reveal specimens, nests, or primary habitat of the Bald Eagle within the proposed project area. No rivers or large lakes preferred by Bald Eagles were present. No evidence of listed species inhabiting or migrating through the project area was observed.

A check of the Texas Parks and Wildlife Department (TPWD) “live” version of the Natural Diversity Database (NDD) in conjunction with GIS was obtained on April 20, 2019. According to the NDD, there are two state-listed species – giant sharpstem umbrella-sedge (*Cyperus cephalanthus*) and southern crawfish frog (*Lithobates areolatus areolatus*) – documented within a 1.5-mile radius of the proposed project area. A site visit conducted on June 6, 2019 did not reveal specimens or their preferred habitat. The NDD no federally listed species were documented within a 1.5 mile radius of the proposed project area.

No Action Alternative – There would not be an impact to biological resources, including state- and federally-protected species.

Proposed Action Alternative – Under the Proposed Action Alternative, approximately 167 acres of vegetation, 159 acres for roadways and 7.7 acres for detention ponds, will be disturbed and revegetated via hydro-mulching or sod. This acreage is scattered throughout the proposed project and is not concentrated in any one area. The project sites include some scattered mature trees and mowed and maintained vegetation. The proposed project area does not contain habitat for any federally-listed threatened or endangered species known to occur in Harris County, therefore FEMA has determined there will be no effect to federally-listed threatened or endangered species as a result of the Proposed Action. Contractors will be made aware of the Southern crawfish frog and giant sharp-stem umbrella-sedge. Encounters with any state-listed species will be reported to the TPWD.

In adherence to the Migratory Bird Treaty Act, the City of Pasadena will limit vegetation management work during the peak migratory bird nesting period of March 15 through September 15, as much as possible, to avoid destruction of individuals, nests, or eggs. If vegetation clearing activities must occur during the nesting season, then the City of Pasadena will implement measures, such as deploying a qualified biological monitor with experience conducting breeding bird surveys to survey vegetation management areas for nests no more than five days prior to construction, to ensure active nests are not present prior to vegetative clearing. No vegetation containing active nests, eggs, or young will be removed if they are present on a project site. If nests are observed during the surveys, then a vegetation buffer area of no less than 150 feet in diameter will remain around the nest until all young have fledged.

The City must comply with the Texas Parks and Wildlife Code Chapter 64, which regulates birds. The proposed actions must not result in the take of birds, nests, or eggs as defined in Sections 64.002 and 64.003 of the Texas Parks and Wildlife Code.

4.3.2 *Vegetation*

The proposed project area is located within the Gulf Coast Prairies and Marshes Ecoregion of Texas. According to the TPWD’s The Vegetation Types of Texas (1984), the vegetation community within the majority of the project area most closely fits the description of Urban (46) and is dominated by a mix of live oaks (*Quercus virginiana*), water oak (*Quercus nigra*), crepe myrtle (*Lagerstroemia indica*), Chinese tallow (*Triadica sebifera*), St. Augustine grass (*Stenotaphrum secundatum*), Bermuda grass (*Cynodon*

dactylon), ragweed (*ambrosia artemisiifolia*), white clover (*Trifolium repens*), Johnson grass (*Sorghum halepense*), and alligatorweed (*Alternanthera philoxeroides*).

No Action Alternative – No construction activities would occur, and no vegetation would be impacted.

Proposed Action Alternative – Under the Proposed Action Alternative, impacts to vegetation will occur along the reconstructed roadways and the areas where detention ponds will be built. Approximately 167 acres of mowed and maintained urban vegetation will be restored with similar vegetation. The proposed detention ponds will be constructed with a typical 4:1 or 6:1 side slope to provide bank stabilization. Where practicable, and when seed is reasonably available, a mixture of native grasses and forbs appropriate to address potential erosion problems and long-term cover will be planted. The City's goal is to use native trees, shrubs, and herbaceous species that are low maintenance and drought tolerant.

4.3.3 *Invasive Species*

On February 3, 1999, President Bill Clinton issued EO 13112 to prevent the introduction of invasive species and provide for their control as well as to minimize their economic, ecological, and human health impacts. In accordance with EO 13112 on invasive species, native plant species would be used in the landscaping and in the seed mixes where practicable.

No Action Alternative – There would not be any construction; therefore, there would be no impact to biological resources, including invasive species.

Proposed Action Alternative – Approximately 167 acres of herbaceous vegetation, including both invasive and non-invasive species, would be impacted. Where practicable and when seed is reasonably available, a mixture of native grasses and forbs appropriate to address potential erosion problems and long-term cover will be planted. The City's goal is to use native trees, shrubs, and herbaceous species that are low-maintenance and drought tolerant.

4.3.4 *Essential Fish Habitat*

The Magnuson-Stevens Fishery Conservation and Management Act, as amended on October 11, 1996, requires all federal agencies whose actions would impact essential fish habitat to consult with the NMFS regarding potential adverse effects. This means any project that receives federal funding must address potential impacts to essential fish habitat. There are no tidally-influenced Waters in the project area.

No Action Alternative – There would be no impact to essential fish habitat.

Proposed Action Alternative – No tidally-influenced Waters will be affected by the proposed activities. There is no essential fish habitat in the project area; therefore, under the Proposed Action Alternative, no impact to essential fish habitat will occur. Coordination with the NMFS will not be required.

4.4 CULTURAL RESOURCES

NEPA’s goal of evaluating and documenting the impact of federally-sponsored actions on human health and the natural environment requires corresponding efforts to analyze possible project-related effects to cultural resources under Section 106 of the National Historic Preservation Act (NHPA), as amended, and implemented by 36 CFR Part 800. Section 106 of the NHPA requires federal agencies to consider the effects of their actions on historic properties and to provide the State Historic Preservation Officer (SHPO) an opportunity to comment on federally-funded or -permitted projects prior to implementation. Historic properties are those archeological sites, buildings, structures, objects, or districts included in or eligible for inclusion in the National Register of Historic Places (NRHP). The Area of Potential Effect (APE) of a federal undertaking is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist.

