

Draft Environmental Assessment

T.C. Jester Stormwater Detention Basin (K500-23-00-E002)

LPDM-PJ-06-TX-2022-007

Harris County, Texas

November 2024



FEMA

U.S. Department of Homeland Security
Federal Emergency Management Agency
Region 6
Federal Region Center
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Acronyms and Abbreviations

AMM	avoidance and minimization measure
APE	Area of Potential Effects
AREF	amphibian and reptile exclusion fence
AST	alligator snapping turtle
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CDBG-MIT	Community Development Block Grant-Mitigation
CFR	Code of Federal Regulations
CWA	Clean Water Act
dBA	A-weighted decibels
EA	Environmental Assessment
EFH	essential fish habitat
EJ	Environmental Justice
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FFRMS	Federal Flood Risk Management Standard
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
FONSI	finding of no significant impact
GHG	greenhouse gas
GHORBA	Greater Houston Off-Road Biking Association

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HCFC	Harris County Flood Control District
H-GAC	Houston-Galveston Area Council
IPaC	Information for Planning and Consultation
LPDM	Legislative Pre-Disaster Mitigation
MBTA	Migratory Bird Treaty Act
MUD	Municipal Utility District
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Services
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetlands Inventory
OSHA	Occupational Safety and Health Administration
PDM	Pre-Disaster Mitigation
PR&G	Principles, Requirements & Guidelines
RCRA	Resource Conservation and Recovery Act
Regional Drainage Plan	Cypress Creek Watershed and Major Tributaries Regional Drainage Plan
SHPO	State Historic Preservation Office
SWPPP	Stormwater Pollution Prevention Plan
TAC	Texas Administrative Code
TCB	tricolored bat
TCEQ	Texas Commission on Environmental Quality

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TDEM	Texas Division of Emergency Management
THC	Texas Historical Commission
TPWD	Texas Parks and Wildlife Department
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service

SECTION 1. Introduction

The Harris County Flood Control District (HCFCD) submitted a Legislative Pre-Disaster Mitigation (LPDM) grant application to the Federal Emergency Management Agency (FEMA) requesting funding for the T.C. Jester Stormwater Detention Basin project in Harris County, Texas. The Texas Division of Emergency Management (TDEM) is FEMA's Recipient under this program. The PDM Grant Program is authorized under Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act 42 United States Code (U.S.C.) 5133, as amended by the Disaster Recovery Reform Act of 2018. The LPDM funds were made available through Congressionally directed spending in the 2022 Department of Homeland Security Appropriations Act (Pub. L. No. 117-103).

HCFCD proposes to construct two wet-bottom stormwater detention basins in the upper part of the Cypress Creek watershed, north of the Houston metro area (**Figure 1.1**). Basin 1A and Basin 2 would be constructed adjacent to Cypress Creek, southeast of the intersection of T.C. Jester Boulevard and Cypresswood Drive (**Figure 1.2**) at latitude and longitude, respectively, 30.03275, -95.46157. HCFCD is also proposing to construct a third stormwater detention basin (Basin 1B, **Figure 1.2**) directly southwest of Basin 1A with non-FEMA funding, which is a standalone project that is independent from FEMA's proposed project. This third basin would incorporate an existing detention basin, Unit Number K500-15-00, which is immediately east of T.C. Jester Boulevard.

This environmental assessment (EA) was prepared in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations to implement NEPA (40 Code of Federal Regulations [CFR] Parts 1500 through 1508), and FEMA guidance for implementing NEPA (U.S. Department of Homeland Security Instruction 023-01-001 and FEMA Instruction 108-01-1). FEMA is required to evaluate and consider potential environmental impacts before funding or approving actions and projects that are federally funded. The purpose of this EA is to analyze the potential environmental consequences of the proposed project and alternatives, including a No Action alternative. FEMA will use the findings in this EA to determine whether to prepare an environmental impact statement or to issue a finding of no significant impact (FONSI).

1.1. Background

HCFCD is a special purpose district created by the Texas Legislature in 1937 and governed by the Harris County Commissioners Court. It was created in response to devastating floods that struck the region in 1929 and 1935. There are 23 primary watersheds within Harris County's boundaries, and each watershed has its own independent flooding problems. Capital projects reduce flooding risks and damage by expanding channels to create floodplain capacity, constructing new detention basins, or buying out flood-prone homes. Bond funding, federal grants, and local partnerships help finance these projects.

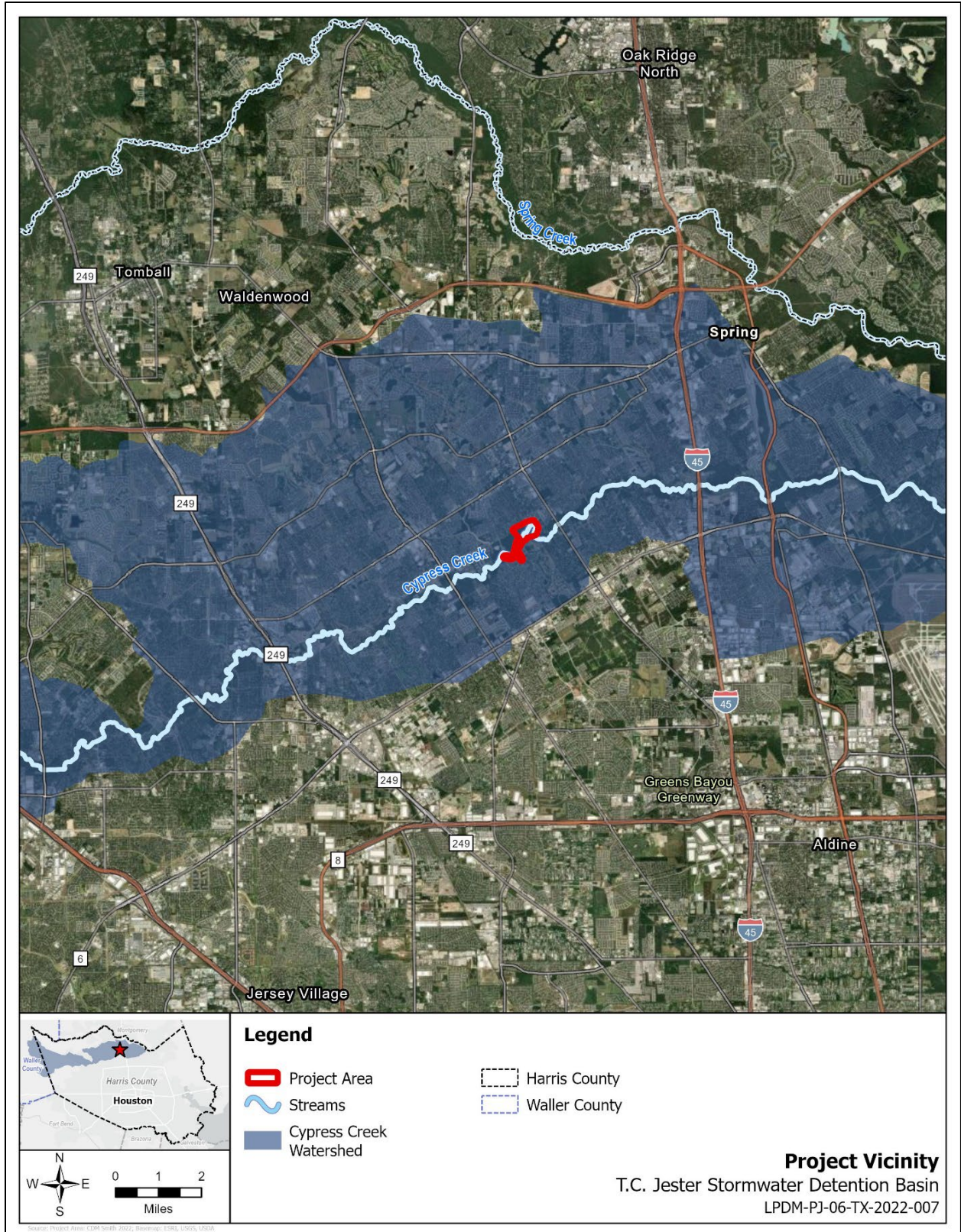


Figure 1.1. Project Vicinity

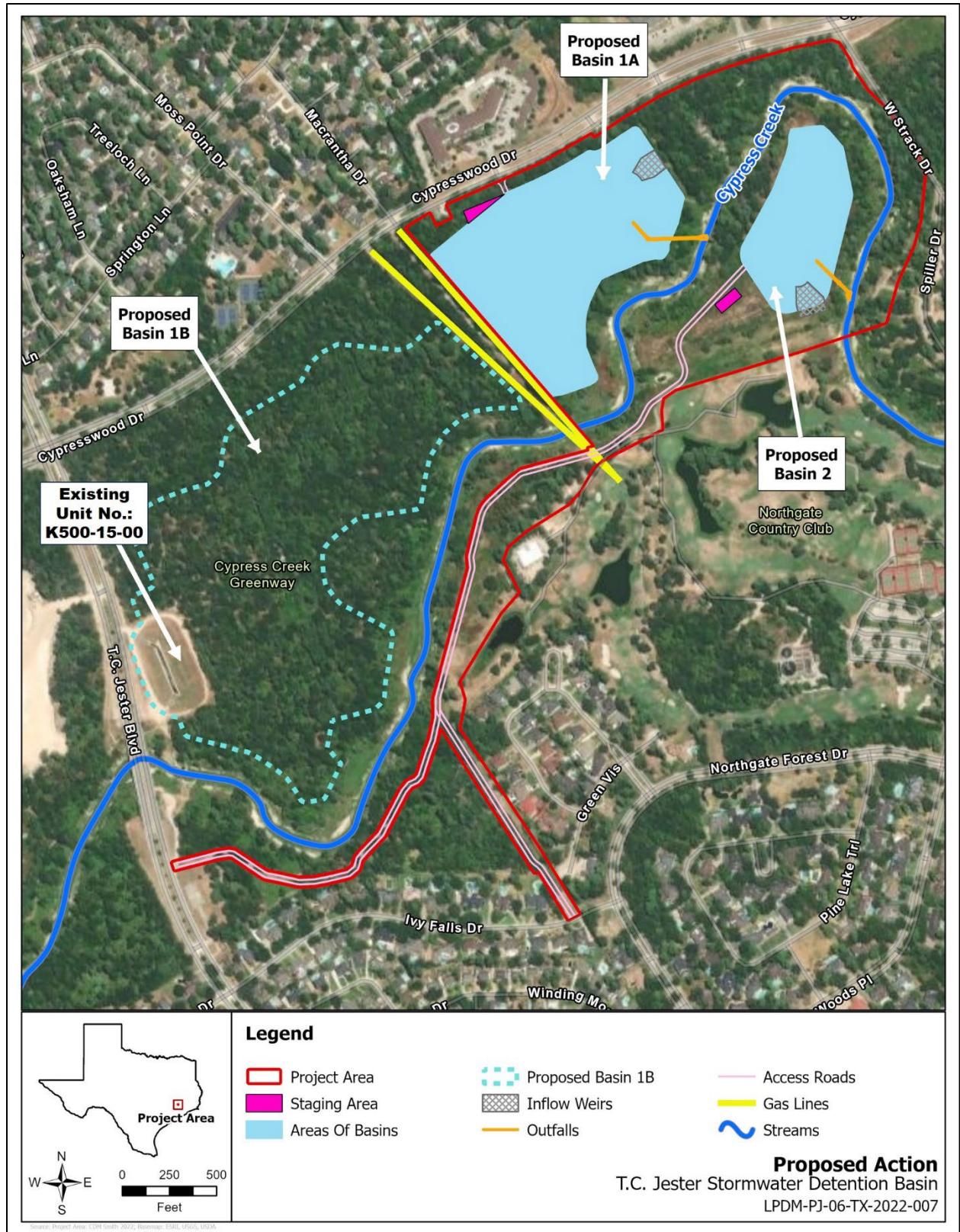


Figure 1.2. Project Area

The proposed T.C. Jester Stormwater Detention Basin project area is in the Cypress Creek watershed in Harris County, Texas (**Figure 1.1**). The Cypress Creek Watershed Major Tributaries Regional Drainage Plan Update Cypress Creek Report (HCFCD 2020) (Regional Drainage Plan), a study that looked holistically at the watershed, found that flooding along tributaries of Cypress Creek is predominately caused by stormwater raising the levels of the creek, and backing up into tributaries, rather than a lack of sufficient stormwater conveyance or drainage capacity on the tributaries themselves. The study recommended that nearly 26,500 acre-feet of additional stormwater detention be constructed and concluded that a series of regularly spaced detention basins along the main stem of Cypress Creek could provide the storage volumes needed to reduce flooding in the watershed. The Cypress Creek Program Implementation Plan (HCFCD 2021a) (Implementation Plan), a study based on the Regional Drainage Plan findings, identified 22 potential stormwater detention basin sites in 11 different areas along Cypress Creek that could hold up to 14,200 acre-feet of excess stormwater to reduce the backwater issue and meet the flood risk reduction targets (HCFCD 2022a).

The proposed project area is southeast of the intersection of T.C. Jester Boulevard and Cypresswood Drive along the banks of the main stem of Cypress Creek, approximately 20 miles north of downtown Houston. The project area consists of approximately 25 acres along the northern bank of the creek for Basin 1A and approximately 20 acres south of Cypress Creek for Basin 2 (**Figure 1.2**). The project area includes both a temporary section of access road as well as a permanent section of new road that would be located adjacent to the south bank of the creek.

In addition, a Principles, Requirements, and Guidelines (PR&G) for Federal Investments in Water Resources analysis was required and performed for this project. The EA includes the information reviewed under the analysis. The PR&G applies to federal investments that by purpose, directly or indirectly, alter water resources by affecting water quality or quantity, and have at least \$10 million in project costs. These water resources projects include projects involving navigation, flood control, water supply, hydropower, ecosystem restoration, or recreation. The PR&G is intended to provide a framework for federal agencies to evaluate proposed water resources projects that balances consideration of economic, social, and environmental objectives. FEMA Instruction 108-1-1 provides FEMA's PR&G Agency-Specific Procedures.

SECTION 2. Purpose and Need

The objective of FEMA's PDM Grant Program is to make federal funds available to eligible state, local, tribal and territorial entities to implement sustainable cost-effective measures designed to reduce the risk to individuals and property from future natural hazards, while also reducing reliance on federal funding from future disasters. The purpose of the Proposed Action is to reduce flood hazards along the main stem of Cypress Creek within the T.C. Jester area.

Because of its topography, the T.C. Jester area is prone to inland flooding. During the storm events of Hurricane Harvey in 2017, Hurricane Ike in 2008, and Tropical Storm Allison in 2001, the surrounding communities sustained devastating damage due to heavy rainfall (HCFCD 2022a). When storm intensity and size increase, the volume of rainfall within a short period of time increases over larger and larger areas, which subsequently increases local flooding within the Cypress Creek watershed. There is a need to reduce the downstream impact of rainfall associated with storm events as well as to minimize localized flooding. Over the past 20 years, flooding has significantly impacted residential and commercial properties and structures in the Cypress Creek watershed. Based on recent hydrologic and hydraulic modeling results, approximately 5,026 acres of land in the watershed would flood during the 5-year storm event and approximately 17,447 acres of land would flood during a 100-year storm event (HCFCD 2022a).

SECTION 3. Alternatives

This section describes the No Action alternative, the Proposed Action, and alternatives that were considered but dismissed from further evaluation in this EA. Alternatives are evaluated for their ability to address the purpose and need, hazard mitigation goals (i.e., does the Proposed Action mitigate flooding impacts), engineering constraints (i.e., is the Proposed Action feasible to construct), and environmental, economic, cultural, and social goals of the PR&G analysis. Under the PR&G, in addition to meeting purpose and need, alternatives for water resource projects also must be evaluated for their ability to achieve the Federal Objective and to conform to the guiding principles as described in Section 4.1, Principles, Requirements and Guidelines.

3.1. No Action Alternative

Under the No Action alternative, there would be no FEMA funding for the construction of two stormwater detention basins near the intersection of T.C. Jester Boulevard and Cypresswood Drive. Without the new stormwater detention, there would be no change to the flood elevations along Cypress Creek. Flooding within the surrounding residential neighborhood and commercial properties along Cypress Creek and its tributaries would continue, resulting in repetitive damage to property and infrastructure, and public health and safety would continue to be at risk. In addition, the intensity and frequency of storms is increasing and severe rain events that result in flooding are also expected to increase in frequency and intensity, which would lead to more prolonged and damaging floods in the vicinity under the No Action alternative.

3.2. Proposed Action

Under the Proposed Action, HCFCD would construct two stormwater detention basins adjacent to the main stem of Cypress Creek, on land owned by HCFCD. The project would comprise two wet-bottom basins, referred to as Basin 1A and Basin 2 (**Figure 1.2**). A wet-bottom basin is designed to contain a permanent pool of water throughout the year that can support the growth of aquatic vegetation (HCFCD 2014) (**Figure 3.1**). The Proposed Action would require tree and vegetation removal and grading within the footprints of the basins. A third basin, adjacent to Basin 1A and identified as Basin 1B (**Figure 1.2**), is part of the Regional Drainage Plan, but it is not funded under the Proposed Action as it is expected to be funded by state community directed funding under the Community Development Block Grant-Mitigation (CDBG-MIT) funding (HCFCD. 2024). Basin 1B is considered under cumulative effects in this EA.

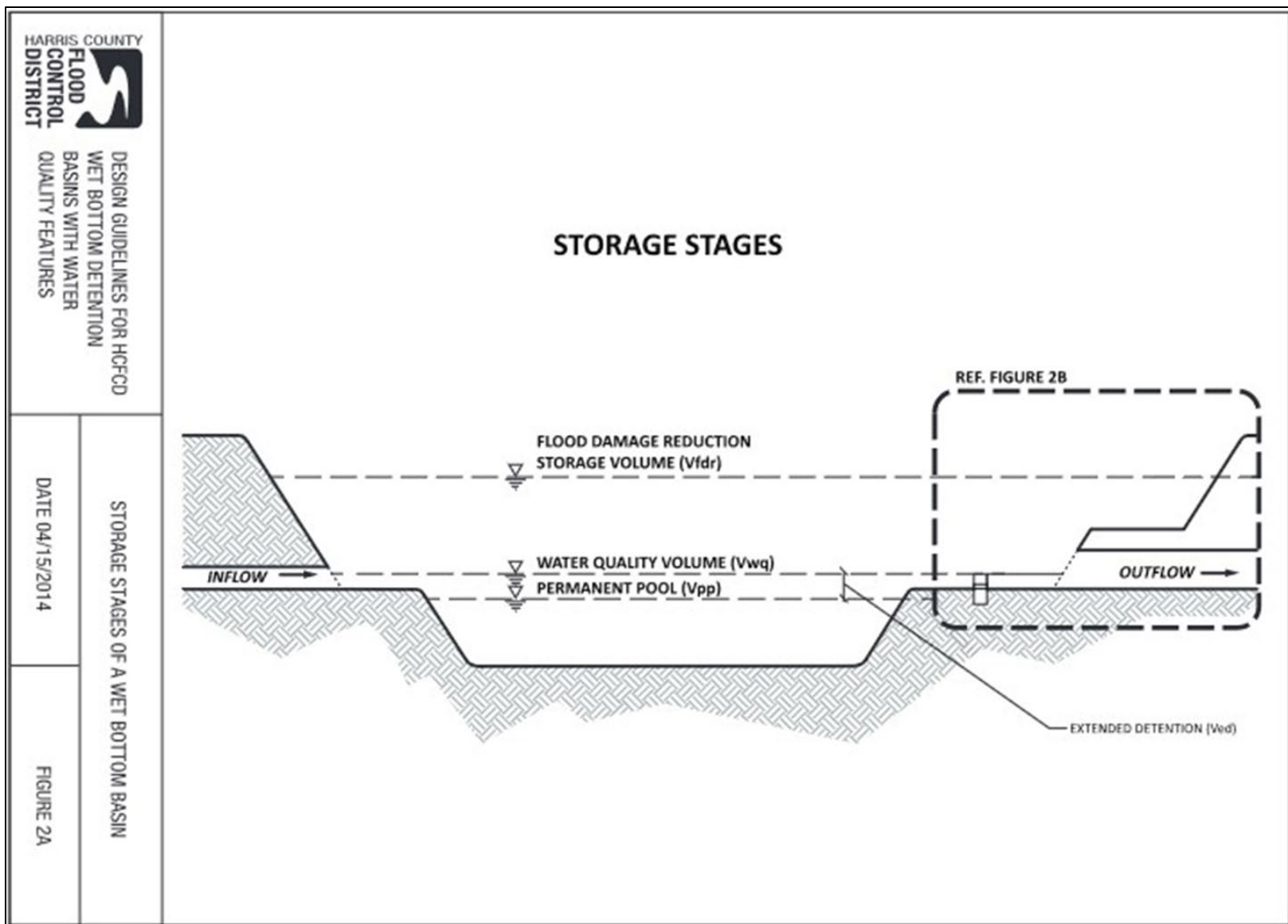


Figure 3.1. Stormwater Storage Stages of a Wet-Bottom Basin

Source: HCFCO 2014

Detention Basins 1A and 2 would be constructed by excavating soil to achieve the proposed depth and side slope configuration. The excavated soil would be used to construct the berm around the outer perimeter of the basins. The project footprint would be approximately 68 acres and would have a stormwater storage capacity of approximately 208.6 acre-feet (HCFCD 2021b). The Proposed Action would provide approximately 0.44 feet of flood reduction during the 10-year storm event, and a maximum reduction of approximately 0.35 feet during the 100-year event (HCFCD 2021b). The basins would be constructed in accordance with the Design Guidelines for HCFCD Wet-Bottom Detention Basins with Water Quality Features (HCFCD 2014). The berm around each basin would be approximately 30 feet wide and would be used for maintenance access. A 30-foot-wide accessible bottom shelf would be constructed approximately 2 feet above the permanent pool elevation within the basins. The basin would be vegetated with grasses and aquatic plants. Existing trees and vegetation would be preserved within the 160-foot-wide forested buffer zone between the basin disturbance areas and Cypress Creek. An approximate 50-foot-wide vegetation buffer would be maintained between Basin 1A and an existing sanitary sewer line that parallels Cypresswood Drive. Construction is anticipated to take approximately 2 years to complete. Construction equipment would include large and medium excavators, backhoes, skid steers, dozers, roll-backs, dump trucks, gooseneck trailers, and cement mixers.

Basin 1A, which would be on the north side of the creek parallel to Cypresswood Drive, would provide approximately 119 acre-feet of storage with an approximate depth of 17.1 to 25 feet. Basin 2, on the south side of the creek, adjacent to the Northgate Forest Golf Club and within a tight bend of the creek, would have approximately 87 acre-feet of water storage at an approximate depth of 19.5 to 35 feet. Both basins would have a 100-foot-wide inflow weir with a maximum 4:1 side slope. Basin 1A would have a 48-inch-diameter reinforced concrete pipe outfall to the creek and Basin 2 would have a 36-inch diameter high-density polyethylene outfall pipe (**Figure 1.2** and **Figure 3.1**). Both outfalls would have riprap erosion protection installed with topsoil placed over the riprap within the grass-lined channels. The construction entrance for Basin 1A would be located at Cypresswood Drive and the construction entrance for Basin 2 would be temporarily located at T.C. Jester Boulevard until project completion. Construction access entrances would be stabilized with granular fill over a geotextile layer and would have a maximum width of 50 feet.

There is an existing maintenance road that extends northwest within an existing storm sewer easement toward Cypress Creek that is approximately 1,343 feet long (**Figure 1.2**). A new temporary access road for the construction of Basin 2, approximately 1,627 feet long, would be installed along the south bank of Cypress Creek until it intersects with the existing maintenance road. From the intersection of these two access roads, a new permanent access road would be constructed to Basin 2 that would be approximately 2,732 feet long. The entrance to the temporary access route would be at T.C. Jester Boulevard, and following the bends of the creek, it would connect with the head of the existing permanent maintenance road, and then continue northeast beside the golf course toward the proposed Basin 2 as a permanent maintenance access corridor. Construction of the temporary portion of the access road would include the cutting of some trees to the ground but would not include removal of the root balls. A top layer of aggregate would be applied to serve as a temporary driving surface. The area would be restored upon completion of the project, including the

removal of as much aggregate as practicable and revegetation along the route. HCFCD would conduct ongoing maintenance of both basins in accordance with their current maintenance policies and practices.

3.3. Additional Action Alternatives Considered and Dismissed

In the Preliminary Engineering Report for the T.C. Jester Stormwater Detention Basin proposal, two additional detention basin alternatives were considered but dismissed—Alternative 1 and Alternative 3 (HCFCD 2021b). Alternative 1 would have had two basins similar to the Proposed Action (called Alternative 2 in the Preliminary Engineering Report), identified as Basin 1 and Basin 2. This configuration would provide 1,070 acre-feet of storage and maintain a 160-foot vegetated buffer between Basin 1 and Cypress Creek. Basin 1 would be larger and constructed in approximately the same location as the combined area of the proposed Basin 1A and Basin 1B. The basin under this alternative would have side slope, depth, and weir configurations similar to those described under the Proposed Action for Basin 1A. This alternative would be constructed over an existing wetland, and thus would have a larger environmental impact, which would be avoided with the Proposed Action design. Alternative 1 would also require the relocation of two existing gas pipelines to obtain the higher storage capacity, which would have greater impacts on the public utilities and services than the Proposed Action. Basin 2 under Alternative 1 would use the same configuration and approximate location as Basin 2 under the Proposed Action, except with a smaller buffer of 100 feet from the creek. Alternative 1 was dismissed from further consideration because of the greater environmental impacts, more complex permitting requirements that would necessitate an individual permit from the U.S. Army Corps of Engineers (USACE), and disruption of public services from the relocation of the pipeline. It was determined not to be cost effective.

Under Alternative 3, Basin 1 would be in approximately the same location as the proposed Basin 1B and would end at the existing gas pipelines. The configuration would not include the area encompassed by the proposed Basin 1A. Alternative 3 would be smaller with a design that would provide 636 acre-feet of storage and a 160-foot vegetation buffer between Basin 1 and Cypress Creek. This proposal would have side slope, depth, and weir configurations similar to those described under the Proposed Action and Alternative 1. Basin 2 would use the same configuration and approximate location as Basin 2 under the Proposed Action and Alternative 1. Alternative 3 would avoid disturbing the gas pipelines; however, it would provide less flood hazard reduction in comparison to the Proposed Action and Alternative 1. Alternative 3 was dismissed from further consideration because it was determined not to provide sufficient flood risk reduction and to have the lowest benefit-to-cost ratio.

SECTION 4. Environmental Services and Trends

4.1. PR&G Principles

Under the PR&G, in addition to meeting the purpose and need, alternatives for water resource projects also must be evaluated against their ability to achieve the Federal Objective and to conform to the guiding principles. The Federal Objective specifies that federal water resources investments must reflect national priorities, encourage economic development, and protect the environment by:

1. Seeking to maximize the sustainable economic development;
2. Seeking to avoid the unwise use of floodplain and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and
3. Protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

The PR&G guiding principles builds on six concepts to promote federal investments in water resources. These guiding principles are Healthy and Resilient Ecosystems, Sustainable Economic Development, Floodplains, Public Safety, Environmental Justice, and Watershed Approach. The guiding principles are key concepts that the potential consequences of the alternatives are evaluated against and are often framed in terms of ecosystem services that may be provided or affected by a project. This section provides the watershed context and model of ecosystem services potentially provided in the project area. **Table 5.8** shows a comparison of the alternatives against the guiding principles.

4.1.1. WATERSHED CONTEXT AND TRENDS

The Cypress Creek watershed (K100-00-00) is situated primarily in northwest Harris County and extends westward into Waller County (**Figure 1.1**). It is the largest watershed in Harris County, covering 267 square miles with 250 miles of open waterways, including Cypress Creek and its major tributaries (HCFCD 2021b). The Implementation Plan (HCFCD 2021a) recommended 23 stormwater detention basin sites within the Cypress Creek watershed. Thirteen of those projects have funding allocated under a 2018 Bond initiative that includes maintenance projects, channel improvements, stormwater detention basins, and right-of-way acquisitions and buyouts.

The Implementation Plan is based on the analysis completed in the Cypress Creek Watershed and Major Tributaries Regional Drainage Plan (HCFCD 2020). The Regional Drainage Plan found that flooding along tributaries of Cypress Creek is caused predominately by stormwater from a rising Cypress Creek backing up into tributaries, rather than a lack of sufficient stormwater conveyance or drainage capacity on the tributaries themselves. The proposed stormwater detention basins along the Cypress Creek channel are expected to be more effective than other types of structural approaches to flood risk reduction in the watershed because the tributary watersheds that feed into Cypress Creek are, for the most part, developed with no room for large regional detention basins. It was determined that the proposed project would provide flood risk reduction both along the Cypress

Creek area where the basins are located and upstream in its tributaries by reducing water levels during a storm event. Flood data analysis based on existing conditions that were identified in the Implementation Plan indicates that more than 16,000 structures are prone to flooding during a 100-year flood event within the watershed.

The Regional Drainage Plan identified that if current development trends continue, the surrounding areas would likely see continued growth of residential small lot and high-density land uses as undeveloped land is built up. Further development in the sub-watersheds would increase impervious cover and lead to further flood impacts, unless flood management strategies are implemented.

Because of climate change, heavy rainfall events in the project area are projected to become more severe. Climate change refers to changes in the Earth's climate caused by a general warming of the atmosphere. Its primary cause is emissions of greenhouse gases (GHG), including carbon dioxide and methane. Climate change affects species distribution, temperature fluctuations, and weather patterns. Warmer temperatures are resulting in higher ocean temperatures in the Gulf of Mexico, which supports more frequent severe storms that bring heavy rainfall to coastal areas such as Harris County, which can lead to increased frequency and severity of flooding along Cypress Creek (Environmental Protection Agency [EPA] 2016b).

4.1.2. CONCEPTUAL MODEL FOR ECOSYSTEM SERVICES

The ecosystem services conceptual model for the PR&G principles shows how the changes to ecological conditions due to the Proposed Action would affect the provision of ecosystem services and their linked societal benefits. In an ecosystem services assessment, conceptual diagram provides a systematic approach to connect ecological conditions to societal benefits. It also considers how and which changes in the environment affect benefits to people. When causal connections to people are not made explicit, it is unclear whether and how each ecological change would result in changes to social benefits, and important changes to societal benefits may be left out of the analysis.

Figure 4.1 shows the model for the T.C. Jester Stormwater Detention Basin project. The model—also known as a causal chain—links changes caused by an external stressor or intervention (i.e., construction of the detention basins) through the ecological system to socioeconomic and human well-being outcomes. The conceptual model provides a visual representation of cause and effect but does not indicate the direction of the effect or the change (e.g., increase or decrease). Larger boxes emphasize more integral or stronger connections in the model. The model for the Proposed Action considers the expected outcomes from the effects of constructing stormwater retention basins to reduce flood impacts.

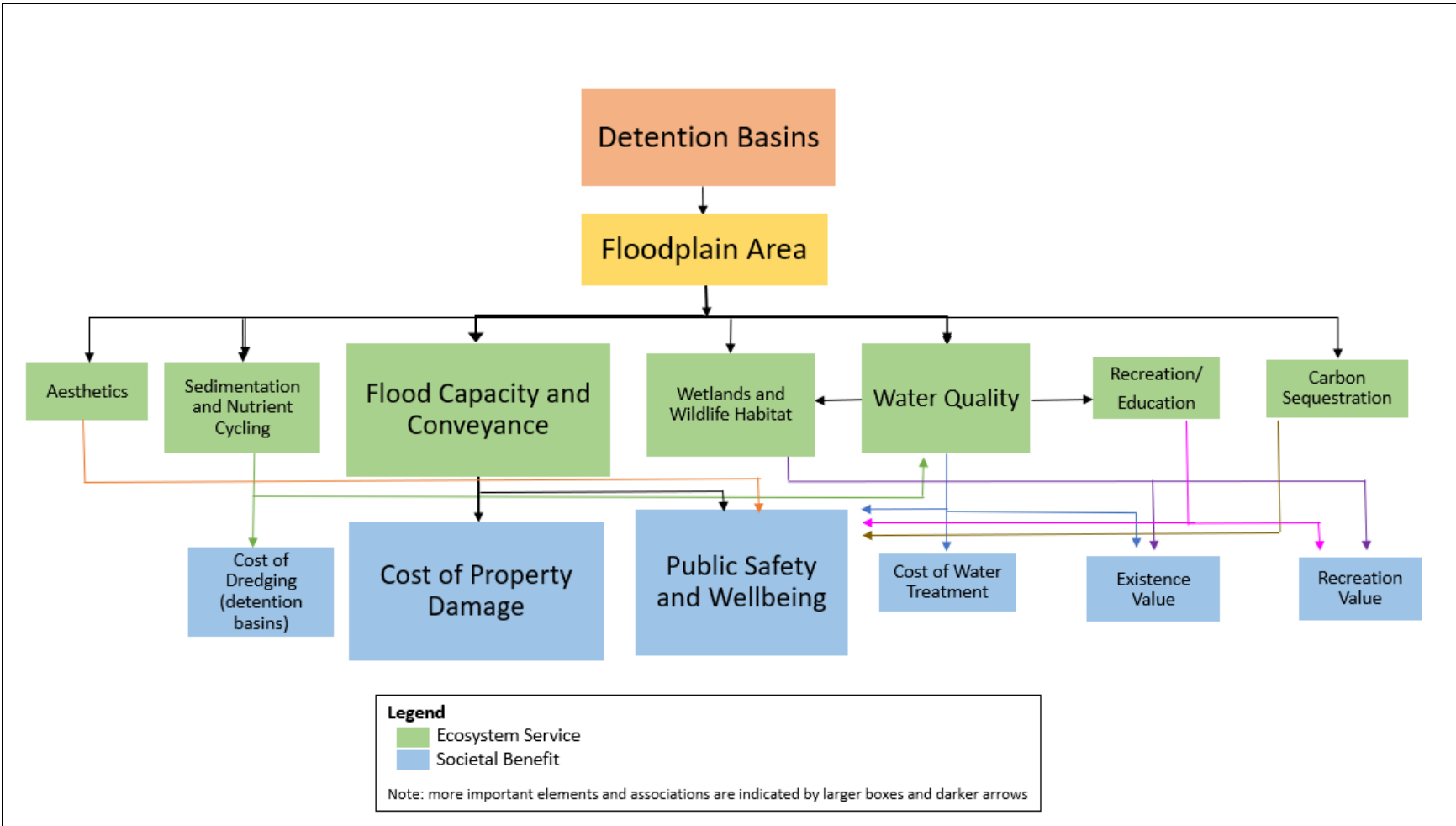


Figure 4.1. Conceptual Model for Flood Events

The conceptual model for the Proposed Action was developed by first considering how the Proposed Action would affect the ecological conditions of the project area. Next, these anticipated changes in ecological conditions were considered as to whether and how they would change the delivery of ecosystem services currently provided in the project area, and how changes in the delivery of ecosystem services could affect benefits or costs to individuals or groups in the project area and the larger watershed (FEMA 2018).

As shown in the conceptual model (**Figure 4.1**), the Proposed Action would change ecological conditions by changing the floodplain area and depths of flooding downstream of the project area. Stormwater detention basins collect stormwater and hold it in a concentrated area. The water then is metered out slowly such that the capacity of the creek channel is not exceeded, reducing the potential for flooding downstream. Alteration of the floodplain area would affect floodplain functions to varying degrees. Each of those floodplain functions contributes to one or more societal benefits. As the change in floodplain area alters the floodplain functions, the corresponding societal benefits are impacted to a greater or lesser degree and effects may be positive or negative. The model provides a conceptual visualization of the connections and the magnitude of the potential changes but does not indicate whether changes would be considered beneficial or adverse. **Section 5** provides detailed potential effects. The model does show that the societal functions most likely to be affected by the proposed basins are those most closely aligned with the purpose and need for the Proposed Action, such as public safety and property damage.

Construction of stormwater retention basins (the Proposed Action) would clearly meet the purpose and need by reducing flooding in the T.C. Jester area and in the Cypress Creek watershed, resulting in positive impacts on the community by reducing flood risk and the associated insurance costs, property damage costs, and risks to public health and safety. Therefore, the Proposed Action meets the PR&G federal objectives and follows the guiding principles. The Proposed Action was determined to be the best alternative to meet the purpose and need in the T.C. Jester area.

The aesthetic aspect of the conceptual model is a qualitative analysis that considers the visual context of the project area, potential for changes in character and contrast, an assessment of whether the project area includes any places or features designated for protection, the number of people who can view the site and their activities, and the extent to which those activities are related to the aesthetic qualities of the area. The existing visual quality of the project area is a densely forested section of land along the Cypress Creek, with two neighborhoods that back up to the north and south boundaries and a forested buffer to the east and west. Since the Proposed Action would have a 160-foot-wide forested buffer between the basins, the creek and back of the adjacent neighborhood on the south and an approximate 50-foot-wide vegetation buffer between Basin 1A and the existing sanitary sewer line that parallels Cypresswood Drive on the north, the aesthetic quality of the project area would be maintained.

4.1.3. ECOSYSTEM SERVICES

The FEMA PR&G Agency-Specific Procedures require that impacts of the Proposed Action be analyzed using an ecosystem services approach. Ecosystem services are benefits that flow from

nature to people. These services include direct and indirect contributions, including economic and social effects, that ecosystems make to the environment and human population. Ecosystem services are categorized into the following three general types:

1. Provisioning services, which refer to the food, fuel, fiber, and clean water that ecosystems provide
2. Regulating services, which refer to the benefits obtained from the regulation of ecosystem processes
3. Cultural services, which refer to the benefits ecosystems confer that do not directly relate to human physical health or material well-being

Ecosystem services that were analyzed for the Proposed Action include:

- Flood capacity and conveyance would be improved by increasing the area available for storage of floodwaters and allowing management of flood flows in Cypress Creek. Improved flood capacity and conveyance would reduce degradation of wildlife habitat by reducing erosive flows in Cypress Creek.
- Water quality in Cypress Creek would be improved by reducing the mobilization of pollutants from flooding in the urban environment. Improved water quality would benefit wildlife habitat, public health, and recreational uses.
- Some wetland areas would be converted to managed detention basins with an associated loss of wetland functions. The wet-bottom detention basins would provide some water quality treatment and wetland habitat functions. Restored habitat on the sides of the detention basins will offset habitat loss.
- Sedimentation in Cypress Creek would be reduced as floodwaters carrying sediments would be detained in the basins and erosive flows would be slowed. Excess nutrients in urban stormwater runoff would be reduced because nutrients would be captured by the basins and not carried downstream.
- Recreation and education opportunities would likely not change in the floodplain area.
- Aesthetics in the floodplain area would change because woodland habitat would be converted to detention basins. Aesthetics in Cypress Creek may improve as water quality is improved, sedimentation is reduced, and wildlife habitat is protected from erosive flows.
- Carbon sequestration could change because trees that store carbon would be converted to vegetated detention basins that store carbon.

4.1.4. SOCIETAL BENEFITS AND COSTS

- Cost of property damage in the project area would be reduced with a lower flood risk because of the improved flood capacity in the basins.
- Public safety and well-being of nearby residents would be improved with reduced flooding. Public well-being would benefit from improvements in water quality and wildlife habitat.

Environmental Services and Trends

- Changes in aesthetics and carbon sequestration could have minor effects on public well-being if the change from woodlands to detention basins is considered adverse.
- Maintenance costs would increase because of the required dredging of the detention basins.

SECTION 5. Affected Environment, Potential Impacts, and Mitigation

5.1. Methodology

This section describes the environment potentially affected by the alternatives, evaluates potential environmental impacts, and recommends measures to avoid or reduce those impacts. When possible, quantitative information is provided to establish potential impacts, and the significance of potential impacts is evaluated qualitatively based on the criteria listed in **Table 5.1**. The study area generally includes the project area along with the access and staging areas needed for the Proposed Action. If the study area for a particular resource category is different from the project area, the differences are described in the appropriate subsection.

Table 5.1. Evaluation Criteria for Potential Impacts

Impact Scale	Criteria
None/Negligible	The resource area would not be affected, or changes or benefits would be either nondetectable or, if detected, would have effects that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, though the changes would be small and localized. Impacts or benefits would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and have either localized or regional-scale impacts/benefits. Impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures would be necessary, and the measures would reduce any potential adverse effects.
Major	Changes would be readily measurable and would have substantial consequences on a local or regional level. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

5.2. Resources Not Affected and Not Considered Further

The following resources would not be affected by either the No Action alternative or the Proposed Action because they do not exist in the project area, or the alternatives would have no effect on the resource (**Table 5.2**). These resources have been removed from further consideration in this EA.

Affected Environment, Potential Impacts, and Mitigation

Table 5.2. Resources Eliminated from Further Consideration

Resource Topic	Reason for Elimination
Designated Farmland Soils (Farmland Protection Policy Act)	The project area is in an urbanized and developed area and does not contain farmland. No conversion of farmland would occur according to Title 7, CFR, Part 658.2(a).
Wild and Scenic Rivers Act	The closest wild and scenic river is the Saline Bayou in Louisiana, approximately 207 miles to the northwest. The alternatives would have no effect on a wild and scenic river.
Sole Source Aquifers	According to the U.S. Environmental Protection Agency's (EPA) Map of Sole Source Aquifer mapper, the project area is not above a sole source aquifer; therefore, the alternatives would have no effect on a sole source aquifer.
Land Use and Zoning	HCFCFCD already owns the project area for flood control purposes as part of the larger Cypress Creek Watershed Program. The alternatives would not alter the land use.
Coastal Resources	This project area is not in the Coastal Zone Boundary designated by the State of Texas (Texas General Land Office n.d.) or within a Coastal Barrier Resources Unit (U.S. Fish and Wildlife Service [USFWS] 2019).
Essential Fish Habitat	Species managed by the National Marine Fisheries Service do not occur in the project area.

5.3. Soils and Topography

A geotechnical investigation was conducted that included field exploration of the project area, soil borings to collect samples, laboratory testing, slope stability analyses, and recommendations for further study and development of the basins (HCFCFCD 2021b).

The project area is mapped within the Middle Pleistocene-age Lissie Formation, which generally comprises alluvial deposits of clay, silt, sand, and a minor amount of siliceous gravel. The topography of the project area is flat with steep banks in some areas along the creek. The elevation of the project area ranges from approximately 100 feet above sea level along the top of the Cypress Creek bank to approximately 110 feet at higher spots within the project area (HCFCFCD 2021b).