The proposed project will involve the excavation and reconstruction of approximately 100 selected street segments to lower their elevations by one to two feet and, thereby, enable those street segments to augment floodwater drainage. Detention would also be provided by eight proposed detention ponds installed at various locations throughout the city. The affected street segments and detention ponds are located within city-owned easements and public parks, typically near the city’s bayous and drainage channels where flood-related problems have occurred in the past. The archeological APE for the project correlates to the footprint of the proposed street and detention pond improvements shown on the exhibits in **Appendix A**. The APE for historic non-archeological resources includes the proposed street segments and detention pond areas as well as the streetscape and landscape setting flanking each proposed improvement. None of the buildings and structures on property adjacent to the proposed flood control improvements will be directly affected by the project.

A review of known cultural resources in proximity to the proposed project site identified a variety of recorded archeological and historical site locations. Records reviewed include online databases maintained by the National Parks Service, the Texas Historical Commission (THC), and TxDOT’s online NRHP-listed and Eligible Bridges of Texas and Historic Districts & Properties of Texas (NPS 2019; THC 2019a and 2019b; TxDOT 2019a and 2019b). The background records review identified seven prior archeological surveys and two previously recorded archeological sites within a 1.0-mile radius of the project area. One Historic Texas Cemetery and two NRHP-listed historic properties are also located within 1.0 mile of the project area. (See **Table 2**.) There are four Official Texas Historical Markers (OTHM) recorded within the 1.0-mile radius. None of these recorded cultural resources are located within or immediately adjacent to the APE for the proposed flood control improvements in the project area. One Neighborhood Survey property, recorded as the Macatee House at 1220 Southmore Avenue in Pasadena, Texas, is incorrectly mapped on the THC’s Historic Sites Atlas. The correct location is 12 miles north of the project area at 1220 Southmore Boulevard in Houston, Texas.

Table 2: Summary of Recorded Cultural Resources within 1.0 Mile of Project Area

Site No./Name	Site Type	NRHP/SAL Eligibility Status ¹	Distance from Project Area	Potential to be Impacted by Project?
---------------	-----------	--	----------------------------	--------------------------------------

<i>Archeological Sites</i>				
41HR308	Historic-age battlefield (Vince's Bridge) (April 27, 1836)	Undetermined	0.6 mile	None
41HR1154	Historic-age artifact scatter (early to mid-20th century)	Recommended ineligible	0.5 mile	None
<i>NRHP-Listed Historic Properties</i>				
Washburn Tunnel	Historic vehicular tunnel (built ca. 1947)	Listed on NRHP	0.6 mile	None
Pomeroy Homestead	Historic house (built ca. 1908)	Listed on NRHP	0.3 mile	None
<i>Cemeteries</i>				
HR-C083 (41HR309)	Crown Hill Cemetery	Historic Texas Cemetery	0.5 mile	None
<i>OTHM</i>				
Pasadena ISD	Subject Marker	Undetermined	1,100 feet	None
City of Pasadena	Subject Marker	Undetermined	1,500 feet	None
Allen Ranch	Subject Marker	Undetermined	1,400 feet	None
Crown Hill Cemetery	Subject Marker	Undetermined	4,100 feet	None

¹ *Determined eligible/ineligible* = Site determined eligible/ineligible by SHPO

Recommended eligible/ineligible = Site recommended as eligible/ineligible by site recorder and/or sponsoring agency but eligibility has not been determined by SHPO

Undetermined = Eligibility not assessed or no information available

NRHP National Register of Historic Places

SAL State Antiquities Landmark

SHPO State Historic Preservation Officer

Based on the results of the records review, further reviews of recent and historical topographic maps, aerial photography, and geological maps, indicate the project area has a moderate to high potential for additional unrecorded cultural resources. On April 16, 2019, a meeting was held with THC Archeological Division staff and FEMA's historic resources liaison to initiate Section 106 consultation for the project and to discuss a survey approach that would meet THC (Texas SHPO) and FEMA requirements for compliance with Section 106 of the NHPA. To identify possible archeological sites in the APE, a pedestrian archaeological survey was recommended for the proposed detention ponds, which are located along or near natural bayous that extend across the project area. For non-archeological historic resources, FEMA's historic resources liaison recognized that most of the approximately 100 street segments with proposed flood control improvements are elements of residential neighborhoods constructed within a two-decade period following World War II, circa 1945 to 1965, and, logically, should be surveyed and evaluated as interrelated elements of possible neighborhood-scale historic districts associated with the post-World War II housing boom that occurred in Pasadena and across the nation.

The cultural resource survey recommendations were based on project layout drawings available at the time of the THC and FEMA staff coordination meeting on April 16, 2019. During the course of the

cultural resource field surveys, conducted between April 18, 2019, and June 9, 2019, one detention pond was removed from the proposed project. Three additional detention ponds and a pump station site were later eliminated, and two of the eight remaining ponds were reduced in size to avoid wetlands. Several changes were also made to the roadway segments. Refer to **Appendix A** for a tabular listing of the originally proposed site locations with subsequent revisions noted.

Archeological and non-archeological historic resource survey reports were prepared by qualified professionals. These reports were submitted to the THC for review and comment under Section 106 of the NHPA. The archeological resources survey report identified no archeological sites within the proposed detention pond locations and four proposed street improvement areas that were also examined during the archeological survey. The non-archeological historic resources survey identified one possible NRHP-eligible historic district – a post-World War II residential subdivision with one affected street segment, Oak Street between Southmore Avenue and Allendale Road in Pasadena Oaks Section 1. Four separate public buildings within the APE were recommended for individual NRHP eligibility. Project-related effects to these recommended NRHP-eligible resources were assessed to be minimal and non-adverse.

Project review and comment by the THC concluded in September 2019. In correspondence dated August 12, 2019, the THC concurred with the information provided in the archeological resources survey report and determined that no historic properties were present or would be affected by the project. In correspondence dated August 14, 2019, the THC concurred with the information provided in the non-archeological resources survey report and determined that no NRHP-eligible historic properties would be adversely affected by the project. Subsequent non-archeological survey and assessment documentation was submitted to the THC as needed to address project changes that developed after the original archeological and non-archeological historic resource survey reports were submitted and initial coordination efforts were completed. On September 30, 2019, the THC responded by indicating that the proposed project revisions would have no effect to historic non-archeological properties. Further archeological survey documentation was not submitted to the THC because the proposed project revisions occurred entirely within areas previously surveyed for this project.

Both NEPA and Section 106 of the NHPA require project planning to include public involvement. Local chairmen of the Harris County Historical Commission (HCHC) were notified of the THC's responses to the archeological and historical surveys of the project. Further public involvement will occur during open public meetings. The Alabama-Coushatta Tribe of Texas, Comanche Nation, Kiowa Tribe, Muscogee Creek Nation, Thlopthlocco Tribe, and Tonkawa Tribe of Indians of Oklahoma were contacted by FEMA to request information and solicit concerns regarding project-related impacts to traditional cultural resources in the project vicinity. Details regarding public involvement, including agency coordination efforts, are discussed in Section 6.0 Public Involvement and Section 7.0 Agency Coordination and Permits of this report.

No Action Alternative – No construction would occur, and historic (NRHP-eligible) cultural resources in the APE will continue to be at risk from future flood events in the project area.

Proposed Action Alternative – The Proposed Action Alternative will affect one historic street segment, Oaks Drive from Southmore Avenue to Allendale Road, within the NRHP-eligible Pasadena Oaks Section 1 historic district. FEMA and the THC have concurred the Proposed Action will have no adverse effect to the streetscape, landscape, and architectural qualities of this post-World War II residential subdivision and the individual homes that line both sides of Oaks Drive. Driveway connectivity was an integral design element for the post-war homes along Oaks Drive and will be maintained by the completed project. Changes in street elevation and construction of low retaining walls along the existing city ROW will be completed with materials and workmanship compatible with existing street and retaining wall features and should provide an overall net beneficial effect by preventing future flood-related impacts to the post-World War II homes along this street. Concurrence from the THC regarding project-related impacts to historic (NRHP-eligible) properties is documented in the agency’s response letters dated August 12, 2019, August 14, 2019, and September 30, 2019. The Comanche Nation responded on July 29, 2019, that “No Properties” potentially containing prehistoric or historic archeological materials of Comanche Nation interest are known to occur in the project area. The remaining tribes have not responded to date. (See **Appendix E**)

No archeological resources are known to occur within or directly adjacent to the proposed flood control improvements. Consequently, no impacts are anticipated for archaeological resources. In the event that archeological deposits, including Native American pottery, stone tools, or human remains, are discovered during project construction, all work will be stopped in the vicinity of the discovery, and measures will be taken immediately to restrict public access and to avoid or minimize further disturbance of the discovery site. In the event of an unexpected discovery, or if it appears that the project has affected a previously unidentified archeological resource, or if it has affected a known historic property in an unanticipated manner, the City of Pasadena will immediately notify the TDEM, who will immediately notify FEMA of the discovery. Upon notification of the unanticipated discoveries or effects, FEMA will consult with the Texas SHPO and Tribal representatives who have expressed their cultural affiliation and interest in the project. Work in sensitive areas will not resume until archeological consultation is completed and appropriate measures have been taken to ensure that the project complies with the NHPA. Human burials, both prehistoric and historic-age, are protected under the Texas Health and Safety Code. In the event that human remains or burial objects are inadvertently discovered during construction, use, or ongoing maintenance in the project area, even in previously surveyed areas, all work will stop immediately, and the THC will be notified of the discovery.

4.5 SOCIOECONOMIC DATA

The proposed project is located in the City of Pasadena and is primarily bound by residential land uses. Government land use (including City government buildings) is generally found at the center of the project area in downtown Pasadena with commercial, institutional (schools), and recreational land uses spread throughout the area. Land use at the proposed detention ponds is open area.

The project area is located within 17 census tracts: 3216, 3219, 3221, 3222, 3226, 3227, 3228, 3229, 3230, 3232, 3233, 3234, 3235, 3238.01, 3238.02, and 3241 of Harris County. The total population of the census tracts, as measured by the U.S. Census Bureau (USCB) 2010 Census, was 84,286 with

approximately 65.1% of Pasadena residents over the age of 16 participating in the work force. Leading employment sectors for the city are construction (16.6%), societal services (i.e., education, healthcare, and social assistance) (16.1%), manufacturing (13.3%), and retail trade (11.0%).

No Action Alternative – Under the No Action Alternative, socioeconomic impacts would occur during significant rainfall events because the risk of flooding and potential property damage would continue for the local residents and businesses, particularly for those in areas along Vince Bayou and Little Vince Bayou.

Proposed Action Alternative – Socioeconomic impacts will be beneficial as the proposed flood mitigation improvements will decrease flooding risk considerably for the local residential and commercial properties. No impacts to community cohesion are anticipated with the Proposed Action Alternative. The proposed project will remain within existing City ROW. No displacements are anticipated based on the proposed project plans. The design and construction of the proposed project will create temporary jobs.

4.6 ENVIRONMENTAL JUSTICE

In 1994, President Bill Clinton issued EO 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations), which mandates that federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations.