Based on the Natural Resources Conservation Service (NRCS) Web Soil Survey of the project area, the site contains mapped soil units of Bissonnet loam (BisA) 0 to 1 percent slopes on 71.3 percent of the site area, Hatliff-Pluck-Klan complex (HatA) 0 to 1 percent slopes on 25.4 percent of the site area, and Splendora-Urban land complex (SpmA) 0 to 2 percent slopes on 3.2 percent of the site area (U.S. Department of Agriculture NRCS 2022). Soil types consist of silts and sands and clays of low to moderate plasticity (HCFCFCD 2021b). Part of the project area is on the depositional side of a meander of Cypress Creek, which influences the stratigraphy of the soils. Project area soils consist of alluvial soils alternating with strata of cohesive and non-cohesive soils that include clays, silts, and sand, which are subject to erosion. Groundwater depths range from about 35 feet below the ground surface at some boring locations to approximately 8.5 to 20 feet below ground surface. Fluctuations

Affected Environment, Potential Impacts, and Mitigation

in groundwater levels are expected and largely dependent on precipitation and surface water elevation changes in Cypress Creek throughout the year (HCFCFCD 2021b).

5.3.1. NO ACTION ALTERNATIVE

Under the No Action alternative, stormwater detention basins would not be constructed. While there would be no construction-related short-term impact on topography, geology, or soils in the project area, the risk of flooding would not be reduced. Flooding would not be expected to alter topography because of the gentle slopes in the area. During flood and storm events, erosion would continue to occur in areas consisting of clays, silts, and sands, which could result in soil loss and sediment deposition to other areas.

Therefore, the No Action alternative would have a minor, long-term, adverse effect on soils in the project area and the vicinity.

5.3.2. PROPOSED ACTION

The Proposed Action would change the topography in the project area by constructing two large depressions below the existing ground surface and building up the top elevation of the berms surrounding the new basins. Construction of the basins would require a maximum excavation depth between approximately 25 and 35 feet below the existing ground surface. The bottom elevation of Basin 1A would be approximately 70.2 feet above sea level; the static pool elevation would be approximately 76.2 feet above sea level; and the top of the berm would vary between approximately 94- and 98-feet above sea level. The bottom elevation of Basin 2 would be approximately 67 feet above sea level; the static pool elevation would be approximately 75 feet above sea level; and the top of the berm would vary between approximately 94- and 100-feet above sea level.

The Proposed Action would require excavation and soil disturbance to construct the basins, which could result in erosion of exposed soils during rain and wind events. Excavated soils would be classified as topsoil, natural cohesive soils, or granular soils. Each type of soil would be stockpiled separately and reused as fill where feasible. Soil exposed during construction and soil stockpiles would be subject to erosion during storm events and high winds. Wet sands and silts (non-cohesive soils) likely would be encountered at the bottom of the basin at some locations, which may require over-excavation of the wet soils and filling of these areas with clay or sodium bentonite fill, or installation of a sheet pile system to prevent slope failure due to seepage from Cypress Creek. A Stormwater Pollution Prevention Plan (SWPPP) describing erosion and sediment control best management practices (BMPs) would be implemented during construction, which is in compliance with a Clean Water Act (CWA) Section 402 National Pollutant Discharge Elimination System (NPDES) Construction General Permit for Texas. These BMPs would include silt fencing and other sediment runoff and wind controls. Areas temporarily disturbed during construction would be stabilized once construction is completed to prevent erosion. The project will result in a minor short-term impact but there will be no long-term adverse impact on topography.

Excavated soils that cannot be reused on-site would be removed and reused or disposed off-site in accordance with applicable regulations. The Proposed Action would result in a minor short-term

impact on soils because of erosion; however, temporary BMPs for erosion and sediment control would be implemented to minimize impacts. Reusable excavated soil would be used to construct an earthen maintenance access berm around the outer perimeter of the basins, and excavated sandy soils would be placed to a minimum depth of 12 inches, where feasible, on each detention basin's side slopes to serve as potential nesting habitat for the female alligator snapping turtle (AST). The bottoms of the detention basins would be permanently inundated with a wet-bottom design, ranging in depth from 6 inches to 6 feet deep. Native aquatic vegetation would be planted on the shallow shelves around the edge to provide stormwater-quality treatment of runoff while also functioning as aquatic nursery habitat; thus, detention basins would not have sandy soils placed in them because of the requirements of these features. The riprap-lined detention basin inflow weirs at the top of bank maintenance berm and permanent all-weather access ramps and roads leading into each detention basin would not have sandy soil placed on them because of the requirements of these features serving as erosion protection and access for maintenance. The temporary access road for construction would be restored with sandy soils and revegetated.

During operation of the basins, there would be the potential for seepage and erosion between the basins and the creek channel, which could lead to failure of the detention basin slopes. The berms for both basins would be 30 feet wide, and a uniform 160-foot-wide forested buffer zone would be retained between Cypress Creek and each basin. The finished side slopes of the basins would be variable to a maximum slope of 4:1 horizontal to vertical. The static pool elevation could fluctuate during operation because of drought or other circumstances affecting the Cypress Creek surface water elevation, decreasing slope stability on the lower slopes (HCFCD 2021b). Slope stability of the basins would be monitored regularly to identify areas of instability and erosion in need of maintenance. Therefore, there would be a minor impact on the slope stability and erosion of the basin and berm during operations.

The project would result in minor short-term impacts on soils and no adverse long-term impacts. The operation of the new basins would reduce erosion and sediment deposition within the creek providing long-term beneficial impacts.

5.4. Air Quality

The Clean Air Act, as amended, requires EPA to establish National Ambient Air Quality Standards (NAAQS) for six pollutants harmful to human and environmental health, including ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, lead, and particulate matter (including particulate matter that is less than 10 micrometers in diameter and fine particulate matter less than 2.5 micrometers in diameter). Fugitive dust, which is considered a component of particulate matter, also can affect air quality. Fugitive dust is released into the air by wind or human activities, such as construction, and can have human and environmental health impacts. Federally funded actions in nonattainment and maintenance areas for these pollutants are subject to conformity regulations (40 CFR Parts 51 and 93) to ensure that emissions of air pollutants from planned federally funded activities would not cause any violations of the NAAQS, increase the frequency or severity of NAAQS violations, or delay timely attainment of the NAAQS or any interim milestone.

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A general conformity determination is required for each criteria pollutant or precursor for which a county is listed as in nonattainment or maintenance. Specifically, areas where the Proposed Action's direct and indirect emissions have the potential to emit one or more of the six criteria pollutants at rates equal to or exceeding the prescribed de minimis rates for that pollutant would require a conformity determination.

According to EPA's Green Book, Harris County is classified as a serious nonattainment area for 8-hour ozone under the 2008 rule and a marginal nonattainment area for 8-hour ozone under the 2015 rule. Harris County is in attainment for all other criteria pollutants (EPA 2022a).

5.4.1. NO ACTION ALTERNATIVE

Under the No Action alternative, there would be no construction-related short-term impacts on air quality within the project area. However, flood events would continue to result in flood-related damage to residential and commercial properties near the project. Therefore, there would be a periodic negligible and temporary impact on air quality from vehicle and equipment emissions resulting from equipment used for flood-related repairs stemming from future storm events. There would be no long-term impact on air quality because no new permanent source of air emissions would be created.

5.4.2. PROPOSED ACTION

Under the Proposed Action, the use of construction equipment and vehicles would result in the short-term release of air pollutant emissions. Construction of the Proposed Action would require the use of two backhoes, three large excavators and four medium excavators, five dump trucks, four skid-steer loaders, three dozers, four roll-backs, and three cement mixers. Emissions from on-site construction equipment, on-road construction-related vehicles, and dust-generating construction activities have the potential to affect short-term air quality. Heavy equipment and earth-moving machinery could temporarily increase the levels of some pollutants, including carbon monoxide, volatile organic compounds, nitrogen dioxide, ozone, and particulate matter. The Proposed Action would take approximately 18 months to construct; therefore, vehicle and equipment use in the project area would be temporary and localized. Temporary impacts on air quality would be reduced through the implementation of BMPs. Vehicles and equipment running times would be kept as short as possible, and areas of exposed soil would be covered or wetted to reduce fugitive dust. All construction equipment would be required to meet current EPA emissions standards (EPA 2016a). The localized and temporary nature of the construction emissions would not exceed de minimis standards; thus, air emissions would not increase to the extent that a general conformity analysis would be required for the Proposed Action. There would be no long-term impact on air quality because no new air emissions source would be created and emissions from periodic flood damage repair activity would also be reduced.

5.5. Climate Change

Climate change refers to changes in the Earth's climate caused by a general warming of the atmosphere. Its primary cause is emissions of GHG, including carbon dioxide and methane. Climate change can affect species distribution, temperature fluctuations, and weather patterns. The CEQ's *Final NEPA Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews* (FEMA, 2016) recommends that agencies quantify a proposed action's projected direct and indirect GHG emissions. Considering available data and GHG quantification tools that are suitable for the Proposed Action, agencies use projected GHG emissions (to include, where applicable, carbon sequestration implications associated with the Proposed Action) as a proxy for assessing potential climate change effects when preparing a NEPA analysis for a Proposed Action. Where agencies cannot quantify an action's projected GHG emissions because tools, methodologies, or data inputs are not reasonably available to support calculations for a quantitative analysis, they may include a qualitative analysis in the NEPA document and explain the basis for determining that quantification is not reasonably available (CEQ 2021).

The temperature in Houston, Texas, which is adjacent to the project area, ranges from an average low of 43 degrees Fahrenheit in January to an average high of 94 degrees Fahrenheit in July and August (U.S. Climate Data 2022). Houston receives an average of approximately 49.58 inches of precipitation annually, which falls throughout the year, with the highest precipitation levels occurring in the late spring and late fall (May, June, October, and November) and the lowest precipitation levels occurring in winter (January through April) (U.S. Climate Data 2022).

The climate in the contiguous United States, including Texas, is changing because of anthropogenic GHG emissions. Most of Texas has warmed between 0.5 degrees Fahrenheit and 1 degree Fahrenheit in the past century. Average annual rainfall has increased in the eastern two-thirds of the state, where the project area is located. During the last 50 years, the amount of rainfall during the wettest four days of the year has increased about 15 percent in the Great Plains region; the anticipated continuation of this trend would result in increased inland flooding (EPA 2016b). Average annual precipitation projections within the Southern Great Plains region suggest that the frequency and intensity of heavy precipitation events will increase, particularly later in the century (Kloesel et al. 2018).

5.5.1. NO ACTION ALTERNATIVE

No construction would occur under the No Action alternative; therefore, this alternative would have no short-term impacts on climate change.

Because no stormwater detention basins or other flood reduction measures would be constructed under this alternative, the project vicinity would continue to be at risk of flooding. However, as the frequency and intensity of flood events increase, compared to existing conditions as a result of anticipated climate change impacts, flood damage would also increase in frequency and intensity. The periodic use of gas- and diesel-fueled construction equipment to repair flood damage would

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release GHGs, but not in amounts that would contribute to regional climate change. Therefore, this alternative would have negligible long-term impacts on climate change.

Implementation of the No Action alternative would not effectively protect surrounding residential and commercial areas against the anticipated adverse effects of climate change, because it would not reduce the impacts of flooding caused by more frequent and intense precipitation events. Therefore, climate change is expected to have moderate impacts on residents, structures, and infrastructure in the area around the proposed project.

5.5.2. PROPOSED ACTION

The Proposed Action would result in temporary GHG emissions from construction activities and the use of vehicles and equipment with diesel and gasoline engines. Construction equipment emissions would be temporary and would not increase GHGs to the extent of contributing to regional climate change. Thus, the Proposed Action would have negligible short-term impacts on climate change.

No long-term impacts on climate are anticipated because the Proposed Action would not be a source of long-term GHG emissions. The Proposed Action would increase the resilience of the surrounding communities against the impacts of climate change, particularly flooding related to higher intensity and more frequent precipitation events, by increasing flood storage capacity in the Cypress Creek basin. The Proposed Action would result in a minor long-term benefit by increasing the resilience of structures and infrastructure in the area around the project area to the effects of climate change.

5.6. Surface Waters and Water Quality

The CWA of 1977, as amended, regulates the discharge of pollutants into water, with sections falling under the jurisdiction of USACE and EPA. Section 404 of the CWA establishes the USACE permit requirements for discharging dredged or fill material into Waters of the United States. Under the NPDES, the Texas Commission on Environmental Quality (TCEQ) regulates both point and nonpoint pollutant sources, including stormwater and stormwater runoff. Activities that disturb one or more acres of ground are required to apply for a Stormwater General Permit for Construction Activities permit through TCEQ, as authorized by EPA under the NPDES program.

Relevant state regulations include the Texas Surface Water Quality Standards (30 Texas Administrative Code [TAC] §307), which maintains the quality of surface water by regulating pollution sources.

The project area is in the Little Cypress Creek-Cypress Creek watershed, hydrologic unit code 1204010201. The USFWS National Wetlands Inventory (NWI) classifies Cypress Creek as a riverine, lower perennial, unconsolidated bottom, permanently flooded feature (USFWS 2018). Cypress Creek within the project area is part of Segment 1009 as designated by TCEQ. Segment 1009 flows east from the confluence of Snake Creek and Mound Creek in Waller County to the confluence with Spring Creek in Harris County. Spring Creek flows into the San Jacinto River, which flows into Lake Houston, approximately 11.5 miles east of the project area. The beneficial uses designated for Segment 1009 include primary contact recreation such as swimming; aquatic life for its highly diverse habitat; and

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the public water supply subcategory of domestic supply, indicating that it is used either as the supply source for public water systems or exhibits characteristics that would permit its use (30 TAC §307.10[1]). Cypress Creek indirectly serves as a public water supply source by augmenting the water supply in Lake Houston through Spring Creek and the West Fork of the San Jacinto River (Houston-Galveston Area Council [H-GAC] 2021).

A wetland and water body delineation of the project area identified one stream within the project area, Cypress Creek; two shallow ephemeral swales that only have water flow as a direct result of precipitation; and three wetlands (HCFCD 2021b). Only Cypress Creek and the three wetlands were determined to be jurisdictional (HCFCD 2021b). On February 28, 2023, USACE issued an approved jurisdictional determination for the project area that identified 5,652 linear feet of Cypress Creek and three, small, adjacent wetlands totaling 0.15 acres as jurisdictional areas requiring a permit for any dredging or fill activities that may be proposed in the project area.

In compliance with CWA Section 303(d), TCEQ maintains a list of water quality-impaired waters, also known as the 303(d) list. None of the waterbodies in the project area are listed as impaired (TCEQ 2022). Although Segment 1009 is not included on the 303(d) list for 2022, it has a contact recreation impairment for *Escherichia coli* (*E. coli*) (EPA 2022d). In July 2021, EPA accepted the Cypress Creek Watershed Protection Plan, which outlines strategies to address fecal waste levels in Cypress Creek and its tributaries (H-GAC 2021). The sources of fecal waste contamination are pet waste, human sewage, and livestock, which are “widespread, diffuse, and diverse in origin, making them more difficult to address through traditional approaches focusing on single entities and regulation” (H-GAC 2021).

5.6.1. NO ACTION ALTERNATIVE

Under the No Action alternative, no construction would occur and there would be no short-term construction-related impacts on water quality. However, continued flooding along Cypress Creek could lead to minor impacts on water quality. Flooding along tributaries of Cypress Creek is primarily caused by stormwater backing up from the main stem of Cypress Creek into the tributaries (HCFCD 2020). Climate change is expected to increase precipitation and, as a result, inland flooding in Texas (EPA 2016b). Under the No Action alternative, there would be no efforts to reduce flood risk and continued flooding could result in an increase in erosion and sedimentation. The transport of sediment could increase turbidity and total suspended solids, which could adversely impact aquatic life and other water quality parameters including temperature and dissolved oxygen (EPA 2021). Continued flooding could also result in the transport of contaminants such as oils and other pollutants from surface streets, contaminants from residential and commercial structures, and other pollutants such as *E. coli*. Sediments and pollutants could be carried downstream to Lake Houston and have a minor adverse impact on treatment costs for drinking water. Thus, the No Action alternative would have a minor, long-term, adverse impact on water quality in the project area and the vicinity.

5.6.2. PROPOSED ACTION

The Proposed Action would require a Nationwide Permit in accordance with Section 404 of the CWA for the detention basin outfalls into Cypress Creek and wetland impacts. Small riprap pads would be placed at the ends of the outfalls to dissipate the energy of water coming from the outfall pipes and prevent scour along the bank of Cypress Creek. These riprap areas would be approximately 900 square feet each and would partially extend into Cypress Creek. **Section 5.7** provides discussion on impacts on wetlands and associated mitigation measures.

Construction activities associated with the Proposed Action would have the potential to impact water quality in the short-term during construction, including site preparation and excavation. The most common pollutant to surface waters from construction sites is sediment and turbidity (EPA 2009). Activities would be temporary and HCFCD would implement a SWPPP that includes erosion and sediment control practices and BMPs such as silt fencing in accordance with the TCEQ Stormwater General Permit for Construction Activities. Construction access entrances would be stabilized with granular fill over a geotextile layer to reduce tracking of soils onto nearby roadways where they could wash off into surface waters. In addition, the project would protect a 160-foot forested buffer between the construction zone and Cypress Creek, which would protect water quality in the creek both during and following construction. HCFCD is responsible for coordinating with and obtaining any required Section 404 Permit(s) from USACE and/or any Section 401/402 Permit(s) from the State prior to initiating work. The applicant must comply with all conditions of the required permit(s). All coordination pertaining to these activities should be retained as part of the project file in accordance with the respective grant program instructions.

Groundwater in the project area was encountered at depths ranging from approximately 32 to 35 feet below ground level (HCFCD 2021b). Groundwater controls during construction could include construction of a seepage cut-off wall (HCFCD 2021b). Dewatering measures would be implemented to keep groundwater levels 5 feet or more below the bottom of excavation. Groundwater control activities would adhere to appropriate control measures as specified in the TCEQ Stormwater General Permit for Construction Activities. Areas where the soils allow groundwater to flow into the basin may be over-excavated and the soils replaced with clay or sodium bentonite fill to prevent infiltration of the basin with groundwater. Therefore, the Proposed Action would have short-term, negligible, adverse impacts on water quality.

By reducing peak flows and slowing runoff velocity, the Proposed Action would protect the project area and surrounding neighborhood from erosion and sedimentation during storm events. Reducing flooding would reduce the potential for pollutants to be carried into surface waters and downstream resulting in a minor beneficial effect on water quality.

The wet-bottom detention basins would include stormwater treatment opportunities such as emergent vegetation, submerged vegetation, a permanent deep pool, adequate distance between the inflow and outflow structures to increase circulation time, varying side slopes, and floatable materials control devices as seen in **Figure 5.1** (HCFCD 2022b). Therefore, operation of the Proposed Action would result in a minor long-term benefit to water quality. These beneficial effects

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on water quality would be consistent with the PR&G guiding principle on healthy and resilient ecosystems described the PR&G section (**Section 4.1**). Beneficial effects on water quality would also benefit public safety and well-being as shown in the conceptual model for ecosystem services (**Figure 4.1**).

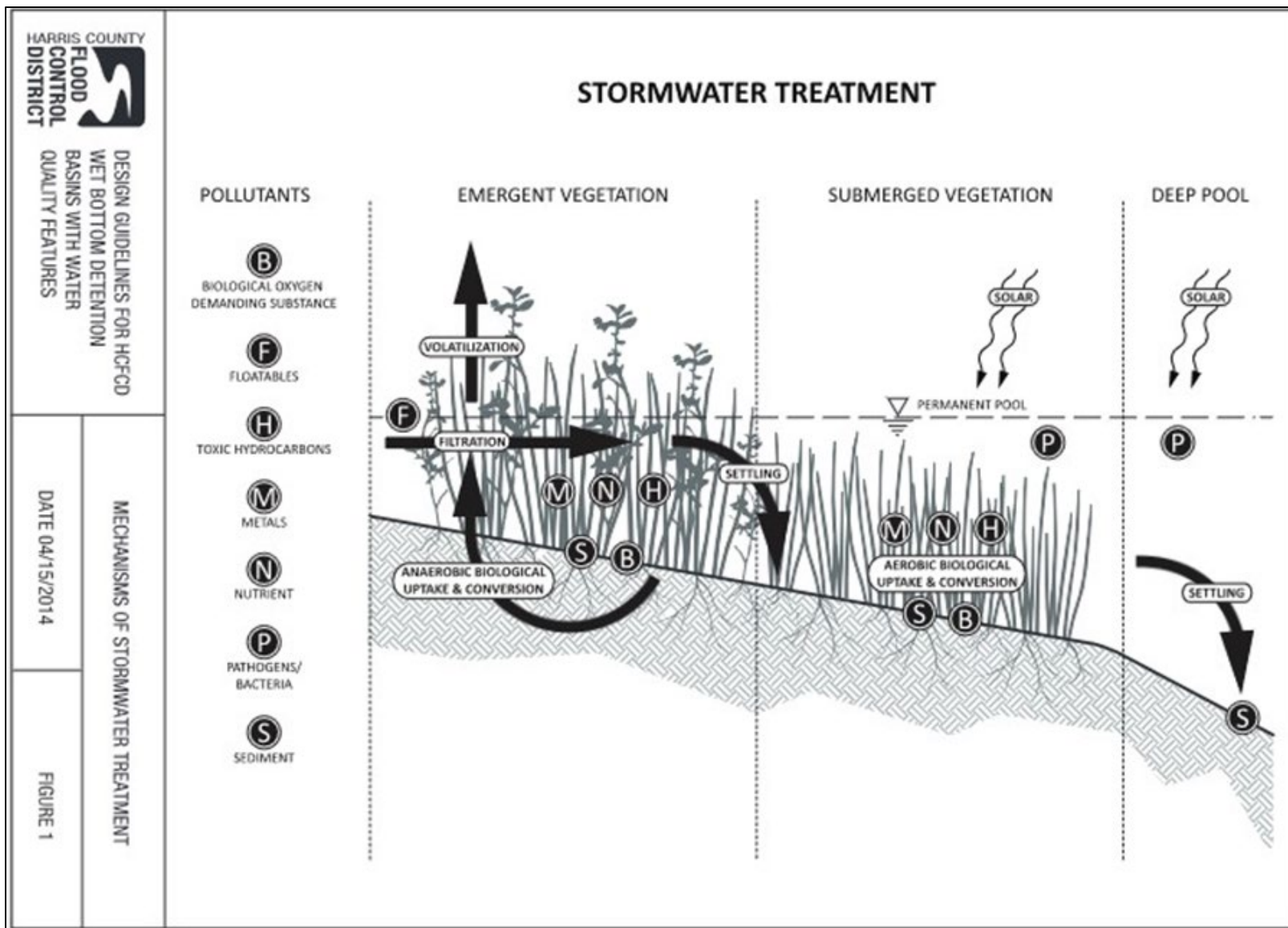


Figure 5.1. Stormwater Treatment Mechanisms in Wet-Bottom Basins

Source: HCFCO 2016

5.7. Wetlands

Executive Order (EO) 11990, Protection of Wetlands, requires federal agencies to consider alternatives to work in wetlands and limits potential impacts on wetlands if there are no practicable alternatives. FEMA regulation 44 CFR Part 9 Floodplain Management and Protection of Wetlands sets forth the policy, procedures, and responsibilities to implement and enforce EO 11990 and prohibits FEMA from funding activities in a wetland unless no practicable alternatives are available. FEMA uses the eight-step decision-making process to evaluate potential impacts on and mitigate impacts on wetlands, in compliance with EO 11990 and 44 CFR Part 9. Under Section 404 of the CWA, USACE regulates the discharge of fill into Waters of the United States, including some types of wetlands.

Wetlands are present within and adjacent to the project area (**Figure 5.2**). USFWS NWI wetlands are identified using high-altitude aerial imagery, which includes some margin of error. Based on a review of NWI mapping, approximately 0.15 acres of palustrine, forested, broad-leaved deciduous, temporary flooded wetlands occur within the project area (USFWS 2018). The project area also contains approximately 0.4 acres of palustrine, unconsolidated bottom, permanently flooded, excavated human-made freshwater ponds. These freshwater ponds were determined to be non-jurisdictional under the 33 CFR 328.3(b)(8) exclusion (HCFCD 2021b). The project area is bounded on the south and east by Cypress Creek.

A wetland delineation conducted by HCFCD evaluated conditions on the ground to confirm the actual presence and spatial extent of wetlands that may not be shown on NWI maps. Wetland delineations were conducted in 2019 for stormwater detention Basin 1A and in 2023 for Basin 2 and its associated access roads (HCFCD 2021b, USACE 2023). Approximately 0.55 acres of wetlands and ponds were identified in the area that encompasses Basins 1A and 2 and the access roads to Basin 2, with 0.15 acres determined to be potentially jurisdictional by USACE (HCFCD 2021b, USACE 2023). Of those mapped wetlands, three potentially jurisdictional wetlands were mapped amounting to 0.078 acres in the Basin 1A project area (HCFCD 2021b). In Basin 2 and its associated access roads, aside from the 0.4 acres of non-jurisdictional, human-made freshwater ponds, three potentially jurisdictional wetlands were mapped amounting to 0.076 acres (USACE 2023).

5.7.1. NO ACTION ALTERNATIVE

The No Action alternative would have no impact on wetlands in the short-term because no construction would occur within the project area, and existing hydrological conditions that may support wetlands in the vicinity would not be altered. Under the No Action alternative, there would be no construction-related vegetation removal or disturbance of wetlands. Therefore, the No Action alternative would have a no adverse or beneficial impact on wetlands.

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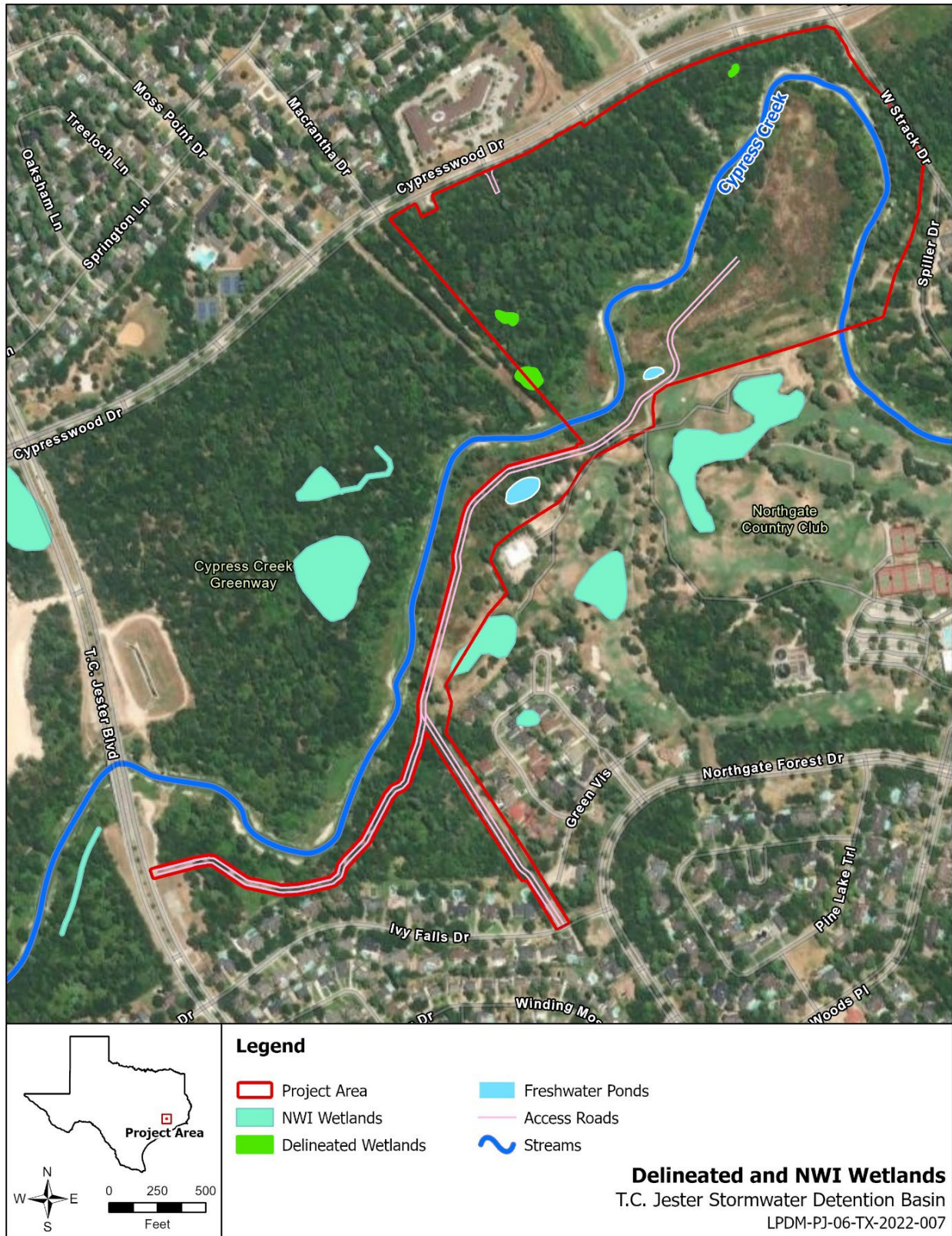


Figure 5.2. Delineated and National Wetlands Inventory Wetlands

5.7.2. PROPOSED ACTION

Under the Proposed Action, 0.05 acres of potentially jurisdictional wetland would be removed during grading and construction of the basins, and 0.04 acres of potentially jurisdictional wetland would be removed during the construction of the temporary access road. Wetland forest vegetation would be cleared for construction of the basins. During the construction of the basins and access road, 0.4 acres of non-jurisdictional, human-made, freshwater ponds, as well as 0.033 acres of emergent marsh wetland, that are adjacent to the access road, would be surrounded by construction fencing with a 25-foot buffer, avoiding impacts to those water bodies. Because the area of wetland habitat is small, there would be a short-term, negligible, adverse effect on wetlands from the loss of the forested wetland area and functions. Furthermore, and as to be determined through 404 permitting requirements with USACE, palustrine forested wetland credits would be bought from the Greens Bayou Wetlands Mitigation Bank to mitigate for the loss of wetlands from construction of the Proposed Action.

The detention basins would be constructed with a wet bottom that would include a mix of grasses, native trees, and native wetland plants, following HCFCD design standards. While the Proposed Action would result in the creation of approximately 3 acres of new emergent wetland habitat (**Figure 5.3**), functionality as a wetland would be limited. The wetland habitat would never develop into the forested wetland habitat that is being removed because stormwater basins are periodically dredged, removing accumulated sediment and maintaining stormwater storage capacity. Consequently, this process removes vegetation within the basin. Also, the fluctuating water levels associated with storm events would not provide adequate habitat for species adapted to natural wetlands. Therefore, the Proposed Action would have short-term and long-term, negligible, adverse impacts on existing wetlands.

5.8. Floodplains

EO 11988, Floodplain Management, requires federal agencies to avoid, to the extent possible, short- and long-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. FEMA regulations (44 CFR Part 9.7) use the 1-percent-annual-chance flood as the minimal area for floodplain impact evaluation. Additionally, EO 13690 established a Federal Flood Risk Management Standard (FFRMS) to help increase community resiliency to flooding, and EO 14030, Climate Related Financial Risk, directs federal agencies to implement this new standard through their programs. While new rules were under development, FEMA issued a partial implementation policy for the FFRMS that applies to its Hazard Mitigation Assistance program, which covers certain project types located within the floodplain. Flood mitigation projects such as the Proposed Action are not subject to FEMA's partial FFRMS policy. FEMA follows an eight-step decision-making process to ensure compliance with EO 11988, which requires the evaluation of alternatives to the use of a floodplain prior to funding the action (Appendix A).

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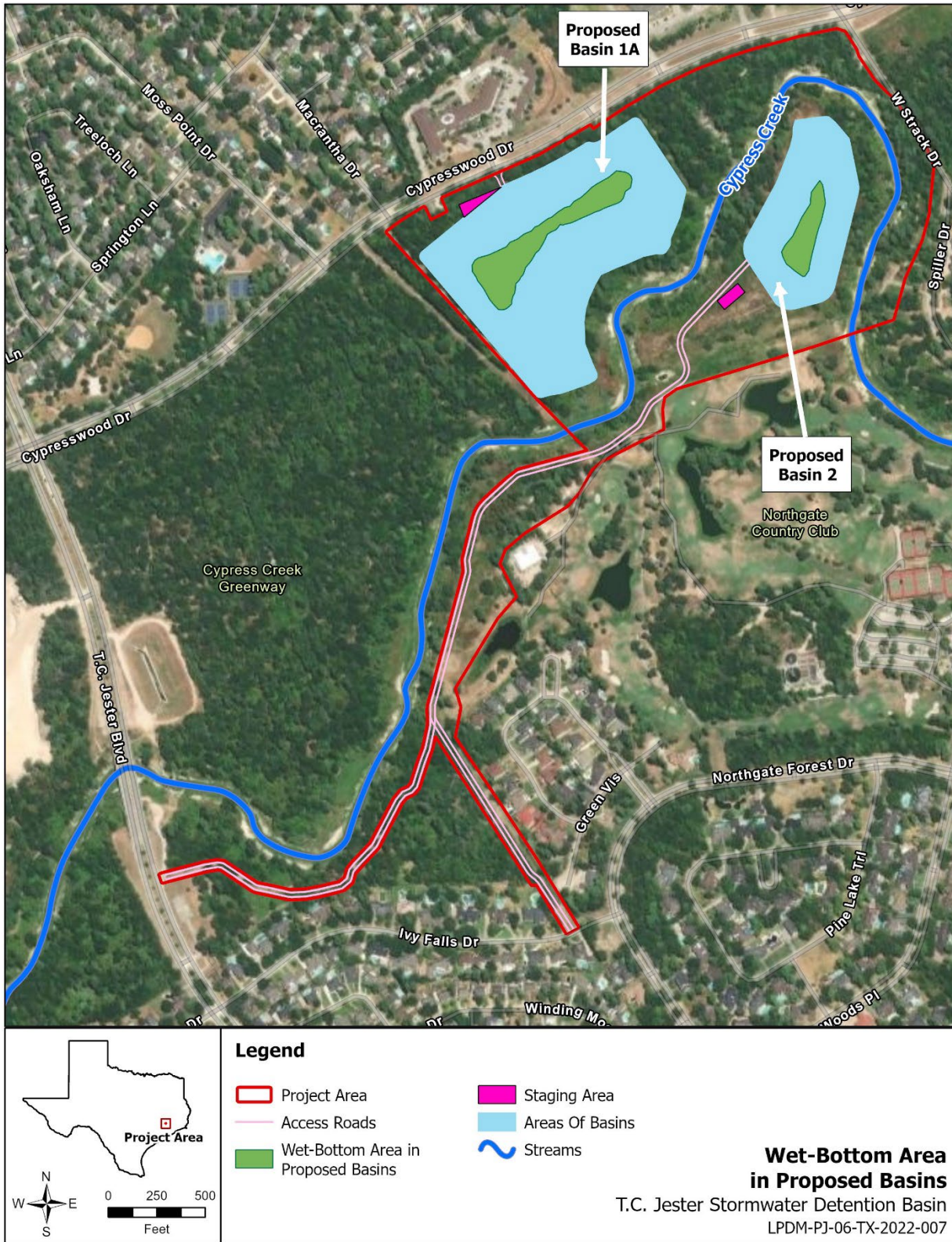


Figure 5.3. Wet-Bottom Area in Proposed Basins

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FEMA uses the 1-percent-annual-chance floodplain as the minimum area for the floodplain impact evaluation. FEMA defines a 1-percent-annual-chance floodplain (i.e., the 100-year floodplain) as an area subject to inundation from a flood that has a 1-percent-annual chance of being equaled or exceeded in any given year. The elevation of the surface water resulting from a 1-percent-annual-chance flood is known as the base flood elevation.

Based on FEMA Flood Insurance Rate Map (FIRM) panel 48201C0265M, effective October 16, 2013, the entire proposed project area falls within Zone AE with a base flood elevation of 105 feet above sea level (**Figure 5.4**). The part of the project area adjacent to the creek is also within the regulatory floodway for Cypress Creek. Flooding from heavy precipitation, tropical storms, and hurricanes have severely and repeatedly impacted residential and commercial properties within and near the project area. HCFCD currently manages an existing small detention basin (K500-15-00) on the east side of T.C. Jester Boulevard near the project area (**Figure 1.2**) and an existing 66-inch-diameter reinforced concrete stormwater outfall conveys stormwater to Cypress Creek from the Terranova West subdivision, which is north of Cypresswood Drive and the project area (HCFCD 2021a).

The Implementation Plan established targets for flood risk reduction projects in the Cypress Creek watershed based on the Regional Drainage Plan. The Drainage Plan recommended a target of 56,500 acre-feet of stormwater detention to mitigate the large flows from Little Cypress Creek (30,000 acre-feet) and Upper Cypress Creek (26,500 acre-feet) that drain into Cypress Creek (HCFCD 2020). The Implementation Plan identified that approximately 14,000 acre-feet of stormwater detention volume may reduce flood risk by removing 39, 21, and 19 percent of structures from the 10-, 50-, and 100-year floodplains, respectively. A hydrologic and hydraulic analysis completed for the project by HCFCD determined that under existing conditions Cypress Creek can convey less than the 10-year storm event within the study area, which included areas both upstream and downstream of the project area (HCFCD 2022b). Under existing conditions, 1,668 structures would be flooded in a 100-year storm, and 4,615 structures would be flooded in a 500-year storm within the study area (HCFCD 2021b).

5.8.1. NO ACTION ALTERNATIVE

Under the No Action alternative there would be no change in the flow or drainage patterns of Cypress Creek or its floodplain. The project area, project vicinity, and the downstream areas of Cypress Creek would continue to flood during major storm events. The flood storage capacity in the Cypress Creek watershed would not increase and public safety, property, and infrastructure would continue to be at risk from floods. Floodwaters can also carry pollutants, excess nutrients, and sediments from upland areas into floodplain areas and creeks, which can adversely affect vegetation and fish and wildlife in the floodplain. Erosion and scour of natural drainageways or infrastructure may also occur. Under the No Action alternative, HCFCD would not meet the flood risk reduction targets along Cypress Creek in accordance with the Implementation Plan. The No Action alternative would have an adverse impact on public safety, property, and infrastructure due to continued flooding.

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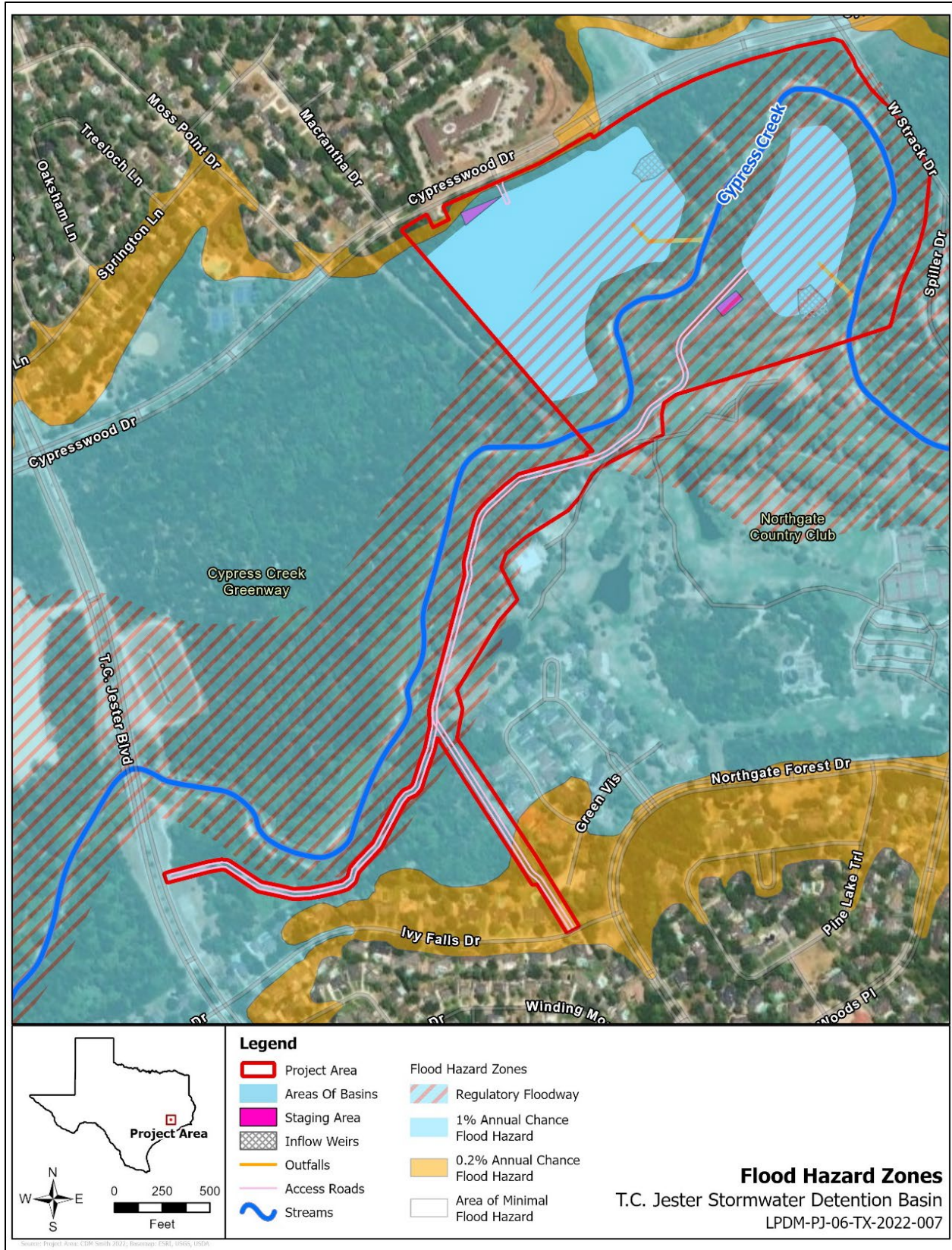


Figure 5.4. Project Area Floodplains

5.8.2. PROPOSED ACTION

During construction of the basins, vegetation would be removed, and soils would be exposed, which could result in erosion and sedimentation of floodplain areas if there is precipitation or windy conditions during construction. Construction activities could also cause an accidental release of hazardous waste (e.g., fuels) from equipment use that could enter water bodies and wetlands in the project area and Cypress Creek. As described in **Section 5.3** and **Section 5.6**, SWPPP would be implemented to reduce the potential impacts on soils and water quality in the floodplain during construction. Therefore, there would be minor short-term impacts on the floodplain from construction of the basins.