According to the USCB 2010 Census, the City of Pasadena has a population of 149,043 individuals. The USCB 2013-2017 American Community Survey (ACS) reports that the median household income for the City of Pasadena was \$50,207 with 19.3% of individuals living below the poverty level. The median household income in Harris County was \$57,791 with 16.8% of individuals living below the poverty level. The median household income in the State of Texas was \$57,051 with 16.0% of individuals living below the poverty level.

According to the USCB 2010 Census, minorities represented 67.3%, 67.0%, and 54.7%, respectively, of the City of Pasadena, Harris County, and the State of Texas populations. The following **Table 3** shows the specific racial composition and median incomes of the City of Pasadena, Harris County, and the State of Texas populations.

Table 3: Demographic Characteristics of the Project Study Area

Characteristic	City of Pasadena	Harris County	State of Texas
Total Population	149,043	4,092,459	25, 145,561
White	32.7%	33.0%	45.3%
Black	2.0%	18.4%	11.5%
Native American	0.2%	0.2%	0.3%
Asian	2.1%	6.1%	3.8%
Native Hawaiian or Pacific Islander	0.0%	0.1%	0.1%
Some Other or Multiple Races	0.8%	1.4%	1.4%
Hispanic	62.2%	40.8%	37.6%
Median Income	\$50,207	\$57,791	\$57,051

No Action Alternative – Under the No Action Alternative, no disproportionately high and adverse impacts to minority or low-income populations would occur. Flooding risks would continue for residents and business owners within the project area.

Proposed Action Alternative – No disproportionately high and adverse impacts on minority or low-income portions of the population or impacts to community cohesion are anticipated. The Proposed Action will reduce flooding risks in the project area where LMI neighborhoods, particularly those located outside of the floodplain, were identified by the Drainage Program for flooding susceptibility. Flood losses to properties will be reduced or eliminated, and the lives of those affected by flooding events will be protected. Additionally, by preventing further flood damage and/or loss in the project area, flood insurance disbursements (for damage claims through low-cost NFIP policies covering areas outside of floodplains but prone to flooding) is anticipated to decrease. This will lessen the exposure to financial liability for the NFIP and allow the program to continue to offer affordable flood insurance policies to the LMI community in the project area. All citizens who live and/or work in the project area, or travel through it, will benefit from the implementation of the Proposed Action, and the design and construction of the proposed project will create temporary jobs.

4.7 TRAFFIC

The project area is primarily residential and interspersed with commercial, governmental (including City government buildings), institutional (schools), and recreational establishments. The roads in the project area serve local traffic needs and do not offer mass transit routes. Therefore, the traffic volume, which includes minor incoming traffic originating from outside the project area for short-term access (i.e., business or recreational purposes) to facilities in the area, is generally low.

The proposed project involves the reconstruction of various roadway segments and the construction of eight detention ponds throughout the project area. The roadway segments will be lowered in elevation but maintain their existing alignments while their associated storm sewer systems will be replaced with new systems.

No Action Alternative – No construction would occur, and there would be no construction-related impacts to traffic. However, the project area would remain vulnerable to flooding. Passage of vehicles during flood events, especially those of emergency response services, would be hazardous.

Proposed Action Alternative – Reconstruction of the roadways include full-width demolition followed immediately with the installation of a crushed concrete base to serve both as a temporary pavement for traffic and also as a permanent subgrade for final paving. Temporary driveways for access to adjacent properties and alternate traffic routing ahead of construction areas will be placed. Emergency services will be properly notified. One-way traffic plans will be coordinated with adjacent projects to ensure orderly traffic movement for systematic traffic phase changes.

The Proposed Action will not affect traffic, except during the construction phase. After construction is complete, capacity or traffic load will not increase. Traffic is not considered an issue of concern for the proposed project.

4.8 NOISE

Noise is generally defined as unwanted sound. Sound is most commonly measured in decibels (dB) on the A-weighted scale, which is the scale most similar to the range of sound that the human ear can hear. The Day-Night Average Sound Level (DNL) is an average measure of sound. The DNL descriptor is accepted by federal agencies as a standard for estimating sound impacts and establishing guidelines for compatible land uses. EPA guidelines and those of many other federal agencies state that outdoor sound levels in excess of 55 dB DNL are "normally unacceptable" for noise-sensitive land uses, such as residences, schools, or hospitals.

No Action Alternative – No construction would occur, and there would be no impact to noise levels.

Proposed Action Alternative – Noise associated with the construction of the project is difficult to predict. Heavy machinery, the major source of noise in construction, is constantly moving in unpredictable patterns. Construction normally occurs during daylight hours when occasional loud noises are more tolerable. No potential receivers would be expected to be exposed to construction noise for a long duration; therefore, extended disruption of normal activities is not expected. Temporary short-term increases in noise levels are anticipated during the construction period. To reduce noise levels during that period, construction activities will take place during working hours enforceable by local ordinance. Equipment and machinery used at the project site will meet local, state, and federal noise regulations. Provisions will be included in the plans and specifications to require the contractor to make every reasonable effort to minimize construction noise through abatement measures, such as work-hour controls and proper maintenance of muffler systems. No permanent noise impacts would occur.

4.9 HAZARDOUS MATERIALS

A Phase I Environmental Site Assessment (ESA) was conducted in conformance with the scope and limitations of ASTM (American Society for Testing and Materials) Practice E1527-13 for the project area at various sites throughout the City of Pasadena, Harris County, Texas.

For the purpose of this EA, hazardous substances/materials are defined as solid, liquid, contained gaseous or semi-solid waste, or combination of regulated wastes that may pose a potential hazard to human health or the environment. Hazardous substances are primarily generated by industry, hospitals, research facilities, and the government. Improper management and disposal of hazardous substances can lead to pollution of natural resources, including air, water, and soil.