Under the Proposed Action, two new stormwater detention basins would be constructed within the 100-year floodplain. The basins would improve floodplain storage capacity by capturing high flows from Cypress Creek and provide approximately 967 acre-feet of storage that would otherwise flood the surrounding and downstream areas. During storm events, the water surface elevations near the project area would decrease because of the increased capacity in the floodplain as compared to existing conditions. As flows in the creek recede, water stored in the basin would slowly outfall back into the creek without increasing water surface elevations downstream. As the basin drains, the storage capacity becomes available again for future storm flows. Following construction, the risk of flooding would be reduced. According to the hydraulic modeling conducted by HCFCD, the Proposed Action would remove 30 structures from the 100-year floodplain and 44 structures from the 500-year floodplain as compared to existing conditions (HCFCD 2022b).

The basins' side slopes would be stabilized to prevent erosion during basin operation. The detention basins would slow stormwater and allow suspended sediments to settle out before the stormwater is discharged back into the floodplain and creek system preventing sedimentation of the floodplain. The basin bottoms would be vegetated, which would stabilize bottom sediments and provide some water quality benefits by removing excess nutrients from stormwater in the basins. The areas where the basin outlets discharge onto the creek banks would also be stabilized with riprap energy dissipation pads to prevent erosion and scour of the creek around the outlets. Although approximately 24 acres of forest cover would be removed from the floodplain (**Section 5.9**), a 160-foot-wide buffer along Cypress Creek would be maintained and would continue to provide riparian habitat benefits in the floodplain. Floodplain functions related to flood storage capacity and removal of sediments and nutrients would be improved while there would be a minor impact on other functions related to habitat and vegetation. Therefore, there would be a moderate long-term benefit to floodplains from the reduced risk of flooding and associated risk of injury and damage to people and property. These effects are consistent with the following PR&G principals: healthy and resilient ecosystems, sustainable economic development, and public safety (**Figure 4.1**). The project would help to meet the flood risk reduction targets along Cypress Creek in accordance with the Implementation Plan.

HCFCD is required to coordinate with the local floodplain administrator and obtain required permits prior to initiating work, including any necessary certifications that encroachments within the adopted regulatory floodway would not result in any increase in flood levels within the community during the

occurrence of the base flood discharge. Applicant must comply with any conditions of the permit and all coordination pertaining to these activities should be retained as part of the project file in accordance with the respective grant program instructions.

5.9. Vegetation

The project area is in the Gulf Plains and Marshes ecoregion (Texas Parks and Wildlife Department [TPWD] n.d.-a). Predominant vegetative communities in this ecoregion include salt grass marshes, tall woodlands, oak mottes and parklands, and remnants of tallgrass prairies (TPWD n.d.-a). The Buffalo–San Jacinto watershed, of which the Cypress Creek watershed is a subcomponent, has been highly modified by residential, commercial, and industrial development, which have altered remaining vegetative communities.

The following discussion of existing conditions within the project area is based on the findings of site visits conducted in 2019 (HCFCD 2021b). The project area contains upland forests, wetland forests, open disturbed areas, and one ephemeral stream, with upland forests representing the majority of the project area. The upland and wetland forests include the following representative species: loblolly pine (*Pinus taeda*), water oak (*Quercus nigra*), American sweetgum (*Liquidambar styraciflua*), green flatsedge (*Cyperus virens*), and longleaf woodoats (*Chasmanthium sessiliflorum*) (HCFCD 2021b). Dominant vegetation in open disturbed areas includes velvet panicum (*Dichanthelium scoparium*), broadleaf plantain (*Plantago major*), and field blackberry (*Rubus arvensis*). Open disturbed areas constitute a small portion of the project area.

Invasive Species

EO 13112, Invasive Species, requires federal agencies, to the extent practicable, to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. Invasive species prefer disturbed habitats and generally possess high dispersal abilities, enabling them to out-compete native species. Common invasive plant species in the Gulf Coast Prairies and Marshes region include giant salvinia (*Salvinia molesta*), Chinese tallow tree (*Triadica sebifera*), salt cedar (*Tamarix ramosissima*), deep-rooted sedge (*Cyperus entrerianus*), Brazilian peppertree (*Schinus terebinthifolius*), chinaberry tree (*Melia azedarach*), Japanese honeysuckle (*Lonicera japonica*), Chinese privet (*Ligustrum sinense*), common water hyacinth (*Eichhornia crassipes*), alligatorweed (*Alternanthera philoxeroides*), trifoliolate orange (*Poncirus trifoliata*), and guineagrass (*Urochloa maxima*) (Texas Invasive Species Institute n.d.).

5.9.1. NO ACTION ALTERNATIVE

The No Action alternative would have no impact on vegetation in the short-term because no excavation and construction would occur within the project area, and existing vegetation would not be disturbed. The long-term impacts of climate change are anticipated to increase both floods and droughts in this region as well as air temperatures (EPA 2016b). Vegetation population composition is expected to shift over time in response to these changing environmental conditions (Xiong et al. 2023). Large flood events, which can cause redistribution and accumulation of debris, would require

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the use of equipment for debris removal, which would disturb existing vegetation. Additionally, large flood events can have adverse effects on water quality that could impact the quality of vegetation present in the project area. Therefore, the No Action alternative would have a long-term, minor, adverse impact on vegetation.

Under the No Action alternative, existing invasive species would continue to persist in the project area because there would be no vegetation removal due to construction. Frequent flooding would continue to mobilize and disperse invasive plant seeds and other viable plant parts. Changes to the local environment resulting from climate change are likely to favor invasive species that can better tolerate stress associated with changing conditions (Clements and Jones 2021, Finch et al. 2021). Therefore, the No Action alternative would have a long-term, minor, adverse impact on vegetation related to invasive species.

5.9.2. PROPOSED ACTION

The Proposed Action would remove approximately 24 acres of existing vegetation during grading and construction of the basins, consisting of upland and wetland forests (**Figure 5.5**). Additionally, 1.7 acres of vegetation would be removed permanently for the access road, and 0.81 acres of vegetation would be removed temporarily for the temporary access road. Although the habitat loss does not represent a substantial amount, this habitat is in an urbanized, fractured environment, and the construction of the basins would exacerbate the habitat and vegetative fragmentation. The bottoms of the detention basins would be planted with native plant species that include a mix of grasses, native trees, and native wetland plants, following HCFCD design standards. The vegetative environment affected by the construction of the temporary portion of the access road would be restored to preconstruction activities. Trees reestablished along the access road in previously disturbed areas would require years to reach maturity. Therefore, the Proposed Action would have a short-term, moderate, adverse impact on vegetation. There would be a long-term, minor, adverse impact on vegetation from the permanent loss of forest vegetation in the area of the basins.

Vegetation removal associated with the Proposed Action would include the removal of existing invasive species at the project site. Plant species used for stabilization of the project would be selected to ensure that they do not include invasive species. BMPs such as cleaning equipment entering and exiting the project area would reduce the spread of viable plant propagules of invasive species. No invasive plant species would be introduced to the project area, either in erosion control materials, seed blends, or live plants as part of revegetation activities associated with the project. The Proposed Action would have a long-term, minor beneficial impact related to invasive species because native species planted during revegetation activities would become established with active maintenance such that they are able to out-compete the invasive species that will likely attempt to recolonize the area.

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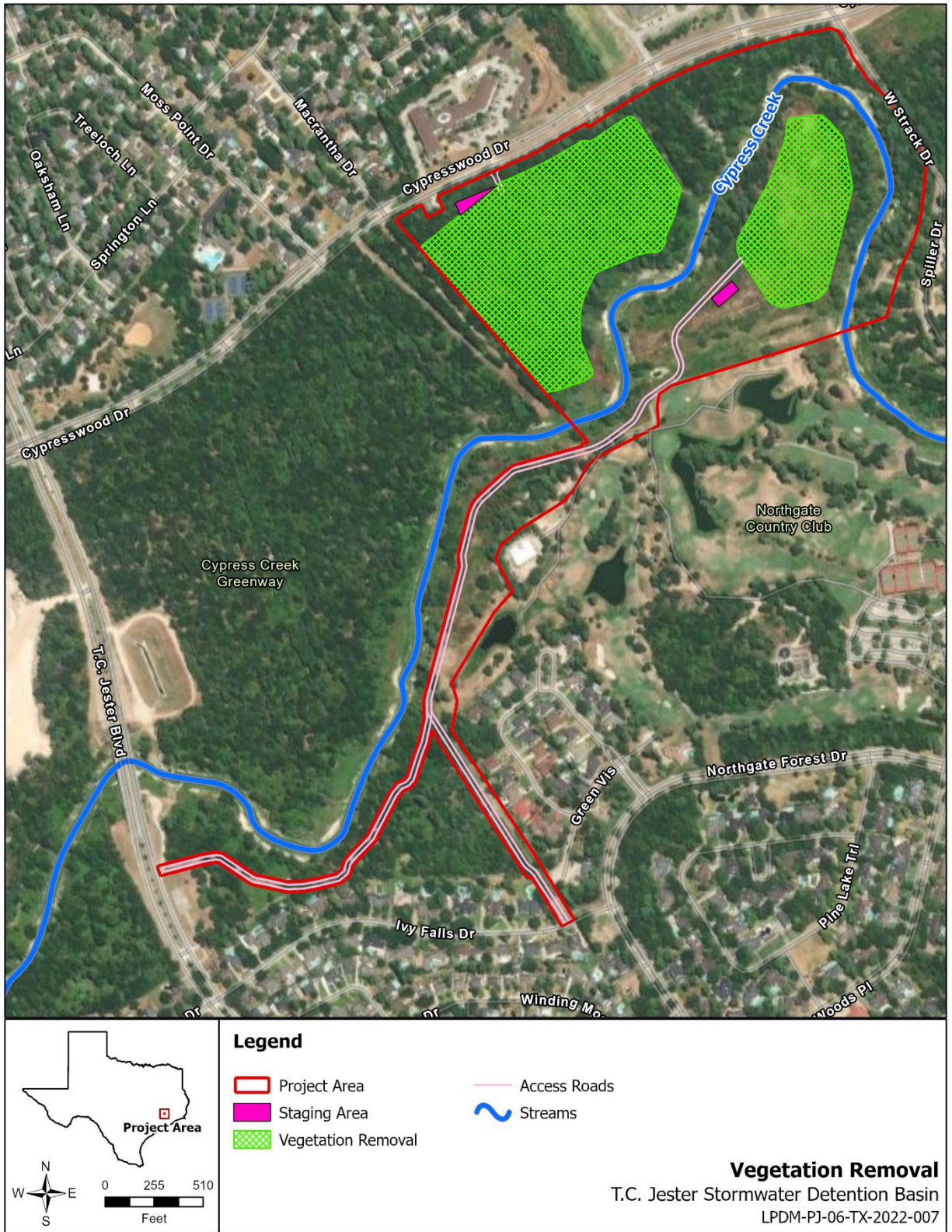


Figure 5.5. Area of Vegetation Removal

5.10. Fish and Wildlife

Fish and wildlife include the species that occupy, breed, forage, rear, rest, hibernate, or migrate through the project area. Regulations relevant to fish and wildlife include the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. **Section 5.11** provide evaluations of the threatened and endangered fish and wildlife species.

A variety of wildlife inhabit the Gulf Coast Prairies and Marshes ecoregion. Wildlife communities within the project area likely consist of urban-adapted generalist species that can live in semi-disturbed, altered habitats. Examples of these species include opossums (*Didelphis marsupialis*), raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), chipmunks (*Tamias* spp.), squirrels (*Sciuridae* spp.), eastern cottontail (*Sylvilagus floridanus*), and passerine birds such as northern cardinals (*Cardinalis cardinalis*) and Carolina chickadees (*Poecile carolinensis*) (TPWD n.d.-a). Reptile and amphibian species found at the project location during site visits conducted in 2019 include the blue-tailed skink (*Cryptoblepharus egeriae*), red-eared slider (*Trachemys scripta elegans*), and Cuban brown anole (*Anolis sagrei*) (HCFCD 2021b). The wetland and stream habitats near the project area have the potential to support several species and may provide a corridor for movement between other terrestrial and aquatic habitats along Cypress Creek.

The Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. 703–711), provides protection for migratory birds and their nests, eggs, and body parts from harm, sale, or other injurious actions except under the terms of a valid permit issued pursuant to federal regulations. USFWS is the lead federal agency for implementing the MBTA. MBTA protects all native birds, and existing habitat in the project area has the potential to support a variety of native bird species. The project area is within the Central Flyway, and migratory bird species could occur in the forested and vegetated areas within project area with nesting typically occurring between April 1 and September 15 (USFWS 2022a).

The Bald and Golden Eagle Protection Act of 1940 prohibits the take, possession, sale, or other harmful action of any bald or golden eagle, alive or dead, including any part, nest, or egg unless allowed by permit (16 U.S.C. 668[a]). This Act requires consultation with USFWS to ensure that proposed federal actions do not adversely affect bald or golden eagles. The Texas Natural Diversity Database indicates an occurrence of bald eagles within a 10-mile radius of the project area (HCFCD 2021b). Although bald eagles prefer to forage and nest along large bodies of water, they may occur occasionally along the densely forested edges of Cypress Creek; therefore, there is the potential for bald eagles to occur in the project area. Golden eagles are not likely to occur regionally or in the project area because they prefer mountainous habitats and nest on rocky cliffs. They do not occur commonly in southeastern Texas (Audubon n.d.).

The USFWS Information for Planning and Consultation (IPaC) was used to identify 12 migratory bird species as birds of particular concern because they occur on the USFWS Birds of Conservation Concern list or because they warrant attention in the project area, according to a query conducted on December 8, 2023 (USFWS 2023a). Of the 12 species, the Wood thrush (*Hylocichla mustelina*), Prothonotary warbler (*Protonotaria citrea*), lesser yellowlegs (*Tringa flavipes*), Henslow's sparrow (*Ammodramus henslowii*), and Kentucky warbler (*Oporornis formosus*) have a low probability of

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occurring within the project area, and probability of occurrence is not associated with breeding seasons. The swallow-tailed kite (*Elanoides forficatus*), American kestrel (*Falco sparverius paulus*), bald eagle (*Haliaeetus leucocephalus*), and brown-headed nuthatch (*Sitta pusilla*) have a moderate probability of occurring at the project site with potential site occurrence during the breeding season. Three species, the chimney swift (*Chaetura pelagica*), pectoral sandpiper (*Calidris melanotos*), and red-headed woodpecker (*Melanerpes erythrocephalus*), have high probabilities of occurring during the breeding season according to the IPaC Probability of Presence Summary (USFWS 2023a).

Under the Magnuson-Stevens Fishery Conservation and Management Act, the National Marine Fisheries Service (NMFS) designates essential fish habitat (EFH), which is defined as those waters and substrates necessary for federally managed species to spawn, breed, feed, and/or grow to maturity. All federal agencies are required to assess the potential effects of proposed actions on EFH, and to consult with NMFS on any actions that could adversely affect EFH. No NMFS-managed species have been identified for the project area and there is no EFH present.

5.10.1. NO ACTION ALTERNATIVE

Under the No Action alternative, there would be no short-term impact on fish and wildlife or their habitats. However, in the long term, flood events would cause damage to native forests by washing out present habitat features, such as undergrowth, and creating openings that subsequently could be colonized by invasive plant species. Invasive plant species would not provide a suitable habitat for native birds, migratory birds, and other wildlife species. Therefore, the No Action alternative would have long-term, minor, adverse impact on fish and wildlife, including migratory birds.

5.10.2. PROPOSED ACTION

Under the Proposed Action, existing vegetation, which currently provides habitat for wildlife species, would be removed during grading and construction of the basins; however, a 160-foot-wide forested buffer would remain between Cypress Creek and the proposed stormwater detention basins. In the short-term, upland and wetland forests would be cleared for construction of the basins, removing habitat and displacing wildlife. Excavation of the basins would likely disturb and displace ground-dwelling terrestrial and subterrestrial wildlife. Construction and excavation would also produce noise, which would disturb wildlife not otherwise directly impacted by construction activities, affecting their ability to forage and conduct life activities. Dust produced from the construction activity would also have the potential to impact surrounding wildlife by disrupting or impairing vision. Vegetation that is used as wildlife habitat would also potentially be impacted if dust settling on the vegetation reduced the photosynthetic ability of the plants. Dust generated from construction activities can also result in sedimentation in aquatic environments. BMPs and avoidance and minimization measures (AMMs) would be enforced to minimize impacts of construction.

Specific BMPs and AMMs would be used to minimize sedimentation in surrounding aquatic habitats including installing silt fencing and avoiding construction activities during rainy conditions.

Birds are mobile and can readily fly away from construction noise and disturbance. However, if construction occurs during the migratory bird breeding season (i.e., March through July), related

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activities could impact bird species protected by the MBTA because vegetation removal could result in nest destruction and loss of eggs and young. Given the potential for take of migratory birds to occur, the Proposed Action would be subject to the prohibitions of the MBTA, and the City would be responsible for obtaining and complying with federal and state laws for the protection of birds before starting work. Because tree removal would be restricted between March 30 and October 1 to protect the tricolored bat, which is proposed for listing under the federal Endangered Species Act (ESA), the potential to impact nesting birds would be minimized. Given that the HCFCD would comply with the MBTA, the Proposed Action would have a negligible, short-term impact on species protected under the MBTA if vegetation removal were to occur during the nesting season. BMPs and AMMs also include nest surveying that would be conducted within 10 days of any vegetation removal to mitigate any disturbance to bird species, including migratory birds and bald eagles. Vegetation removal would occur from October 1 through March 15 to avoid bat nesting and roosting season, which also generally coincides with bird nesting seasons. If nests are encountered, a species buffer would be applied, and the nest would be avoided until no longer occupied.

Although wetland vegetation would be planted in the bottoms of the basins and some trees would be planted on the outside edges of the basins in disturbed areas, the existing forest cover would be permanently altered. In the long-term, the Proposed Action would result in a permanent upland and wetland forest habitat loss of 26 acres. However, as an offset, a 160-foot-wide buffer would remain between Cypress Creek and either basin of the Proposed Action to limit habitat fragmentation and maintain available habitat for wildlife species.

The Proposed Action would reduce the effects of flooding on wildlife habitat surrounding the project area. Floods can carry sediments downstream that smother vegetation and wildlife habitats when they settle out of floodwaters. Flooding may also result in scour of creek bottoms and banks that damages aquatic habitats. These impacts are expected to worsen as flooding increases with climate change-driven precipitation and storm events. The Proposed Action would reduce these impacts downstream of the project area by reducing future flooding and moderating flood flows in Cypress Creek. The wet-bottom detention basins would treat stormwater runoff by allowing suspended sediments to settle. Additionally, associated aquatic vegetation can provide treatment through the uptake of nutrients and other pollutants.

The Proposed Action would have a short-term, minor, adverse impact on wildlife and migratory birds from construction noise and activity. However, BMPs and AMMs would help reduce potential effects on wildlife and migratory birds. The project would have a minor, long-term, adverse impact on wildlife and migratory birds from the conversion of approximately 26 acres of forested habitat to stormwater basins and an access road within the project area. There would be a long-term negligible beneficial effect on aquatic habitats from the reduction in flooding and scour and from improved water quality to Cypress Creek through the treatment of stormwater runoff in the basins.

5.11. Threatened and Endangered Species and Critical Habitat

The ESA of 1973 gives USFWS and NMFS authority for the protection of threatened and endangered species. This protection includes a prohibition on direct take (e.g., killing, harassing) and indirect take (e.g., destruction of habitat).

The ESA defines the action area (AA) as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action” (50 CFR 402.02). Therefore, the action area where effects on listed species must be evaluated may be larger than the project area where project activities would occur. The action area includes the area surrounding the project area and considers such factors as noise, vibration, dust, stormwater runoff, construction vehicle and equipment traffic, waste, and spills, as well as construction fencing and silt fences. Construction noise was determined to be the effect that would extend the farthest from the project area. To account for potential noise impacts, the action area includes a 0.25-mile buffer extending from the project area (**Figure 5.6**). This distance was based on buffer requirements for active roost trees for the northern long-eared bat (U.S. Forest Service 2014).

Federally Listed Species

The USFWS IPaC was accessed on December 8, 2023, to identify proposed, threatened, and endangered species that potentially may occur in the action area. Four federally listed species have the potential to occur in the project area including the eastern black rail, piping plover, red knot, and whooping crane as shown in **Table 5.3** (USFWS 2023a). The AST, proposed for listing as threatened under the ESA, has the potential to occur within the project area. The tricolored bat (TCB), proposed for listing as endangered under the ESA, has the potential to occur within the project area. Based on an assessment of the suitability of habitats within the project area for these six species, only the AST and TCB have the potential to occur in the project area. The Proposed Action will not affect species under the jurisdiction of NMFS.

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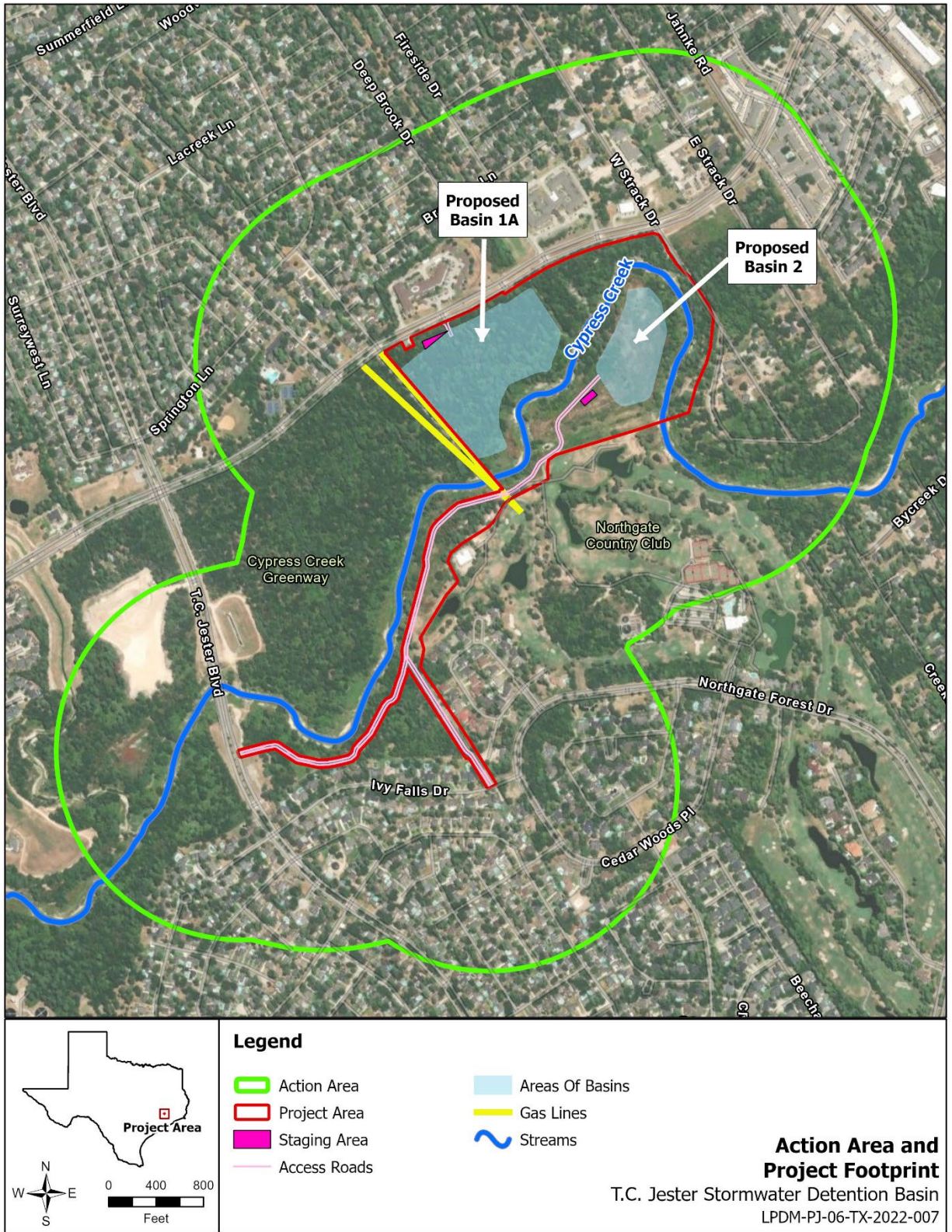


Figure 5.6. Action Area and Project Footprint

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Table 5.3. Federally Listed Species Identified in IPaC for the Project Area

Common Name	Scientific Name	Status
Birds		
Eastern black rail	<i>Laterallus jamaicensis ssp. jamaicensis</i>	Threatened
Piping plover	<i>Charadrius melodus</i>	Threatened
Red knot	<i>Calidris canutus rufa</i>	Threatened
Whooping crane	<i>Grus americana</i>	Endangered
Reptile		
Alligator snapping turtle	<i>Macrochelys temminckii</i>	Proposed Threatened
Mammal		
Tricolored bat	<i>Perimyotis subflavus</i>	Proposed Endangered

Source: USFWS 2023a

Federally Listed Species Descriptions

Eastern black rail: This species uses wetland habitats, ranging from salt, brackish, and freshwater marshes to wet meadows and pond edges. Roosting and nesting occur in dense marsh grasses and *Salicornia* species. The existing site conditions do not have coastal salt or brackish marshes with dense cover, or inland meadows and marshes that the species requires.

Piping plover: This species is commonly found along sandflats, beaches, barrier islands, and associated dunes. The project site lacks these features that are required for piping plover habitat.

Red knot: This species roosts in its winter range along Texas seacoasts, including tidal flats, beaches, and shorelines. The project area lacks suitable habitat for red knot (HCFCD 2021b).

Whooping crane: This species migrates biannually from summer habitats in central Canada to the salt marshes and tidal flats in the Aransas National Wildlife Refuge on the Texas coast in the winter. During migration, birds may stop transiently in a variety of open field, agricultural, marsh, and wetland habitats. The project area lacks suitable habitat (HCFCD 2021b).

Alligator snapping turtle: This species is the largest freshwater turtle in North America and is found in freshwater habitats including backwater swamps, rivers, and lakes, and occasionally in low-salinity brackish environments. Potential habitat exists on-site in Cypress Creek and the associated forested upland areas (HCFCD 2021b). AST breeding and nesting season occurs April 1 through June 30. Adult female ASTs may nest up to 656 feet away from streams, rivers, canals, and swamps (USFWS 2021). However, according to information provided by Texas Parks and Wildlife Department (TPWD) and USFWS, ASTs in the region typically establish nests within approximately 200 feet of the water's edge with many nests established within 12 to 26 feet of the water's edge (TPWD 2022; USFWS 2021).

Tricolored bat: This species roosts in both live and dead leaf clusters of live or recently dead deciduous hardwood trees during the spring, summer, and fall seasons, and hibernates in culverts,

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tree cavities, and abandoned water wells during winter (USFWS 2022b). Female TCB can exhibit site fidelity and form maternity colonies, switching roost trees regularly, while males roost alone (USFWS 2022b, 2023b). Maternity colonies can range in abundance, from 5 to 56 females and pups in a colony roost (USFWS 2022b); though, they generally average 35 or fewer females and pups in a roost (TPWD n.d.-b). TCB exhibit high site fidelity for roost site and hibernaculum (USFWS 2022b). Potential habitat exists on-site in associated forested areas (HCFCD 2021b).

State Listed Species

A freshwater mussel reconnaissance survey was conducted on September 27, 2023, for the area around the two proposed outfalls into Cypress Creek following TPWD protocols for freshwater mussel surveys. The survey determined whether state-listed mussel species identified in **Table 5.4** were potentially present and evaluated the potential suitability of habitat around each outfall location. The survey concluded that native freshwater mussel species are not likely to occur within the survey areas because of the presence of hard-packed clay substrates with extensive bank erosion and little to no woody debris. Furthermore, no evidence of live or dead mussels either on the bank or in the stream was observed. On October 10, 2023, TPWD concurred with this assessment and agreed that no further surveys were necessary for the project because of the poor habitat and lack of recently observed freshwater mussel species (SWCA 2023).

Table 5.4. State Listed Species Potentially Occurring in Harris County

Common Name	Scientific Name	Status
Mussel		
False Spike	<i>Quadrula mitchelli</i>	Threatened
Golden Orb	<i>Quadrula aurea</i>	Threatened
Louisiana Pigtoe	<i>Pleurobema ridellii</i>	Threatened
Mexican Fawnsfoot	<i>Truncilla cognata</i>	Threatened
Salina Mucket	<i>Potamilus metnecktayi</i>	Threatened
Sandbank Pocketbook	<i>Lampsilis satura</i>	Threatened
Smooth Pimpleback	<i>Quadrula houstonesis</i>	Threatened
Southern Hickorynut	<i>Obovaria jacksoniana</i>	Threatened
Texas Fatmucket	<i>Lampsilis bracteate</i>	Threatened
Texas Fawnsfoot	<i>Truncilla macrodon</i>	Threatened
Texas Heelsplitter	<i>Potamilus amphichaenus</i>	Threatened
Texas Hornshell	<i>Popenaias popeii</i>	Threatened
Texas Pigtoe	<i>Fusconaia askewi</i>	Threatened
Texas Pimpleback	<i>Quadrula petrina</i>	Threatened
Triangle Pigtoe	<i>Fusconaia lananensis</i>	Threatened

5.11.1. NO ACTION ALTERNATIVE

Under the No Action alternative, there would be no short-term impacts on the AST. Over the long term, flood events, which are predicted to increase because of climate change, would continue to impact the area. Flood events would potentially degrade AST habitat causing scour that would steepen the creek bank and washing out woody debris preferred by AST. Flood events would also potentially result in nest flooding, causing egg asphyxiation and subsequent nest failure (Jackson and Ewert 2023). Therefore, the No Action alternative would have long-term, minor, adverse impact on AST.

Under the No Action alternative, there would be no short-term or long-term adverse or beneficial impacts on the TCB because there would be no change in the existing forest cover.

5.11.2. PROPOSED ACTION

Alligator Snapping Turtle

Construction of the Proposed Action may adversely affect AST because the project area contains potentially suitable habitat for the AST, and the species may be present during construction.

Proposed AMMs would be implemented to reduce potential impacts on AST and would include preconstruction surveys, seasonal avoidance, wildlife exclusion fencing, entrapment prevention, best practices when encountering AST, environmental awareness training of construction workers, and erosion and sediment control measures around the perimeter of active construction areas (detailed in **Section 7.3**) (Appendix B). The proposed AST-specific AMMs include the presence of a biological monitor, habitat avoidance and relocation when avoidance is not possible, seasonal avoidance during peak nesting and breeding times, best practices for encounters with the AST, and site restrictions in place to minimize impacts on the AST. An AST exclusion fence will be installed along the outer edge of the 160-foot-wide tree buffer (the edge closest to the proposed construction), and the 160-foot forested buffer would be preserved to protect habitat along Cypress Creek.

ASTs on land during construction may be adversely affected either by direct interaction with construction workers and equipment or by becoming trapped in excavated areas. Exclusion fencing around the project area and sloped excavation trenches to facilitate animal escape would reduce the potential for AST to be entrapped within the project area. Avoiding clearing forested areas within 656 feet of Cypress Creek during the nesting season would further reduce the potential for AST to encounter construction workers or equipment because they spend most of their time in aquatic habitats during the rest of the year. With the implementation of the proposed AMMs, the Proposed Action would have a short-term, minor, adverse impact on ASTs by reducing the area available for AST nesting.

Noise from construction activities is not expected to impact ASTs that may occur in the adjacent stretch of Cypress Creek because (1) turtles have poor sensitivity to airborne sound and (2) any ASTs occupying aquatic habitat in the vicinity would be minimally exposed to airborne noise sources because ASTs spend most of their time underwater. Hence, construction-related noise is not

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expected to trigger a behavioral response in ASTs occurring in adjacent aquatic habitat or result in auditory masking that could impair normal AST behaviors in the aquatic environment (Christensen-Dalsgaard et al. 2012). Furthermore, with the implementation of the proposed erosion and sediment control measures and the avoidance of work during rainy or wet conditions, construction work would not appreciably impact water quality in Cypress Creek, which serves as potential AST habitat.

Construction of the basins and permanent access road of the Proposed Action would impact approximately 17 acres of potential upland nesting habitat for AST, and 9.8 acres would be restored with sandy soils to serve as potential AST upland nesting habitat. In total, 7.2 acres, or approximately 13 percent, of the suitable potential nesting habitat in the project area would be permanently impacted. Most of this area occurs on the fringe of the potential nesting habitat (furthest from Cypress Creek), where potential AST females are less likely to nest because they prefer sites closer to aquatic habitat (TPWD 2022, USFWS 2021). The protected 160-foot-wide forested buffer between the creek and the basins would retain its existing habitat characteristics and be available for nesting during and in the years following construction. While there would not be a 160-foot forested buffer maintained between the access roads and the creek, the permanent access road would only impact 1.1 acres of suitable potential nesting habitat for the AST. Within the project area, approximately 47 acres of suitable nesting habitat within 656 feet of Cypress Creek would remain upon the completion of the Proposed Action. The Proposed Action would not disrupt aquatic and creek bank habitat features except for the installation of the riprap energy dissipaters at the basin outfalls totaling approximately 0.04 acres (1,800 square feet). Observations of another Texas urban AST population suggest that the number of AST potentially affected would be low and that AST occurring in fragmented urban habitats may not be strongly affected by changes in the configuration of available habitat (Munscher et al. 2023a, 2023b). Cypress Creek runs approximately 85 kilometers (53 miles) in length (H-GAC 2005). Assuming a population density of 7.03 AST per kilometer (USFWS 2024), the AST population of Cypress Creek is approximately 598 turtles. The Proposed Action would potentially impact 4 to 15 turtles, which represents 2.5 percent of the Cypress Creek AST population.

The Proposed Action would have short-term, minor, adverse impact on the AST by reducing potential nesting habitat and slightly reducing creek bank habitat. The Proposed Action would have long-term, minor, beneficial impact on the AST by reducing flood events that could cause egg asphyxiation in AST nests and that could degrade existing AST habitat. Additionally, the constructed wet-bottom detention basins would treat stormwater runoff by allowing suspended sediments to settle. Furthermore, associated aquatic vegetation would provide treatment through the uptake of nutrients and other pollutants (HCFCD 2014).

Tricolored Bat

Construction of the Proposed Action may adversely affect TCB because the project area contains potentially suitable habitat for the TCB, and the species may be present during construction. However, this wooded area contains off-road bike paths, experiences elevated human activity during the summer months and represents a fragmented wooded habitat. Additionally, bat occupancy is negatively impacted by noise generated from an urban environment, even if suitable habitat and

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water sources are available (Lehrer et al. 2021). These features potentially make the project area less favorable to TCB.

Proposed AMMs would be implemented to reduce potential impacts on TCB and would include preconstruction surveys, seasonal avoidance, and environmental awareness training of construction workers (detailed in **Section 7.3**) (Appendix B). The proposed TCB-specific AMMs include the presence of a biological monitor, habitat avoidance during active season, seasonal avoidance during active roosting and mating, best practices for encounters with the TCB, and, to the maximum extent possible, tree removal restrictions to minimize impacts on the TCB.

Noise from the Proposed Action would negatively impact TCB in the action area. To account for potential noise impacts, the action area includes a 0.25-mile buffer extending from the project area (**Figure 5.6**). Heavy machinery and equipment that would be used for the Proposed Action, would be well maintained, have sound-control devices no less effective than those provided on the original equipment, and have muffled exhaust.

Other effects on TCB from the Proposed Action tree removal during the active season include potential injury or mortality of individuals or maternal colonies roosting in trees that are removed, especially pups that cannot fly. Individuals may be injured or killed while fleeing disturbance during daylight hours because of an increased likelihood of predation. If a roost tree were to be cut during the active season, if alternate roosts remain in the project vicinity, impacts associated with the loss of individual roost trees would include additional energy expended traveling to the alternate roost tree. However, removing a primary roost tree might disrupt colony cohesion, increase stress, and increase energy demands through searching for a new roost, which might decrease reproductive success. Effects on TCB from tree removal include loss of foraging, commuting, and roosting habitat. To minimize potential effects on TCB, all tree and vegetation removal would take place outside of the active season (i.e., trees would be minimized between March 26 and September 30 and not occur from May 1 through July 15), and any unnecessary tree removal would be minimized to reduce habitat loss caused by the Proposed Action. Habitat similar to the project area would remain adjacent to the project area as well as within the project area, represented by the 160-foot vegetative buffer that would remain between Cypress Creek and the stormwater detention basins. This could serve as potential habitat for displaced TCB if it were unoccupied. However, the project area of the Proposed Action contains a high density of bike paths and sees high levels of human activity. These disturbances likely deter TCB from inhabiting the project area. Although 26 acres of vegetation would be removed, nighttime foraging could continue in the 160-foot vegetative buffer that would remain between Cypress Creek and the stormwater detention basins as well as in vegetation between Cypress Creek and the access roads.

Implementation of the Proposed Action would result in a reduction of potential TCB roosting habitat within the action area, representing a permanent impact of approximately 26 acres and a temporary impact of 0.81 acres. However, the current habitat available to potential TCB is fragmented, sees high levels of human activity, and is impacted by urban noise, reducing its suitability as TCB habitat. Furthermore, similar habitat would remain available adjacent to the project area for potential TCB use. Additionally, it has been demonstrated that habitat availability is not a limiting factor for this

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species (Silvis et al. 2016), and white nose syndrome is the main threat to TCB (USFWS 2022b). The potential for injury or mortality of TCBs to result from the Proposed Action would be minimized through implementation of the general and species-specific AMMs described in **Section 7.3** (Appendix B). With the implementation of these measures, the potential for the Proposed Action to result in injury or mortality of TCBs would be negligible. The Proposed Action would have short-term, negligible, adverse impact on TCB and long-term negligible impact on TCB.

A formal conference with USFWS was completed on November 15, 2024; USFWS concurred that the project would not jeopardize the continued existence of the AST, and if the AST becomes listed before completing the Proposed Action, the Proposed Action would likely adversely affect the AST. USFWS also concurred that the project would not jeopardize the continued existence of the TCB, and if the TCB becomes listed before completing the Proposed Action, the Proposed Action would not likely adversely affect the TCB (Appendix B).

5.12. Cultural Resources

In accordance with Section 106 of the National Historic Preservation Act (NHPA), as amended and implemented by 36 CFR Part 800, FEMA must consider the potential effects of its actions upon cultural resources before engaging in any undertaking. The NHPA of 1966 defines a historic property as “any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on the National Register.” Eligibility criteria for listing a property on the National Register of Historic Places (NRHP) is detailed in 36 CFR Part 60.

Pursuant to 36 CFR 800.4(a)(1), the Area of Potential Effects (APE) is the geographic area(s) within which the undertaking may directly or indirectly affect cultural resources. Within the APE, effects to cultural resources are evaluated prior to the undertaking for both standing structures (aboveground resources) and archaeology (belowground resources). The APE for this undertaking consists of all areas of ground disturbance, including staging and access areas not on existing hardened surfaces. This consists of the area of ground disturbance associated with construction of the stormwater detention basins, comprising approximately 26 total acres that includes both the construction of the basin and the permanent access road as well as the ground disturbance associated with the temporary access road.

In February 2020, HCFCD initiated cultural resources studies of the project’s APE in compliance with the Antiquities Code of Texas (Texas Natural Resources Code, Title 9, Chapter 191) for the area proposed for Basin 1A and Basin 1B (not part of this undertaking). In February and March 2020, an intensive archaeological survey and deep testing study was completed within the portion of the APE that lies between Cypress Creek to the south and Cypresswood Drive to the north. No previously recorded archaeological sites, National Register-listed or eligible properties, or cemeteries were identified within the APE during background research, and the survey and testing did not identify any new archaeological sites within the APE. No further survey work was recommended within the current APE. On July 28, 2020, the Texas Historical Commission (THC) concurred with the recommendations.

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In September 2020, an archaeological deep testing study was conducted on the remaining portion of the APE, south of Cypress Creek, identified as Basin 2. Background research indicated that one previously recorded archaeological site, a Paleoindian site, lies within the APE. The site was recorded with two possible locations and the investigation excavated 25 trenches, none of which were positive for cultural materials. Monitoring during earth-moving activities near the potential site locations was recommended. On October 24, 2022, FEMA requested additional guidance from THC, which confirmed that monitoring of excavation activities would be warranted.

The following recommendations would be implemented during construction of the project:

- For all ground-disturbing activities occurring near the identified archaeological site, HCFCD must retain a Secretary of Interior Standards-qualified archaeologist to perform archaeological monitoring during these activities. If potential archaeological features or artifacts are observed, HCFCD would immediately cease construction in that area and notify Texas Division of Emergency Management (TDEM) and FEMA. FEMA would work with the THC Archaeology Division and federally recognized tribes with interests in the project area to develop a plan. An appropriate buffer radius would be placed around the identified area and no construction activities may resume in the buffer area until FEMA, in consultation with the THC Archaeology Division and federally recognized tribes with interests in the project area, has provided written notification to resume construction.
- Archaeological monitoring is not required on the remainder of the APE; however, should any artifacts be identified during construction, the same process will apply.
- At the completion of the archaeological monitoring, an archaeological monitoring report detailing the results of the effort will be prepared and submitted to FEMA.

On October 28, 2022, FEMA consulted with the THC and Native American Tribes with ancestral ties to Harris County, under Section 106 of the NHPA for the proposed undertaking. These Tribes included the Tonkawa Tribe of Indians of Oklahoma, the Comanche Nation, the Kiowa Tribe, and the Alabama-Coushatta Tribe of Texas. FEMA submitted its initial finding that the proposed undertaking would have no adverse effect on historic properties (Appendix B).

On November 23, 2022, the THC concurred with FEMA's recommendation that the project would have no adverse effect on historic resources within the project area. On November 2, 2022, the Comanche Nation concurred that the proposed project would not adversely affect traditional, religious, or culturally significant sites. The Kiowa Tribe, Tonkawa Tribe of Indians of Oklahoma, and Alabama-Coushatta Tribe of Texas did not provide comments within 30 days or declined to comment (Appendix B).

In October 2023, an addendum Cultural Resources Desktop Assessment for the T.C. Jester Basin project was completed for a previously unassessed area. This assessment focused on an expansion of the APE for a proposed temporary access road that connects Basin 2 to T.C. Jester Boulevard along the south bank of Cypress Creek. The assessment consisted of background research including a review of previously recorded archaeological sites and surveys, environmental factors, and historic

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resources. No archaeological survey or testing was completed. The proposed access road expands the APE by approximately 0.81 acres. The background research did not identify any previously recorded archaeological sites within or adjacent to the expanded portion of the APE. However, six previously identified prehistoric archaeological sites are located along Cypress Creek and within a 0.6-mile radius of the expanded APE. The expanded portion of the APE is within an area where surface surveys are recommended prior to ground disturbance. HCFCD consulted with THC on November 1, 2023, and received THC's response on November 28, 2023, that an archaeological survey should be conducted (Appendix B). HCFCD conducted and submitted an Intensive Level Cultural Resource Survey to THC on April 11, 2024. THC concurred with the findings of no historic properties affected on May 8, 2024 (Appendix B).

FEMA consulted with THC and Native American Tribes with ancestral ties to the project area on July 1, 2024, for the expanded APE that encompasses the temporary access road. These tribes included the Kiowa Tribe, the Tonkawa Tribe, the Comanche Nation, and the Alabama-Coushatta Tribe of Texas. FEMA submitted its initial finding of no historic properties affected.

On July 9, 2024, the THC concurred with FEMA's recommendation that the project would not affect historic properties within the project area. Consultation with the Kiowa Tribe, the Tonkawa Tribe, the Comanche Nation, and the Alabama-Coushatta Tribe of Texas was conducted according to 36 CFR §800.2(c)(2)(i)(B). On July 15, 2024, the Comanche Nation concurred that the proposed project would not adversely affect traditional, religious, or culturally significant sites. The Kiowa Tribe, Tonkawa Tribe of Indians of Oklahoma, and Alabama-Coushatta Tribe of Texas did not provide comments within 30 days or declined to comment (Appendix B).

5.12.1. NO ACTION ALTERNATIVE

Under the No Action alternative, there would be no effect on historic standing structures and archaeological sites from FEMA-funded grant activities. The THC concurred that there are no historic properties within the project APE; therefore, under the No Action alternative, flooding of Cypress Creek into the surrounding neighborhood during storm events would not affect cultural resources within the direct APE for the project. However, with no change to the flood elevations along Cypress Creek, flooding within the surrounding residential neighborhood and commercial properties along Cypress Creek and its tributaries beyond the APE would not be reduced. Residential and commercial properties along Cypress Creek and its tributaries would continue to flood resulting in repetitive damage to property and infrastructure, which may include above- and belowground cultural resources. In addition, the intensity and frequency of storms is increasing and severe rain events that result in flooding are also expected to increase in frequency and intensity, which would lead to more prolonged and damaging floods in the vicinity.

5.12.2. PROPOSED ACTION

FEMA's consultation had a finding of no historic properties affected within the direct APE with a recommendation that all ground disturbing activities that occur within the vicinity of the one

recorded archaeological site be monitored by a SOI-qualified archaeologist during those activities. Construction would have no effect on historic (standing) structures or known archaeological sites.

Construction of the stormwater basins would reduce flooding in the surrounding neighborhood along Cypress Creek where undocumented or unassessed cultural resources may be located. With reduced flood impacts, there could be minor to moderate, long-term, beneficial effects to historic structures and archaeological sites beyond the APE, because the surrounding area would no longer be exposed to flood damage and erosion during storm events.

5.13. Environmental Justice

Environmental justice (EJ) is defined by EO 12898 (59 Federal Register 7629) and CEQ guidance (1997). Under EO 12898, demographic information determines whether minority or low-income populations are present within the areas potentially affected by the range of project alternatives. EPA defines minority populations (people of color) as individuals who list their racial status as a race other than white alone and/or list their ethnicity as Hispanic or Latino (i.e., all people other than non-Hispanic white-alone individuals). Low-income populations are measured as households with an income that is less than or equal to twice the federal poverty level. If EJ populations are present, a determination must be made on whether implementation of the project alternatives may cause disproportionately high and adverse human health or environmental impacts on those populations.

The study area for this analysis includes the project area and the extent of potential project-related impacts, such as noise, transportation, and water and air quality impacts. Therefore, the study area for the EJ analysis includes the basin areas, access road, and the surrounding 0.1 mile around the project area. Although the Texas Environmental Justice Explorer tool was consulted during this evaluation (Texas Rising n.d.), it was determined that the EPA's EJ Screen tool provided the best available data since it enabled a more localized and accurate analysis to be performed using census block group data as opposed to census tract data. Thus, for the purposes of this analysis, EJ populations were identified using demographic indicators and EJ Indexes. The EJ Indexes combine environmental indicators with socioeconomic indicators to identify areas where there may be a disproportionate exposure to environmental pollution.

In accordance with the FEMA EO 12898, Environmental Justice: Interim Guidance for FEMA EHP Reviewers, EJ populations are defined as meeting either or both of the following criteria:

- Population within the project study area contains a minority or low-income population that is equal to or exceeds the 50th percentile compared to the average of the state where the affected environment is located.
- One or more Environmental Justice Index (e.g., air quality pollutants, traffic proximity and volume, proximity to hazardous waste sites) equals or exceeds the 80th percentile compared to the average of the state.

Table 5.5 and **Table 5.6** depict the demographic indicators and Environmental Justice Indexes for the study area and the state and identify if EJ populations are present based on the aforementioned criteria. Appendix C includes a complete EJ Screen report.

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As presented in **Table 5.5**, the low-income population in the affected environment exceeds the 50th percentile in the state. Additionally, one of the 13 EJ Indexes for the affected environment exceeds the 80th percentile in the state (Air Toxics Respiratory Hazard Index), as shown in **Table 5.6** (EPA 2023). These data indicate that the affected environment contains a low-income population as well as an EJ population that has a greater exposure to air toxics posing respiratory hazards than most other non-EJ populations within Texas. Therefore, an EJ population is expected to be present within 0.1 mile of the project area.

Table 5.5. Environmental Justice Demographics

Demographic Indicator	Percentage of Population	Percentile in State	EJ Population Present in Study Area
People of Color	44	37	No
Low Income	40	62	Yes

Source: EPA 2023

Note: Values in bold meet or exceed the criteria for identifying EJ populations.

Table 5.6. Environmental Justice Indexes

EJ Index	Percentile in State	EJ Population in Study Area
Particulate Matter	75	No
Ozone	73	No
Diesel Particulate Matter	67	No
Air Toxics Cancer Risk	67	No
Air Toxics Respiratory Hazard Index	87	Yes
Toxic Releases to Air	74	No
Traffic Proximity	67	No
Lead Paint	0	No
Superfund Proximity	67	No
Risk Management Plan Facility Proximity	65	No
Hazardous Waste Proximity	40	No
Underground Storage Tanks	63	No
Wastewater Discharge	74	No

Source: EPA 2023

Note: Values in bold meet or exceed the criteria for identifying EJ populations.

5.13.1. NO ACTION ALTERNATIVE

Under the No Action alternative, no construction related to flood reduction measures would occur that could result in impacts on EJ populations, such as noise or temporary reductions of air quality. However, this alternative would not reduce the risk of flooding in the project area and periodic flooding could lead to repetitive damage, resulting in repair costs that would disproportionately

impact EJ communities. Because the risk of flooding would not be reduced under this alternative, all populations, including EJ populations, near the project area would continue to be at risk of flooding. Flooding could result in the damage or loss of homes and property, which could place a disproportionate burden on low-income residents who are unlikely to have the same resources available to protect themselves and/or recover from flood events. Therefore, disproportionately high and adverse effects on EJ populations could occur over the long term, depending on the frequency and extent of flooding.

5.13.2. PROPOSED ACTION

Under the Proposed Action, no residential or commercial displacements would occur. However, temporary and localized impacts such as construction noise and temporarily reduced air quality, could impact populations near the work location, including nearby EJ populations. However, these temporary impacts are not expected to extend very far from where the proposed activities would be implemented. Therefore, although construction of the Proposed Action could result in minor, short-term impacts on EJ populations, these impacts on EJ populations would not be disproportionately high. In the long term, the risk of flooding would be reduced. The health and safety benefits of reduced flood risks would be applicable to all populations within and surrounding the project area, including EJ populations. Thus, the Proposed Action would have a minor, long-term benefit on EJ populations and would be consistent with the PR&G guiding principles on sustainable economic development and EJ.

5.14. Hazardous Materials

Hazardous materials are those substances defined by the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act, and the Toxic Substances Control Act. The Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA), which was further amended by the Hazardous and Solid Waste amendments, defines hazardous wastes. In general, both hazardous materials and waste include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, may present substantial danger to public health or to the environment when released or otherwise improperly managed.

Hazardous materials may be encountered during a project, or they may be generated by the project activities. To determine whether any hazardous waste facilities exist in the vicinity or upgradient of the proposed treatment area or whether there is a known and documented environmental issue or concern that could affect the proposed treatment area, a search for Superfund sites, toxic release inventory sites, industrial water dischargers, hazardous facilities or sites, and multiactivity sites was conducted using EPA's NEPAAssist website (EPA 2022c). The Phase I Environmental Site Assessment for the project area did not identify the presence of any hazardous substances or petroleum products or conditions that could pose a material threat of a future release to the environment (HCFCD 2021b). Several dump sites were identified in the project area that included discarded materials such as general litter, carpet, buckets, an empty 5-gallon bucket of fertilizer, plastic water containers, organic landscape materials, concrete, and plastic culverts (HCFCD 2021b).

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Four water dischargers are present within a 0.5-mile radius of the project area, including the Northwest Harris County Municipal Utility District (MUD) 20 Wastewater Treatment Plant, Spring Gully Creek Low Water Crossing, HCFCD Project K100-00-00-X084, and HCFCD Project K500-23-00-E001 (EPA 2022c). HCFCD Project K100-00-00-X084 is a project to restore channels of Cypress Creek and HCFCD Project K500-23-00-E001 is a project to construct stormwater detention basins adjacent to the Proposed Action. These three operators have obtained NPDES permits under the CWA to discharge pollutants into Waters of the United States for these four sites. Five sites regulated under RCRA are present within a 0.5-mile radius of the project area including Northgate Country Club, Dry Clean USA, CVS Pharmacy 5662, Collision Specialist Kuykendahl, and Chevron USA, Inc. (EPA 2022c). These facilities are inventoried under RCRA because of their role as generators, transporters, treaters, storers, or disposers of hazardous waste.

5.14.1. NO ACTION ALTERNATIVE

Under the No Action alternative, there would be no construction of flood reduction measures; therefore, there would be no short-term potential to generate construction-related hazardous materials or expose contaminated materials through ground-disturbing activities. However, periodic flooding could inundate streets and buildings that could contain hazardous substances, such as fuels and commercial and industrial chemicals (Brennan et al. 2021). As mentioned in **Section 5.6**, receding floodwaters could carry pollutants such as oil into Cypress Creek. Equipment used for flood-related repairs may also result in leaks of fuels and oils. Thus, there would be a minor, long-term, adverse impact from the continued risk of flooding and damage that could lead to the dispersal of hazardous materials.

5.14.2. PROPOSED ACTION

The Proposed Action would include the use of mechanical equipment, such as graders and excavators, which could release fuels, oils, and lubricants through inadvertent leaks and spills. Construction activities would be temporary, and the use of equipment in good condition and compliance with BMPs and conditions specified in the TCEQ Stormwater General Permit for Construction Activities permit would reduce the threat of leaks and spills. Although subsurface hazardous materials are not anticipated to be present, excavation activities could expose or otherwise affect previously undetected subsurface hazardous wastes or materials. Any hazardous materials discovered, generated, or used during implementation of the Proposed Action would be handled and disposed of in accordance with applicable local, state, and federal regulations. Therefore, there would be a negligible, short-term, adverse impact from the use of vehicles and equipment and from the potential for inadvertent exposure of previously unknown hazardous materials.

Post-construction, the Proposed Action would reduce the risk of flooding, thereby reducing the risk that pollutants and hazardous materials would be transported by floodwaters into Cypress Creek. Reduced flooding would also decrease the need for flood-related repairs that require construction equipment and the associated risk of leaks and spills of hazardous materials. Therefore, there would be a minor, long-term benefit related to hazardous materials from the reduced risk of flooding.

5.15. Noise

Sounds that disrupt normal activities or otherwise diminish the quality of the environment are considered noise. Noise events that occur during the night (10 p.m. to 7 a.m.) are more annoying than those that occur during normal waking hours (7 a.m. to 10 p.m.). Assessment of noise impacts includes the proximity of the Proposed Action to sensitive receptors. A sensitive receptor is defined as an area of frequent human use that would benefit from a lowered noise level. Typical sensitive receptors include residences, schools, churches, hospitals, nursing homes, and libraries. The closest noise-sensitive receptors to the project area include eight residential structures approximately 100 feet from the temporary access road at T.C. Jester Boulevard. Along Cypresswood Drive, there is a retirement community, an assisted living facility, and the edge of a residential neighborhood approximately 300 feet northwest of the project area, as well as a Montessori school approximately 650 feet north of the project area. The project area is in an unincorporated area of Harris County, in suburban Houston, and typical noise sources include cars, trucks, sirens, and construction noise.

The Federal Highway Administration (FHWA) identified noise levels and ranges for construction equipment that typically would not need noise attenuation measures (FHWA 2006) and Occupational Safety and Health Administration (OSHA) established thresholds for occupational noise exposure to protect the health and safety of workers (29 CFR 1926.52).

5.15.1. NO ACTION ALTERNATIVE

Under the No Action alternative, the project area would remain at risk of flooding, which could result in damage that must be repaired. Construction activities to repair flood damage would temporarily increase noise levels in the immediate vicinity of the work. The loudest equipment likely to be used would be bulldozers and excavators, which can produce noise levels up to 85 A-weighted decibels (dBA) when perceived from approximately 50 feet away (FWHA 2006). Repairs likely would be conducted during daytime hours when noise is less annoying. Repairs associated with each flood event would increase noise levels within the immediate vicinity of the work for the duration of construction. Thus, there would be a minor, long-term, adverse impact because the unabated risk of flooding would periodically generate associated construction noise from repairs.

5.15.2. PROPOSED ACTION

Under the Proposed Action, construction activities would temporarily increase noise levels in the project vicinity. Heavy machinery and equipment that would be used for the Proposed Action would be well maintained, have sound-control devices no less effective than those provided on the original equipment, and have muffled exhaust. Based on the type of construction equipment proposed for use (**Section 3.2**), construction noise would be expected to attenuate with distance to the background noise levels expected in an urban commercial/industrial area within 500 feet of the equipment. The typical construction equipment proposed for use would generate sound levels up to 85 dBA within 50 feet, with the sound levels decreasing with increasing distance. Therefore, the sound levels at the closest residences (approximately 100 feet away) would be below acceptable levels for daytime construction noise. Therefore, there would be a minor, short-term increase in noise levels during construction. Post-construction, noise levels would return to preconstruction levels and

the risk of flooding would be reduced, lessening occasional increases in noise from flood-related repairs. Therefore, the Proposed Action would have a negligible long-term benefit related to noise levels.

5.16. Transportation

Regional access to the project area is provided by Interstate Highway 45. The segment of Interstate Highway 45 near the project area has an annual average daily traffic count of 216,912 (Texas Department of Transportation 2022). Other main roadways in the project vicinity include Cypresswood Drive and T.C. Jester Boulevard, both of which would be used for access to the project area. Local roads, such as Ivy Falls Drive, also provide access to the project area.

The Metropolitan Transit Authority of Harris County provides transit service to the City of Houston and Harris County. Several bus routes operate to the south of the project area along Farm-to-Market Road 1960 (Metropolitan Transit Authority of Harris County 2022), but no transit stops are within or near the project area. No impact on this public service would be anticipated from any of the alternatives.

5.16.1. NO ACTION ALTERNATIVE

Under the No Action alternative, there would be no construction equipment or personnel accessing the project area. Therefore, there would be no short-term impact on transportation from construction-related traffic. However, flooding in the area would not be reduced. Continued flooding could inundate roadways, requiring road closures and detours. Therefore, the No Action alternative would have a minor, long-term, adverse impact on transportation in the project vicinity as a result of periodic flooding and associated detours and roadway closures.

5.16.2. PROPOSED ACTION

Under the Proposed Action, construction equipment and personnel would access the project area using existing roadways and a temporary access road, resulting in additional traffic on roadways surrounding the project area. Construction entrances to the project area would be on Cypresswood Drive and T.C. Jester Boulevard (**Figure 1.2**). Construction access entrances would be stabilized with granular fill over a geotextile layer and would have a maximum width of 50 feet. A temporary access road with a length of approximately 4,500 feet would be constructed from T.C. Jester Boulevard to Basin 2 (**Figure 1.2**). All staging areas would be within the project area and not on existing roadways (**Figure 1.2**). The Proposed Action would take approximately 24 months to construct. No roadway closures or detours are expected. Increases in traffic from construction equipment and personnel would be temporary and localized, affecting a small number of roadways. Therefore, there would be a negligible, short-term, adverse impact on transportation from construction-related traffic.

In the long term, the Proposed Action would result in a reduced risk of flooding, and resulting damage to, or closure of, transportation infrastructure would be reduced. By reducing the risk of flooding, the Proposed Action could also reduce the number of detours and road closures required during each flood event. Therefore, the Proposed Action would have a minor long-term benefit to

transportation in the project area and the vicinity from the reduced risk of closures and detours caused by flooding and flood damage.

5.17. Utilities and Public Services

Utility infrastructure located within and adjacent to the project area includes facilities for stormwater drainage and flood control, sanitary, electrical, gas, and telecommunications. A Louetta Road Utility District sanitary sewer force main and a Centerpoint Energy electric line run parallel to T.C. Jester Boulevard, east of the roadway. A gas pipeline operated by Sunoco Pipeline, L.P. and another gas pipeline operated by Explorer Pipeline Company run northwest to southeast through the project site. A third gas line operated by Kinder Morgan, Inc. bisects the site approximately 1,300 feet east of the previously mentioned pipelines. Three stormwater pipelines, operated by Sinclair, are within the project area. Three additional stormwater pipelines are adjacent to the project area limits on the south side of Cypress Creek. Comcast and AT&T telecom lines and a T-Mobile cell tower are on the northeast corner of the project area.

Most of the project area is heavily forested land with Cypress Creek bisecting the two proposed basins. Cypress Creek is also an important site for recreation. Recreational and subsistence fishing are popular along Cypress Creek (H-GAC 2021). Segment 2 of the Cypress Creek paddle route recommended by the Bayou Preservation Association extends through the project area from Kuykendahl Bridge to Mercer Arboretum (Bayou Preservation Association n.d.). Many of the parks in the Cypress Creek watershed are along Cypress Creek and are part of an effort to preserve a natural corridor along Cypress Creek and to connect a series of parks via the Cypress Creek Greenway Trail (Cypress Creek Cultural District n.d.-a). Immediately west of the project area is a network of unpaved multiuse trails that extends from Collins Park to T.C. Jester Boulevard to connect components of the Cypress Creek Cultural District. This trail network was established through a partnership between Harris County and the Greater Houston Off-Road Biking Association (GHORBA) (Cypress Creek Cultural District n.d.-a). This network of trails extends into the project area north of Cypress Creek, but there is no existing agreement with any group for the use of the project area property, and the trails in this area do not have any official sanction (HCFCD n.d.). There is also an existing Harris County Precinct 4 canoe launch on Cypress Creek near the T.C. Jester Boulevard bridge.

5.17.1. NO ACTION ALTERNATIVE

No construction would occur under the No Action alternative; therefore, this alternative would not disrupt or increase demand on public services or utilities in the project area in the short term. Under this alternative, the existing flood control facility HCFCD Unit K500-15-00 would remain in use, and the risk of flooding and flood-related impacts would not be reduced. As such, the No Action alternative would have a minor adverse impact on existing public utilities and services in the long-term, depending on the frequency and extent of flooding.

5.17.2. PROPOSED ACTION

The stormwater basins planned for north of Cypress Creek were split into two cells to avoid conflicts with existing utility infrastructure (Basin 1A under the Proposed Action and Basin 1B planned for future construction as funding is identified). The existing 66-inch stormwater outfall to Cypress Creek would be incorporated into Basin 1B. Other stormwater outfalls near the proposed basin footprint would discharge to the new Basin 1A.

Construction activities would not require temporary detours on roads adjacent to the project area because the work would be contained within the project area boundaries. Access to recreational features adjacent to the project area would be maintained during construction. Construction would result in the permanent closure of trails within the project area. HCFCD would notify GHORBA 30 days before construction begins. GHORBA is expected to remove all ad hoc bike trails and facilities such as ramps and bridges before construction. Any trail facilities remaining at the start of construction would be demolished. No interruptions to gas service provided by Sunoco Pipeline, L.P., Explorer Pipeline Company, or Kinder Morgan would be expected because of construction. Sanitary sewer service provided by Louetta Road Utility District would also not be expected to be disrupted because of construction. The Proposed Action would avoid relocation of the three gas pipelines, and no other utilities or public services would be disrupted or relocated during construction. Thus, the Proposed Action would have a negligible, short-term, adverse impact on public services and utilities as a result of construction.

Implementation of the Proposed Action would reduce the risk of flooding, thereby reducing the likelihood that public services and utility infrastructure in the benefit area would be damaged by flooding. Some of the existing network of multiuse trails within the project area likely would be removed permanently. A sponsor, such as a county precinct or utility district, would be required to create and maintain recreational features within the project area after construction (HCFCD 2019). HCFCD would be open to partnerships to develop recreational features on the property after construction of the Proposed Action (HCFCD n.d.). HCFCD has begun discussions with Harris County Precinct 4 about the potential for recreational facilities within the project area after the construction of the Proposed Action (HCFCD 2021b). Within Cypress Creek, the Proposed Action would not impact the existing aquatic recreational features and navigability. Therefore, the Proposed Action would have a negligible long-term benefit on public services and utilities from the reduced risk of flood-related damage. The permanent closure of off-road bike trails would result in a minor adverse impact on recreation.

5.18. Public Health and Safety

In 1997, President Clinton signed EO 13045, Protection of Children from Environmental Health Risks and Safety Risks, which mandates that federal agencies identify and assess health risks and safety risks that may disproportionately affect children. Public health and safety are also related to accessibility to police, fire, medical services, and the response times for those providers to reach people in need.

The project area is within Precinct 4 for police services. The project area is within Emergency Services District 11, which is the governing entity responsible for providing emergency medical services to the residents and visitors of the district. The project area is within Emergency Services District 16 for fire response services, with the Klein Fire Department Station 2 approximately 1.5 miles from the project site (Harris County 2022). The closest hospital, HCA Houston Healthcare Northwest, is 2.7 miles east of the project site. Vulnerable populations associated with a retirement home, an assisted living facility, a Montessori school, an adult daycare center, a primary school, and a learning center, are less than a mile from the project site boundary.

5.18.1. NO ACTION ALTERNATIVE

Under the No Action alternative, flooding would continue to result in road closures, which could increase emergency response times, cause power outages, and back up sewer lines, thus exposing people to health hazards. Because there would be no reduction in flood hazards, there would be a minor recurring adverse long-term impact on public health and safety from periodic flooding.

5.18.2. PROPOSED ACTION

Under the Proposed Action, all construction activities would be performed away from existing streets and roadways, which would minimize risks to safety and human health during construction. Qualified construction personnel trained in the proper use of equipment, including all safety precautions, would conduct the work. Additionally, all activities would be conducted in accordance with the standards specified in the OSHA regulations. Therefore, the Proposed Action would have negligible, short-term, adverse impacts on public safety in the project area, and these impacts would not disproportionately impact children.

Implementation of the Proposed Action would reduce damage sustained by adjacent residential and commercial areas from future repetitive flood events and would assist in managing downstream water rise during storm events. Construction of the basin would not require street closures that could increase emergency response times, nor would it require additional police or emergency vehicle presence. Post-construction, the Proposed Action would reduce the risk of flooding and associated public health and safety concerns such as the rerouting of emergency vehicles around flooded areas, backup of combined sewer systems, and other health hazards from flooding. A moderate, long-term, beneficial impact would result from the reduced risk of flooding and associated public health and safety concerns. Therefore, the Proposed Action would result in major long-term benefits to the safety and security of residents, including children, and property in and around the project, which would be consistent with the conceptual model for ecosystem services and PR&G guiding principles on public safety (**Table 5.2**).

Because the wet-bottom basin and channel could be a potential hazard for animals or children, mitigation measures that include signage or fencing to restrict entrance into the basin would be recommended.

5.19. Summary of Effects and Mitigation

Table 5.7 provides a summary of the potential environmental effects from implementation of the Proposed Action, any required agency coordination or permits, and any applicable proposed mitigation or BMPs.

5.20. PR&G Impact Analysis Summary

The Federal Objective specifies that federal water resources investments will reflect national priorities, encourage economic development, and protect the environment by seeking to maximize sustainable economic development, seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used, and protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems. **Table 5.8** provides a summary of alternatives considered and their associated environmental and social effects.

Affected Environment, Potential Impacts, and Mitigation

Table 5.7. Summary of Impacts and Mitigation

Affected Resource Area	Potential Impacts	Agency Coordination or Permits	Mitigation/BMPs
Soils and Topography	No adverse impact on topography and minor, short-term, adverse impact on soils. However, there could be minor long-term benefits for soils and a minor, long-term, adverse impact on slope stability and erosion.	N/A	<ul style="list-style-type: none"> • Temporarily control erosion including silt fencing. • Temporarily control sediment runoff and dust. • Regular monitor slope stability during operations.
Air Quality	There would be temporary, short-term, adverse impacts due to construction activities; no long-term impact is anticipated.	N/A	<ul style="list-style-type: none"> • Minimize run times of construction equipment and vehicles. • Control dust using wet exposed soils. • Meet EPA construction equipment emissions standards.
Surface Waters and Water Quality	Negligible, short-term, adverse impact due to construction site preparation and excavation. Minor long-term benefit from water quality treatment provided by basins and flood reduction.	N/A TCEQ Stormwater General Permit	<ul style="list-style-type: none"> • Temporarily control erosion including silt fencing. • Temporarily control sediment runoff and dust.
Wetlands	Negligible, short- and long-term, adverse impacts due to 0.09 acres of permanent wetland loss and 0.04 acres temporary wetland impacts. Purchase of wetland credits from an existing mitigation bank would result in no net loss.	USACE Permit	<ul style="list-style-type: none"> • Temporarily control erosion measures including silt fencing. • Purchase wetland mitigation credit. • Reintroduce native species to minimize the spread of invasive species.
Floodplains	Negligible short-term impacts and no long-term adverse impact. There would be a moderate, long-term, beneficial effect.	Permit from local floodplain administrator	<ul style="list-style-type: none"> • Implement stormwater BMPs and SWPPP. • Obtain and comply with floodplain permit

Affected Environment, Potential Impacts, and Mitigation

Affected Resource Area	Potential Impacts	Agency Coordination or Permits	Mitigation/BMPs
Vegetation	Moderate, short-term, adverse impact due to vegetation removal and loss of forest cover. Minor long-term adverse impact because of permanent vegetation removal for basins. However, long-term, minor, beneficial impact from the removal of invasive plant species, reestablishment of native plant species, and flood reduction, reducing invasive vegetation spread.	N/A	<ul style="list-style-type: none"> • Reintroduce native species to minimize the spread of invasive species.
Fish and Wildlife (including migratory birds)	Minor, short-term, adverse impact on wildlife and migratory birds from vegetation/habitat removal, construction noise, and dust; negligible short-term impact on eagles. Minor, long-term, adverse impact attributed to permanent upland and wetland forested habitat. Minor, long-term, beneficial impact to aquatic species through water quality improvement and flood reduction.	N/A	<ul style="list-style-type: none"> • Implement measures to maintain wildlife habitat features after construction of basins, as described in Section 5.10, to the maximum extent practicable. • Maintain 160-foot-wide habitat buffer between basins and Cypress Creek. • Schedule tree removal to occur outside of nesting seasons (i.e., October 1 to March 31). • Avoid bird nests and buffer around occupied nests.
Threatened and Endangered Species	FEMA has determined the proposed action may affect and is likely to adversely affect the AST and may affect but is not likely to adversely affect the TCB.	USFWS Formal Conference	<ul style="list-style-type: none"> • Conduct preconstruction surveys. • Avoid seasonal nesting schedules. • Install wildlife exclusion fencing. • Prevent entrapment. • Use best practices when encountering AST. • Provide environmental awareness training for the AST. • Practice erosion control measures where suitable AST aquatic habitat is present. • Implement seasonal restrictions on tree removal.

Affected Environment, Potential Impacts, and Mitigation

Affected Resource Area	Potential Impacts	Agency Coordination or Permits	Mitigation/BMPs
Cultural Resources	No adverse effect on historic properties within the APE. Minor to major, long-term, beneficial effects beyond the APE, because the area surrounding the basin would experience less flooding and erosion during storm events.	THC, Alabama-Coushatta Tribe of Texas, Comanche Nation, Kiowa Tribe, Tonkawa Tribe of Indians of Oklahoma	<ul style="list-style-type: none"> • Implement required monitoring for all ground-disturbing activities in the area of identified archaeological site. • If any archaeological resources are discovered during project implementation, cease work immediately, secure the area. HCFCD would notify the State Historic Preservation Office (SHPO) and FEMA for further evaluation.
Environmental Justice	No disproportionately high and adverse impacts would occur to EJ populations near the project area. Minor long-term benefits from the reduction of flood risk on EJ populations.	N/A	<ul style="list-style-type: none"> • Minimize run times of construction equipment and vehicles. • Wet exposed soils to control dust. • Meet EPA construction equipment emission standards.
Hazardous Materials	Negligible short-term impact due to construction and inadvertent exposure. Minor long-term benefit from reduction of flooding.	TCEQ Stormwater General Permit	<ul style="list-style-type: none"> • Comply with BMPs specified in TCEQ Stormwater General Permit for Construction Activities.
Noise	Minor short-term increase in noise levels during construction and negligible, long-term, beneficial impact on noise levels from reduction in periodic flood repairs.	N/A	N/A
Transportation	Negligible short-term impact due to construction. Minor long-term benefit due to reduction of flooding and flood-related detours and closures.	N/A	N/A

Affected Environment, Potential Impacts, and Mitigation

Affected Resource Area	Potential Impacts	Agency Coordination or Permits	Mitigation/BMPs
Utilities and Public Services	Negligible short-term impact on public services and utilities because of construction activity and a negligible long-term benefit on public services and utilities from the reduced risk of flood-related damage in the project area. Minor adverse impact on recreation from the closure of off-road bike trails.	N/A	N/A
Public Health and Safety	Negligible, short-term, adverse impact. Moderate, long-term, beneficial impact from reduced risk of flooding with major long-term benefit to associated public health and safety and security of residents and property.	N/A	Use recommended permanent signage or fencing to restrict entrance into the basin.

Affected Environment, Potential Impacts, and Mitigation

Table 5.8. Summary of Alternatives Considered and Their Associated Environmental and Social Effects

Parameter	No Action Alternative	Build Alternative 2 (Proposed Action)
Wetland and Wildlife Habitat Impacts (Acres)	0	26 acres of permanent reduction of vegetation 1 acre of temporary reduction of vegetation Offset of 160-foot-wide forested buffer and 9.8 acres of restored sandy soils (mitigation area)
Floodplain Impacts (no. properties removed from 500-yr floodplain)	0	44 properties
Floodplain Impacts (no. properties removed from 100-year floodplain)	0	30 properties
Cost of Property Damage (estimated structural value)	\$465,352,821	\$0
Public Safety and Wellbeing	Moderate Negative	Moderate benefit (critical services will be protected)
Total Waters of U.S. Impacts	0	Low
Tree Canopy Impacts	0	High
Recreation Opportunity Space Benefit	0	Low
Summary of Impacts	0	Minor

Table 5.9 provides a summary of the potential impacts on ecosystem services from and their linked societal benefits.

Affected Environment, Potential Impacts, and Mitigation

Table 5.9. PR&G Principles for the No Action and Proposed Action Impacts

PR&G Principles	No Action Alternative	Stormwater Detention Basin Alternative (Proposed Action)
Healthy and Resilient Ecosystems	No change to the baseline would occur; ecosystems in and near the project area would continue to experience periodic inland flooding associated with severe storm events.	The Proposed Action would provide flood control attenuation and water purification quality treatment services for the ecosystem.
Sustainable Economic Development	Homes and businesses in the project vicinity would continue to flood during large storm events and require funds to repair damage caused by flooding.	The construction of the proposed detention basins would remove 30 structures from the 100-year floodplain and 44 structures from the 500-year floodplain in the immediate area, reducing the amount of future spending required to repair flood damage. Further analysis indicates that these basins combined with detention sites already owned by Harris County would remove 1,590 structures from the floodplain, of which 1,095 have been previously flooded, for an estimated structural value of \$465,352,821.
Floodplains	Existing floodplains in the project area would be maintained, but the project benefit area would continue to be subject to periodic flooding and flood damage.	Approximately 206 acre-feet of storage would be created, reducing water surface elevations within the project area during storm events and increasing the floodplain's capacity and function.
Public Safety	Public safety in and near the project area would continue to be threatened by flooding.	Improved public safety resulting from a reduction in flood risks, a reduction of possible pollutants and hazardous materials that could be transported by floodwaters into Cypress Creek, and a reduction in the likelihood that public services in the benefit area would be damaged by flooding.
Environmental Justice	Continued risk of flooding in the project area has the potential for disproportionately high and adverse impacts on low-income communities, because they are unlikely to have the same resources available to recover from flood damage compared to other populations.	No disproportionately high and adverse impacts on low-income populations. Flood damage reduction benefits are expected to be proportional to all residents in the area. Residents were engaged during project scoping meetings, and tribes with interest in the area were consulted and did not raise any concerns.

Affected Environment, Potential Impacts, and Mitigation

PR&G Principles	No Action Alternative	Stormwater Detention Basin Alternative (Proposed Action)
<p>Watershed Approach</p>	<p>There would be a continued lack of adequate stormwater conveyance and drainage capacity on the tributaries because of water backing up from a rising Cypress Creek and would have the potential for future sustained flooding in the surrounding areas.</p>	<p>The proposed detention basins along Cypress Creek are expected to provide flood risk reduction both along the Cypress Creek area where the basins are located but also upstream in its tributaries because the tributary watersheds have no undeveloped areas for the creation of large regional basins. The Proposed Action provides 2 of the 23 stormwater detention sites recommended to reduce flooding across the Cypress Creek watershed.</p>

SECTION 6. Cumulative Impacts

This section addresses the potential cumulative impacts associated with the implementation of the Proposed Action. Cumulative effects 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 other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.1). CEQ’s regulations for implementing NEPA require an assessment of cumulative effects during the decision-making process for federal projects.

In addition to NEPA, other statutes require federal agencies to consider cumulative effects. These include the CWA Section 404(b)(1) guidelines, the regulations implementing the conformity provisions of the Clean Air Act, the regulations implementing Section 106 of the NHPA, and the regulations implementing Section 7 of the ESA.

The Proposed Action and other flood reduction projects are ongoing or planned as part of the Cypress Creek Watershed Program (the Program) and Implementation Plan. The Implementation Plan recommends the construction of stormwater detention basins at 23 different sites within the Cypress Creek watershed upstream and downstream of the Proposed Action. These stormwater detention basin sites are prioritized into Tier 1, Tier 2, and Tier 3 groups. Tier 1 basins, including the Proposed Action, are currently proceeding with development; Tier 2 basins would be developed as funding and other opportunities arise; and Tier 3 basins require further study. It is expected to take approximately 10 years to complete implementation of the projects as funding becomes available and land acquisitions are completed (HCFCD 2021a).

One of the flood reduction projects identified in the Implementation Plan is the planned wet-bottom Basin 1B that would be located adjacent to the Proposed Action Basin 1A. Basin 1B is not proposed for funding under the FEMA Proposed Action, and it has both an independent utility and can be permitted as a standalone project. This is because the basin design includes both inflow and outflow structures independent of Basin 1A (HCFCD 2022b). Basin 1B would provide detention of stormwater during a flood event and would contribute to a reduction in the overall flood hazards identified in the Implementation Plan. Currently, Basin 1B is expected to be funded by state community directed funding under the CDBG-MIT funding (HCFCD. 2024) along with funding from a local bond program. While funding is not yet secured for construction of Basin 1B, construction is reasonably foreseeable. Basin 1B would not have cumulative construction impacts because it would be constructed at a different time than Basin 1A and Basin 2. The construction and design of Basin 1B would incorporate many of the same BMPs and AMMs that have been described in this EA to reduce potential impacts on the natural and human environment from construction and operation of the basin. The addition of Basin 1B would result in a cumulative reduction of flood hazards and contribute toward meeting the flood management goals of the Implementation Plan.

Other stormwater detention basin projects described in the Implementation Plan would have similar environmental impacts as those described for the Proposed Action. These impacts include short-

term minor construction-related impacts on water quality, fish and wildlife, and transportation and minor long-term benefits to soils, fish and wildlife, hazardous materials, transportation, and public health and safety. Construction-related impacts generally would not be cumulative because they would occur at different times in different parts of the watershed. The Implementation Plan would result in a long-term net cumulative benefit by incrementally reducing the potential for flood damage to property with each new project. Therefore, there would be a long-term cumulative benefit from the construction and operation of other stormwater detention basins under the Implementation Plan.

SECTION 7. Agency Coordination, Public Involvement, and Permits

This section provides a summary of the agency coordination efforts and the public involvement process for the proposed T.C. Jester Stormwater Detention Basin project. In addition, an overview of the permits that would be required under the Proposed Action is included.

7.1. Agency Coordination

Section 7(a)(2) of the ESA requires the lead federal agency to consult with either the USFWS or the NMFS, depending on which agency has jurisdiction over the federally listed species. When a federally funded project may have the potential to adversely affect a federally listed species, or a federal action occurs within or may have the potential to impact designated critical habitat, FEMA would consult with USFWS if there is the potential to adversely affect federally listed species. FEMA conferenced with USFWS on potential effects to species proposed for listing and concluded that the Proposed Action would not result in jeopardy to the species. On November 15, 2024, USFWS agreed with the determinations. If the species are listed before the Proposed Action is completed, FEMA determined that the project would “likely adversely affect” the federally proposed threatened AST and would “not likely adversely affect” the federally proposed endangered TCB.

FEMA consulted with THC and Native American Tribes with ancestral ties to Harris County, under Section 106 of the NHPA for the construction of the stormwater basins. These tribes included the Tonkawa Tribe of Indians of Oklahoma, Comanche Nation, Kiowa Tribe, and Alabama-Coushatta Tribe of Texas. FEMA submitted its initial finding that the Proposed Action would have “No Effect” on historic properties to all parties on October 28, 2022. On November 23, 2022, the THC concurred that the project would have no effect on the historic resources within the project area. On November 2, 2022, the Comanche Nation concurred that the proposed project would not adversely affect traditional, religious, or culturally significant sites. The Kiowa Tribe, Tonkawa Tribe, and Alabama-Coushatta Tribe of Texas did not provide comments within 30 days or declined to comment. A second consultation was conducted with THC and Native American Tribes for an expanded APE that included a new temporary access road to Basin 2. FEMA submitted the finding of No Historic Properties Affected on July 1, 2024, to all identified parties. On July 9, 2024, the THC concurred that the Proposed Action would not affect historic properties. On July 15, 2023, the Comanche Nation concurred that the proposed project would not adversely affect traditional, religious, or culturally significant sites. The Kiowa Tribe, Tonkawa Tribe, and Alabama-Coushatta Tribe of Texas did not provide comments within 30 days or declined to comment.

7.2. Public Participation

HCFCDD seeks to provide transparent and meaningful project engagement for all members of affected communities by holding community engagement meetings near the beginning of project development to solicit public comments. These meetings are typically held virtually and outside of standard work hours to increase the likelihood that all community members can attend (HCFCDD

2022c). HCFCD held a public information session in September 2020 to discuss this project, and a virtual community engagement meeting was held for this project on June 16, 2021 (HCFCD 2022c).

In accordance with NEPA, this draft EA would be released to the public for a 30-day public review and comment period (Appendix D). Comments on this draft EA would be incorporated into the final EA, as appropriate. This draft EA reflects the evaluation and assessment of the federal government, the decision-maker for the federal action; however, FEMA would take into consideration any substantive comments received during the public review period to inform the final decision regarding grant approval and project implementation. If no substantive comments are received from the public or agency reviewers, this draft EA would be assumed to be final and a FONSI would be issued by FEMA.

HCFCD applied for U.S. Department of Housing and Urban Development Community Development Block Grant – Mitigation funds received by the State of Texas. The Texas General Land Office is the designated administer for the grant funds. Extensive public engagement has been pursued for The Implementation Program as well as project specific public engagement opportunities. The public comment period for the Community Development Block Grant application was open from October 3 through October 16, 2020. HCFCD presented the Proposed Action at a public information session on September 22, 2020. A virtual community engagement meeting facilitated by the HCFCD was conducted on June 16, 2021, specifically for the Proposed Action. In addition, a virtual community engagement meeting facilitated by HCFCD was held on March 9, 2022, to solicit additional public comment about the entire Implementation Program.

The HCFCD would make the draft EA available on its website at <https://www.hcfcd.org/Activity/Active-Projects/Cypress-Creek/TC-Jester-Stormwater-Detention-Basin-K500-23-00>. The draft EA also would be available on FEMA's website at <https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa-repository>. Hard copies of the draft EA would be made available at the HCFCD Brookhollow Building, 9900 Northwest Freeway, Houston, TX 77092, from 8:00 a.m. to 5:00 p.m. and requested from Dorothy Cook, FEMA Region 6, email: dorothy.cook@fema.dhs.gov. The comment period for the draft EA would start when the public notice of EA availability is published and would extend for 30 days. Comments on the draft EA may be submitted by email to dorothy.cook@fema.dhs.gov (include "T.C. Jester Stormwater Detention Basins" in the subject line). Comments also may be submitted via mail to Dorothy Cook, Senior Environmental Protection Specialist, FEMA Region 6, 800 N Loop 288, Denton, TX 76209.

7.3. Best Management Practices, Mitigation Measures, and Permits

The following are standard BMPs, mitigation measures, and conditions applicable to the Proposed Action:

- Any change to the approved scope of work will require re-evaluation for compliance with NEPA and other Laws and Executive Orders.
- This review does not address all federal, state and local requirements. Acceptance of federal funding requires recipient to comply with all federal, state and local laws. Failure to obtain all

appropriate federal, state and local environmental permits and clearances may jeopardize federal funding.

- If ground disturbing activities occur during construction, applicant will monitor ground disturbance and if any potential archeological resources are discovered, will immediately cease construction in that area and notify the State and FEMA.