A search of environmental regulatory databases to identify potential environmental concerns associated with the project area was conducted. The US EPA All Appropriate Inquiries and ASTM E1527-13 Standard define the minimum search distances for some databases. The following **Table 4** lists the regulatory sites located within the minimum search distances. A copy of the database search is presented in the Phase I ESA report. Records beyond those required by the ASTM 1527-13 Standard for Phase I ESAs were also sought. Some of these included exclusive records from EDR, a data collections and database research company, and were based on compilations of business directories and other listings regarding historical land use in the area, such as underground storage tank (UST) sites, automobile service stations, and dry cleaners.

The Phase I ESA identified fifty Recognized Environmental Conditions (RECs) within x feet of the project area. These RECs are also considered Vapor Encroachment Conditions (VECs). One of the RECs discussed in the Phase I ESA report comprises 51 listings that reflect the extent of petroleum industry activities in the northern area of the city. These listings are grouped into one REC discussion because of the density of the petroleum refining activities in the area and the imprecise locations of possible sources of releases listed in the records. A discussion of individual RECs is provided in the Phase I ESA report, which is available upon request from kimberly.campoallen@fema.dhs.gov.

Table 4: Regulatory Database Facilities within Project Vicinity

Database ¹	Search Distance (miles)	Target Property	Total Facilities Listed**
Federal ASTM Standard Environmental Record Sources			
National Priority List (NPL)²	1.00	No	1
Delisted NPL	0.50	No	0
Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS)	0.50	No	2
CERCLIS-No Further Remedial Action Planned (NFRAP)	0.50	No	2
Resource Conservation Recovery Act (RCRA) Corrective Action System (CORRACTS)	1.00	No	7
RCRA- Treatment, Storage, and Disposal Facilities (TSDF)	0.50	No	2

Database ¹	Search Distance (miles)	Target Property	Total Facilities Listed**
RCRA Generators	Target Property and Adjoining	No	27
Federal Institutional Control/Engineering Control (IC/EC)	Target Property	No	0
Emergency Response Notification System (ERNS)	Target Property	Yes	1
State ASTM Standard Environmental Record Source			
State Equivalent NPL	1.00	No	1
State Equivalent CERCLIS	0.50	No	0
State Landfill	0.50	No	5
Leaking Petroleum Storage Tanks (LPSTs)	0.50	No	80
Underground Storage Tank (USTs) and Aboveground Storage Tank (ASTs)	Target Property and Adjoining	No	134
State IC/EC	Target Property	No	4
Texas Voluntary Cleanup Program (TX VCP)	0.50	No	5
Brownfields	0.50	No	1
Additional Environmental Record Sources			
Dry Cleaners	0.25	No	7
RCRA Non-Generator/No Longer Regulated (NonGen/NLR)	0.25	No	52
TX Industrial and Hazardous Waste (IHW)	0.25	No	98
TX IHW Corrective (Corr) Action	0.25	No	5
Non-ASTM Databases²			
Manufactured Gas Plant (MGP)	1.00	No	0
US Historical USTs	Target Property and Adjoining	No	0
US Historical Auto Stations	0.25	No	72
US Historical Cleaners	0.25	Yes	9

¹ Some regulatory facilities may be recorded in more than one database

² EDR-exclusive databases

No Action Alternative – No construction would occur, and there would be no impacts to hazardous materials or waste. However, erosion caused by flooding could expose buried waste.

Proposed Action Alternative – Contaminated soil and groundwater may be encountered during construction activities. A plan will be included with the site construction specifications for the testing, removal, and disposal of contaminated soils and groundwater in accordance with applicable laws and regulations. If indications of contamination (e.g., odors, staining, sheen, etc.) are encountered during excavation activities, the affected media will be sampled. Recommended analyses will depend on the field observations and the nearby RECs discussed in the Phase I ESA report.

The contractor would take appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. The use of construction equipment within environmentally sensitive areas would be minimized. Construction materials and equipment used for the project would be removed as soon as work schedules permit.

4.10 SAFETY

Poor historic land development design and subsidence have contributed to flooding susceptibility in the project area, and the existing drainage system cannot contain the overflow from severe rainfall events, including hurricanes. Limited flood control for the project area poses a risk to loss of life and damage to residences, businesses, government facilities, and personal property.

Federal regulations for protecting health and safety include Occupational Safety and Health Administration (OSHA) regulations (29 CFR). Additionally, the City of Pasadena has a Code of Ordinances that includes design and construction guidelines and practices to maintain public health, safety, and welfare.

No Action Alternative – The No Action Alternative would have a negative effect on the general safety of the residents surrounding the proposed project area. The inadequate or lack of capacity of the existing drainage and detention facilities would continue to put homes, property, and life in jeopardy during significant rainfall events when flooding occurs.

Proposed Action Alternative – The Proposed Action Alternative will have a positive effect on the general safety of the residents by creating inline roadway water detention and underground drainage capacity to convey floodwaters and, thereby, reduce the risk to life safety and property damage during significant rainfall events.

Construction materials used for this project will be removed as soon as work schedules permit. Construction activities will be performed using qualified personnel trained in the proper use of the appropriate equipment, including appropriate safety precautions. Construction activities will be conducted in a safe manner and in accordance with the standards specified in OSHA regulations. The appropriate signage and barriers, especially near schools and high-volume traffic areas, will be in place prior to construction activities to alert pedestrians and motorists of the project activities.

4.11 MITIGATION MEASURES

Mitigation measures associated with the Proposed Action Alternative are summarized in **Table 5**.

Table 5: Summary of Mitigation Measures

Affected Environment	Impacts	Mitigation
Geology and Soils	No impacts to underlying geology are anticipated. Shallow soils and rock on the proposed project will be disturbed during construction.	Excavated soil and waste materials will be managed and disposed of in accordance with applicable local, state, and federal regulations. If contaminated materials are discovered during the construction activities, then the work will cease until appropriate procedures and permits can be implemented.
Farmland Conversion Impact Rating	Prime farmland soils are not present at the proposed project.	None.

Affected Environment	Impacts	Mitigation
Air Quality	No long-term impacts are anticipated for the project improvements; however, short-term impacts might occur during construction.	Construction contractors will be required to use misted water in the construction areas, when necessary to minimize dust, keep running times of fuel-burning equipment to a minimum, and keep engines properly maintained.
Surface Water	Temporary short-term impacts to downstream surface waters might occur during construction.	A SW3P will be prepared, and an NPDES permit will be obtained prior to construction. BMPs, such as installing silt fences and revegetating bare soils, will minimize runoff. Periodic inspections of BMP controls will be conducted for their effectiveness, and maintenance will be performed as needed.
Groundwater	No impacts to groundwater are anticipated.	If the proposed action will require additional excavation to groundwater depths, then the City of Pasadena will consult with EPA and TCEQ to identify the appropriate mitigation.
Floodplains	No adverse impacts to the floodplain are anticipated.	Coordination with the local Floodplain Administrator will be performed prior to construction.
Waters of the U.S., including Wetlands	No jurisdictional impacts are anticipated to occur during construction.	A SW3P will be prepared, and BMPs for storm water management will be implemented to minimize detrimental effects to water quality of the water bodies in the project area during construction.
Biological Resources	No impacts to state- or federally-protected species are anticipated.	<p>Contractors will be made aware of the Southern crawfish frog and giant sharp-stem umbrella-sedge, and encounters with listed species will be reported to TPWD, as per current instructions.</p> <p>The City of Pasadena will limit vegetation management work during the peak migratory bird nesting period of March 15 through September 15 as much as possible to avoid destruction of individuals, nests, or eggs. If vegetation clearing activities will occur during the nesting season, then the City of Pasadena will implement measures, such as conducting nest surveys no more than five days prior to construction, to ensure active nests are not present prior to vegetation clearing. No vegetation containing active nests, eggs, or young will be removed if they are present on a project site. If nests are observed during the surveys, then a vegetative buffer area of no less than 150 feet in diameter will remain around the nest until all young have fledged.</p> <p>The City will comply with the Texas Parks and Wildlife Code Chapter 64, which regulates birds. The proposed actions will not result in the take of birds, nests, or eggs as defined in Sections 64.002 and 64.003 of the Texas Parks and Wildlife Code.</p>

Affected Environment	Impacts	Mitigation
Cultural Resources	No NRHP-eligible historic properties are anticipated to be adversely affected by the project.	<p>Driveway connectivity was an integral design element for the post-war homes along Oaks Drive and will be maintained by the completed project. Changes in street elevation and construction of short retaining walls along the existing city ROW will be completed with materials and workmanship compatible with existing street and retaining wall features.</p> <p>In the event that archeological deposits, including Native American pottery, stone tools, or human remains, are discovered during project construction, then all work will be stopped in the vicinity of the discovery, and measures will be taken immediately to restrict public access and to avoid or minimize further disturbance to the discovery site. In the event of an unexpected discovery, or if it appears that the project has affected a previously unidentified property, or if it has affected a known historic property in an unanticipated manner, then the City of Pasadena will immediately notify TDEM, who will immediately notify FEMA of the discovery. Upon notification of the unanticipated discoveries or effects, FEMA will consult with the Texas SHPO and Tribal representatives who have expressed their cultural affiliation and interest in the project. Work in sensitive areas will not resume until archeological consultation has been completed and appropriate measures have been taken to ensure that the project complies with the NHPA. Human burials, both prehistoric and also historic-age, are protected under the Texas Health and Safety Code. In the event that human remains or burial objects are inadvertently discovered during construction, use, or ongoing maintenance in the project area, even in previously surveyed areas, all work will stop immediately, and the THC will be notified of the discovery.</p>
Socioeconomic Resources	No adverse impacts to socioeconomic resources are anticipated.	None.
Environmental Justice	No disproportionately high and adverse impacts on minority or low-income portions of the population are anticipated.	None.
Noise	Temporary short-term impacts in noise levels are anticipated during construction.	To reduce noise levels during construction, construction activities will take place during working hours enforceable by local ordinance.
Traffic	Minor temporary increase in the volume of construction traffic on roads in the immediate vicinity is anticipated. No other impacts are anticipated after construction is complete.	Construction vehicles and equipment will be stored on site during the project construction, and appropriate signage will be posted on affected roadways.

Affected Environment	Impacts	Mitigation
Hazardous Material	Contaminated soil and groundwater might be encountered during construction activities.	A plan will be included with the site construction specifications for the testing, removal, and disposal of contaminated soils and groundwater, in accordance with applicable laws and regulations. If indications of contamination (e.g., odors, staining, sheen, etc.) are encountered during excavation activities, then the impacted media will be sampled. Recommended analyses will depend on the field observations and the nearby RECs discussed in the Phase I ESA report.
Safety	Construction activities could present safety risks to those performing the activities. No long-term negative safety impacts are anticipated.	Construction activities will be performed using qualified personnel trained in the proper use of the appropriate equipment, including appropriate safety precautions. Construction activities will be conducted in a safe manner and in accordance with the standards specified in OSHA regulations. The appropriate signage and barriers, especially near schools and high-volume traffic areas, will be in place prior to construction activities to alert pedestrians and motorists of the project activities.

5.0 CUMULATIVE IMPACTS

According to the CEQ regulations, cumulative impacts represent the “impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time (40 CFR 1508.7)”. In accordance with NEPA, and to the extent reasonable and practical, this EA considered the combined effect of the Proposed Action and other actions occurring or proposed near the project site.

The Proposed Action is located in an area that is currently developed with residences, downtown commercial and government buildings, public parks, public schools, and industrial facilities. There are few surrounding vacant tracts, which limits opportunity for future expansion within the area. Several roadway expansions with drainage have been identified in the surrounding areas. Because of the highly developed setting, substantial future projects are not likely within the surrounding project area.