The following specific conditions are also applicable to the Proposed Action:

- Areas of exposed soils will be kept wet or covered to reduce fugitive dust.
- All construction equipment will meet current EPA emissions standards.
- HCFCD must implement a Stormwater Pollution Prevention Plan (SWPPP) that includes erosion and sediment control practices and best management practices (BMPs) in accordance with the TCEQ Stormwater General Permit for Construction Activities.
- HCFCD is responsible for coordinating with and obtaining any required Section 404 Permit(s) from the United States Army Corps of Engineers (USACE) and/or any Section 401/402 Permit(s) from the State prior to initiating work. The applicant must comply with all conditions of the required permit(s), including any mitigation for loss of jurisdictional wetlands. All coordination pertaining to these activities should be retained as part of the project file in accordance with the respective grant program instructions.
- HCFCD is required to coordinate with the local floodplain administrator and obtain required permits prior to initiating work, including any necessary certifications that encroachments within the adopted regulatory floodway would not result in any increase in flood levels within the community during the occurrence of the base flood discharge. Applicant must comply with any conditions of the permit and all coordination pertaining to these activities should be retained as part of the project file in accordance with the respective grant program instructions.
- General AMMs must be implemented, including:
 - AMM 1 Erosion and Sediment Control Measures: Silt fencing made of woven non-monofilament geotextile fabric will be installed along the perimeter of active construction areas to minimize erosion and sedimentation into the aquatic environment. Silt fence installation will be installed such that it is buried to a depth of 6 in (0.15 m) and has a height of 24 in (0.61 m). Silt fencing in flood prone areas will be removed when a major storm event is anticipated but will be replaced after the storm passes. The biological monitor (AST AMM 1, BA Subsection 2.5.2) will inspect the silt fencing for trapped wildlife before construction begins each day. Hydro-mulching and hydro-seeding will be used for final site stabilization. The hydro-mulch used will not contain microplastics.
 - AMM 2 Bank Stabilization: After riprap is installed to stabilize stream banks beneath the proposed detention basin outfalls, the riprap will be covered with the native soil material displaced during the installation activities.

- AMM 3 Bird Nest Avoidance: A bird nest survey will be conducted within 5 days of any vegetation disturbance, regardless of time of year. Any nests found, will receive a species-specific buffer, biweekly monitoring, and be avoided until the nest is no longer occupied.
- AMM 4 Rain Event Limitations: Construction activities will not occur when there a rain event that releases more than 2 inches of precipitation over a 24-hour period at which point construction may resume.
- AMM 5 Environmental Awareness Training: Employees and contractors, with the exception of truck drivers, will be provided with environmental awareness training by a qualified biologist. This training will familiarize personnel with the species and their habitats that may occur on-site, measures to be implemented to protect this species, and project boundaries. Because truck drivers change daily, it is impracticable to ensure all truck drivers are provided with this training. Therefore, the use of disposal material trucks within 160 ft (48.8 m) of Cypress Creek will be prohibited. Signage will be posted on-site, and plans will identify where signs will be placed for truck exclusion areas.
- AST AMMs must be implemented, including:
 - AST AMM 1 Biological Monitor: A permitted biological monitor (e.g. authorized TPWD scientific collection permit for AST and Service Section 10 permit if the species is listed) will be on-site during all activities that may result in encounters with ASTs (e.g., during any clearing or construction work within 656 ft (200 m) of Cypress Creek if work starts prior to installation of wildlife exclusion fencing and within 200 ft (61 m) for work starting after installation of the exclusion fence (AST AMM 4). The biological monitor will be responsible for surveys to look for adults, juveniles, hatchlings, and nests prior to initiating mechanical removal of woody and brush vegetation. They will also be responsible for inspecting exclusion fencing or any open trenches daily to ensure that the fence is not compromised or breached, and no turtles are entangled or trapped in fences or open trenches.
 - The biological monitor will also be responsible for surveying any in water work areas prior to construction. The biological monitor should first survey the submerged areas visually for AST surfacing for normal respiration (once every 20 to 60 minutes).
 - The applicant will provide pre-construction education and training of construction crews by providing educational materials developed by the biological monitor on the identification of AST and avoidance requirements of this conference opinion or biological opinion (if listed) during construction activities.
 - AST AMM 2 Habitat Avoidance: Construction personnel will be directed to avoid impacts on logs, cutbanks, root balls, and similar in-water structural features typically used by AST for cover. If avoidance is not feasible, existing in-water structural features will be removed temporarily and relocated as near as possible to where the in-water structure originated during post construction activities. The on-site permitted biological monitor will

- advise construction personnel of structures to avoid impacts to the in-water structure and where to relocate any in-water structural features that cannot be avoided.
- AST AMM 3 Seasonal Avoidance: Construction activities within 200 ft (61 m) of the water's edge where exclusion fencing is installed will be avoided during the peak AST nesting and breeding season (i.e., April 1 through June 30).
 - AST AMM 4 Wildlife Entrapment Prevention: Wildlife exclusion fencing will be installed along the outer edge of the 160-ft-wide (48.8-m-wide) forested buffer (the edge closest to the proposed construction within AST nesting habitat), in the water directly adjacent to where shoreline protection is being installed, and around the perimeter of any open trenches to prevent AST from entering construction areas. Trench walls will be excavated at 30-degree angles to allow AST or other animals to escape if they enter the trench. Wildlife exclusion fencing will consist of 16-ft (4.9-m) by 4-ft (1.2-m) feedlot panels with 4-in (0.1-m) by 4-in (0.1-m) openings made of 4 to 14.5-gauge galvanized wire, or similar materials that won't collapse, and do not have the potential to entangle wildlife. Fence posts (4 ft (1.2 m) tall) will be installed at 6-ft (0.15-m) intervals to support and secure the fencing. The fencing will be buried 1-ft (0.3-m) deep so that the above ground portion is 3-ft (0.9 m) high. This type of exclusion fence must be inspected daily to ensure that it is not compromised or breached. Any necessary exclusion fence repairs or replacements will be made immediately. The on-site permitted biological monitor will inspect exclusion fences and open trenches daily for trapped wildlife before construction can begin each day (details are included in BA, Section 2.5.1).
 - AST AMM 5 Encounters with the Species: Each encounter with an AST will be treated on a case-by-case basis. If an AST is found, the following will apply:
 - If an AST is detected within 200 ft (61 m) of work activities in the action area (terrestrial or aquatic environments) that may result in the harm, injury, or death to the animal, all work activities will cease immediately, and the on-site permitted biological monitor will be notified immediately. The permitted biological monitor will then notify TPWD and USFWS before taking any action.
 - Based on the professional judgment of the permitted biological monitor, if project activities can be conducted without harming or injuring the AST, the individual maybe left at the location of discovery and monitored by the biological monitor until AST moves out of the action area. All project personnel will be notified of the finding and at no time will work occur within 200 ft (61 m) of an AST without the biological monitor being present.
 - Based on the professional judgment of the permitted biological monitor, if project activities cannot be conducted without harming or injuring the AST, all work will cease until the AST leaves the area (e.g., turtle crawls back to the water and swims at least 200 ft (61 m) away from construction activities. Under no circumstances should the AST or other wildlife be harmed or harassed (e.g., herded back into water) by construction crews or the permitted biological monitor.

- If an AST is observed or found within the construction area that will not leave on its own accord within 4 hours of detection, then the permitted biological monitor will notify TPWD's Kelly Norrid at 281-908-3569, to provide guidance or assist on the individual's capture and arrangements for release at a designated relocation site within the Cypress Creek watershed.
- AST that are captured during construction activities will be detained individually in a large plastic or similar container, with at least 3 in (0.08 m) of water and covered with branches or vegetation to calm it until relocation to a designated holding site or release site is arranged. If project work takes place in the summer temperatures above 80 °F (26.6 °C) or winter temperatures below 60 °F (15.6 °C), the turtle will be kept in a shaded or protected area to avoid overheating or exposure to elements. AST may not be handled or detained on site without a permitted biological monitor present. AST may not be stored in vehicles or closed containers. If more than one AST is detained during construction, then AST relocations may need to occur at a frequency greater than once per day.
- AST AMM 6 Site Restrictions: The following site restrictions will be implemented to avoid or minimize effects on the AST:
 - Trash, food, food containers, and food waste will be secured at all times by individual workers or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.
- AST AMM 7 Habitat Restoration: The applicant will restore 9.8 ac (0.04 km²) of AST nesting habitat within the detention basins and restore all temporary roads and workspaces to former AST nesting habitat.
- TCB AMMs including:
 - AMM-1 TCB Roosting and Foraging Habitat: All operators, employees, and contractors (with the exception of truck drivers) working in the project area for more than 1 day, including access roads and staging areas, will be educated on TCB and informed of all applicable AMMs.
 - AMM-2 TCB Tree Removal: Only the number of trees necessary to implement project construction activities safely would be removed during all phases/aspects of the project (e.g., basins, access road alignments, temporary work areas, etc.).
 - AMM-3 TCB Tree Removal: Tree clearing will not occur during pupping season (May 1 through July 15) when juveniles cannot fly.
 - AMM-4 TCB Tree Removal: Tree removal activities within TCB suitable habitat or travel corridors will be timed to avoid summer occupancy season (March 15 through July 15) when bats are present and roosting in trees on their summer home range and/or roosting in colonies. If tree removal must occur during the summer occupancy season, a pre-construction acoustic survey, using Service recommended protocols, will be

- conducted by a qualified biologist to identify maternal roosts potentially containing flightless pups, at least one month prior to the proposed tree removal action. If a maternal roost is identified, no trees may be removed within 1,000 ft (305 m) of the roost tree for a period of four weeks, or if a subsequent acoustic survey confirms that all pups have left the maternal roost.
- AMM-5 TCB Tree Removal: Tree removal will be limited to the areas specified in project plans and clearing limits will be marked in the field (e.g., install brightly colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits). All contractor personnel will be directed to stay out of exclusion areas.
 - AMM-6 TCB Culvert Removal or Replacement: Prior to any project related culvert modification, a culvert survey using Service recommended survey protocols for culvert surveys (USFWS 2024b, Appendix K) would be conducted by a qualified biologist to identify the presence or absence of hibernating or roosting TCBs. If TCB are found within the culvert then the culvert is being used for winter torpor, or the culvert is being used as an incidental roost site by bats outside of torpor periods. If TCB are positively identified during a culvert survey assessment or if species identification cannot be verified at a culvert with evidence of use, the applicant will coordinate with TCCPESFO within 24 hours to determine next steps. For other species of bat identified, the applicant will coordinate with the appropriate state agency (Texas Parks and Wildlife Department (TPWD)). If TCB are found in the culvert during winter season (December 15 through February 15), then culvert removal or replacement activities will be delayed until the applicant conducts subsequent surveys and provides evidence that no bats are present prior to commencing construction activities; and the qualified biologist will continue to monitor the culvert for TCB until the replacement or removal operation is complete. The applicant will not exclude TCB from roosting in existing culverts in the action area.
 - AMM-7 TCB Stop Work Order: Within the portion of TCB range where bats remain active year-round and continue to roost in trees during the winter, and where mean winter temperatures fall below 40 °F (4.4 °C) for three (3) consecutive days between December 15 and February 15, the tree clearing activities will immediately halt until temperatures reach above 40 °F and remain above 40 °F (4.4 °C) for a 24-hour period after the initial temperature drop.
 - HCFCD shall immediately contact the Service's Texas Coastal and Central Plains Ecological Services Field Office (TCCPESFO) at 281-282-8282 to report direct encounters between the TCB and AST and project workers and their equipment whereby incidental take in the form of harassment, wounding, or killing occurs. If the encounter occurs after normal working hours, HCFCD shall contact the TCCPESFO at the earliest possible opportunity by the next working day. When injured or killed individuals of the species are found in the proposed project area, HCFCD shall also follow the steps outlined in the Salvage and Disposition of Individuals section below.
 - For those components of the action that will require the capture and relocation of any listed species, HCFCD shall immediately contact the TCCPESFO at 281-286-8282 to report the

action. If capture and relocation occur after normal working hours, HCFCD shall contact the TCCPESFO at the earliest possible opportunity by the next working day to report the action.

- Care should be taken in handling sick or injured specimens to ensure effective treatment and care or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured specimens or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Service Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed (follow the steps outlined in the Salvage and Disposition of Individuals section below).
- Upon completion of construction, a post-activity report will be prepared by HCFCD and sent to FEMA, who will forward to the Field Supervisor of the TCCPESFO within 60 calendar days. This report shall detail:
 - Dates project activities occurred.
 - Pertinent information concerning the completion of and success in implementing the conservation measures.
 - An explanation of failure to meet such measures, if any.
 - Occurrences of species covered in this opinion encountered during project implementation and project effects, if any.
 - Occurrences of incidental take of covered species if any.
 - For those components of the action that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, HCFCD shall provide a precise accounting to FEMA of the total acreage of habitat impacted and habitat restored to the Service after completion of construction.
 - Other pertinent information.
- Salvage and Disposition: Upon locating a dead, injured, or sick listed species initial notification must be made to the Service's Law Enforcement Office, 19581 Lee Road, Humble, Texas and 281-876-1520 within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification must be sent to the Law Enforcement Office with a copy to the TCCPESFO. Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen.

- For all ground-disturbing activities occurring near the identified archaeological site, HCFCD must retain a Secretary of Interior Standards-qualified archaeologist to perform archaeological monitoring during these activities. If potential archaeological features or artifacts are observed, HCFCD would immediately cease construction in that area and notify Texas Division of Emergency Management (TDEM) and FEMA. FEMA would work with the Texas Historical Commission (THC) Archaeology Division and federally recognized tribes with interests in the project area to develop a plan. An appropriate buffer radius would be placed around the identified area and no construction activities may resume in the buffer area until FEMA, in consultation with the THC Archaeology Division and federally recognized tribes with interests in the project area, has provided written notification to resume construction. Archaeological monitoring is not required on the remainder of the APE; however, should any artifacts be identified during construction, the same process will apply. At the completion of the archaeological monitoring, an archaeological monitoring report detailing the results of the effort will be prepared and submitted to FEMA.
- Any hazardous materials discovered, generated, or used during implementation of the Proposed Action must be handled and disposed of in accordance with applicable local, state, and federal regulations.
- Heavy machinery and equipment will be well maintained. Sound-control devices and mufflers will be used.

SECTION 8. List of Preparers

The following is a list of preparers who contributed to the development of the T.C. Jester Stormwater Detention Basin draft EA for FEMA. The following individuals had principal roles in the preparation of this document. Many others, including senior managers, administrative support personnel, and technical staff, contributed, and their efforts were no less important to the development of this EA.

Federal Emergency Management Agency

Reviewers	Role in Preparation
Leger-Taylor, LaToya	Technical Review and Approval
Cook, Dorothy	Technical Review and Approval
McComb, Angela	Technical Review and Approval

CDM Smith

Preparers	Experience and Expertise	Role in Preparation
Condon, Emily	Water Resources Engineer	NEPA Documentation
Jadhav, Ajay	Geographic Information System Specialist	GIS
Looney, Mary	Environmental Scientist, Biologist	Biological Assessment
McLaughlin, Aislinn	Environmental Scientist	NEPA Documentation
Nelson, Tracy	Senior Cultural Resource Specialist, SOIS Qualified Reviewer	NEPA Documentation, NHPA Consultation
Quan, Jenna	Environmental Planner, Biologist	NEPA Documentation
Roberts, Jessica	Environmental Scientist	NEPA Documentation
Stenberg, Kate	PhD, Senior Biologist, Senior Planner	Technical Review
Wilkins, Suzanne	Environmental Planner	NEPA Documentation
Wilson, Devin	Environmental Scientist, Biologist	Biological Assessment

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SECTION 9. References

- Audubon. n.d. "Guide to North American Birds – Golden Eagle." Accessed October 27, 2022. Available at: <https://www.audubon.org/field-guide/bird/golden-eagle>.
- Bayou Preservation Association. n.d. Paddle Trips. Accessed November 2, 2022. Available at: <https://www.bayoupreservation.org/Bayous/Cypress-Creek/Paddle-Trails>.
- Brennan, T., G. Cole., and B. Stephens. 2021. Report to the U.S. Environmental Protection Agency on Guidance Documents to Safely Clean, Decontaminate, and Reoccupy Flood-Damaged Houses. Accessed October 10, 2022. Available at: https://www.epa.gov/sites/default/files/2018-10/documents/flood-related_cleaning_contractor_report-final-508_8.31.18.pdf.
- Christensen-Dalsgaard, J., B. Christian, K.L. Willis, B.C. Christensen, B. Christian, D. Ketten, P. Edds-Walton, et al. 2012. "Specialization for underwater hearing by the tympanic middle ear of the turtle, *Trachemys scripta elegans*." *Proceedings of the Royal Society B*. 279, no. 1739 (July): 2816–2824. Available at: <https://doi.org/10.1098/rspb.2012.0290>.
- Clements, D.R. and V.L. Jones. 2021. Rapid Evolution of Invasive Weeds Under Climate Change: Present Evidence and Future Research Needs. *Frontiers in Agronomy*. 3:664034. doi: 10.3389/fagro.2021.664034. Available at: <https://doi.org/10.3389/fagro.2021.664034>.
- Council on Environmental Quality (CEQ). 2021. Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. Accessed November 16, 2022. Available at: https://ceq.doe.gov/docs/ceq-regulations-and-guidance/nepa_final_ghg_guidance.pdf.
- _____. 1997. Environmental Justice Guidance Under the National Environmental Policy Act. Accessed October 7, 2022. Available at: https://www.energy.gov/sites/default/files/nepapub/nepa_documents/RedDont/G-CEQ-EJGuidance.pdf.
- Cypress Creek Cultural District. n.d.-a. Cypress Creek Greenway Hike and Bike Trails. Accessed November 2, 2022. Available at: <https://www.cypresscreekculturaldistrict.org/arts-and-culture/cypress-creek-greenway-hike-and-bike-trails/>.
- n.d.-b. Cypress Creek Cultural District Location. Accessed November 2, 2022. Available at: <https://www.cypresscreekculturaldistrict.org/cultural-district/>.
- Federal Emergency Management Agency (FEMA). 2022a. Consultation letter from FEMA to Mark Wolfe, Texas State Historic Preservation Officer. Section 106 Review Consultation, Harris County Flood Control District (HCFCD) – T.C. Jester Stormwater Detention Basin. Dated October 28, 2022.

- _____. 2022b. Consultation concurrence letter from Mark Wolfe, Texas State Historic Preservation Officer to FEMA. Section 106 Review Consultation, Harris County Flood Control District (HCFCD) - T.C. Jester Stormwater Detention Basin. Dated November 8, 2022.
- _____. 2022c. Consultation letter from FEMA to Tonkawa Tribe of Indians of Oklahoma. Section 106 Review Consultation, Harris County Flood Control District (HCFCD) - T.C. Jester Stormwater Detention Basin. Dated October 28, 2022.
- _____. 2022d. Consultation letter from FEMA to Comanche Nation. Section 106 Review Consultation, Harris County Flood Control District (HCFCD) - T.C. Jester Stormwater Detention Basin. Dated October 28, 2022.
- _____. 2022e. Consultation letter from FEMA to Kiowa Tribe. Section 106 Review Consultation, Harris County Flood Control District (HCFCD) - T.C. Jester Stormwater Detention Basin. Dated October 28, 2022.
- _____. 2022f. Consultation letter from FEMA to Alabama-Coushatta Tribe of Texas. Section 106 Review Consultation, Harris County Flood Control District (HCFCD) - T.C. Jester Stormwater Detention Basin. Dated October 28, 2022.
- _____. 2022g. EO 12898 Environmental Justice: Interim Guidance for FEMA EHP Reviewers. Dated October 2022.
- _____. 2018. Handbook on FEMA's Agency Specific Procedures for the Principle, Requirements, and Guidelines (PR&G) Analysis. Dated March 2018.
- _____. 2016. Final NEPA Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews. Dated August 1, 2016. Available at: https://obamawhitehouse.archives.gov/sites/whitehouse.gov/files/documents/nepa_final_ghg_guidance.pdf.
- Federal Highway Administration (FHWA). 2006. Construction Noise Handbook. Accessed August 16, 2023. Available at: https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/.
- Finch, D.M. J.L. Butler, J.B. Runyon, C.J. Fettig, F.F. Kilkenny, S. Jose, S.J. Frankel, et al. 2021. Effects of Climate Change on Invasive Species. In: Poland, T.M., Patel-Weynand, T., Finch, D.M., Miniati, C.F., Hayes, D.C., Lopez, V.M. (eds) Invasive Species in Forests and Rangelands of the United States. Springer, Cham. Accessed June 12, 2022. Available at: https://doi.org/10.1007/978-3-030-45367-1_4.
- Harris County. 2022. Jurisdiction and Precinct Maps. *Harris Votes*. Accessed October 5, 2022. Available at: <https://www.harrisvotes.com/Voter/Registration/Jurisdiction-Precinct-Maps>.

- Harris County Flood Control District (HCFCD). 2024. Project Description, East of T.C. Jester Boulevard (K500-23-00-E002). Accessed July 23, 2024. Available at: <https://www.hcfcd.org/Activity/Projects/Cypress-Creek/TC-Jester-Stormwater-Detention-Basin-K500-23-00/East-of-TC-Jester-Boulevard-K500-23-00-E002>.
- _____. 2022a. Cypress Creek Watershed. Accessed October 27, 2022. Available at: <https://www.hcfcd.org/Activity/Active-Projects/Cypress-Creek>.
- _____. 2022b. T.C. Jester Detention Basin, HCFCD Project ID: K500-23-00-E002, Technical Memorandum. Prepared by Pacheco Koch. Dated August 24, 2022.
- _____. 2022c. Community Engagement and Public Meetings. Accessed November 1, 2022. Available at: <https://www.hcfcd.org/Community/Community-Engagement-and-Public-Meetings/page/2>.
- _____. 2021a. Cypress Creek Program Implementation Plan (K100-00-00-P007). Accessed October 31, 2022. Available at: [https://www.hcfcd.org/Portals/62/Watershed/Clear-Creek/01-Cypress%20Creek%20Implementation%20Plan%20\(K100-00-00-P007\)%20rev-2%20SEALED%20REPORT.pdf](https://www.hcfcd.org/Portals/62/Watershed/Clear-Creek/01-Cypress%20Creek%20Implementation%20Plan%20(K100-00-00-P007)%20rev-2%20SEALED%20REPORT.pdf).
- _____. 2021b. T.C. Jester Detention Basin, HCFCD Project ID: K500-23-00-E002, Preliminary Engineering Report. Prepared by Pacheco Koch. Dated August 24, 2021.
- _____. 2020. Cypress Creek Watershed Major Tributaries Regional Drainage Plan Update. Accessed October 31, 2022. Available at: <https://www.hcfcd.org/Portals/62/Watershed/Cy-Creek/CC Major Tributaries Update Report Combined 02242020 Reduced.pdf>.
- _____. 2019. Policy Criteria and Procedure Manual for Approval and Acceptance of Infrastructure. Available at: <https://www.hcfcd.org/Resources/Technical-Manuals/2019-Atlas-14-Policy-Criteria-and-Procedures-Manual-PCPM?folderId=16290&view=gridview&pageSize=10>.
- _____. 2014. Wet Bottom Detention Basins with Water Quality Features, Design Guidelines for HCFCD Wet-Bottom Detention Basins with Water Quality Features. Dated April 2014. Available at: <https://www.hcfcd.org/Resources/Technical-Manuals/Design-Guidelines-for-HCFCD-Wet-Bottom-Detention-Basins-With-Water-Quality-Features?folderId=16296&view=gridview&pageSize=10>.
- _____. n.d. T.C. Jester Stormwater Detention Basin K500-23-00. Accessed November 15, 2022. Available at: <https://www.hcfcd.org/Activity/Active-Projects/Cypress-Creek/TC-Jester-Stormwater-Detention-Basin-K500-23-00>.
- Houston-Galveston Area Council (H-GAC). 2021. Cypress Creek Watershed Protection Plan. Available at: https://attains.epa.gov/attains-public/api/documents/actions/TCEQMAIN/TX_NP24_CypressCrWPP/206616.

- . 2005. Cypress Creek Source Identification Study. Final Report. Available at: https://www.h-gac.com/getmedia/aac18153-60d3-4435-a317-b70cf38d5a59/bacteria_cypress_creek_source_identification_study.pdf.
- Jackson, D.R., and M.A. Ewert. 2023. "Nesting Ecology of the Alligator Snapping Turtle (*Macrochelys temminckii*) along the Lower Apalachicola River, Florida." *Southeastern Naturalist* 22(12): 311–334. Available at: <https://doi.org/10.1656/058.022.0sp1219>.
- Kloesel, K., B. Bartush, J. Banner, D. Brown, J. Lemery, X. Lin, C. Loeffler, G. McManus, E. Mullens, J. Nielsen-Gammon, M. Shafer, C. Sorensen, S. Sperry, D. Wildcat, and J. Ziolkowska. 2018. Southern Great Plains. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 987–1035. doi: 10.7930/NCA4.2018.CH2. Accessed November 16, 2022. Available at: <https://nca2018.globalchange.gov/chapter/23/>.
- Lehrer, E.W., T. Gallo, M. Fidino, R.J. Kilgour, P.J. Wolff, and S.B. Magle. 2021. "Urban bat occupancy is highly influenced by noise and the location of water: Considerations for nature-based urban planning." *Landscape and Urban Planning* 210:104063. Available at: <https://doi.org/10.1016/j.landurbplan.2021.104063>.
- Metropolitan Transit Authority of Harris County. 2022. Transit System Map. Accessed October 26, 2022. Available at: <https://www.ridemetro.org/MetroPDFs/Schedules/SystemMaps/METRO-System-Map.pdf>.
- Munscher, E.C., S. Gabriela, C.M. Brown, A.G. Lawrence, D. Rivers, J. Stein, K. Norrid, and A. Walde. 2023a. "First documents observation of nesting in an urban habitat by an Alligator Snapping Turtle, *Macrochelys temminckii* Troost in Harlan, 1835." *Herpetology Notes* 16. 275–279. Available at: <https://www.biotaxa.org/hn/article/view/79878/76276>.
- Munscher, E.C., J.D. Riedle, A. Tuggle, J. Gray, D.B. Ligon, V. Gladkaya, C. Drake, R. Couvillon, J. Bolton, M. Morrison, B.P. Butterfield, and A.D. Walde. 2023b. "Demography of an Urban Population of Alligator Snapping Turtles (*Macrochelys temminckii*) in Texas." *Southeastern Naturalist* 22(12): 221–235. Available at: <https://doi.org/10.1656/058.022.0sp1213>.
- Silvis, A., R.W. Perry, and W.M. Ford. 2016. *Relationships of Three Species of Bats Impacted by White-nose Syndrome to Forest Condition and Management*. General Technical Report SRS-214. USDA Forest Service, Southern Research Station, Asheville, NC. Available at: <https://doi.org/10.2737/SRS-GTR-214>.
- SWCA Environmental Consultants (SWCA). 2023. Freshwater Mussel Reconnaissance Survey in Cypress Creek for the T.C. Jester Stormwater Detention Basin Project (K500-23-00-E002), Houston, Harris County, Texas/SWCA Project No. 80387-001.

- Texas Commission on Environmental Quality (TCEQ). 2022. *Texas Integrated Report*. Accessed October 10, 2022. Available at: <https://www.tceq.texas.gov/downloads/water-quality/assessment/integrated-report-2022/2022-303d.pdf>.
- Texas Department of Transportation. 2022. Traffic Count Database System. Accessed October 26, 2022. Available at: <https://txdot.public.ms2soft.com/tcds/tsearch.asp?loc=Txdot&mod=TCDS>.
- Texas General Land Office. n.d. Land and Lease Viewer. Accessed November 17, 2022. Available at: <https://gisweb.glo.texas.gov/glomaps/index.html>.
- Texas Invasive Species Institute. n.d. Gulf Coast Prairies and Marshes Dirty Dozen Terrestrial Invasive Species. Accessed October 18, 2022. Available at: https://texasinvasives.org/i101/ecoalert_detail.php?ecoregion_id=2.
- Texas Parks and Wildlife Department (TPWD). n.d.-a. Texas Ecoregions. Accessed October 18, 2022. Available at: <https://tpwd.texas.gov/education/hunter-education/online-course/wildlife-conservation/texas-ecoregions>.
- _____. n.d.-b. Tricolored Bat (*Perimyotis subflavus*). Accessed December 8, 2023. Available at: <https://tpwd.texas.gov/huntwild/wild/species/easpiip/>.
- _____. 2022. *Request for Review and Comment – Mercer Stormwater Detention Basin; Harris County, Texas*. Austin, Texas: Consultation from Rachel Lange of TPWD to Amanda Gregory (HCFCD). Dated October 24, 2022.
- Texas Rising. n.d. Texas Environmental Justice Explorer. Accessed November 1, 2022. Available at: <https://ej.txrising.org/Explore/>.
- U.S. Army Corps of Engineers (USACE). 2023. Preliminary Jurisdictional Determination Form SWG-2020-00633. Dated November 13, 2023.
- _____. 2022. Navigable Water Protection Rule Vacatur. Accessed November 9, 2022. Available at: <https://www.usace.army.mil/Media/Announcements/Article/2888988/5-january-2022-navigable-waters-protection-rule-vacatur/>.
- _____. 2021a. Approved Jurisdictional Determination Form SWG-2019-00857. Accessed October 30, 2022. Available at: <https://www.swg.usace.army.mil/Portals/26/docs/regulatory/JDs/SWG201900857.pdf>.
- _____. 2021b. Approved Jurisdictional Determination Form SWG-2020-00633. Accessed November 9, 2022. Available at: <https://www.swg.usace.army.mil/Portals/26/docs/regulatory/JDs/SWG2020000633.pdf>.

- _____. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0). Accessed November 14, 2022. Available at: <https://usace.contentdm.oclc.org/utils/getfile/collection/p266001coll1/id/7594>.
- _____. 1987. Corps of Engineers Wetlands Delineation Manual. Accessed November 14, 2022. Available at: <https://usace.contentdm.oclc.org/digital/collection/p266001coll1/id/4530>.
- U.S. Climate Data. 2022. Climate Houston – Texas. Accessed November 16, 2022. Available at: <https://www.usclimatedata.com/climate/houston/texas/united-states/ustx2750>.
- U.S. Department of Agriculture Natural Resources Conservation Service (NRCS). 2022. Web Soil Survey, T.C. Jester Basin Soil Map. Accessed October 24, 2022. Available at: <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>.
- U.S. Environmental Protection Agency (EPA). 2023. EJ Screen: EPA's Environmental Justice Screening and Mapping Tool (Version 2.2). Accessed July 3, 2023. Available at: <https://ejscreen.epa.gov/mapper/>.
- _____. 2022a. Nonattainment Areas for Criteria Pollutants (Green Book). Accessed December 14, 2022. Available at: <https://www.epa.gov/green-book>.
- _____. 2022b. EJ Screen Environmental Justice Mapping and Screening Tool: EJ Screen Technical Documentation. Accessed July 3, 2023. Available at: https://www.epa.gov/sites/default/files/2021-04/documents/ejscreen_technical_document.pdf.
- _____. 2022c. NEPAssist. Accessed October 31, 2022. Available at: <https://nepassisttool.epa.gov/nepassist/nepamap.aspx>.
- _____. 2022d. How's My Waterway? Waterbody Report for Cypress Creek. Accessed October 25, 2022. Available at: https://mywaterway.epa.gov/waterbody-report/TCEQMAIN/TX-1009_03/2022.
- _____. 2022e. Navigable Waters Protection Rule. Accessed November 9, 2022. Available at: <https://www.epa.gov/wotus/navigable-waters-protection-rule>.
- _____. 2021. Factsheet on Water Quality Parameters. Turbidity. Accessed October 24, 2022. Available at: https://www.epa.gov/system/files/documents/2021-07/parameter-factsheet_turbidity.pdf.
- _____. 2016a. All EPA Emission Standards. Accessed October 6, 2022. Available at: <https://www.epa.gov/emission-standards-reference-guide/all-epa-emission-standards>.
- _____. 2016b. What Climate Change Means for Texas. Accessed November 16, 2022. Available at: <https://www.epa.gov/sites/default/files/2016-09/documents/climate-change-tx.pdf>.

- _____. 2009. Environmental Impact and Benefits Assessment for Final Effluent Guidelines and Standards for the Construction and Development Category. Accessed October 10, 2022. Available at: https://www.epa.gov/sites/production/files/2015-06/documents/cd_envir-benefits-assessment_2009.pdf.
- _____. 1974. Information on levels of environmental noise requisite to protect public health and welfare with adequate margin of safety. EPA/ONAC 550/9-74-004. Available at: <http://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF>.
- U.S. Fish & Wildlife Service (USFWS). 2024. Correspondence with Dr. Jan Culbertson, Fish and Wildlife Biologist. May 8, 2024.
- _____. 2023a. Information for Planning and Consultation (IPaC). Accessed December 8, 2023. Available at: <https://ecos.fws.gov/ipac/>.
- _____. 2023b. Programmatic Conference Opinion NCDOT Program Effects on the Tricolored Bat in Divisions 1-8. Raleigh, North Carolina: USFWS Raleigh Field Office.
- _____. 2022a. Migratory Bird Program Administrative Flyways. Accessed November 1, 2022. Available at: <https://www.fws.gov/partner/migratory-bird-program-administrative-flyways>.
- _____. 2022b. *Endangered and Threatened Wildlife and Plants; Endangered Species Status for Tricolored Bat*. Federal Register 87(177):56381–56393. Available at: <https://www.federalregister.gov/documents/2022/09/14/2022-18852/endangered-and-threatened-wildlife-and-plants-endangered-species-status-for-tricolored-bat>.
- _____. 2021. Species Status Assessment Report for the Alligator Snapping Turtle (*Macrochelys temminckii*). Atlanta, Georgia: FWS Southeast Region. Available at: <https://ecos.fws.gov/ServCat/Reference/Profile/137739>.
- _____. 2019. Coastal Barrier Resources System Maps-Texas. Accessed November 17, 2022. Available at: <https://www.fws.gov/library/collections/coastal-barrier-resources-system-maps-texas>.
- _____. 2018. National Wetlands Inventory. Accessed November 2, 2022. Available at: <https://data.nal.usda.gov/dataset/national-wetlands-inventory>.
- U.S. Forest Service. 2014. Biological Assessment for Activities Affecting Northern Long-Eared Bats on Southern Region National Forests. Available at: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3843091.pdf.
- Xiong, Y., S. Mo, H. Wu, X. Qu, Y. Liu, and L. Zhou. 2023. Influence of human activities and climate change on wetland landscape pattern – A review, *Science of the Total Environment*, 879. Accessed October 6, 2023. Available at: <https://doi.org/10.1016/j.scitotenv.2023.163112>.

Appendix A. 8-step Checklist for Wetlands and Floodplains

T.C. Jester Stormwater Detention Basins
Executive Order 11988 and 11990 – Floodplain Management and Wetland Protection
Eight-Step Decision Making Process

Executive Order (EO) 11988 (Floodplain Management) requires federal agencies “to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of the floodplain and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.” Similarly, EO 11990 requires federal agencies “to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.” FEMA’s implementing regulations are codified under 44 CFR Part 9, which includes an eight-step decision-making process for compliance with this part.

This eight-step process is applied to the proposed T.C. Jester Stormwater Detention Basin. The proposed project area is within the 100-year floodplain of Cypress Creek Watershed. The steps in the decision-making process are as follows:

Step 1 Determine if the proposed action is located in the Base Floodplain and Wetland.

The T.C Jester Stormwater Detentions Basins involves the construction of two stormwater detention basins adjacent to Cypress Creek, southeast of the intersection of T.C. Jester Boulevard and Cypresswood Drive in Harris County, Texas (Latitude: 30.03275; Longitude: -95.46157). The proposed project site consists of 25 acres along the northern bank of Cypress Creek for Basin 1A and approximately 20 acres south of Cypress Creek for Basin 2. The project area includes both a temporary section of access road as well as a permanent section of a new road that would be located adjacent to the south bank of the creek. *The Cypress Creek Watershed Major Tributaries Regional Drainage Plan Update, Cypress Creek Report* found that stormwater raises the water level of Cypress Creek, causing floodwaters to back into the creek’s tributaries resulting in floodwaters overtopping the tributary banks. The stormwater detention basins would reduce flood risk and damage during heavy rain events by safely storing excess stormwater and slowly releasing it back into the creek when the flooding has passed.

The proposed project, referred to as the Proposed Action, would be comprised of two stormwater detention basins adjacent to the main stem of Cypress Creek, on land owned by HCFCD. The project would comprise two wet-bottom basins, referred to as Basin 1A and Basin 2. A wet-bottom basin is designed to contain a permanent pool of water throughout the year that can support the growth of aquatic vegetation. The Proposed Action would require tree and vegetation removal and grading within the footprints of the basins. A third basin, adjacent to Basin 1A and identified as Basin 1B, is part of the Regional Drainage Plan, but it is not funded under the Proposed Action as it is expected to be funded by state community-directed funding under the Community Development Block Grant-Mitigation (CDBG-MIT) funding. Basin 1B functions independently from the FEMA funded project.

Basin 1A, which would be on the north side of the creek parallel to Cypresswood Drive, would provide approximately 119 acre-feet of storage with an approximate depth of 17 feet. Basin 2, on the south side of the creek, adjacent to the Northgate Forest Golf Club and within a tight bend of the creek, would have approximately 87 acre-feet of water storage at an approximate depth of 19.5 feet. Both basins would have a 100-foot-wide inflow weir with a maximum 4:1 side slope. Basin 1A would have a 48-inch-diameter reinforced concrete pipe outfall to the creek and Basin 2 would

have a 36-inch diameter high-density polyethylene outfall pipe. Both outfalls would have riprap erosion protection installed with topsoil placed over the riprap within the grass-lined channels. The construction entrance for Basin 1A would be located at Cypresswood Drive and the construction entrance for Basin 2 would be temporarily located at T.C. Jester Boulevard until project completion. Construction access entrances would be stabilized with granular fill over a geotextile layer and would have a maximum width of 50 feet.

Detention Basins 1A and 2 would be constructed by excavating soil to achieve the proposed depth and side slope configuration. The excavated soil would be used to construct the berm around the outer perimeter of the basins. The project footprint would be approximately 68 acres and would have a stormwater storage capacity of approximately 208.6 acre-feet. The Proposed Action would provide approximately 0.44 feet of flood reduction during the 10-year storm event, and a maximum reduction of approximately 0.35 feet during the 100-year event.

There is an existing maintenance road that extends northwest within an existing storm sewer easement toward Cypress Creek that is approximately 1,343 feet long. A new temporary access road for the construction of Basin 2, approximately 1,627 feet long, would be installed along the south bank of Cypress Creek until it intersects with the existing maintenance road. From the intersection of these two access roads, a new permanent access road would be constructed to Basin 2 which would be approximately 2,732 feet long. The entrance to the temporary access route would be at T.C. Jester Boulevard, and following the bends of the creek, it would connect with the head of the existing permanent maintenance road, and then continue northeast beside the golf course toward the proposed Basin 2 as a permanent maintenance access corridor. Construction of the temporary portion of the access road would include the cutting of some trees to the ground but would not include the removal of the root balls. A top layer of aggregate would be applied to serve as a temporary driving surface. The area would be restored upon completion of the project, including the removal of as much aggregate as practicable and revegetation along the route.

Based on FEMA Flood Insurance Rate Map panels 48201C0265M, effective October 16, 2013, retrieved from the FEMA RiskMAP6 website (<http://www.riskmap6.com>) on November 14, 2022, the entire proposed project area falls within Zone AE with a Base Flood Elevation of 105 feet (Figure 1). The portion of the project area adjacent to the creek is also within the Regulatory Floodway for Cypress Creek.

The detention basins would be constructed with a wet bottom that would include a mix of grasses, native trees, and native wetland plants, following local design standards. While the Proposed Action would result in the creation of approximately 3 acres of new emergent wetland habitat (Figure 2), functionality as a wetland would be limited. The wetland habitat would never develop into the forested wetland habitat that is being removed because stormwater basins are periodically dredged, removing accumulated sediment and maintaining stormwater storage capacity. Consequently, this process removes vegetation within the basin. Also, the fluctuating water levels associated with storm events would not provide adequate habitat for species adapted to natural wetlands. Therefore, the Proposed Action would have short-term and long-term, negligible, adverse impacts on existing wetlands.