The City of Pasadena currently has other projects in development to address flooding mitigation needs:

- \$2,600,000 drainage project under the 2016 CDBG-DR Program – at the 90% design phase – involving the construction of two detention facilities on Armand Bayou (southeast of the project area) and
- \$8,200,000 Hurricane Harvey Armand Bayou Upper Reaches Drainage Project under the 2017 CDBG-DR Program and in conjunction with the Harris County Community Services Department (HCCSD) – at the preliminary phase seeking engineering services – for the installation of a 200- to 400-acre-foot detention channel approximately 3.4 miles in length in the median of Red Bluff Road south of Fairmont Parkway (southeast of the project area).

The Proposed Action and the Armand Bayou projects will have permanent impacts considered positive for the general public. They will collectively contribute to the overall flooding mitigation efforts designed to aid the community, including the LMI population, affected by severe rainfall events. Under the Proposed Action, the cross-section improvements to approximately 27 miles of local roadway and drainage as well as the addition of 44 acre-feet of storm water detention will reduce flooding during significant rainfall events and control erosion along the main waterways and their tributaries. The Armand Bayou projects will also relieve flooding as the proposed facilities will divert drainage from vulnerable areas and/or detain floodwaters.

The construction of the Proposed Action might have temporary impacts on air quality, by increasing criteria pollutants during construction activities, and by traffic. No other cumulative impacts are anticipated. The construction of the proposed project will have little or no negative cumulative impact on the surrounding community and environment.

6.0 PUBLIC INVOLVEMENT

FEMA is the lead agency for ensuring environmental compliance for the proposed City of Pasadena Street Drainage and Flood Mitigation project. It is the goal of the lead agency to be responsive to the needs of the community and the purpose and need of the proposed action while meeting the intent of federal environmental and cultural resource laws, including NEPA, and complying with necessary provisions.

The City of Pasadena held two public meetings to present the proposed project and to solicit input from the local residents, business owners, public officials, and other interested stakeholders. The first meeting occurred on August 15, 2019 and was held at City Hall. A total of 12 members of the public signed in to that meeting. The second meeting, also at City Hall, was held on September 19, 2019 with nine members of the public attending.

The City of Pasadena held a public hearing on November 5, 2019, in accordance with TPWD Code Chapter 26, because of the proposed detention pond at Strawberry Park, a designated public park and recreational area. The hearing was conducted during a regularly scheduled City Council meeting at City Hall in which at least 20 members of the public attended.

Upon FEMA approval of this draft EA, a public comment period will be advertised. A copy of this EA will be made available at the Office of the City Secretary (by appointment only) for the 30-day public comment period. Two public notices, one at the beginning and one 15 days into the public comment period, will be published in the *Pasadena Citizen* to inform the public of the report availability. Comments received during this public comment period or from the public meetings will be given proper consideration prior to FEMA approval of the final report. If no substantive comments are received, then the draft EA will become final. Any substantive comments will be addressed as appropriate in FEMA's final documents.

7.0 AGENCY COORDINATION AND PERMITS

Review of the project was requested from the state and county historical commissions (i.e., THC and HCHC, respectively). In correspondence dated August 12, 2019 and August 14, 2019, THC determined the Proposed Action would have “No Effect” on NRHP-eligible resources and that no historic properties will be adversely affected by the project. HCHC has provided no response to date.

Requests for review were sought from federally recognized Native American Tribal Nations of the region: (1) Tonkawa Tribe of Indians of Oklahoma, (2) Thlopthlocco Tribe, (3) Muscogee Creek Nation, (4) Kiowa Tribe, (5) Comanche Nation, and (6) Alabama-Coushatta Tribe of Texas. The Comanche Nation responded on July 29, 2019, that “No Properties” potentially containing prehistoric or historic archeological materials of Comanche Nation interest are known to occur in the project area. The remaining tribes have not responded to date.

Coordination occurred with TCEQ, and the agency determined on August 7, 2019, that the project is not anticipated to produce significant long-term environmental impacts as long as construction and waste disposal activities are completed in accordance with applicable local, state, and federal environmental permits, statutes, and regulations. The agency recommended that the City of Pasadena implement BMPs to control runoff from construction sites and dispose of debris or waste at an appropriately authorized disposal facility.

No impact to jurisdictional WOTUS, including wetlands, will occur from proposed project activities. The City of Pasadena initially contacted USACE on March 12, 2019, to notify the agency of the proposed project. USACE replied on April 29, 2019, with acknowledgement of the project. Subsequent coordination to provide USACE details of the project occurred on July 26, 2019. The agency responded on July 29, 2019, to provide an official request for review because of findings from the June 2019 wetland delineation conducted by BOA. (See **Appendix C: Wetland Determination and Classification Map**.) As stated in the letter dated July 26, 2019, the project has been redesigned from the original footprint to avoid impacts to potentially jurisdictional and jurisdictional wetland features; therefore, no further USACE coordination is warranted.

The project lies within the Texas Coastal Zone Management area. Coordination with the Texas General Land Office was initiated, and a letter of consistency was received on July 26, 2019. The proposed improvements will likely not have adverse impacts on coastal natural resource areas (CNRAs) in the coastal zone. Siting and construction will avoid and minimize impacts to CNRAs.

The Texas Water Development Board was contacted for project review. A July 25, 2019 letter of response stated that the City of Pasadena, as a NFIP participant, has authority to conduct this project within its jurisdiction, and that project activities need to follow local flood damage prevention ordinance requirements.

TPWD responded on August 2, 2019, to a request for review and response on the proposed project. The agency made several comments regarding General Construction, Bank Stabilization, Federal Law:

MBTA, and State Law: Parks and Wild Code - Chapter 64, Birds. The EA addressed these comments as appropriate. A response letter was submitted to TPWD on September 17, 2019. TPWD has provided no further consultation to date.

Subsequent coordination was conducted with several agencies because of project changes that developed after initial coordination efforts. THC, HCHC, and the six Native American Tribal Nations were contacted because the nature and locations of the proposed improvements are critical factors considered for impacts to cultural resources. Because TPWD recommendations were dependent on the nature and locations of the proposed improvements, this agency was made aware of the project changes in the September 2019 response letter. No further coordination was required for the remaining agencies because the new developments did not affect their original responses and comments.

On September 30, 2019, the THC responded by indicating that the proposed project revisions would have no effect to historic non-archeological properties. Further archeological survey documentation was not submitted to the THC because the proposed revisions occurred entirely within areas previously surveyed for this project. To date, HCHC, TPWD, and the six Native American Tribal Nations have offered no response to the request for review of the project changes.

Documentation of the coordination conducted with these agencies and organizations are included in **Appendix E**.

The City of Pasadena will coordinate with the local floodplain administrator to obtain, and comply with, the required floodplain permit.

In accordance with applicable local, state, and federal regulations, the City will be responsible for acquiring other necessary permits prior to commencing construction of the Proposed Action.

8.0 REFERENCES

- Gould, Frank W. Common Texas Grasses. 1978. Texas A&M University Press, College Station, Texas.
- Hatch, Stephen L., K.N. Gandhi, and Larry E. Brown. Checklist of the Vascular Plants of Texas. July 1990. Texas Agricultural Experimental Station, Texas A&M University, College Station, Texas.
- Little, Elbert L. National Audubon Society Field Guide to Trees, Eastern Region. 1980. Alfred A. Knopf, Inc.
- National Park Service (NPS). National Register of Historic Places online database. Accessed: May 9, 2019. Website address: <http://nrhp.focus.nps.gov/natreghome.do?searchtype=natreghome>.
- Reed, Jr., Porter B. National List of Plant Species that Occur in Wetlands: South Plains (Region 6). May 1988, U.S. Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C.
- Texas Department of Transportation (TxDOT). Historic Bridges of Texas. Accessed: April 11, 2019. Website address: <https://www.arcgis.com/home/webmap/viewer.html?webmap=e55a0c5725644e5badef578db02bee9f&extent=-109.4371,25.5608,-86.8053,37.2641>.
- TxDOT. Historic Districts & Properties of Texas. Accessed: April 11, 2019. Website address: http://maps.dot.state.tx.us/AGO_Template/TxDOT_BasicViewer/?appid=c8fc0a742ec44e0e9da4b009c21eb70c.
- Texas Historical Commission (THC). Texas Archeological Sites Atlas online database (access-restricted). Accessed: May 9, 2019. Website address: <https://atlas.thc.state.tx.us/>.
- THC. Texas Historic Sites Atlas online database. Accessed: May 9, 2019. Website address: <https://atlas.thc.state.tx.us/>.
- Texas Parks and Wildlife Department. Annotated County Lists of Rare Species – Harris County. Updated: July 17, 2019. Website address: <http://tpwd.texas.gov/gis/rtest/>.
- Thieret, John W. (reviser) original authors William A. Niering and Nancy C. Olmstead. National Audubon Society Field Guide to Wildflowers, Eastern Region, Revised Edition. 2001. Alfred A. Knopf, Inc.
- U.S. Army Corps of Engineers. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region to the Corps of Engineers Wetland Delineation Manual – Technical Report Y-87-1 (Version 2.0). Vicksburg, Mississippi. November 2010.
- U.S. Army Corps of Engineers - Regulatory Department. SWG-Standard Operating Procedures (SOP); Recording Jurisdictional Delineations Using Global Positioning Systems (GPS). Galveston District Policy Statement 98-01. Galveston District, Texas. October 2003.
- U.S. Census Bureau (USCB). American FactFinder online database. *2010 Census Summary File 1*. Accessed: May 23, 2019. Website address: <http://factfinder.census.gov>.

- USCB. American FactFinder online database. “DP03: Selected Economic Characteristics”. *2013-2017 American Community Survey 5-Year Estimates*. Accessed: June 4, 2019. Website address: <http://factfinder.census.gov>.
- U.S. Department of Agriculture (USDA), Natural Resources Conservation Service. Web Soil Survey online database. Accessed: April 30, 2019. Website address: <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>.
- USDA, Soil Conservation Service. Soil Survey of Harris County, Texas. 1976.
- U.S. Department of the Interior, U.S. Fish and Wildlife Service. Environmental Conservation Online System – Information for Planning and Consultation (ECOS-IPaC). List of Threatened and Endangered Species. July 30, 2019. Website address: <http://ecos.fws.gov/ipac>.
- U.S. Geological Survey. Texas Gulf Coast Groundwater and Land Subsidence. Accessed: June 10, 2019. Website address: http://txpub.usgs.gov/houston_subsidence/home.

9.0 LIST OF PREPARERS

Amy M. Brook

Senior Associate
Berg♦Oliver Associates, Inc.
Arlington, Texas

William J. Proctor

Project Manager
Berg♦Oliver Associates, Inc.
Houston, Texas

Mary-Claire Graham

Project Coordinator
Berg♦Oliver Associates, Inc.
Houston, Texas

Maria Esther Rodriguez

NEPA Specialist/Senior GIS Analyst
Berg♦Oliver Associates, Inc.
Houston, Texas

Eugene Foster

History Program Manager
Horizon Environmental Services, Inc.
Austin, Texas

Mark Sloop, P.G.

Staff Geologist, P.G. (TX 12157)
Baer Engineering and Environmental Consulting, Inc.
Austin, Texas

Government Reviewers

Kevin Jaynes

Regional Environmental Officer, FEMA
Denton, Texas

Kim Campo-Allen

Environmental Specialist, FEMA
Denton, Texas

Dorothy Weir Cook

Senior Environmental Specialist, FEMA
Denton, Texas