Figure 1: Project Area Floodplains

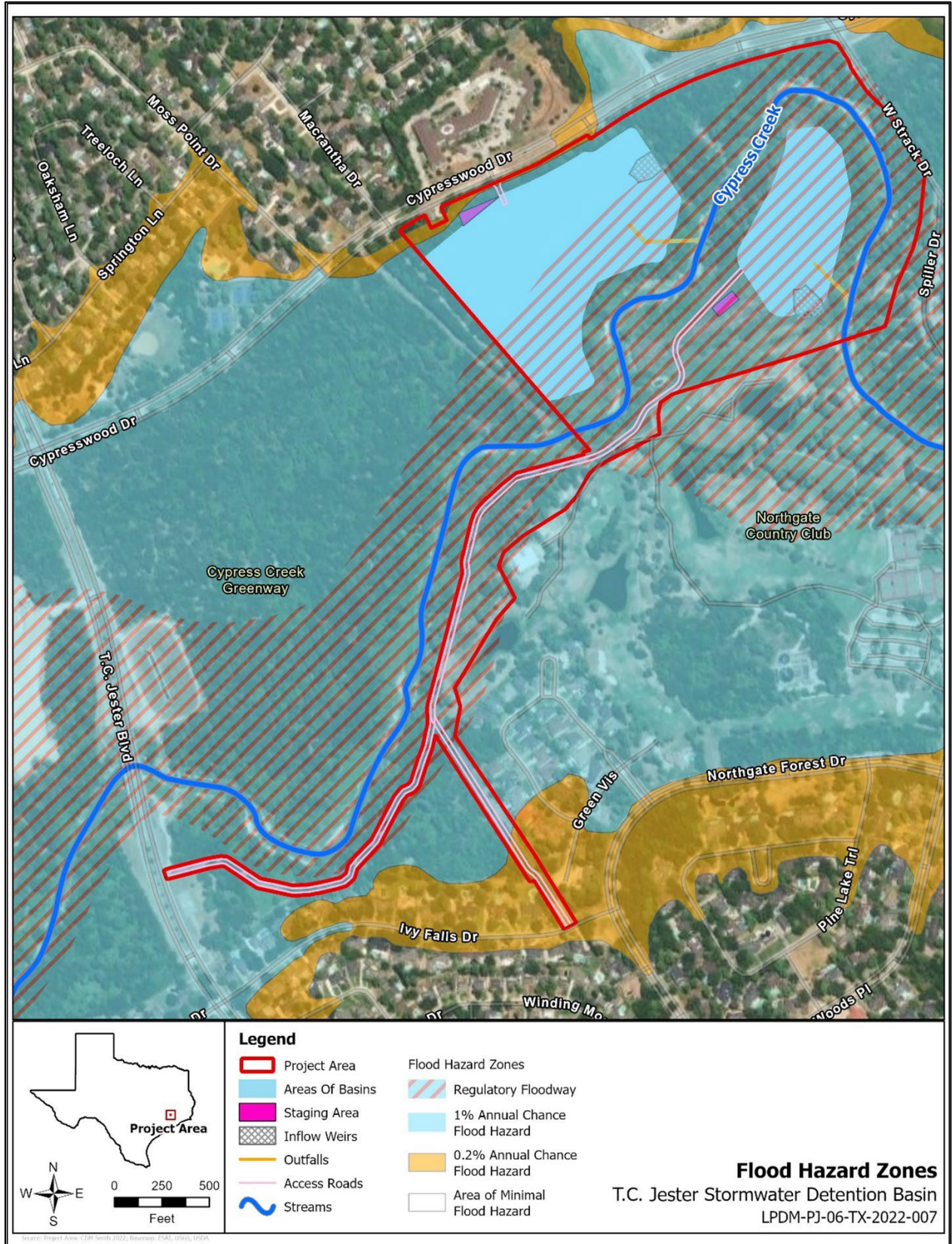
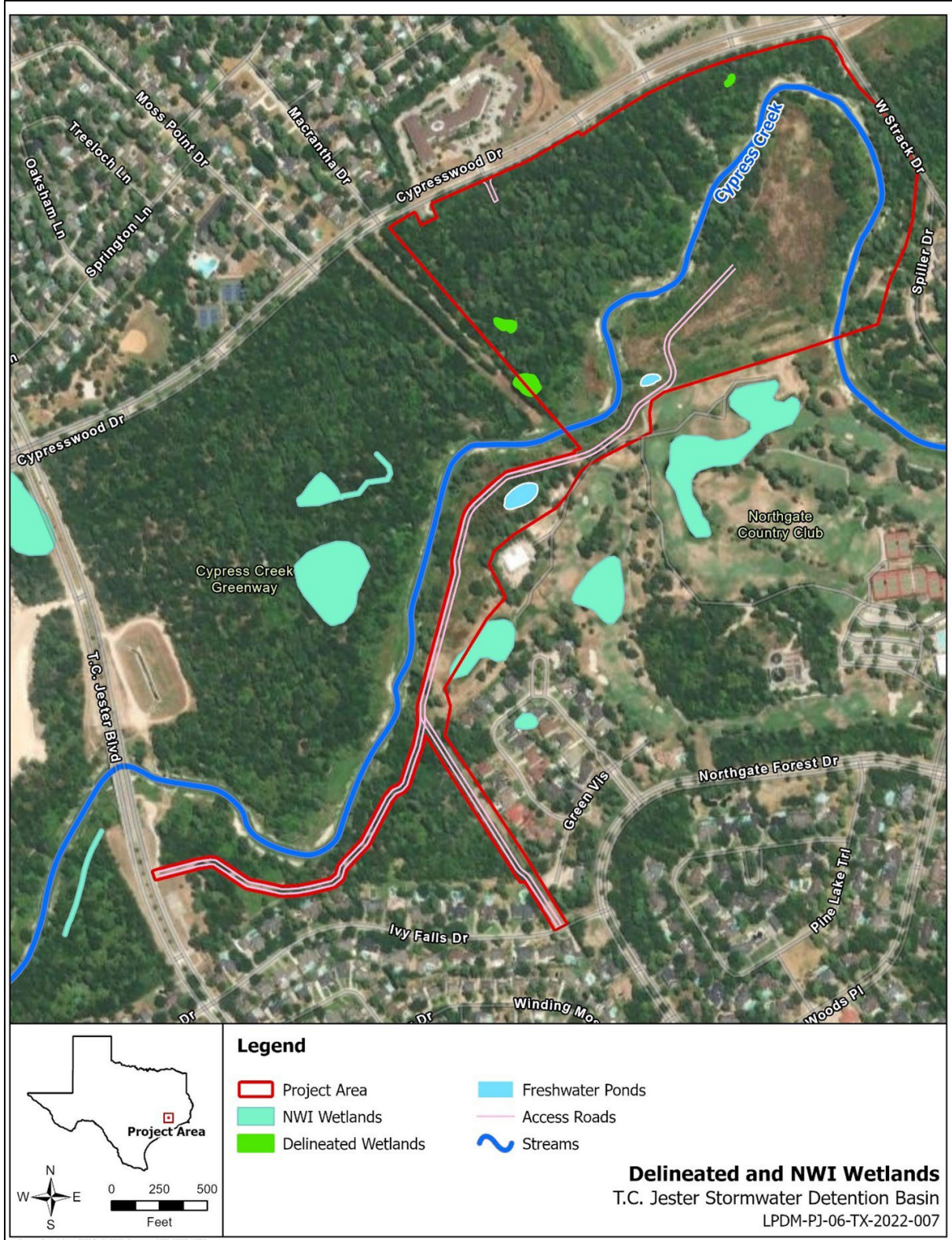


Figure 2: Wet-Bottom Area in Proposed Basins



Step 2 Early public notice (Preliminary Notice).

The Proposed Action was presented at a public information session on September 22, 2020. A virtual community engagement meeting facilitated by the Harris County Flood Control District was conducted on June 16, 2021, specifically for the Proposed Action. In addition, a virtual community engagement meeting facilitated by HCFCD was held on March 9, 2022, to solicit additional public comment about the entire Cypress Creek Watershed Implementation Program.

Step 3 Identify and evaluate alternatives to locating in the base floodplain and wetland.

Three alternatives were identified and evaluated under the Environmental Assessment (EA) for the Proposed Action; the No Action alternative, the Proposed Action, and the Alternative 3 Proposal.

Under the No Action alternative, there would be no FEMA funding for the construction of two stormwater detention basins near the intersection of T.C. Jester Boulevard and Cypresswood Drive. Without the new stormwater detention, there would be no change to the flood elevations along Cypress Creek. Flooding within the surrounding residential neighborhood and commercial properties along Cypress Creek and its tributaries would continue, resulting in repetitive damage to property and infrastructure, and public health and safety would continue to be at risk. In addition, the intensity and frequency of storms are increasing, and severe rain events that result in flooding are also expected to increase in frequency and intensity, which would lead to more prolonged and damaging floods in the vicinity under the No Action alternative.

Under the Proposed Action, HCFCD would construct two stormwater detention basins adjacent to the main stem of Cypress Creek, on land owned by HCFCD. The project would comprise two wet-bottom basins, referred to as Basin 1A and Basin 2. A wet-bottom basin is designed to contain a permanent pool of water throughout the year that can support the growth of aquatic vegetation. The Proposed Action would require tree and vegetation removal and grading within the footprints of the basins. A third basin, adjacent to Basin 1A and identified as Basin 1B, is part of the Regional Drainage Plan, but it is not funded under the Proposed Action as it is expected to be funded by state community-directed funding under the Community Development Block Grant-Mitigation (CDBG-MIT) funding. The Proposed Action would provide approximately 0.44 feet of flood reduction during the 10-year storm event, and a maximum reduction of approximately 0.35 feet during the 100-year event.

Under Alternative 3, Basin 1 would be in approximately the same location as the proposed Basin 1B and would end at the existing gas pipelines. The configuration would not include the area encompassed by the proposed Basin 1A. Alternative 3 would be smaller with a design that would provide 636 acre-feet of storage and a 160-foot vegetation buffer between Basin 1 and Cypress Creek. This proposal would have side slope, depth, and weir configurations similar to those described under the Proposed Action and Alternative 1. Basin 2 would use the same configuration and approximate location as Basin 2 under the Proposed Action and Alternative 1. Alternative 3 would avoid disturbing the gas pipelines; however, it would provide less flood hazard reduction in comparison to the Proposed Action and Alternative 1. Alternative 3 was dismissed from further consideration because it was determined not to provide sufficient flood risk reduction and to have the lowest benefit-to-cost ratio.

Alternatives Considered Outside the Floodplain – There are no practicable alternatives outside the floodplain. The purpose of the proposed project is to reduce damage from flooding in the Cypress

Creek Watershed. This area is heavily developed, and it is not practicable to move existing streets, utilities, and private development outside of the floodplain.

Step 4 Identify the impacts of proposed action associated with occupancy or modification of the floodplain and wetland.

Per 44 CFR 9.10 FEMA must consider whether the proposed action will result in an increase in the useful life of any structure or facility in question, maintain the investment at risk and exposure of lives to the flood hazard, or forego an opportunity to restore the natural and beneficial values served by floodplains or wetlands. FEMA should specifically consider and evaluate impacts associated with the modification of floodplains; additional impacts that may occur when certain types of actions may support subsequent actions that have additional impacts of their own; adverse impacts of the proposed actions on lives and property and natural and beneficial floodplain values; and these three categories of factors: flood hazard-related factors, natural values-related factors, and factors relevant to a proposed action's effects on the survival and quality of wetlands.

Per 44 CFR, natural values-related factors include water resource values (natural moderation of floods, water quality maintenance, and groundwater recharge); living resource values (fish and wildlife and biological productivity); cultural resource values (archaeological and historic sites, and open space recreation and green belts); and agricultural, aquacultural and forestry resource values. Factors relevant to a proposed action's effects on the survival and quality of wetlands include public health, safety, and welfare, including water supply, quality, recharge, and discharge; pollution; flood and storm hazards; and sediment and erosion; maintenance of natural systems, including conservation and long term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources; and other uses of wetlands in the public interest, including recreational, scientific, and cultural uses.

Under the Proposed Action the new stormwater detention basins would be constructed within the 100-year floodplain. The basins would improve floodplain function by capturing high flows from Cypress Creek through weirs and the approximately 68 acres of the project footprint would have a stormwater storage capacity of approximately 208.6 acre-feet. During storm events, the water surface elevations within the area would decrease due to the increased capacity in the floodplain compared to existing conditions. As flows recede water stored in the basin above the static pool would slowly outfall back into the creek increasing the storage capacity in the basin for flood relief during future storms.

The functions of the floodplain are to provide flood storage and conveyance, filter nutrients and impurities from runoff, reduce flood velocities, reduce flood peaks, moderate the temperature of water, reduce sedimentation, promote infiltration and aquifer recharge, and reduce frequency and duration of low surface flows would remain intact after the implementation of the project. Construction activities associated with the Proposed Action would have the potential to impact water quality in the short term during construction, including site preparation and excavation. The most common pollutants in surface waters from construction sites are sediment and turbidity. Activities would be temporary and a stormwater pollution protection plan would include erosion and sediment control practices and BMPs such as silt fencing in accordance with the TCEQ Stormwater General Permit for Construction Activities. Construction access entrances would be stabilized with granular fill over a geotextile layer to reduce tracking of soils onto nearby roadways where they could wash off into surface waters. In addition, the project would protect a 160-foot

forested buffer between the construction zone and Cypress Creek, which would protect water quality in the creek both during and following construction.

By reducing peak flows and slowing runoff velocity, the Proposed Action would protect the project area and surrounding neighborhood from erosion and sedimentation during storm events. Reducing flooding would reduce the potential for pollutants to be carried into surface waters and downstream resulting in a minor beneficial effect on water quality. The wet-bottom detention basins would include stormwater treatment opportunities such as emergent vegetation, submerged vegetation, a permanent deep pool, adequate distance between the inflow and outflow structures to increase circulation time, varying side slopes, and floatable materials control devices as seen in. Therefore, the operation of the Proposed Action would result in a minor long-term benefit to water quality.

Wetlands are present within and adjacent to the project area. USFWS NWI wetlands are identified using high-altitude aerial imagery, which includes some margin of error. Based on a review of NWI mapping, approximately 0.15 acres of palustrine, forested, broad-leaved deciduous, temporary flooded wetlands occur within the project area (USFWS 2018). The project area also contains approximately 0.4 acres of palustrine, unconsolidated bottom, permanently flooded, excavated human-made freshwater ponds. These freshwater ponds were determined to be non-jurisdictional under the 33 CFR 328.3(b)(8) exclusion (Figure 2).

A wetland delineation conducted by HCFCD evaluated conditions on the ground to confirm the actual presence and spatial extent of wetlands that may not be shown on NWI maps. Wetland delineations were conducted in 2019 for stormwater detention Basin 1A and in 2023 for Basin 2 and its associated access roads. Approximately 0.55 acres of wetlands and ponds were identified in the area that encompasses Basins 1A and 2 and the access roads to Basin 2, with 0.15 acres determined to be potentially jurisdictional by USACE. Of those mapped wetlands, three wetlands were mapped amounting to 0.078 acres in the Basin 1A project area. In Basin 2 and its associated access roads, aside from the 0.4 acres of non-jurisdictional, human-made freshwater ponds, three wetlands were mapped amounting to 0.076 acres.

Step 5 Design or modify the proposed action to minimize threats to life and property and preserve its natural and beneficial floodplain and wetland values.

Best management practices (BMPs), included in Section 7.3 of the EA, outline standard BMPs, mitigation measures, and conditions applicable to the Proposed Action. Implementation of Section 7.3 is a requirement of the EA's Finding of No Significant Impact (FONSI). As explained above, construction of the stormwater detention basins would improve floodplain function by capturing high flows from Cypress Creek, it will not increase flood hazard to other structures or encourage further development in the floodplain.

Under the Proposed Action, 0.05 acres of potentially jurisdictional wetland would be removed during the grading and construction of the basins, and 0.04 acres would be removed during the construction of the temporary access road. Wetland forest vegetation would be cleared for the construction of the basins. During the construction of the basins and access road, 0.4 acres of non-jurisdictional, human-made, freshwater ponds, as well as 0.033 acres of emergent marsh wetland, that are adjacent to the access road, would be surrounded by construction fencing with a 25-foot buffer, avoiding impacts to those water bodies. Furthermore, palustrine forested wetland credits would be bought from the Greens Bayou Wetlands Mitigation Bank to mitigate for the loss of wetlands from the construction of the Proposed Action.

HCFCFCD will obtain a Department of the Army Permit under Section 404 of the Clean Water Act. Although wetlands will be impacted, USACE compulsory wetland mitigation will identify mitigation measures to compensate for the loss of those natural resources. In addition, a WOTUS Jurisdictional Determination was issued on March 8 and April 14, 2021. Furthermore, unavoidable impacts on vegetated wetlands will be mitigated through credits from the Greens Bayou Mitigation Bank.

HCFCFCD is required to coordinate with the local floodplain administrator and obtain required permits prior to initiating work, including any necessary certifications that encroachments within the adopted regulatory floodway would not result in any increase in flood levels within the community during the occurrence of the base flood discharge. Applicant must comply with any conditions of the permit and all coordination pertaining to these activities should be retained as part of the project file in accordance with the respective grant program instructions.

Step 6 Re-evaluate the proposed action.

The project will not expose any segment of the population to flood hazards and will instead afford the population additional protection from future flood hazards. The action will not facilitate development in the floodplains to any greater degree than in non-floodplain areas of the community. The project will not disrupt floodplain values because it will not change water levels in the floodplain, but it will remove 0.05 acres of potentially jurisdictional wetland in the floodplain. Unavoidable impacts on vegetated wetlands will be mitigated through credits from the Greens Bayou Mitigation Bank. Therefore, it is still practicable to construct the proposed project within the floodplain.

Alternatives consisting of locating the project outside the floodplain and wetland or taking “no action” are not practicable.

Step 7 Final Notification

In accordance with 44 CFR § 9.12, final floodplain public notice will be incorporated into the notice of availability for the Draft EA.

Step 8 Implement the action

The proposed T.C. Jester Stormwater Detention Bains will be constructed in accordance with applicable floodplain development requirements, and USACE permit conditions, and adhere to the grant conditions outlined in this decision document and the EA.

Appendix B. Agency Correspondence



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Texas Coastal and Central Plains Ecological Services Office
Houston Sub-Office
17629 El Camino Real, Suite 211
Houston, Texas 77058
PHONE: 281/286-8282
FAX: 281/488-5882



In Reply Refer to:
2024-0002745

November 15, 2024

Ms. Dorothy Cook
Senior Environmental Biologist
Federal Emergency Management Agency, Region 6
U.S. Department of Homeland Security
800 North Loop 288
Denton, Texas 76209

Subject: Conference Opinion for T.C. Jester Stormwater Detention Basin (Harris County Flood Control District Project ID K500-23-00-E002/LPDM-PJ-06-TX-2022-007), Harris County, Texas.

Dear Ms. Cook:

Enclosed is the U.S. Fish and Wildlife Service's (Service) informal conference report and formal conference opinion (CO) based on our review of the effects of the proposed T.C. Jester Stormwater Detention Basin (Harris County Flood Control District Project ID K500-23-00-E002/LPDM-PJ-06-TX-2022-007) within the U.S. Army Corps of Engineers (Corps) Galveston District on proposed listed species, pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.; Act). The Federal Emergency Management Agency (FEMA), as the lead Federal action agency, submitted a biological assessment (BA) for our review and requested concurrence with the findings presented therein. These findings conclude that the proposed Federal action may affect but is not likely to adversely affect the proposed endangered tri-colored bat (*Perimyotis subflavus*; TCB) and is likely to adversely affect the proposed threatened alligator snapping turtle (*Macrochelys temminickii*; AST) as detailed in Section 3.4.1 of the BA. There is no critical habitat proposed for these species in the action area.

The applicant, Harris County Flood Control District (HCFCD), is proposing to construct and maintain two stormwater detention basins (Basin 1A and Basin 2) along the banks of Cypress Creek main stem near the T.C. Jester neighborhood, approximately 20 miles (mi) (32.2 kilometers (km)) north of downtown Houston, Texas (referenced hereafter as proposed project) (BA Figure 2, Appendix A). The proposed project area encompasses approximately 68 acres (ac) (0.27 square kilometer (km²)) which includes two stormwater detention basins, outfall structures,

permanent and temporary access roads, and staging areas for each basin. Construction is anticipated to occur from summer 2025 (post TCB pupping season) to spring 2027.

FEMA's request for initiating informal and formal conferences for proposed listed species was received on March 8, 2024. After multiple meetings and correspondences, FEMA submitted a complete BA for the T.C. Jester Stormwater Detention Basin (proposed project) and informal and formal conferences started on August 19, 2024. In considering FEMA's request, the Service based our evaluation on the information provided in the BA as well as video meetings, and emails with FEMA, HCFCD, environmental consultants, and other sources of information. Literature cited in this conference opinion is not a complete bibliography of all literature available on the proposed species being reviewed, construction activities and their effects, or on other subjects considered in this opinion. A complete administrative record of this conference is on file at the Texas Coastal and Central Plains Ecological Services Field Office (TCCPESFO).

In the BA, FEMA made a no effect determination for the threatened Eastern Black Rail (*Laterallus jamaicensis ssp. jamaicensis*), threatened Piping Plover (*Charadrius melodus*), threatened Rufa Red Knot (*Calidris canutus rufa*), and the endangered Whooping Crane (*Grus americana*) both wild and experimental non-essential populations. FEMA's no effects determinations are detailed in the BA (Appendix D). While these species are noted in our Information for Planning and Consultation database (IPaC, <https://ipac.ecosphere.fws.gov/>) to be in the project area, FEMA does not expect these species to be impacted by the proposed project because there is no suitable habitat for them in the action area. Determinations of no effect do not require consultation under section 7 of the Act; therefore, these species will not be addressed in this conference opinion.

The Act requires a Federal agency to confer with the Service if their action is likely to jeopardize the continued existence of a species proposed for listing or that is likely to destroy or adversely modify critical habitats proposed for designation (section 7(a)(4)). FEMA determined that the proposed action is not likely to jeopardize the continued existence of the proposed endangered TCB due to the wide range and distribution of the species, and lack of hibernacula near the proposed project. However, should TCB be listed, FEMA determined the permanent loss of TCB habitat in the action area may affect, but is not likely to adversely affect the TCB because of the conservation measures being implemented. Therefore, FEMA requested informal conferencing procedures pursuant to Section 7 of the Act for this species.

FEMA determined the proposed action is not likely to jeopardize the continued existence of the proposed threatened AST due to the wide range and distribution of the species. However, should the AST be listed, FEMA determined that the permanent reduction of available AST nesting habitat in the project area, in addition to known occurrences of the species in the action area, may adversely affect AST. Therefore, FEMA initiated formal conferencing procedures pursuant to Section 7 of the Act for this species.

The Service's response is provided under the authority of the Act, and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402).

Tricolored Bat

TCB is a widely distributed, insectivorous bat of eastern and central North America that is known from 39 states as well as portions of Canada, Mexico, and Central America (USFWS 2021). The TCB was proposed as an endangered species on September 14, 2022 (87 FR 56381). No final ruling date has been set and no critical habitat has been proposed. As one of the smallest bats in North America, TCBs are readily identifiable by their tricolored fur, with each individual hair on their pelage having three different shades of dark and light hues.

TCBs primarily roost in among leaf clusters of live or recently dead deciduous hardwood trees (e.g., *Quercus spp.*) or trees containing Spanish moss (*Tillandsia usneoides*) in the spring, summer, and fall (e.g., non-hibernating seasons) (Veilleux et al. 2003, Perry and Thill 2007, Thames 2020). Additionally, TCBs have been observed roosting in the foliage of pines and junipers with clusters of dead pine needles (Perry and Thill 2007, Thames 2020). Suitable roost trees are 2:5 inches (in) (12.7 centimeters (cm)) in diameter at breast height. Individual trees may be considered suitable habitat when they exhibit characteristics of a potential roost tree and are located within 1,000 feet (ft) (305 meters (m)) of another forested/wooded habitat. Suitable forest habitat may be occupied by TCB all year in the Texas year-round zone 2, where the project is located.

TCB prefer foraging along forested edges of larger forest openings, along edges of riparian areas, and over water and avoid foraging in dense, unbroken forests, and narrow road cuts through forests (Barbour and Davis 1969, Mumford and Whitaker 1982, Hein et al. 2009). TCBs are opportunistic feeders and consume small insects. TCB emerge early in the evening and forage at treetop level or above (Davis and Mumford 1962, Barbour and Davis 1969) but may forage closer to ground later in the evening (Mumford and Whitaker 1982).

Male and female TCB converge at cave or mine entrances or alternate hibernacula (e.g., culverts) between mid-August and mid-October to swarm and mate (fall swarming period). Adult females store sperm in their uterus during the winter and fertilization occurs soon after spring emergence from hibernation (Guthrie 1933). Spring staging occurs when most bats are emerging from hibernation in caves or alternate hibernacula, roosting in trees near hibernacula, and preparing for migration to their summer home range. Summer occupancy is the timeframe when bats have migrated to their summer home range and are individually roosting in trees or roosting in maternal colonies of females and pups between March 15 and July 15. The pup season is the timeframe when new-born pups are non-volant so they cannot fly or forage independently between May 1 and July 15 (USFWS 2024a). However, pups may be negatively affected by clearing roosting trees within 0.25 mi (40.2 km) of a hibernaculum at any time of year (USFWS 2024b).

Although TCB may remain active during the winter season (December 15 to February 15) within the Texas year-round active range zone 2, they may enter a state of torpor or have temporarily decreased physiological activity when temperatures fall below 40 degrees Fahrenheit (°F) (4.4 degrees Celsius (°C)) for three consecutive days. When winter torpor occurs, TCB roost in trees, bridges, culverts, or other natural and human-made protective structures until temperatures increase above 40°F (4.4°C) (Sandel et al. 2001, Katzenmeyer 2016, Bernard et al. 2019, Sasse et al. 2011). TCB require greater energy expenditures to remain warm when they are in a state of

torpor, when food and water resources are scarce or unavailable. Frequent arousals from torpor increases the probability of mortality in bats with limited fat stores (Boyles and Willis 2010).

As with many other vespertilionid bats, TCBs exhibit high site fidelity and often return year after year to the same roosting areas in summer and winter (Davis 1966, Jones and Suttkus 1973, Sandel et al. 2001). TCB can migrate up to 151 mi (243 km) between winter hibernacula and summer roosting sites (Samoray et al. 2019). Additional information on the life history, ecology, status, and threats to the tricolored bat may be found in the proposed listing rule (87 FR 56381) and the species status assessment (USFWS 2021).

There are no known maternal TCB colonies near the project site, and there are no reported sightings or acoustical surveys conducted at this specific project site to determine whether TCB currently utilize the forested habitat within the action area. The applicant proposes to remove 26 ac (0.11 km²) of forest habitat from the 68-ac (0.27-km²) project area, which exceeds the minimum forest canopy cover (0.5 ac (0.0002 km²)) expected to not adversely affect TCB within this specific 6,177-ac (25-km²) grid (USFWS 2024). TCB that may utilize the remaining 47 ac (0.19 km²) of forest habitat not removed during construction are expected to either avoid roosting near the construction site completely or move to another suitable forest habitat. The applicant will implement species specific avoidance and minimization measures (AMMs) within the action area (BA, Section 2.5.3) to reduce the effects of permanent loss of forest habitat to insignificant and or discountable levels. Thus, the loss of associated functions of the forest in the project area (e.g., availability of food resources and roosting sites) provided to individual TCB is not anticipated to be measurably affected by the proposed action.

- AMM-1 TCB Roosting and Foraging Habitat: All operators, employees, and contractors (with the exception of truck drivers) working in the project area for more than 1 day, including access roads and staging areas, will be educated on TCB and informed of all applicable AMMs.
- AMM-2 TCB Tree Removal: Only the number of trees necessary to implement project construction activities safely would be removed during all phases/aspects of the project (e.g., basins, access road alignments, temporary work areas, etc.).
- AMM-3 TCB Tree Removal: Tree clearing will not occur during pupping season (May 1 – July 15) when juveniles cannot fly.
- AMM-4 TCB Tree Removal: Tree removal activities within TCB suitable habitat or travel corridors will be timed to avoid summer occupancy season (March 15 – July 15) when bats are present and roosting in trees on their summer home range and/or roosting in colonies. If tree removal must occur during the summer occupancy season, a pre- construction acoustic survey, using Service recommended protocols, will be conducted by a qualified biologist to identify maternal roosts potentially containing flightless pups, at least one month prior to the proposed tree removal action. If a maternal roost is identified, no trees may be removed within 1,000 ft (305 m) of the roost tree for a period of four weeks, or if a subsequent acoustic survey confirms that all pups have left the maternal roost.

- AMM-5 TCB Tree Removal: Tree removal will be limited to the areas specified in project plans and clearing limits will be marked in the field (e.g., install brightly colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits). All contractor personnel will be directed to stay out of exclusion areas.
- AMM-6 TCB Culvert Removal or Replacement: Prior to any project related culvert modification, a culvert survey using Service recommended survey protocols for culvert surveys (USFWS 2024b, Appendix K) would be conducted by a qualified biologist to identify the presence or absence of hibernating or roosting TCBs. If TCB are found within the culvert then the culvert is being used for winter torpor, or the culvert is being used as an incidental roost site by bats outside of torpor periods. If TCB are positively identified during a culvert survey assessment or if species identification cannot be verified at a culvert with evidence of use, the applicant will coordinate with TCCPESFO within 24 hours to determine next steps. For other species of bat identified, the applicant will coordinate with the appropriate state agency (Texas Parks and Wildlife Department (TPWD)). If TCB are found in the culvert during winter season (December 15 – February 15), then culvert removal or replacement activities will be delayed until the applicant conducts subsequent surveys and provides evidence that no bats are present prior to commencing construction activities; and the qualified biologist will continue to monitor the culvert for TCB until the replacement or removal operation is complete. The applicant will not exclude TCB from roosting in existing culverts in the action area.
- AMM-7 TCB Stop Work Order: Within the portion of TCB range where bats remain active year-round and continue to roost in trees during the winter, and where mean winter temperatures fall below 40°F (4.4 °C) for three (3) consecutive days between December 15 and February 15, the tree clearing activities will immediately halt until temperatures reach above 40°F and remain above 40°F (4.4 °C) for a 24-hour period after the initial temperature drop.

Based on the information provided within the BA and the implementation of the conservation measures, the Service concurs with FEMA's determination and anticipates any negative consequences to the TCB due to project construction and operation will be insignificant.

The remainder of this document provides our conference opinion on the effects of the proposed project on AST.

Consultation History

March 8, 2024: FEMA submits Conference BA to Service on March 8, 2024. FEMA's requests concurrence on their determination of "may affect, likely to adversely affect" for AST.

April 1, 2024: Service provides initial feedback on the deficiencies of the BA and missing appendices referenced in the BA.

April 1, 2024: FEMA provides missing appendices from BA to the Service.

- April 11, 2024: FEMA provides email response to address remaining deficiency items requested in Service email on April 1, 2024. Service acknowledges the information is received.
- April 18, 2024: Service emails guidance for revisions to the BA.
- April 19, 2024: Service provides some information and research on habitat creation for AST.
- April 24, 2024: Meeting with FEMA, Service, HCFCD (applicant) to discuss revisions to BA. Service provides guidance.
- April 26, 2024: FEMA provides draft habitat impact summary table for Service review and comment.
- April 29, 2024: Service emails questions about the summary table acreages, and requests additional information on habitat creation plans for AST.
- April 30, 2024: FEMA and Service exchange emails about the AST effects table, AST nesting habitat acreage estimates, and KMZ file of action areas.
- May 1, 2024: FEMA contractor provides update on density estimates used for AST to the Service.
- May 2, 2024: Service provides additional information on density estimates for AST take calculation/effects table and additional information on AST satellite trackers which appear to not be a good offset option.
- May 6, 2024: Service emails concern that FEMA project (Basins 1A and 2) is adjacent to GLO/HUD stormwater detention project (Basin 1B) initiated under a separate consultation. Service recommends a combined consultation since the action areas appeared to overlap where the construction access roads appeared to be located.
- May 6, 2024: FEMA responds to the Service that a combined consultation was not possible when there are two different Federal agencies funding two different projects on two different timelines
- May 6, 2024: FEMA, GLO/HUD, and Service meet to discuss the two different projects and conclude that because there are no overlapping action areas the consultations may remain separate for FEMA at Basins 1A and 2, and the General Land Office/U.S. Department of Housing and Urban at Basin 1B.
- May 6, 2024: FEMA contractor provides revised KMZs of project area to Service.
- May 6, 2024: Service provides information on radio telemetry tags and habitat creation options for use as potential AST offsets.

- May 8, 2024: Service and FEMA/contractor meet to discuss impact areas/acreages/density calculations for AST. FEMA agrees to revise text and figures for AST and will resubmit a revised BA including an AST offset plan in early June
- May 8, 2024: Service emails question to FEMA whether any surveys or tree restoration activities will be done as part of the Federal action. FEMA responded no because conservation measures are already being implemented to justify no further actions are required.
- June 13, 2024: FEMA submits revised BA to Service based on prior discussions and email up to this date. Revisions included:
- Summary of effects table included in the executive summary on each species.
 - AST upland nesting habitat extended from 200 ft to 200 m and all estimates updated based on this range.
 - Incorporation of AST upland nesting habitat offset by reusing excavated sandy soil totaling 9.8 ac (0.04 km²).
 - Update to AST AMM 1: Biological Monitor.
 - Update to AST AMM 4: Exclusion Fence.
 - Update to AST AMM 5 to discuss how an AST would be handled if handling was necessary.
 - Updated turtle density population numbers based on call with Service.
 - Updated range of potential take of AST based on call with Service using recent unpublished density of turtles per km in Cypress Creek.
 - Addition of Appendix E figures detailing AST aquatic and upland nesting habitat.
 - Summary of habitat alterations based on Proposed Action in Section 5.
- July 12, 2024: Service reviews the revised BA and provides additional and significant comments on deficiencies of the BA. The Service references new guidance and clarification of offsets, not available during prior discussions with FEMA, resulting in Service recommendations for revisions to the BA.
- July 29, 2024: FEMA requests call with Service regarding clarification of zone restrictions.
- July 30, 2024: Service replies with requested information in lieu of a meeting.
- August 19, 2024: FEMA submits third revision of BA to Service.
- August 21, 2024: Service sends email that the BA is complete and the conference start date is August 21, 2024.
- October 18, 2024: Service provides a draft conference opinion to FEMA for review.
- November 7, 2024: FEMA provided comments on the draft conference opinion.

CONFERENCE OPINION

The purpose of this section 7 conference is to evaluate the effects of the proposed action on AST. The Act requires a Federal agency to confer with the Service if their action is likely to jeopardize a species proposed for listing or that is likely to destroy or adversely modify critical habitats proposed for designation (Act 7(a)(4)). Recommendations resulting from that conference are advisory (i.e., they are not required) because the species or critical habitat is the subject of a proposed rule and the prohibition against jeopardy and adverse modification under the Act's section 7(a)(2) only applies to listed species and critical habitat designations. Conferencing can be conducted informally or can follow the format of a formal consultation under 7(a)(2).

By conferencing now, any future consultation required under 7(a)(2) when a species listing or critical habitat designation is finalized may be streamlined, and in some cases, conferences can satisfy the consultation requirements under 7(a)(2). Using this approach, in this conference, we found the proposed action is not likely to jeopardize any proposed or candidate species or result in the destruction or adverse modification of any proposed critical habitat designations. No critical habitat for AST is proposed and will not be evaluated in this conference opinion.

Description of the Proposed Action

Regulations implementing the Act (50 CFR § 402.02) define "action" as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies of the United States or upon the high seas." The proposed action is funded by a FEMA Pre-Disaster Mitigation (PDM) grant to reduce risks to individuals and property from future natural hazards, while also reducing reliance on Federal funding from future disasters. After reviewing the BA, the Service determined that the proposed action is a Federal action, as defined in 50 CFR § 402.02, that may affect AST, and therefore supports FEMA's conference with the Service.

A detailed description of the proposed project can be found in the BA (T.C. Jester Stormwater Detention Basin, HCFCD Project ID K500-23-00-E002, LPDM-PJ-06-TX-2022-007, Harris County, Texas, August 2024). The following is a summary of the proposed action, which includes construction of two stormwater detention basins, two outfall structures, temporary and permanent roads, reinforcement of an existing storm sewer line, and two staging areas on land owned by HCFCD along the main stem of Cypress Creek. The two detention basins are referenced in BA as Basin 1A (17 ac; 0.069 km²) and Basin 2 (7 ac; 0.028 km²) (Figure 1).

Land-based work

The two detention basins are designed to be wet-bottom facilities which maintain a permanent pool of water throughout the year and can support aquatic vegetation along a shelf within the inner perimeter of the basin (HCFCD 2014). Wet bottom detention basins can treat stormwater runoff by allowing suspended sediments to settle, and the associated aquatic vegetation in the basin can provide water quality enhancement functions through the uptake of nutrients and other pollutants prior to stormwater discharge into Cypress Creek (HCFCD 2014).

Basin 1A would provide approximately 119 ac-ft (144,784-m³) of storage and is located on the north side of the creek. The Basin 1A inflow weir connection to Cypress Creek would be

approximately 100-ft-wide (30.5-m-wide) with a 48-in-diameter (1.2-m-diameter), and 500-ft-long (152.4-m-long) reinforced concrete pipe outfall to the creek (BA, Appendix B). Basin 1A would be approximately 25 ft (7.6 m) deep with variable side slopes having a maximum slope of 4:1. Permanent all-weather access ramps and maintenance roads would be constructed leading into Basin 1A via T.C. Jester Boulevard and Cypresswood Drive. The staging area for Basin 1A would result in approximately 0.15 ac (607 m²) of temporary vegetation removal, that would be revegetated after construction is complete. There will be direct construction access from Cypresswood Drive to Basin 1A and no temporary or permanent access roads will be required for this portion of the project.

Basin 2 would provide approximately 87 ac-ft (107,313-m³) of water storage and is located on the south side of the Cypress Creek, adjacent to the Northgate Country Club, and within the oxbow where the creek channel bends (BA Figure 2, Appendix A). The Basin 2 inflow weir connection to Cypress Creek would be approximately 100 ft (30.5 m) wide, with a 48-in (1.2-m) diameter, 538-ft (164-m) long reinforced concrete pipe outfall (BA, Appendix B). Basin 2 would be approximately 35 ft (10.7 m) deep with variable side slopes having a maximum slope of 4:1. The staging area for Basin 2 would result in approximately 0.14 ac (566.6 m²) of temporary vegetation removal that would be revegetated after construction is complete.

The two proposed detention basins would be constructed using typical activities such as vegetation clearing, earthwork, and installation of erosion and sediment control best management practices. Vegetation removal is expected to occur and would be cleared by mechanized equipment using clearing techniques to minimize soil disturbance within the project area. Excavation and moving soil to construct the earthen berms and basins would be done by using standard equipment (excavators, skid steers, backhoes, dozers, rollbacks, dump trucks, and trailers) to achieve the proposed depth and side slope configuration as detailed in the BA (Appendix B). The excavated soil would be used to construct an approximate 30-ft-wide (9.1-m-wide) earthen maintenance access berm around the outer perimeter of each basin. Excavated sandy soils would be sequestered during construction and then placed on top of the basin side slopes to a minimum depth of 12 in (0.3 m), where feasible, to serve as potential nesting habitat for female AST. An approximate 30-ft-wide (9.1-m-wide) bottom shelf would be constructed approximately 2 ft (0.6 m) above the permanent pool elevation within the basins for access purposes. The bottoms of each detention basin would be permanently inundated with a wet bottom design, ranging in depth from 6-in (0.15-m) to 6-ft (1.8-m) deep, and planted with native aquatic vegetation on the shallow shelves around the edge to provide stormwater quality treatment of runoff while also functioning as aquatic habitat for AST (HCFCD 2014).

A new permanent maintenance access road, approximately 4,685 ft (1,428 m) long and 16 ft (4.9 m) wide, would be constructed from Ivy Falls Drive to Basin 2. Approximately 1.7 ac (3,277 m²) of vegetation would be removed during the construction of the permanent access road, of which approximately 1.1 ac (4,451 m²) would be within 656 ft (200 m) of Cypress Creek, which is in suitable AST nesting habitat. The permanent access route would begin at Ivy Falls Drive just west of the intersection with Northgate Forest Drive and travel northwest within an existing storm sewer easement towards Cypress Creek. This route would then head northeast beside the golf course towards the proposed Basin 2. Approximately 1,200 ft (366 m) of the existing storm sewer easement would be reinforced to meet the requirements for passage of heavy equipment

over the storm sewer. The permanent access road and storm sewer easement will not be revegetated after construction is complete.

Additionally, a temporary access road would be constructed from T.C. Jester Boulevard just north of the intersection with Ivy Falls Drive and travel northeast and adjacent to Cypress Creek until meeting the permanent access road from Ivy Falls Drive for construction access to Basin 2. This road would be approximately 1,998 ft (609 m) long and 16 ft (4.9 m) wide. Approximately 0.81 ac (3,277 m²) of vegetation would be removed during the construction of the temporary access road, which is entirely located within 656 ft (200 m) of Cypress Creek and suitable AST nesting habitat. Construction of the temporary road would include the cutting of some trees to the ground but would not include removal of the root balls. A woven polypropylene geotextile fabric would be placed on the ground, and a top layer of aggregate would be placed on top of the fabric to serve as a temporary driving surface. This portion of the area would be restored upon completion of the project, including revegetation with native trees except where it intercepts the storm sewer easement, previously mentioned.

In water work

The two outfall structures adjacent to Cypress Creek for Basin 1A and Basin 2 would encompass approximately 1,800 ft² (0.04 ac/161.9 m²) of aquatic habitat. This estimate includes the footprint of the outfall pipe and the riprap material that would flank either side of the concrete pipe. Basins 1A and 2 outfall structures would extend adjacent to approximately 3,608.9 ft (1,100 m) of Cypress Creek. Construction of the outfall structures will require bank stabilization, limited excavation, and soil disturbance within the project area. Temporary erosion control structures will be installed as detailed in the general avoidance and minimization measures (AMM) to prevent sediment movement outside of the project area (BA, Section 1.5.1).

Action Area

The action area is defined at (50 CFR 402.02) as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” Consistent with Section 7 of the Act, as amended (16 U.S.C. 1531 et seq.) implementing regulations, in delineating the action area for the proposed project, we evaluated the physical, chemical, and biotic effects of the proposed action on the environment that would not occur but for the proposed action and are reasonably certain to occur. Based on the BA, the Service has determined that the action area for this project is the approximately 68-ac (0.27-km²) project area and a 0.25-mi (0.4-km) buffer extending from the project area as described below and shown in (Figure 1). The 68-ac (0.27-km²) project area includes the two detention basins, temporary and permanent roads and inflow and outfall structures.

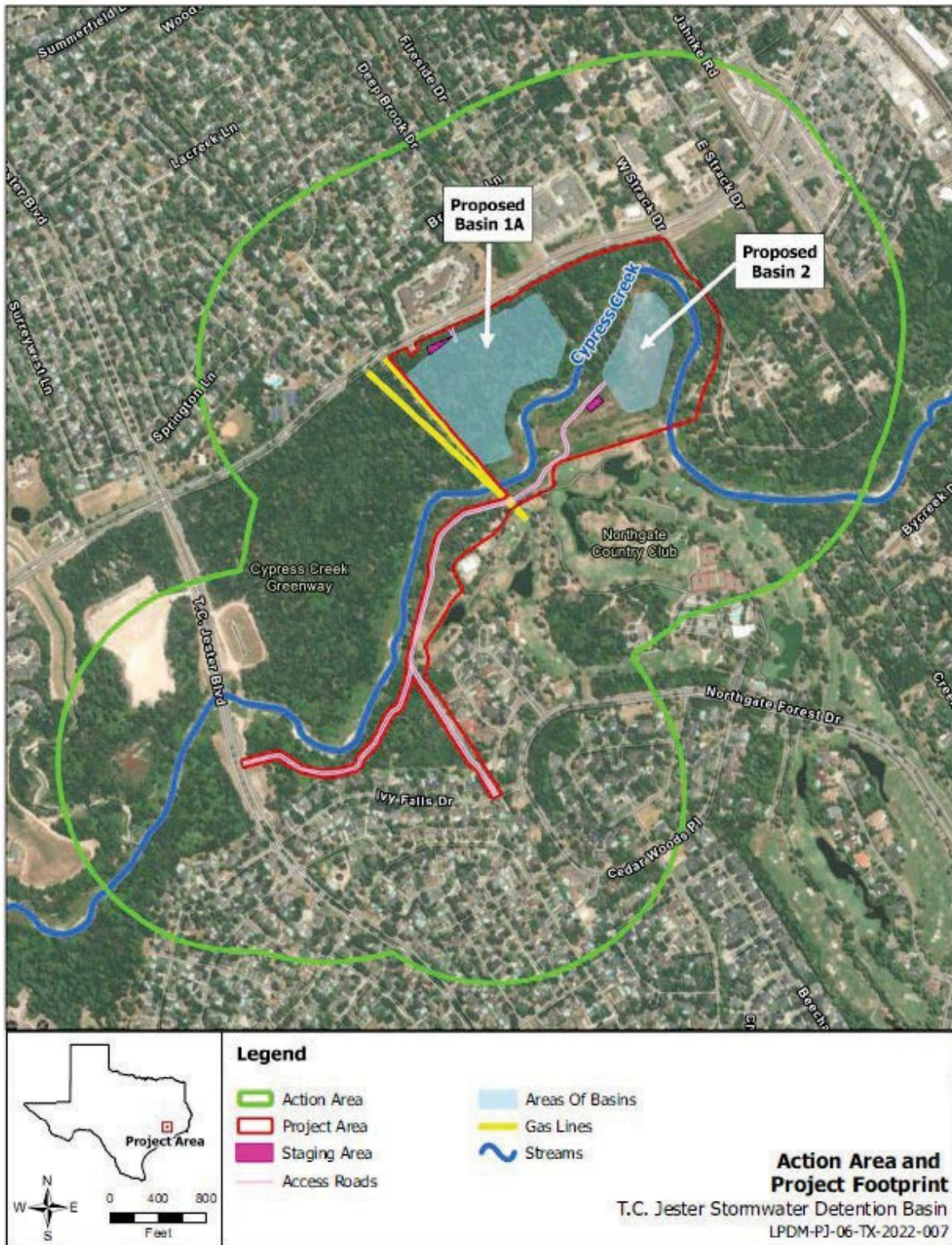


Figure 1. Action area and project footprint for T.C. Jester Stormwater Detention Basin LPDM-PJ-06-TX-2022-007) consists of Basin 1A (17 ac, 0.069 km²), Basin 2 (7 ac, 0.028 km²), temporary and permanent roads, inflow and outfall structures.

Conservation Measures

The applicant agrees to implement general and species-specific conservation measures to minimize potential impacts to AST during construction. The applicant is offsetting adverse effects from permanent loss of AST nesting habitat by preserving a 160-ft (48.8-m) forested buffer within AST nesting habitat directly adjacent to Cypress Creek and between the two basins. The applicant agrees to sequester and stockpile the sandy soils excavated during construction of the basins and create 9.8 ac (0.04 km²) of potential AST nesting habitat along the side slopes of these basins.

General Avoidance and Minimization Measures for AST

The following avoidance and minimization measures (AMMs) follows general construction recommendations provided by the TPWD for a similar flood mitigation project proposed in northern Harris County.

- AMM 1 Erosion and Sediment Control Measures: Silt fencing made of woven non-monofilament geotextile fabric will be installed along the perimeter of active construction areas to minimize erosion and sedimentation into the aquatic environment. Silt fence installation will be installed such that it is buried to a depth of 6 in (0.15 m) and has a height of 24 in (0.61 m). Silt fencing in flood prone areas will be removed when a major storm event is anticipated but will be replaced after the storm passes. The biological monitor (AST AMM 1, BA Subsection 2.5.2) will inspect the silt fencing for trapped wildlife before construction begins each day. Hydro-mulching and hydro-seeding will be used for final site stabilization. The hydro-mulch used will not contain microplastics.
- AMM 2 Bank Stabilization: After riprap is installed to stabilize stream banks beneath the proposed detention basin outfalls, the riprap will be covered with the native soil material displaced during the installation activities.
- AMM 3 Bird Nest Avoidance: A bird nest survey will be conducted within 5 days of any vegetation disturbance, regardless of time of year. Any nests found, will receive a species-specific buffer, biweekly monitoring, and be avoided until the nest is no longer occupied.
- AMM 4 Rain Event Limitations: Construction activities will not occur when there a rain event that releases more than 2 inches of precipitation over a 24-hour period at which point construction may resume.
- AMM 5 Environmental Awareness Training: Employees and contractors, with the exception of truck drivers, will be provided with environmental awareness training by a qualified biologist. This training will familiarize personnel with the species and their habitats that may occur on-site, measures to be implemented to protect this species, and project boundaries. Because truck drivers change daily, it is impracticable to ensure all truck drivers are provided with this training. Therefore, the use of disposal material trucks within 160 ft (48.8 m) of Cypress Creek will be prohibited. Signage will be posted on-site, and plans will identify where signs will be placed for truck exclusion areas.

Species Specific Avoidance and Minimization Measures for AST

In addition to the above general AMMs, the Proposed Action would implement the following AST-specific AMMs developed by HCFCD in collaboration with TPWD and USFWS to avoid and/or minimize potential impacts on the species associated with detention basin construction.

- AST AMM 1 Biological Monitor: A permitted biological monitor (e.g. authorized TPWD scientific collection permit for AST and Service Section 10 permit if the species is listed) will be on-site during all activities that may result in encounters with ASTs (e.g., during any clearing or construction work within 656 ft (200 m) of Cypress Creek if work starts prior to installation of wildlife exclusion fencing and within 200 ft (61 m) for work starting after installation of the exclusion fence (AST AMM 4). The biological monitor will be responsible for surveys to look for adults, juveniles, hatchlings, and nests prior to initiating mechanical removal of woody and brush vegetation. They will also be responsible for inspecting exclusion fencing or any open trenches daily to ensure that the fence is not compromised or breached and no turtles are entangled or trapped in fences or open trenches.
 - The biological monitor will also be responsible for surveying any in water work areas prior to construction. The biological monitor should first survey the submerged areas visually for AST surfacing for normal respiration (once every 20 to 60 minutes).
 - The applicant will provide pre-construction education and training of construction crews by providing educational materials developed by the biological monitor on the identification of AST and avoidance requirements of this conference opinion or biological opinion (if listed) during construction activities.
- AST AMM 2 Habitat Avoidance: Construction personnel will be directed to avoid impacts on logs, cutbanks, root balls, and similar in-water structural features typically used by AST for cover. If avoidance is not feasible, existing in-water structural features will be removed temporarily and relocated as near as possible to where the in-water structure originated during post construction activities. The on-site permitted biological monitor will advise construction personnel of structures to avoid impacts to the in-water structure and where to relocate any in-water structural features that cannot be avoided.
- AST AMM 3 Seasonal Avoidance: Construction activities within 200 ft (61 m) of the water's edge where exclusion fencing is installed will be avoided during the peak AST nesting and breeding season (i.e., April 1 through June 30).
- AST AMM 4 Wildlife Entrapment Prevention: Wildlife exclusion fencing will be installed along the outer edge of the 160-ft-wide (48.8-m-wide) forested buffer (the edge closest to the proposed construction within AST nesting habitat), in the water directly adjacent to where shoreline protection is being installed, and around the perimeter of any open trenches to prevent AST from entering construction areas. Trench walls will be excavated at 30-degree angles to allow AST or other animals to escape if they enter the trench. Wildlife exclusion fencing will consist of 16-ft (4.9-m) by 4-ft (1.2-m) feedlot panels with 4-in (0.1-m) by 4-in (0.1-m) openings made of 4 to 14.5-gauge galvanized wire, or similar materials that won't collapse, and do not have the potential to entangle wildlife. Fence posts (4 ft (1.2 m) tall) will

be installed at 6-ft (0.15-m) intervals to support and secure the fencing. The fencing will be buried 1-ft (0.3-m) deep so that the above ground portion is 3-ft (0.9 m) high. This type of exclusion fence must be inspected daily to ensure that it is not compromised or breached. Any necessary exclusion fence repairs or replacements will be made immediately. The on-site permitted biological monitor will inspect exclusion fences and open trenches daily for trapped wildlife before construction can begin each day (details are included in BA, Section 2.5.1).

- AST AMM 5 Encounters with the Species: Each encounter with an AST will be treated on a case-by-case basis. If an AST is found, the following will apply:
 - If an AST is detected within 200 ft (61 m) of work activities in the action area (terrestrial or aquatic environments) that may result in the harm, injury, or death to the animal, all work activities will cease immediately, and the on-site permitted biological monitor will be notified immediately. The permitted biological monitor will then notify TPWD and USFWS before taking any action.
 - Based on the professional judgment of the permitted biological monitor, if project activities can be conducted without harming or injuring the AST, the individual may be left at the location of discovery and monitored by the biological monitor until AST moves out of the action area. All project personnel will be notified of the finding and at no time will work occur within 200 ft (61 m) of an AST without the biological monitor being present.
 - Based on the professional judgment of the permitted biological monitor, if project activities cannot be conducted without harming or injuring the AST, all work will cease until the AST leaves the area (e.g., turtle crawls back to the water and swims at least 200 ft (61 m) away from construction activities. Under no circumstances should the AST or other wildlife be harmed or harassed (e.g., herded back into water) by construction crews or the permitted biological monitor.
 - If an AST is observed or found within the construction area that will not leave on its own accord within 4 hours of detection, then the permitted biological monitor will notify TPWD's Kelly Norrid at 281-908-3569, to provide guidance or assist on the individual's capture and arrangements for release at a designated relocation site within the Cypress Creek watershed.
 - AST that are captured during construction activities will be detained individually in a large plastic or similar container, with at least 3 in (0.08 m) of water and covered with branches or vegetation to calm it until relocation to a designated holding site or release site is arranged. If project work takes place in the summer temperatures above 80F (26.6°C) or winter temperatures below 60F (15.6°C), the turtle will be kept in a shaded or protected area to avoid overheating or exposure to elements. AST may not be handled or detained on site without a permitted biological monitor present. AST may not be stored in vehicles or closed containers. If more than one AST is detained during construction, then AST relocations may need to occur at a frequency greater than once per day.

- AST AMM 6 Site Restrictions: The following site restrictions will be implemented to avoid or minimize effects on the AST:
 - Trash, food, food containers, and food waste will be secured at all times by individual workers or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.
- AST AMM 7 Habitat Restoration: The applicant will restore 9.8 ac (0.04 km²) of AST nesting habitat within the detention basins and restore all temporary roads and work spaces to former AST nesting habitat.

Analytical Framework for the Jeopardy Determination

Section 7(a)(2) of the Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. “Jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this conference opinion considers the effects of the proposed Federal action, and any cumulative effects, on the range-wide survival and recovery of the listed species. It relies on four components: (1) the *Status of the Species*, which describes the current range-wide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the current condition of the species in the action area without the consequences to the listed species caused by the proposed action, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the *Effects of the Action*, which determines all consequences to listed species that are caused by the proposed Federal action; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the species. The *Effects of the Action* and *Cumulative Effects* are added to the *Environmental Baseline* and in light of the status of the species, the Service formulates its opinion as to whether the proposed action is likely to jeopardize the continued existence of the listed species.

Status of the Species

The Service was petitioned in 2012 to list AST as a threatened or endangered species under the Act. The Service compiled the best available scientific and commercial information about the species as well as a viability assessment as described by its current and future resiliency, redundancy, and representation into a Species Status Assessment Version 1.2 (SSA) (USFWS 2021b). The information provided in the SSA Version 1.2 showed AST populations are in decline and expected to continue to decline into the foreseeable future. This document also served as the biological foundation for the Service’s decision to list the AST as a threatened species. We published a proposed rule to list AST as a threatened species with a rule issued under section 4(d) of the Act (“4(d) rule”) (86 FR 62434, November 8, 2021, Docket FWS–R4–ES–2021–0115). Based on the comments and new information received during the public

comment period on the proposed rule, the Service updated the previous version of SSA to create SSA Version 1.3 (USFWS 2024c). This document was produced with input from many partners, underwent independent peer and partner review, and provides the most recent comprehensive biological risk assessment of the species' range using the best available scientific and commercial information on threats to a species and evaluates the species' current condition. The SSA Version 1.3 also forecasts a species' future status under varying scenarios and forms a revised foundational basis for a species' recovery plan, should AST become listed. The revised version of the SSA will be available in December 2024 at <https://ecos.fws.gov/ServCat/Reference/Profile/137739>. A summary of information from the SSA follows.

Species Distribution

AST were historically found in 14 states: Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Missouri, Mississippi, Oklahoma, Tennessee, and Texas. Currently, the species is known to occur in 13 of those states and only Indiana has had no recent occurrence records (Kessler and Dreslik 2021). Kansas released 40 AST with tracking devices into the Neosho River on September 12, 2024¹. The map of current range-wide occurrences (2000 to present) for AST was published in December 2022, but does not include the recent release of AST into Kansas waters (Figure 2). The range-wide map will be updated with revisions for Kansas and Oklahoma in the near future. However, range contractions were reported in other peripheral northern states within the historical range including western Oklahoma, northern Missouri, Illinois, Kentucky, and Tennessee (Shipman et al. 1995; Riedle et al. 2008a; Riedle et al. 2008b; Lescher et al. 2013; Bluett et al. 2011; Baxley et al. 2014; Kessler et al. 2017; Garig et al. 2021; Kessler and Dreslik 2021).

Species Description and Life History

ASTs are the largest species of freshwater turtle in North America and occur in the river systems that flow into the Gulf of Mexico or Mississippi River drainages (Figure 2). In the Gulf Coastal Plain, its range extends from the Ochlockonee River in the Florida panhandle to the upper Trinity River in northeast Texas (Powell et al. 2016; Enge et al. 2023; Rosenbaum et al. 2023a). Those states within the northern range with river systems flowing into the Mississippi River historically included Kansas (Shipman et al. 1991; Lovich 1993), Missouri (Lescher et al. 2013), Illinois (Kessler et al. 2017), Indiana (Kessler and Dreslik 2021), and Kentucky (Baxley et al. 2014). In Texas this species is found within the Sabine, Neches, Cypress, Trinity, San Jacinto, Sulphur, and Red River watersheds.

Sexually mature adults are greater than 13 in (330 millimeters (mm)) carapace length (CL), large juveniles (subadults) are greater than 7.1 in (180 mm) CL, small juveniles are less than 7.1 in (180 mm) CL, and hatchlings (those turtles less than one year old) are an average size of 1.5 in (37.4 mm) CL.

¹ <https://www.youtube.com/watch?v=uuDuM4a3YB0>

AST are characterized by a large head, long tail, and an upper jaw with a strongly hooked beak. They have muscular legs and webbed toes with long, pointed claws. This species has three keels with posterior elevations on the scutes of the carapace, which is dark brown and often has algal growth that adds to the turtle's camouflage. AST also possess an extra row of carapace scutes, called supra-marginals, that are positioned between the marginal scutes and costal scutes, usually numbering between two and five. They have a narrow, triangular, or U-shaped caudal notch in the carapace (Thomas et al. 2014). Their hinge-less plastron is significantly smaller than their carapace and is narrow and cross-shaped with a long, narrow bridge. The plastron is greyish brown to tan in adults; in juveniles it may be somewhat mottled with small whitish blotches. Their eyes are positioned on the side of the head and are surrounded by small, fleshy, pointed projections. Numerous epidermal projections are also present on the side of the head, chin, and neck (Ernst and Lovich 2009). Hatchlings look very similar to adults but smaller (Ernst and Lovich 2009).

AST are sexually dimorphic, with males being larger than females and having a longer tail base (anterior to vent). Sexes can be differentiated by the relative length of the pre-cloacal tail length, ranging from 4.5 to 10.5 in (114 to 267 mm) for males and from 1.9 to 4.5 in (48 to 114 mm) in mature females (Dobie 1971). Sexual dimorphism also exists in the maximum size and weight attained, with males exceeding females in both measures (Dobie 1971). The standard midline CL measured from wild turtles harvested at a Louisiana processing facility showed that females attained maturity between 12.9-14.6 in (32.7-37.0 cm) CL and males attained maturity between 14.9-16.1 in (37.8-41.0 cm) CL (Tucker and Sloan 1997). The largest currently recorded male across the range was captured in Texas (211.2 lbs. (95.8 kg) and 29.1 in (74 cm) CL; Rosenbaum et al. 2023a), while the largest female was captured in Alabama (80 lbs. (36.4 kg) and 21.8 in (55.4 cm) CL; Godwin et al. 2023), resulting in a calculated sexual size dimorphism (SSD) index estimate of -2.69 by mass, and SSD estimate of -1.35 by length.

Despite being one of the largest freshwater turtles in the world, the AST is difficult to study due to their aquatic and cryptic nature (Ernst & Lovich 2009; Rosenbaum et al. 2023a). Although fully aquatic, this species' overland movements are generally restricted to nesting females and hatchlings moving from the nest to water. During low water conditions, both male and female AST move overland to nearest water for survival (Adams et al. 2024). Female alligator snapping turtles' nest relatively near to water, with nests observed approximately 8 to 656 ft (2.5 to 200 m) landward from the nearest water (Ewert 1976; Ewert et al. 2006; Jackson and Jensen 2003; Powders 1978). In Texas, a female was observed and photographed nesting on a steep bank (approximately 63-degree incline), 11.2 ft (3.4 m) above the water's surface (Munscher et al. 2023a). The female's preference for nesting on steeper slopes appears to be an instinctive adaptation for selecting sites where nests would not be flooded.

AST demonstrate seasonal differences in their activity levels and movements. Both males and females are less active during the winter (November to March) and summer (July to August) but most active during reproduction and nesting seasons in the spring (Riedle et al. 2006; Carr et al. 2010; Munscher et al. 2021). The minimum home range of adults and large juveniles varies between 44 to 610 ac (0.18 to 2.47 km²) (Sloan and Taylor 1987). The linear home range of adults and large juveniles from a Louisiana study was reported between 0.88 mi to 2.17 mi (1.42 to 3.49 km) (Harrel et al. 1996). One Texas study tracking AST in Buffalo Bayou, a major river within the City of Houston, reported similar findings where adult females averaged both greater

movement distances and total observed home range (0.43 to 2.63 mi; 0.69 to 4.23 km) than adult males (0.18 to 1.42 mi; 0.29 to 2.29 km) (Munscher et al. 2021). In another Texas study, female and juvenile AST were radio telemetry-tracked after 401 relocations in a lower order stream with lotic habitat in the Stephen F. Austin Experimental Forest in East Texas. This study found that the median linear home range for all turtles (e.g. adults and juveniles) was 0.66 mi (1.062 km), with females generally having slightly longer median home ranges (0.77 mi, 1.24 km) than juveniles (0.446 mi, 0.718 km) (Adams et al. 2024).

In a Louisiana study within Black Bayou National Wildlife Refuge, radio tracked hatchlings moved more frequently during April and June than in other months which were associated with warm temperatures when water levels were stable, allowing individuals to move about more freely in the shallow forested wetlands (Bass 2007). However, the average home range for these re-introduced hatchlings during the spring/summer season (623.2 ft²(57.9 m²), 0.014 ac (0.006 hectares (ha)) was less than those of hatchlings tracked during the fall (1410.0 ft² (131.0 m²), 0.032 ac (0.013 ha)), with an overall average home range size of 1,017.1 ft²(94.5m², 0.023 ac (0.009 ha)) (Bass 2007). Hatchlings appeared to inhabit this core home range but would relocate if there was some sort of water-level fluctuation that made conditions unfavorable for their survival (Bass 2007).

Geographic isolation of river drainages and the propensity of the AST to maintain a core home range has led to genetically discrete populations within each Gulf of Mexico river system (Munscher et al. 2021; Riedle et al. 2006; Trauth et al. 2016; Hyder et al. 2021). Although populations in the western and central assemblages are geographically closer together and are genetically more similar, it is extremely rare for inter-drainage dispersal of genetically discrete populations of *Macrochelys* among isolated Gulf of Mexico river drainages (Apodaca et al. 2023; Pearson 2021; Roman et al. 1999; Echelle et al. 2010).

Small juveniles and hatchling AST generally inhabit shallower water with woody canopy cover and/or structural cover like woody debris where they are less likely to become prey to aquatic predators (Spangler et al. 2021; Bass 2007). Adult and large juvenile AST can inhabit a wide range of aquatic habitats from deeper waters of large rivers and their tributaries to reservoirs where they can meet their thermoregulatory needs to stay cool during warmer seasons. However, adults and large juveniles can also be found in small streams, bayous, canals, swamps, lakes, ponds, and oxbows with a high percentage of canopy cover, or with undercut banks, which provides much needed shading to meet these thermoregulatory needs (Munscher et al. 2020, 2021, 2023; Gordon et al. 2023; Rosenbaum et al. 2023a). AST are also found occupying aquatic habitats with submerged structures (e.g., tree root masses, stumps, submerged trees, etc.). These submerged structures provide cover and an opportunity to prey on fish, crawfish, crabs, mollusks, insects, small mammals (e.g., nutria, wild hog, opossum, squirrel, and armadillo), snakes, small turtles, and birds (Howey and Dinkelacker 2009; Harrel et al. 1996; Rudolph et al. 2002; Carr et al. 2007; Carr et al. 2010; Ligon and Voves 2018; Munscher et al. 2021; Rosenbaum 2022). AST are also opportunistic scavengers that consume pecans, acorns, persimmons, wild grapes, leeches, ducks, racoons, muskrats, and rabbits (Sloan et al. 1996). Although other states have reported AST on barrier islands in the Gulf of Mexico, one deceased turtle was discovered on the Gulf of Mexico side of Bolivar Peninsula in Texas, which leads to questions regarding this species' salinity tolerance to estuarine habitats since the nearest record

of alligator snapping turtles to this one is over 44 mi (70.8 km) away in Buffalo Bayou, in Harris County (Norrid et al. 2021).

While alligator snapping turtles are primarily aquatic, they also need access to the surface to breathe air. Alligator snapping turtles cannot remain submerged for long periods of time compared to other aquatic turtles. At water temperatures of 21 to 24°C (69.8 to 75.2°F), submergence times range from 40 to 50 minutes (Ernst and Lovich 2009). However, during the winter season, movement is very limited as water temperatures drop, body temperature, heart rate, and respiration drop, resulting in lower energy and oxygen needs for survival. As winter progresses, AST enter a state of brumation, similar to mammalian hibernation. During brumation, AST can obtain oxygen from water flowing over the cloacal region of their body where the densest blood vessels are close to the epidermis under the tail (Navarrette 2021). Cloacal respiration can also be used to supplement respiratory needs during high flow conditions or ice cover when the turtle is prevented from reaching surface for normal breathing.

Male and female ASTs reach sexual maturity in 11-21 years and 13-21 years, respectively (Ernst and Lovich 2009; Reed et al. 2002). Mating takes place underwater (Ernst and Lovich 2009) and has been observed in captive ASTs from February to October, but geographic variation among wild populations is not well understood (Grimpe 1987; Reed et al. 2002; Ligon and Hannabass 2020; Rostal et al 2023, Jackson and Ewert 2023a, Munscher et al. 2023a). Females ovulate in spring and are thought to breed yearly, though poor foraging success may cause females to skip a breeding year. No more than one clutch per year per female has been observed in the wild and clutch sizes across the species' range vary from 9 – 61 eggs, with a mean of 27.8 eggs (Ernst and Lovich 2009). Eggs hatch between 79 and 107 days at incubation temperatures ranging from 20 to 25C (77 °F) (Ernst et al 1994). Nesting females generally represents the only adult life stage to venture onto land (Ernst and Lovich 2009). Previous studies indicate that females leave the water during the late night or early dawn hours and complete nesting during the day (Ernst and Lovich 2009). Most nesting activity for this species has been reported to occur between May and July (Reed et al. 2002), with areas in the southern part of the range (e.g., Georgia, Florida, Texas, and Louisiana) beginning in April and extending through May; whereas areas in the north and western portion of the range nesting occurs between late May through June and July (Ernst and Lovich 2009; Carr et al. 2010).

Temperature of the nest site is important because this species exhibits temperature-dependent sex-determination – where more males are produced at intermediate incubation temperatures and more females are produced at the two extremes (Ewert and Nelson 1991, Ligon and Lovern 2009; Jackson and Ewert 2023). Nests have been found in sandy or sand mixed with silt, loam, and organic alluvium substrates, and some are found on elevated mounds on dredge spoils, or in some cases on bluffs of high steep cut banks, that are partly shaded by trees and brush (Munscher et al. 2023; Jackson and Ewert 2023). Nest predation by fire ants (*Solenopsis invicta*) or raccoons (*Procyon lotor*) and other mammals, and flooding are major sources of mortality in many AST populations across the range (Ewert et al. 2006; Holcombe and Carr 2013; Miller et al. 2014; Dreslik et al. 2017; Shipman 2019; Holcombe and Carr 2023). Growth is rapid until maturity (11-21 years of age), slowing after reaching maturity (Dobie 1971).

Threats

Historic threats from extensive overexploitation through commercial and recreational harvest in the last century resulted in significant declines of this species throughout much of its range, with recent, large-scale trapping industries operating in the mid-South (Dobie 1971; Sloan and Lovich 1995). Captive farm-raised turtles are allowed to be commercially harvested in Louisiana. Recreational harvest is still permitted for personal use with the restriction of one turtle per day per person or per vehicle in Louisiana, and one turtle per open season in Mississippi.

The main threats to AST across the range between 2000 and 2023 are nest predation (Shipman 2019; Holcomb and Carr 2023), recreational bycatch and hook ingestion, illegal intentional harvest (including export for pet trade and international consumption), commercial bycatch for non-game species by trot or limb lines, and habitat alteration (Shook et al. 2023; Rosenbaum 2023). Although commercial and recreational regulatory restrictions have decreased the number of AST being harvested across the range (with exception of Louisiana and Mississippi), populations have not rebounded or responded to local state conservation measures (USFWS 2021b). This lag in population response is likely due to any of the following factors: large size, slow growth rate, delayed sexual maturity (average age of 17 years), low clutch size, low hatchling survivorship, large temporal intervals between reproduction, long life spans, ease in which individuals can be collected by hooking, and nest predation (fire ants, racoons, and other small mammals). Long generation times correspond to slower evolutionary changes and this species is less likely to adapt and persist in response to increased environmental changes (USFWS 2021b). This species' inability to maintain sustainable numbers increases its susceptibility to overexploitation and extirpation (Reed et al. 2002).

Habitat alterations are also considered a major threat to survival of all life stages of AST. Reduced water levels and temperature shifts within AST suitable habitat motivates these aquatic turtles to seek deeper water or move overland to adjacent aquatic habitats to maintain moisture and cool their bodies (Enge et al. 2014; Pearson et al. 2021; Shook et al. 2023). In a Florida study, during low water levels, important microhabitats such as undercut banks and woody debris associated with banks become less available and AST moved overland to submerged woody debris within river channels or woody wetlands (Enge et al. 2014). In this same study, during high water levels, AST used floodplains and were found to be more likely located under trees and among root systems (Enge et al. 2014). These turtles were also observed to repeatedly move between the floodplain and the river channel, making overland movements when these habitats were no longer connected by water. Although previous studies of AST indicated overland movement to be rare or absent (Prichard 2006), Enge et al. (2014) found AST will move over land to access suitable habitat when low water levels occur. In other studies, overland movement, prompted by habitat alterations, prompted AST to traverse roads or railroad tracks, which decreased their chance of survival (Shook et al. 2023). Loss of woody canopy cover also reduces shading of suitable habitat, allowing sunlight to heat up the water and their body temperatures, which also prompts AST to move to other suitable habitat to maintain respiratory and circulatory functions.

Recreational fishing bycatch and hook ingestion are also threats to adult and juvenile AST survival. Recreation freshwater fishing is prevalent throughout the species distribution and includes typical rod-and-reel fishing along the shoreline and from boats to trot-lines (series of

baited hooks suspended in the water column) and limb-lines (one or more hooks tied off to an overhanging tree branch) in shallow water habitats. Conservation measures to deter hooking mortalities have been successfully implemented through an educational signage program in Texas watersheds that gives the public an opportunity to identify the turtle, report recreational fishing bycatch encounters, promote live releases after removing the hook if possible, and report any mortalities observed from non-game targeted commercial bycatch on limb or trot lines (Watson et al. 2020). This type of state and citizen supported educational program has not been utilized in other states but is an example of how local conservation measures can be implemented to reduce the threat of hooking mortalities in Texas.

Range-wide Survival and Recovery Needs

There is no recovery plan for AST nor have the survival needs of the species been fully determined by the Service.

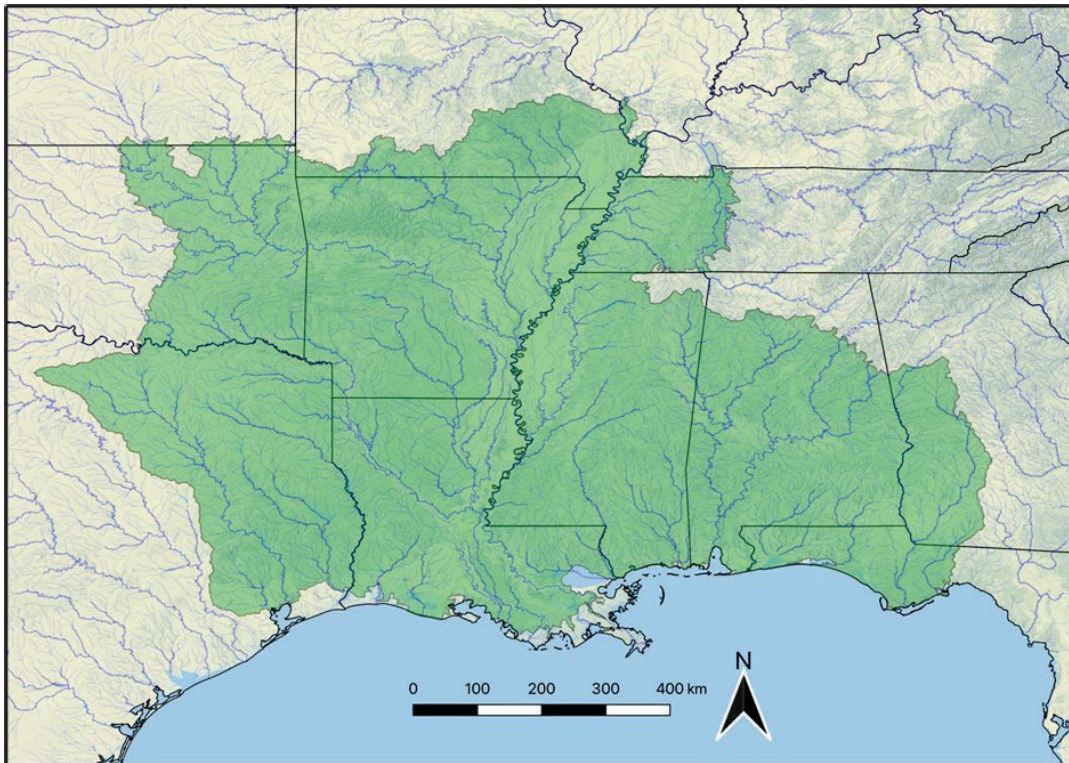


Figure 2. Current One Range map of the alligator snapping turtle is based on known occurrences reported since 2000. The current range map will be updated based on reintroductions in Kansas in September 2024.

Environmental Baseline

Environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already

undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

Status of the Species in the Action Area

In Texas, multiple studies are in progress to evaluate populations of AST and the effects of different threats on this species. One study funded by the Service's Wildlife and Sport Fish Restoration Grant and TPWD's State Wildlife Grant is evaluating the population structure of AST through estimation of demographic vital rates (e.g., survivorship, emigration) in habitats subjected to different intensity of passive fishing pressure (e.g., trotlines, juglines) while also quantifying the pervasiveness of these threats as well as studying the ecological requirements regarding their trophic ecology (Ecosphere 2022-0071943). Another study is monitoring 16 AST composed of both repatriated and wild caught turtles using radio telemetry and is tracking their movements between 2023 and 2024 by Stephen F. Austin University through a Texas Comptroller's Office grant (Connor Adams 2023, pers. comm.). This study reported several AST moved several miles during low water conditions to find the nearest water body, and in some cases had to "puddle jump" between wet areas to reach larger waterbodies (Connor Adams, 2023 personal communication). TPWD, HCFCD, and Steven W. Carothers and Associates (SWCA) are actively tracking 10 female AST in Cypress Creek to determine where and how far they travel to nest in this urban watershed. Although the final results of this on-going study are not published yet, the density of turtles in Cypress Creek is estimated to be 7.03 turtles per km within this 85-km (52.9-mi) long creek (Munscher, 2024 pers. comm.). Based on this density estimate for Cypress Creek, the Service estimates approximately 598 adult and juvenile turtles occupy Cypress Creek. However, the number of hatchlings produced each year within Cypress Creek is unknown at this time.

The entirety of the proposed action lies within the range of AST. The action area contains suitable AST nesting habitat and there are known documented AST occurrences in Cypress Creek. Given the presence of AST habitat and documented historical occurrence of the species above and below the action area, we expect the action area is occupied by the species. Given the presence of potential nesting habitat within and adjacent to the project area, and the likely presence of suitable aquatic AST habitat within both the project and action areas, we anticipate the species is likely to be present within the action area, and individuals are likely to move through or into the action area during project construction.

Effects of the Action

Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action.

The following analysis evaluates the full implementation of the proposed action and other threats ASTs are anticipated to encounter in the action area. The consequences of these actions are

considered together for this analysis. Due to this species' cryptic behavior and also being fully aquatic except for nesting females, adverse consequences may be difficult to detect as individuals could unknowingly be killed, injured, or stressed by the proposed actions while submerged in their aquatic habitat or while crawling over terrestrial habitat to nest.

Construction for the proposed action will affect 17 ac (0.069 km²) of the 54 ac (0.22 km²) of suitable AST nesting habitat within the project area. Construction for the proposed action will also occur adjacent to 1.37 mi (2.2 km) of suitable AST aquatic habitat within Cypress Creek, which has known occupancy records. However, construction of the proposed outfall structures will only affect 0.04 ac (0.0002 km²) of AST aquatic habitat. Construction is anticipated to span two breeding seasons of AST. Once the basins are completed, the temporary access roads and staging areas will be revegetated with native trees and a mix of grasses. The applicant will also be creating 9.8 ac (0.04 km²) of AST nesting habitat within the basins using sandy excavated soils obtained during construction of the basins.

We anticipate that the proposed action, in the absence of effective conservation measures, would result in disturbance, sublethal, and potentially lethal effects to individual AST, particularly where individuals remain undetected and are exposed to project stressors (e.g., equipment or vehicles running over individuals or nests). To avoid and minimize impacts to the AST as a result of the proposed action, the applicant will require contractors and construction crews to implement conservation measures discussed in the AMMs and Sections 4.1 of BA. Conservation measures include but are not limited to; training contractors and site staff to act as AST monitors during portions of the project construction, the use of exclusion fencing to prevent females from accessing project workspaces, altering natural features to the minimum extent necessary and relocating any AST that becomes entangled in fencing or accesses the project work spaces and will not leave of their own accord. These measures are intended to reduce the likelihood and severity of the anticipated effects, and these measures will factor into our analysis when discussing the likelihood of exposure below.

Noise from construction activities is not expected to impact ASTs that may occur in the adjacent stretch of Cypress Creek because (1) submerged turtles have poor sensitivity to airborne sound (Christensen-Dalsgaard et al. 2012) and (2) any ASTs occupying aquatic habitat in the vicinity of construction would be minimally exposed to airborne noise sources because ASTs spend most of their time underwater except to surface to breathe every 40 to 50 minutes (Ernst and Lovich 2009). Consequently, construction-related noise is not expected to trigger a behavioral response in ASTs occupying adjacent aquatic habitat or result in auditory masking that could impair freshwater turtle's behaviors in the aquatic environment (Christensen-Dalsgaard et al. 2012).

The effect of the action (e.g., dirt moving or installation of rip rap) could release sediment into the water column, which has the potential to degrade water quality and may require AST to surface more often to breathe during warmer water temperatures or may hinder cloacal respiration during colder water temperatures. While the AST are commonly found in low visibility environments associated with deeper areas of the channel, any additional sediment deposited into the littoral system from the proposed action could impair visibility and alter the foraging behavior of the AST. We would expect these specific activities to be of a temporary nature and in the absence of conservation measures that minimize sediment and erosion entering the littoral system, could have lethal effects on the AST. The effects to water quality and AST in

their aquatic habitat from the proposed action would be minimized by implementation of the proposed erosion and sediment control measures (AMM 1) and the avoidance of work during a rain event that releases more than 2 in (5.1 cm) of precipitation over a 24-hour period at which point construction may resume (AMM 4), as described in BA (Section 2.5).

Construction and installation of two proposed outfall pipes and riprap aprons would result in disturbance to the existing banks and creek bed that may include the removal of structural features such as snags, submerged logs, and other debris that provide ASTs with underwater cover. The removal of such features would decrease the value of existing in-stream habitat for ASTs. However, in accordance with AST AMM 2, existing in-water structural features would be avoided to the extent feasible, and in cases where their avoidance is impracticable, the on-site biological monitor would oversee the relocation of such features to a suitable nearby location. The two outfalls and riprap aprons would impact a total 1,800 ft² (0.04 ac; 0.0002 km²) of creek bank habitat. Therefore, although the proposed action could result in a permanent localized reduction in habitat, the structural features of the stream reach would be retained and aquatic habitats within the action area would be expected to retain their existing overall value for ASTs upon project completion.

Aside from the installation of outfall pipes and riprap for shoreline protection, the proposed action would not involve work in aquatic habitats, where ASTs are most likely to occur. The effects of the proposed action would be primarily limited to potential encounters with females on the land within 656 ft (200 m) of Cypress Creek, which represents the maximum distance a female AST nests from the water (Ewert 1976; Ewert et al. 2006; Jackson and Jensen 2003; Powders 1978). Noise and vibrations from construction activities could disrupt normal AST nesting behavior, and nesting females could be injured or killed if they were to become trapped within open trenches, or injured or killed by vehicles or construction equipment if work were to occur within 656 ft (200 m) of Cypress Creek during the nesting season. The risk of an impact increases with decreasing distance to the creek. Although a 160-ft (48.8-m) forested buffer zone from Cypress Creek to Basin 1A would be maintained, construction would occur in the outer 496 ft (151 m) of the 656-ft (200-m) zone of suitable nesting habitat along the creek. The proposed basins would overlap with approximately 16 ac (0.065 km²) of viable AST nesting habitat. Additionally, there would be approximately 2,954 ft (0.9 km) of the 16-ft-wide (4.9-m-wide) permanent access road within 656 ft (200 m) of the creek, amounting to approximately 1.1 ac (0.004 km²) of potential nesting habitat permanently impacted and approximately 1,998 ft (0.609 km) of 16-ft-wide (4.9-m-wide) temporary access road within 656 ft (200 m) of the creek, amounting to approximately 0.81 ac (0.003 km²) of potential nesting habitat temporarily impacted. Additionally, there would be a permanent loss of the outer 496 ft (151 m) of habitat along the basins considered to be suitable for nesting.

Terrestrial construction work includes clearing vegetation, and all earth moving activities associated with site preparation, construction of staging areas, excavation of basins, temporary and permanent access roads, shoreline stabilization and landscaping. Equipment used to complete these tasks includes excavators, skid steers, backhoes, dozers, rollbacks, dump trucks, trailers, and cement mixers.

Construction activities in AST terrestrial habitat could potentially affect two nesting seasons. AST are mobile species and if disturbed by construction activities, could leave the action area

and move to a different location with suitable nesting habitat. However, we have no data to suggest the species will vacate an area based on noise or vibration from construction in their terrestrial nesting habitat and therefore may attempt to nest in the action area.

As part of the construction, the applicant will erect wildlife exclusion fencing made of rigid material to prevent AST from being incidentally trapped in open trenches. The applicant is incorporating specific AMMs to monitor the open trenches and exclusion fencing to prevent entrapment in trench, injury or death from exposure. There is a possibility that female AST will become entangled or trapped within the wildlife exclusion fencing should the fencing not withstand the force of an adult AST as it moves across the landscape to nest. The applicant is incorporating specific AMMs to reduce the likelihood of adult AST entanglement by surveying the wildlife exclusion fencing daily and educating on-site contractors to report any AST observed in the construction work areas so that work stops until the AST leaves the area or is relocated according to protocols in the AMMs.

The proposed action could also affect AST hatchlings and eggs from a nest not being detected before or during construction that could be injured or killed from (1) being crushed by equipment or worker foot traffic, (2) being crushed within nests that are collapsed by heavy equipment, vehicles, or foot traffic, or (3) collisions with project-related vehicles and equipment on access roads and staging areas. The applicant is incorporating specific AMMs to reduce the likelihood of hatchling entanglement by the biological monitor surveying the nesting areas (656 ft; 200 m) from Cypress Creek; and educating on-site contractors to report any AST observed in the construction work areas.

The potential for AST behavioral disruptions, injury, or mortality to occur would be minimized through the implementation of general and AST-specific AMMs described in the BA (Section 2.5). These measures include:

- Having a permitted biological monitor on-site during work within 656 ft (200 m) of Cypress Creek (AST AMM 1) before the installation of the wildlife exclusion fencing and 200 ft (61 m) after its installation.
- Avoiding or minimizing impacts to AST aquatic habitat (e.g., logs, cutbanks, root balls or similar in water structures) during construction and restoring such features post-construction (AST AMM 2).
- Limiting work within 200 ft (61 m) of the water's edge to times outside of the peak AST nesting season (AST AMM 3).
- Installing wildlife exclusion fencing around open trenches and adjacent to the shoreline protection work, in addition to conducting daily inspections of fence integrity will prevent ASTs from entering the construction area (AST AMM 4).
- Installing wildlife exclusion fencing between the construction area and the 160-ft-wide (48.8- m-wide) forested protection buffer along the creek (AST AMM 4). This fence is anticipated to greatly reduce the occurrence of nesting females and juvenile AST beyond 160-ft (48.8-m) of Cypress Creek upon its installation.

- Ceasing all potentially harmful activity within 200 ft (61 m) of any ASTs that occur within the action area and allowing individuals to leave the area on their own (AST AMM 5).
- Informing all construction personnel of the AST's potential presence and of the measures being implemented to protect ASTs and their habitat (AST AMM 5).
- Keeping work areas clear of food waste to avoid attracting potential predators of AST nests and limiting vehicle speeds to facilitate the detection and avoidance of any ASTs that may cross access roads enroute to or from nest sites (AST AMM 6).

With the implementation of these conservation measures, the potential for the proposed action to result in the injury or mortality of ASTs would be minimized but still possible.

Although the proposed action could result in a localized reduction in habitat quality due to the removal of existing cover, this would only affect upland potential nesting habitat, with some of these effects being temporary. As an offset for unavoidable impacts to suitable AST nesting habitat, sandy soils will be excavated and retained from the stormwater detention basins to be placed in and around the basins, at a thickness of 12-in (0.3 m) over base materials, to create 9.8 ac (0.04 km²) of potential upland nesting habitat for female AST (Miller et al. 2014; AST AMM 7). Consequently only 7.2 ac (0.03 km²), or approximately 13 percent of the suitable nesting habitat in the project area, would be permanently impacted by the proposed action. Another 0.81 ac (0.003 km²) would be temporarily impacted by the temporary access road and revegetated after construction is completed. The protected 160-ft-wide (48.8-m-wide) forested buffer between the creek and the basins would retain its existing habitat characteristics and be available for nesting during and in the years following construction. While there would not be a 160-ft (48.8-m) forested buffer maintained between the access roads and the creek, the permanent access road would only impact 1.1 ac (0.004 km²) of suitable AST nesting habitat. Within the project area, approximately 47 ac (0.19 km²) of suitable nesting habitat (includes undamaged areas, restored AST nesting habitat within the basin, and restored work areas temporarily impacted) within 656 ft (200 m) of Cypress Creek would remain upon the completion of the proposed action.

As noted previously in the "Description of the Proposed Action" section, the project proponent also proposes a set of conservation measures, including the commitment to provide compensatory habitat (9.8 ac (0.04 km²) of AST nesting habitat) as a condition of the action. This compensatory habitat is intended to minimize the effect on the species of the proposed project's anticipated incidental take, resulting from the permanent loss of nesting habitat described above. This component of the action will have the effect of providing suitable habitat for nesting commensurate with or better than the habitat lost as a result of the proposed project. Providing this compensatory habitat may contribute to other recovery efforts for the species (e.g., on-going study of female AST nesting movements in Cypress Creek).

Cumulative Effects

The action area is comprised of urban landscape adjacent to T.C. Jester Boulevard and Ivy Falls Drive and Cypress Creek. The surrounding public land consists of forest and private lands are residential use. Activities performed by local municipalities (Harris County, City of Houston)

and private entities may occur in the area, but the Service did not identify any future non-Federal actions that are reasonably certain to occur in the action area of the proposed project.

Conclusion

After reviewing the current status of AST, the environmental baseline for the action area, the effects of the proposed T.C. Jester Stormwater Detention Basin (Harris County Flood Control District Project ID K500-23-00-E002/LPDM-PJ-06-TX-2022-007), and the cumulative effects, it is the Service's conference opinion that the proposed project is not likely to jeopardize the continued existence of the AST. The Service reached this conclusion because the project-related effects to the species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of the species based on the following:

- 1) The area impacted by the project (17 ac (0.069 km²) of nesting habitat, 0.04 ac (0.0002 km²) of aquatic habitat) is a fraction of the range of the species, which extends over a 13-state area.
- 2) The estimated incidental take of 15 AST is approximately 2.5% of the 598 estimated to occur in Cypress Creek and would not be expected to impact the species across its 13-state range.
- 3) The loss of 17 ac (0.069 km²) of nesting habitat will be offset with 9.8 ac (0.04 km²) of nesting habitat restored onsite.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary and must be undertaken by FEMA so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. FEMA has a continuing duty to regulate the activity covered by this incidental take statement. If FEMA (1) fails to assume and implement the terms

and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, FEMA must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take

Based on the results of the “Effects of the Action” analysis above, the Service anticipates incidental take of AST will occur as a result of the proposed project. At this time the Service has AST occupancy records for Cypress Creek from an on-going female nesting study conducted by TPWD, HCFCD and SWCA where live turtles were captured in traps and tracking devices are installed on 10 female AST. Based on these study results (unpublished) the Service anticipates 598 AST juveniles and adults, at a density of 7.03 turtles per km, occupy the 85-km (52.9-mi) Cypress Creek (Eric Munscher 2024, pers. comm.). By applying this density estimate, it is reasonable to assume that 15 adult or juvenile turtles would be present in the 2.2-km (1.37-mi) action area during construction of the proposed project (Table 1). Although we acknowledge the actual numbers of AST present may vary slightly from this estimate, we do not expect substantially larger numbers of AST would be present in the action area once construction has started. Although the actual number is uncertain, we would not expect more than 15 adult or juvenile AST would be present during construction and exposed to project stressors over the duration of the action (extending over a 2-year period).

The Service anticipates that incidental take of AST will be difficult to detect for the following reason(s): the species has cryptic behavior and spend almost all of their life underwater making them hard to detect in murky water. Females leave their aquatic habitat to nest in terrestrial areas primarily at night and are difficult to detect unless they are finishing nesting during the day. There is a risk of harm, injury and mortality as a result of the proposed construction activities, permanent and temporary loss/degradation of suitable nesting habitat, in addition to capture and relocation efforts. However, proper implementation of avoidance measures and restoration activities in terrestrial habitats discussed above should be effective in reducing incidental take of individual AST and nests and eggs from project stressors. The applicant has taken measures to exclude nesting females from the terrestrial portion of the project area, however male and female AST migrating through the action area may be affected at any time of the year as the species is aquatic and can move into new home ranges when disturbed.

Although there is the potential for temporary failure of the wildlife exclusion fencing to prevent AST from entering the construction work areas due to breaches in the fencing, the designated biological monitor will relocate these turtles in accordance with protocols in the AMMs and reduce the likelihood of injurious effects or losses of AST. The biological monitor will also survey the wildlife exclusion fencing daily and ensure timely repair to any breaches or damages to the fences. Thus, we anticipate a small number of individual ASTs will experience disturbance, sublethal (e.g., elevated stress levels from handling during capture or relocation, noise, and vibration during construction) that are likely to result in disruption of movement, breeding, feeding, or sheltering of adult or juvenile AST. Additionally, some lethal effects (e.g., exposure to heat resulting in death) may occur. Actual terrestrial habitat degradation may be detectable, but directly attributing specific effects of that degradation to individuals is not

possible. Incidental take associated with nesting behaviors would also be difficult to determine. We expect that lethal take of AST, if any, will be drastically reduced by implementation of avoidance and minimization measures. However, the Service anticipates that 15 adult or juvenile AST will be incidental taken over the 2-year construction period (Table 1). Incidental take would be in the form of killing, wounding, harassing, and harm.

Table 1. Amount of AST habitat and number of AST occupying Cypress Creek and the proposed project area. * Density estimate based on ongoing research in Cypress Creek.

Identification of Unit Measured	Area km ² (ac)	Length km (mi)	Density (Number of turtles/km) *	Number of Turtles	Percent of Turtles in Cypress Creek
Cypress Creek	34 (8,401.58)	85 (52.9)	7.03	598	100
Proposed Project in Cypress Creek	0.22 (54)	2.2 (1.37)	7.03	15	2.51

Effect of the Take

In the accompanying conference opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to AST. Although we anticipate some incidental take to occur, the implementation of the proposed AMMs will ultimately result in avoidance and minimization of adverse effects to individuals of AST.

Reasonable and Prudent Measures and Terms and Conditions

All necessary and appropriate measures to avoid or minimize effects on the AST resulting from implementation of this project have been incorporated into the project's proposed conservation measures and incorporated here by reference. Therefore, no additional reasonable and prudent measure or terms and conditions are necessary.

Monitoring and Reporting Requirements

1. FEMA shall immediately contact the Service's TCCPESFO at 281-282-8282 to report direct encounters between the species addressed in this conference and project workers and their equipment whereby incidental take in the form of harassment, wounding, or killing occurs. If the encounter occurs after normal working hours, FEMA shall contact the TCCPESFO at the earliest possible opportunity by the next working day. When injured or killed individuals of the species are found in the proposed project area, FEMA shall also follow the steps outlined in the Salvage and Disposition of Individuals section below.
2. For those components of the action that will require the capture and relocation of any listed species, FEMA shall immediately contact the TCCPESFO at 281-286-8282 to report the action. If capture and relocation occur after normal working hours, FEMA shall

contact the TCCPESFO at the earliest possible opportunity by the next working day to report the action.

3. Care should be taken in handling sick or injured specimens to ensure effective treatment and care or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured specimens or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Service Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed (follow the steps outlined in the Salvage and Disposition of Individuals section below).
4. Upon completion of construction, a post-activity report prepared by FEMA shall be forwarded to the Field Supervisor of the TCCPESFO within 60 calendar days. This report shall detail:
 - a. Dates project activities occurred.
 - b. Pertinent information concerning the completion of and success in implementing the conservation measures.
 - c. An explanation of failure to meet such measures, if any.
 - d. Occurrences of species covered in this opinion encountered during project implementation and project effects, if any.
 - e. Occurrences of incidental take of covered species if any.
 - f. For those components of the action that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, FEMA shall provide a precise accounting of the total acreage of habitat impacted and habitat restored to the Service after completion of construction.
 - g. Other pertinent information.

Salvage and Disposition of Individuals:

Upon locating a dead, injured, or sick listed species initial notification must be made to the Service's Law Enforcement Office, 19581 Lee Road, Humble, Texas and 281-876-1520 within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification must be sent to the Law Enforcement Office with a copy to the TCCPESFO. Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the

specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following:

The distribution of the AST and TCB occur over a large portion of the Texas, mostly in the eastern portion of the state. Because these species habitats are relatively general in nature, Federal actions that overlap these ranges are likely to continue to encounter the species and/or their habitats. For this reason, we recommend FEMA consider proactively developing a plan to address future consultations, as well as work with the Service and TPWD to develop ways FEMA actions could promote recovery of the species. This is especially pertinent to the AST, which spends the majority of its life in aquatic environments and may benefit from FEMA's floodplain management programs. The Service would be happy to assist in the development of a plan that would work within existing FEMA programs to further recovery of the AST and TCB.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any of these conservation recommendations.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on the proposed project (T.C. Jester Stormwater Detention Basin (Harris County Flood Control District Project ID K500-23-00-E002/LPDM-PJ-06-TX-2022-007). The Service may confirm the conference opinion as a biological opinion issued through formal consultation if the proposed species are listed and/or critical habitat is designated. The request must be in writing. If the Service determines there are no significant changes in the action as planned or in the information used during the conference, the Service will confirm the conference opinion as the biological opinion for the project and no further section 7 consultation will be necessary.

The incidental take statement provided in this conference opinion does not become effective until the species is listed, and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the proposed species occurred. Modifications of the conference opinion and incidental take statement may be appropriate to reflect that take. No take of the proposed species may occur between the listing of the species and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation. Although not required, we recommend that FEMA implement the reasonable and prudent measures and terms and conditions herein prior to our final listing decision. If the species are subsequently listed,

implementation of reasonable prudent measures and terms and conditions in any conference opinion adopted as a biological opinion, is mandatory.

After listing as threatened or endangered and any subsequent adoption of this conference opinion, FEMA shall re-initiate consultation if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect the species in a manner or to an extent not considered in the conference opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the species that was not considered in this conference opinion or written concurrences; or 4) a new species is listed or critical habitat designated that may be affected by the action.

This concludes formal conferencing on the proposed project (T.C. Jester Stormwater Detention Basin (Harris County Flood Control District Project ID K500-23-00-E002/LPDM-PJ-06-TX-2022-007) in Harris County, Texas. Please refer to consultation number 2024-0002745 in future correspondence concerning this project. We appreciate FEMA's coordination and opportunity to engage in actions that will promote conservation of at-risk species. Should you require further assistance or if you have any questions regarding this conference opinion, please contact Dr. Jan Culbertson at 281-227-5117 or jan_culbertson@fws.gov.

Sincerely,

OMAR

BOCANEGRA

for Catherine Yeargan
Field Supervisor

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cc: Jonathan Holley, HCFCD, Houston, Texas
Lela Shepherd, HCFCD, Houston, Texas

LITERATURE CITED

- Adams, C.S., S. Gartenstein, J.B. Pierce, J.L. Glasscock, and C.M. Schalk. 2024. Movement Patterns, home range, and microhabitat use of alligator snapping turtles (*Macrochelys temminckii*) in a small east Texas stream system. *Texas J. of Science* 76(1): Article 1. 19 pp. DOI 10.32011/txjsoci_76_1_Article1
- Apodaca, J.J., A.K.R. Krohn, L. Collins, J.C. Godwin, L. Pearson, A.D. Walde. 2023. Reevaluating population structure, conservation units, and taxonomy in extant alligator snapping turtles (genus *Macrochelys*) using next-generation sequencing. *Southeastern Naturalist* 22 (Special Issue 12):1–24.
- Bailey, M.A., J.N. Holmes, K.A. Buhlmann, and J.C. Mitchell. 2006. Habitat Management Guidelines for Amphibians and Reptiles of the Southeastern United States. *Partners in Amphibian and Reptile Conservation Technical Publication HMG-2*, Montgomery, Alabama. 88 pp.
- Barbour, R.W. and W.H. Davis. 1969. *Bats of America*. The University Press of Kentucky, Lexington, Kentucky.
- Bass, A.A. 2007. Habitat use and movements of Alligator Snapping Turtle (*Macrochelys temminckii*) hatchlings. Unpubl. MS Thesis. University of Louisiana at Monroe. Monroe, Louisiana, USA.
- Bernard, R.F., J. Evans, N.W. Fuller, J.D. Reichard, J.T. Coleman, C.J. Kocer, and E.H. Campbell Grant. 2019. Different management strategies are optimal for combating disease in East Texas cave versus culvert hibernating bat populations. *Conservation Science and Practice* 1(10), e106.
- Boyles, J.G. and C.K.R. Willis. 2010. Could localized warm areas inside cold caves reduce mortality of hibernating bats affected white-nose syndrome? *Frontiers in Ecology and the Environment* 8:92–98.
- Carr, J.L., A. Bass, L.B. White, and L. Besenhofer. 2007. Alligator snapping turtle movements and reproduction at Black Bayou Lake National Wildlife Refuge Final Report. University of Louisiana at Monroe Department of Biology & Museum of Natural History. Monroe, La. 76 pp.
- Carr, J.L., S.M. Holcomb, and M. Ray. 2010. Alligator snapping turtle (*Macrochelys temminckii*) ecology and reproduction at Black Bayou Lake National Wildlife Refuge, Ouachita Parish, Louisiana. Final Report. University of Louisiana at Monroe. 108 pp.
- Christensen-Dalsgaard, J., B. Christian, K.L. Willis, B.C. Christensen, B. Christian, D. Ketten, P. Edds-Walton, R. Fay, P. Madsen, and C. Carr. 2012. Specialization for underwater hearing by the tympanic middle ear of the turtle, *Trachemys scripta elegans*. *Proceedings of the Royal Society B* 279(1739):2816–2824. <https://doi.org/10.1098/rspb.2012.0290>.

- Davis, W.H. 1966. Population dynamics of the bat *Pipistrellus subflavus*. *Journal of Mammalogy* 47(3):383–396.
- Davis, W.H. and R.E. Mumford. 1962. Ecological notes on the bat *Pipistrellus subflavus*. *American Midland Naturalist*, pp. 394–398.
- Dobie, J.L. 1971. Reproduction and growth in the Alligator Snapping Turtle, *Macrochelys temminckii* (Troost). *Copeia* 1971:645–658. <https://doi.org/10.2307/1442633>.
- Dreslik, M.J., J.L. Carr, D.B. Ligon, and E.J. Kessler. 2017. Recovery of the alligator snapping turtle (*Macrochelys temminckii*) in the Mississippi River Valley drainages of southern Illinois, Oklahoma, and Louisiana. Illinois Department of Natural Resources. 60 pp.
- Echelle, A.A., J.C. Hackler, J.B. Lack, S.R. Ballard, J. Roman, S.F. Fox, D.M. Leslie Jr., and R.A. Van Den Bussche. 2010. Conservation genetics of the alligator snapping turtle: cytonuclear evidence of range-wide bottleneck effects and unusually pronounced geographic structure. *Conservation Genetics* 11:1375–1387.
- Enge, K.M., T.M. Travis, and E. Suarez. 2014. Population status, distribution, and movements of alligator snapping turtle in the Suwannee River. Final Report Reptile and Amphibian Subsection, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission. 47 pp.
- Ernst, C.H., J.E. Lovich, and R. Barbour. 1994. *Turtles of the United States and Canada*. Smithsonian Institution Press, Washington, D. C. 578 pp.
- Ernst, C.H. and J.E. Lovich. 2009. *Turtles of the United States and Canada*. Second edition. John Hopkins University Press. 840 pp.
- Ewert, M.A. 1976. Nests, nesting and aerial basking of *Macrochelys* under natural conditions, and comparisons with *Chelydra* (Testudines: Chelydridae). *Herpetological* 32: 150–156.
- Ewert, M.A. and C.E. Nelson. 1991. Sex determination in turtles: diverse patterns and some possible adaptive values. *Copeia* 1991:50–69.
- Ewert, M.A., D.R. Jackson, and P.E. Moler. 2006. *Macrochelys temminckii* – alligator snapping turtle. In Meylan, P.A. (Ed.), *Biology and Conservation of Florida Turtles*. Chelonian Research Monographs, Lunenburg, Massachusetts, p. 58–71.
- Federal Emergency Management Agency [FEMA]. Biological Assessment [BA] for T.C. Jester Stormwater Detention Basin, HCFCD Project ID K500-23-00-E002, LPDM-PJ-06-TX-2022-007, Harris County, Texas, August 2024. Prepared by CDM Smith, Contract:70FA6020D000000238, Task Order: 70FA6022F00000075. 38 pp.
- Godwin, J.C., A. Coleman, and C. Guyer. 2023. Distribution and status of the alligator snapping turtle (*Macrochelys temminckii*) in Alabama. *Southeastern Naturalist* 22 (Special Issue 12):109–125.

- Gordon, M., B. Giles, K. Garcia, J.W. Oakley, E. Munscher, J.J. Apodaca, A. Krohn, D.R. Bontrager, J. Kittle, M. Mokrech, T. Sankey, A. Tuggle, C. Franklin, V. Ricardez, C. Schalk, D. Saenz, D. Rosenbaum, C. Jones, J. Watson, T. Corbett, and G. Guillen. 2023a. Baseline study of Alligator Snapping Turtle (*Macrochelys temminckii*) population viability in Texas watersheds, Final Report. (Report No. EIH23-002). Prepared for the Texas Comptroller of Public Accounts (Contract 20-6997BG). 107 pp.
- Gordon, M., D.R. Bontrager, J.E. Watson, T. Corbett, C. Crawford, C.J. Franklin, B. Kirby, E. Munscher, V. Ricardez, and A. Tuggle. 2023b. Using Local Ecological Knowledge to Document Distribution and Temporal Patterns of *Macrochelys temminckii* in Texas. *Southeastern Naturalist* 22 (Special Issue 12):171–196.
- Grimpe, R. 1987. Maintenance, behavior, and reproduction of the alligator snapping turtle *Macrochelys temminckii*, at the Tulsa Zoological Park. *The Bulletin of the Oklahoma Herpetological Society* 12(1–4):1–6.
- Guthrie, M.J. 1933. The reproductive cycles of some cave bats. *Journal of Mammalogy* 14(3):199–216.
- Harrel, J.B., C.M. Allen, and S.J. Hebert. 1996. Movement and habitat use of subadult alligator snapping turtles (*Macrochelys temminckii*) in Louisiana. *The American Midland Naturalist Journal* 135:60–67.
- Harris County Flood Control District [HCFCD]. 2014. Design Guidelines for HCFCD Wet Bottom Detention Basins with Water Quality Features. Accessed June 8, 2023, https://www.hcfcd.org/Portals/62/Technical_Document_Library/Design%20Guidelines%20for%20HCFCD%20Wet%20Bottom%20Detention%20Basins%20with%20Water%20Quality%20Features/Design-Guidelines-WetBottom-Basins-FINAL.pdf?ver=s9hGneR0kmw12DSvFlzKgA%3d%3d×tamp=1686261017717
- Hein, C.D., S.B. Castleberry, and K.V. Miller. 2009. Site-occupancy of bats in relation to forested corridors. *Forest Ecology and Management* 257(4):1200–1207.
- Holcomb, S.R. and J.L. Carr. 2023. Nest success of alligator snapping turtles (*Macrochelys temminckii*) in Louisiana, with comments on sources of mortality. *Southeastern Naturalist* 22 (Special Issue 12):297–310.
- Howey, C.A.F., and S.A. Dinkelacker. 2013. Characteristics of a historically harvested alligator snapping turtle (*Macrochelys temminckii*) population. *Copeia* 2013:58–63.
- Hyder, S.J., J.R. Ennen, and J.M. Davenport. 2021. Ontogenetic and seasonal shifts in movement and habitat selection of the alligator snapping turtle (*Macrochelys temminckii*). *Amphibia-Reptilia* 42:217–226.
- Jackson, D.R., and J.B. Jensen. 2003. *Macrochelys temminckii* (alligator snapping turtle) reproduction. *Herpetological Review* 34:362–363.

- Jackson, D.R., and M.A. Ewert. 2023. Nesting Ecology of the Alligator Snapping Turtle (*Macrochelys temminckii*) along the Lower Apalachicola River, Florida. *Southeastern Naturalist* 22(12):311–334. <https://doi.org/10.1656/058.022.0sp1219>
- Jones, C. and R.D. Suttkus. 1973. Colony structure and organization of *Pipistrellus subflavus* in southern Louisiana. *Journal of Mammalogy* 54(4):962–968.
- Katzenmeyer, J.B. 2016. *Use of highway culverts, box bridges, and caves by winter-roosting bats in Mississippi* [Master's Thesis, Mississippi State University] Mississippi State University Libraries Theses and Dissertations. <https://scholarsjunction.msstate.edu/td/4869/>
- Kessler, E.J., C.A. Phillips, S.R. Ballard, and M.J. Dreslik. 2017. The first record of alligator snapping turtle (*Macrochelys temminckii*) in Illinois in 30 years. *Southeastern Naturalist* 16:29–35.
- Kessler, E.J. and M.J. Dreslik. 2021. Environmental DNA Surveys for the Alligator Snapping Turtle (*Macrochelys temminckii*) in Southwestern Indiana. *Illinois Natural History Survey Technical Report 2021(22)*:1–27.
- Ligon D.B. and M.B. Lovern. 2009. Temperature effects during early life stages of alligator snapping turtle (*Macrochelys temminckii*). *Chelonian Conservation and Biology* 8(1):74–83.
- Ligon, D.B. and K.C. Voves. 2018. Final Performance Report: Surveys to assess suitability of alligator snapping (*Macrochelys temminckii*) Reintroduction sites in Oklahoma. January 1, 2018–December 31, 2018. Federal Aid Grant No. F17AF01213 (T-101-R-1) Oklahoma Department of Wildlife Conservation. 27 pp.
- Ligon, D.B. and S.L. Hannabass. 2020. Final Report: Growth, reproduction, and immigration in an introduced population of alligator snapping turtles: January 1, 2017–March 31, 2020. Grant NO. F16AP00596 (E-31-R-1). Kansas Department of Wildlife, Parks and Tourism. 36 pp.
- Lovich, J.E. 1993. *Catalogue of American Amphibians and Reptiles*. Society for the Study of Amphibians and Reptiles, United States Department of the Interior, National Biological Survey, Palm Springs Field Station, National Ecology Research Center, 63-500 Garnet Avenue, P.O. P.O. Box 2000, North Palm Springs, California, USA 92258-2000. 4 pp.
- Mumford, R.E. and J.O. Whitaker. 1982. *Mammals of Indiana*. Indiana University Press, Bloomington, Indiana.
- Miller, J.L., D.M. Thompson, J. Heywood, and D.B. Ligon. 2014. Nest-site selection among reintroduced *Macrochelys temminckii*. *The Southwestern Naturalist* 59(2):188–192. <https://doi.org/10.1894/F05-NBF-09.1>
- Munscher, E.C., G. Sosa, C.M. Brown, A.G. Lawrence, D. Rivers, J. Stein, K. Norrid, and A. Walde. 2023a. First documented observation of nesting in an urban habitat by an

- Alligator Snapping Turtle, *Macrochelys temminckii* Troost in Harlan, 1835. Herpetology Notes 16:275–279. <https://www.biotaxa.org/hn/article/view/79878/76276>
- Munscher, E.C., J.D. Riedle, A. Tuggle, J. Gray, D.B. Ligon, V. Gladkaya, C. Drake, R. Couvillon, J. Bolton, M. Morrison, B.P. Butterfield, and A.D. Walde. 2023b. “Demography of an Urban Population of Alligator Snapping Turtles (*Macrochelys temminckii*) in Texas.” *Southeastern Naturalist* 22(12):221–235. <https://doi.org/10.1656/058.022.0sp1213>
- Munscher, E.C., V. Gladkaya, J. Stein, B.P. Butterfield, R. Adams, J. Gray, A.S. Weber, K. Norrid, and A. D. Walde. 2021. Movements of Western Alligator Snapping Turtles, *Macrochelys temminckii* (Testudines, Chelydridae), in an urban ecosystem: Buffalo Bayou, Houston, Texas. *Herpetology Notes* 14: 985-995. <https://www.biotaxa.org/hn/article/view/67578>
- Navarrette, A. 2021. Turtle Brumation: The benefits and dangers of the hibernation cycle. Texas A&M. University, Veterinary Medicine & Biomedical Sciences. VMBS News November 18, 2021. Access web site 12-01-2023: <https://vetmed.tamu.edu/news/pet-talk/turtle-brumation/>
- Norrid, K., E.C. Munscher, and A. Tuggle. 2021. *Macrochelys temminckii* (Alligator Snapping Turtle). *Herpetological Review* 52(3):574
- Pearson, L. 2021. Distribution, abundance, and population genetics of the alligator snapping turtle (*Macrochelys temminckii*) in Mississippi. Dissertation. University of Southern Mississippi. 127 pp.
- Pearson, L., L. Haralson, G. Berry, and C. Qualls. 2020. Status of the alligator snapping turtle (*Macrochelys temminckii*) in Mississippi. Final report to Mississippi Department of Wildlife, Fisheries, and Parks and U.S. Fish and Wildlife Service. 93 pp.
- Pearson, L., L. Haralson, G. Berry, G.J. Brown, and C. Qualls. 2023. Distribution patterns and factors influencing relative abundance of the alligator snapping turtle (*Macrochelys temminckii*) in Mississippi. *Southeastern Naturalist* 22 (Special Issue 12):138–156.
- Perry, R.W. and R.E. Thill. 2007. Tree roosting by male and female eastern pipistrelles in a forested landscape. *Journal of Mammalogy* 88(4):974–981.
- Powders, V.N. 1978. Observations on oviposition and natural incubation of eggs of the alligator snapping turtle, *Macrochelys temminckii*, in Georgia. *Copeia* 1978:154-156.
- Pritchard, P.C.H. 1989. The alligator snapping turtle: Biology and conservation. Milwaukee Public Museum, Milwaukee, WI, USA. 104 pp.
- Reed, R.N., J. Congdon, and J.W. Gibbons. 2002. The alligator snapping turtle [*Macrochelys temminckii*]: a review of ecology, life history, and conservation, with demographic analyses of the sustainability of take from wild populations. Report, Division of Scientific Authority, United States Fish and Wildlife Service, Aiken, South Carolina. 17 pp.

- Riedle, J.D., P.A. Shipman, S.F. Fox, and D.M. Leslie, Jr. 2006. Microhabitat use, home range, and movements of the alligator snapping turtle, *Macrochelys temminckii*, in Oklahoma. *The Southwestern Naturalist* 51(1):35–40.
- Roman, J., S.D. Santhuff, P.E. Moler and B.W. Bowen. 1999. Population structure and cryptic evolutionary units in the alligator snapping turtle. *Conservation Biology* 13:135–142.
- Rosenbaum, D. 2022. Detection, occupancy, abundance, and mercury accumulation of the alligator snapping turtle (*Macrochelys temminckii*) in Texas. MS Thesis. Stephen F. Austin State University. 134 pp.
- Rosenbaum, D., C.M. Schalk, and D. Saenz. 2022. Distribution, occupancy, and mercury bioaccumulation of alligator snapping turtles (*Macrochelys temminckii*) in Texas. Final Performance Report Texas Parks & Wildlife Department. 73 pp.
- Rosenbaum, D., D.C. Rudolph, D. Saenz, L.A. Fitzgerald, R.E. Nelson, C.S. Collins, T.J. Hibbitts, R.W. Maxey, P. Crump, and C.M. Schalk. 2023a. Distribution and demography of the Alligator Snapping Turtle (*Macrochelys temminckii*) in Texas: A 20-year perspective. *Southeastern Naturalist* 22 (Special Issue 12):197–220.
<https://doi.org/10.1656/058.022.0sp1212>
- Rosenbaum, D., Saenz, D., Montaña, C.G., Zhang, Y., Schalk, C.M. 2023b. Detection, occupancy, and abundance of the alligator snapping turtle in Texas. *Journal of Wildlife Management*. DOI: 10.1002/jwmg.22409. pp. 34.
- Rostal, D.C., Teare, A., P. Marley, and J.B. Jensen. 2023b. Determining sexual size dimorphism in an alligator snapping turtle (*Macrochelys temminckii*) population in southwest Georgia: Use of morphometrics, ultrasonography, and testosterone. *Southeastern Naturalist* 22 (Special Issue 12):250–263.
- Rudolph, D.C., L.A. Fitzgerald, R.E. Nelson, T. Hibbitts, and R.W. Maxey. 2002. Final Report WER42: Historical and local processes determining the current status of *Macrochelys temminckii*: the alligator snapping turtle in Texas. Grant No. E-1-13. 74 pp.
- Samoray, S.T., S.N. Cotham, and M.W. Gumbert. 2019. Spring migration behavior of a *Perimyotis subflavus* (tri-colored bat) from Tennessee. *Southeastern Naturalist* 18(3):16–20.
- Sandel, J.K., G.R. Benatar, K.M. Burke, C.W. Walker, T.E. Lacher, and R.L. Honeycutt. 2001. Use and selection of winter hibernacula by the eastern pipistrelle (*Pipistrellus subflavus*) in Texas. *Journal of Mammalogy* 82(1):173–178.
- Sasse, D.B., D.A. Saugey, and D.R. England. 2011. Winter roosting behavior of Rafinesque’s big-eared bat in southwestern Arkansas. Pp. 123–128 in Loeb, S.C.; Lacki, M.J.; Miller, D.A. (editors). *Conservation and management of eastern big-eared bats: a symposium*. Gen. Tech. Rep. SRS-145. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 157 pp.

- Shipman, P.A., D.R. Edds, and D. Blex. 1991. Report on the recapture of the alligator snapping turtle (*Macrolemys temminckii*) in Kansas. Kansas Herpetological Society Newsletter 85:8–9.
- Shipman, A.M. 2019. Investigation of nest predation as a cause of turtle population declines on the Sequoia National Wildlife Refuge, Oklahoma. Thesis. Thomas H. Goswell School of Life Sciences, Rochester Institute of Technology. May 23, 2019. 54 pp.
- Shook, A.K., J.L. Carr, and N.H. Douglas. 2023. Status and Distribution of Alligator Snapping Turtles (*Macrochelys temminckii*) in Northern Louisiana. Southeastern Naturalist 22 (Special Issue 12):25–55.
- Sloan, K.N., and D. Taylor. 1987. Habitats and movements of adult alligator snapping turtles in Louisiana. Proceedings of the Annual Conference of the Southeast Association of Fish and Wildlife Agencies 41:343–348.
- Spangler, S.J., Thompson, D.M., Fillmore, B.M., Simmons, R., Graves, K., and D.B. Ligon. 2021. Observations of Movement Patterns and Habitat Associations of Hatchling Alligator Snapping Turtles (*Macrochelys temminckii*). Herpetological Conservation and Biology, 16(2):461–470.
- Thames, D.B. 2020. Summer foraging range and diurnal roost selection of tricolored bats, *Perimyotis subflavus*. Master's Thesis University of Tennessee Knoxville.
- Thomas, T.M., M.C. Granatosky, J.R. Bourque, K.L. Krysko, P.E. Moler, T. Gamble, E. Suarez, E. Leone, K.M. Enge, and J. Roman. 2014. Taxonomic assessment of Alligator Snapping Turtles (Chelydridae: *Macrochelys*), with the description of two new species from the southeastern United States. Zootaxa 3786:141–165.
- Thompson, D. and D.B. Ligon. 2023. Nesting Behavior and Ecology in a Captive Population of Alligator Snapping Turtles (*Macrochelys temminckii*). Southeastern Naturalist 22(12):275–296. <https://doi.org/10.1656/058.022.0sp1217>.
- Thompson, M.M., B.H. Coe, R.M. Andrews, D.F. Stauffer, D.A. Cristol, D.A. Crossley II, W.A. Hopkins. 2018. Major global changes interact to cause male-biased sex ratios in a reptile with temperature-dependent sex determination. Biological Conservation 222:64–74. <https://doi.org/10.1016/j.biocon.2018.03.006>.
- Trauth, S.E., D.S. Siegel, M.L. McCallum, D.H. Jamieson, and A. Holt. 2016. Long-term monitoring and recovery of a population of alligator snapping turtles, *Macrochelys temminckii* (Testudines: Chelydridae), from a northeastern Arkansas stream. Journal of the Arkansas Academy of Science 70:235–247.
- Tucker, A.D. and K.N. Sloan. 1997. Growth and reproductive estimates from Alligator Snapping Turtles, *Macrolemys temminckii*, taken by commercial harvest in Louisiana. Chelonian Conservation and Biology 2:587–592.
- U.S. Fish and Wildlife Service [USFWS]. 2021a. Species Status Assessment Report for the

- tricolored Bat (*Perimyotis subflavus*), Version 1.0. May 2021. Hadley, MA.
- U.S. Fish and Wildlife Service [USFWS]. 2021b. Species Status Assessment Report for the alligator snapping turtle (*Macrochelys temminckii*), Version 1.2. March 2021. Southeast Region, Atlanta, Georgia,
- U.S. Fish and Wildlife Service [USFWS]. 2024a. Draft northern long-eared bat and tricolored Bat Voluntary Environmental Review Process for Development Projects Version 1.0. August 8, 2024.
- U.S. Fish and Wildlife Service [USFWS]. 2024b. Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines, available here: <https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines>.
- U.S. Fish and Wildlife Service [USFWS]. 2024c. Species Status Assessment Report of the alligator snapping turtle (*Macrochelys temminckii*) Version 1.3. December 2024. Southeast Region. Atlanta, Georgia
- Veilleux, J.P., J.O Whitaker, and S.L. Veilleux. 2003. Tree-roosting ecology of reproductive female eastern pipistrelles, *Pipistrellus subflavus*, in Indiana. *Journal of Mammalogy* 84(3):1068 1075.
- Watson, J.E., P.S. Crump, and C.F. McDonald. 2020. East Texas Initiative – Lower Neches Valley Authority Alligator Snapping Turtle/Western Chicken Turtle Database (not publicly available).

PERSONAL COMMUNICATIONS

- Munscher, E. 2024. Electronic mail communication from Eric Munscher, SWCA to Jan Culbertson, USFWS, Houston, Texas dated April 22, 2024 regarding AST density estimates from Cypress Creek study, unpublished data.



FEMA

October 28, 2022

Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711-2276

RE: Section 106 Review Consultation
Harris County Flood Control District (HCFCD) – T.C. Jester Stormwater Detention
Basin
City of Houston, Harris County, Texas
FEMA Project Number: LPDM-PJ-06-TX-2022-007
THC Tracking Number: 202014944 & 202103140
(latitude 30.03275; longitude -95.46157)

Dear Mr. Wolfe:

The Federal Emergency Management Agency (FEMA) will be providing funds authorized under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, as amended, to the Harris County Flood Control District (HCFCD) for the above-referenced project in the City of Houston, Harris County, Texas (Figures 1 and 2). FEMA is initiating Section 106 review for the project in accordance with the Texas Programmatic Agreement among FEMA, the Texas Historical Commission (THC; SHPO), the Texas Division of Emergency Management (TDEM); and participating Tribes dated March 22, 2022 (2022 Texas PA).

It is proposed that federal funding through FEMA's Pre-Disaster Mitigation (PDM) grant program will be provided to the HCFCD (Applicant) to construct two stormwater detention basins adjacent to the main stem of Cypress Creek southeast of the intersection of T.C. Jester Boulevard and Cypresswood Drive in Harris County (Undertaking). The purpose of the project is to reduce flooding risks and damages during heavy rain events by safely storing excess stormwater and slowly releasing it back to the creek when the flooding has passed. Both residential and commercial properties along the Cypress Creek and its tributaries have been severely impacted by flooding in the last two decades.

FEMA has determined that the Area of Potential Affect (APE) for the proposed Undertaking is the footprint of the project limits of disturbance, which includes approximately 138.1 acres on the southern side of Cypress Creek, centered at latitude 30.03275; longitude -95.46157 (see Figures 1 and 2).

In February 2020, the HCFCD initiated cultural resources studies of the project APE in compliance with the Antiquities Code of Texas (Texas Natural Resources Code, Title 9, Chapter 191). In February and March 2020, Gray & Pape, Inc. completed an intensive archaeological survey and deep testing study within the portion of the APE that lies between Cypress Creek to the south and Cypresswood Drive to the north. An additional parcel on the western side of T.C. Jester Boulevard, which has since been removed from the project, was also investigated. No previously recorded archaeological sites, National Register listed or eligible properties, or cemeteries were identified within the project area during background research, and the survey and testing did not identify any new archaeological sites within the parcel that is currently included in the APE. Gray & Pape recommended no further work within the current APE. On July 28, 2020, the THC issued electronic review comments for the report and concurred with the recommendations.

In September 2020, Gray and Pape conducted an archaeological deep testing study on the remaining portion of the APE, south of Cypress Creek. Background research indicated that previously recorded archaeological site 41HR732, a Paleoindian site, lies within the APE. The site was recorded with two possible locations based on the mapped and digitized coordinate information. The investigation resulted in the excavation of 25 trenches, none of which were positive for cultural materials. While Gray & Pape did not recommend avoidance of either possible location of 41HR732, they recommended monitoring during earth moving activities in the vicinity of the site. In an email dated December 15, 2020, the THC stated that they did not require monitoring but would concur should the client have concerns. On October 24, 2022, FEMA reached out to the THC for additional guidance, and received confirmation that monitoring would be warranted based on the reported Paleoindian component of the site.

FEMA recommends that for all ground-disturbing activities that occur within the vicinity of 41HR732, HCFCD must retain an SOI-qualified archaeologist to perform archaeological monitoring during these activities. If potential archaeological features or artifacts are observed, HCFCD will immediately cease construction in that area and notify TDEM and FEMA. FEMA will work with the THC Archaeology Division and Federally recognized Tribes with Interest in the project area to develop a plan. An appropriate buffer radius will be placed around the identified area and no construction activities may resume in the buffer area until FEMA, in consultation with the THC Archaeology Division and Federally recognized Tribes with Interest in the project area, has provided written notification to resume construction. At the completion of the archaeological monitoring, an archaeological monitoring report detailing the results of the effort will be prepared and submitted to FEMA. Archaeological monitoring is not required on the remainder of the APE; however, should any artifacts be identified during construction, the same process will apply.

Based on the completed cultural resources surveys and above information, including implementation of FEMA's proposed recommendations, FEMA has determined that the proposed Undertaking will have **No Adverse Effect to Historic Properties**.

We respectfully request your review of this Undertaking within 30 days in accordance with Stipulation I.E.2 of the 2022 Texas PA. Your prompt review of this project is greatly appreciated. Should you need additional information please contact Dorothy Cook, Senior Environmental Protection Specialist, at dorothy.cook@fema.dhs.gov or (940) 383-7250.

Sincerely,

DOROTHY

K COOK

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Date: 2022.10.27
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DWC for

Kevin Jaynes

Regional Environmental Officer

FEMA Region 6

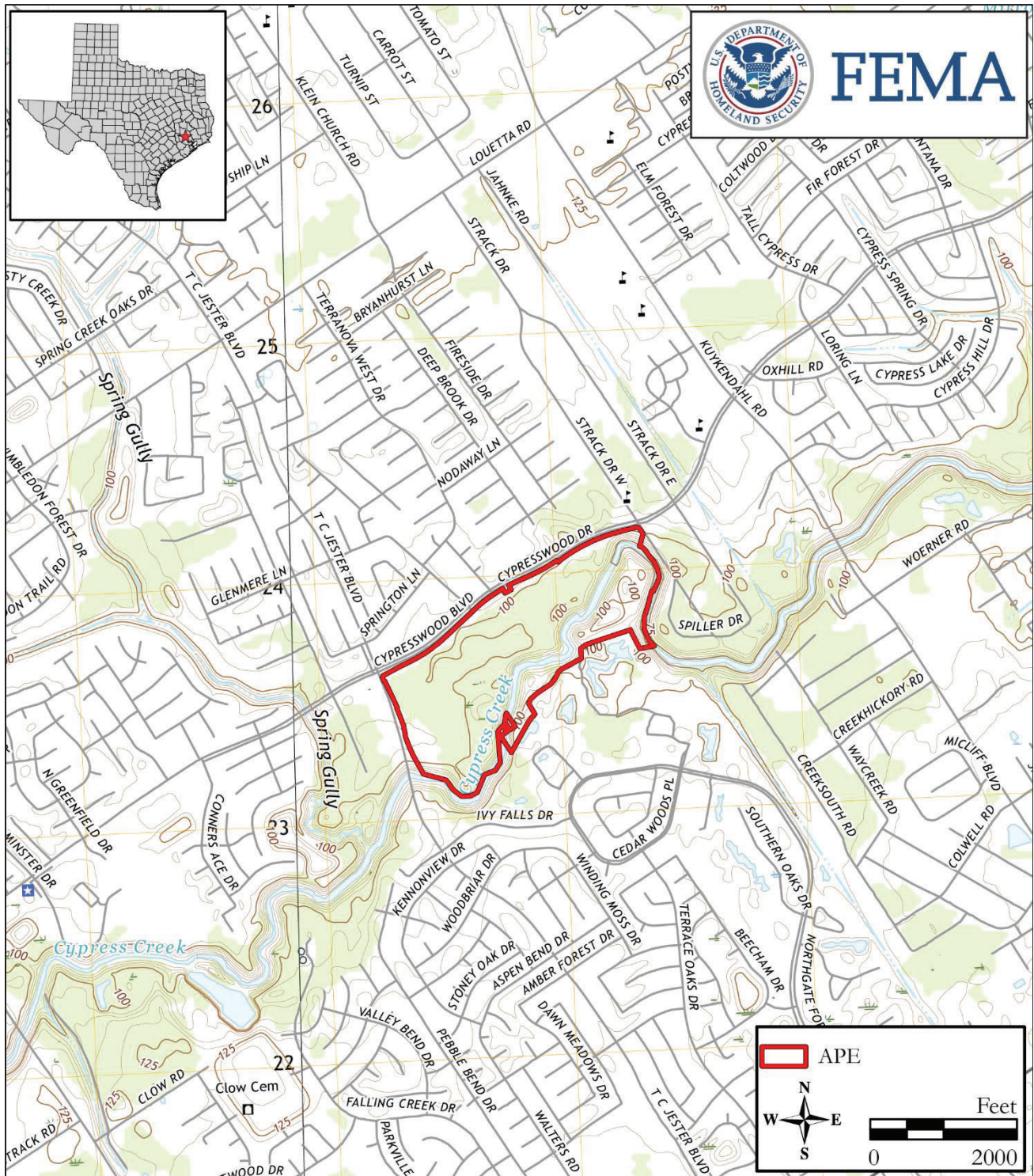


Figure 1. Excerpt from the Spring, Texas 7.5 Minute Series USGS topographic quadrangle map (2019) showing the location of the T.C. Jester Stormwater Detention Basin APE.

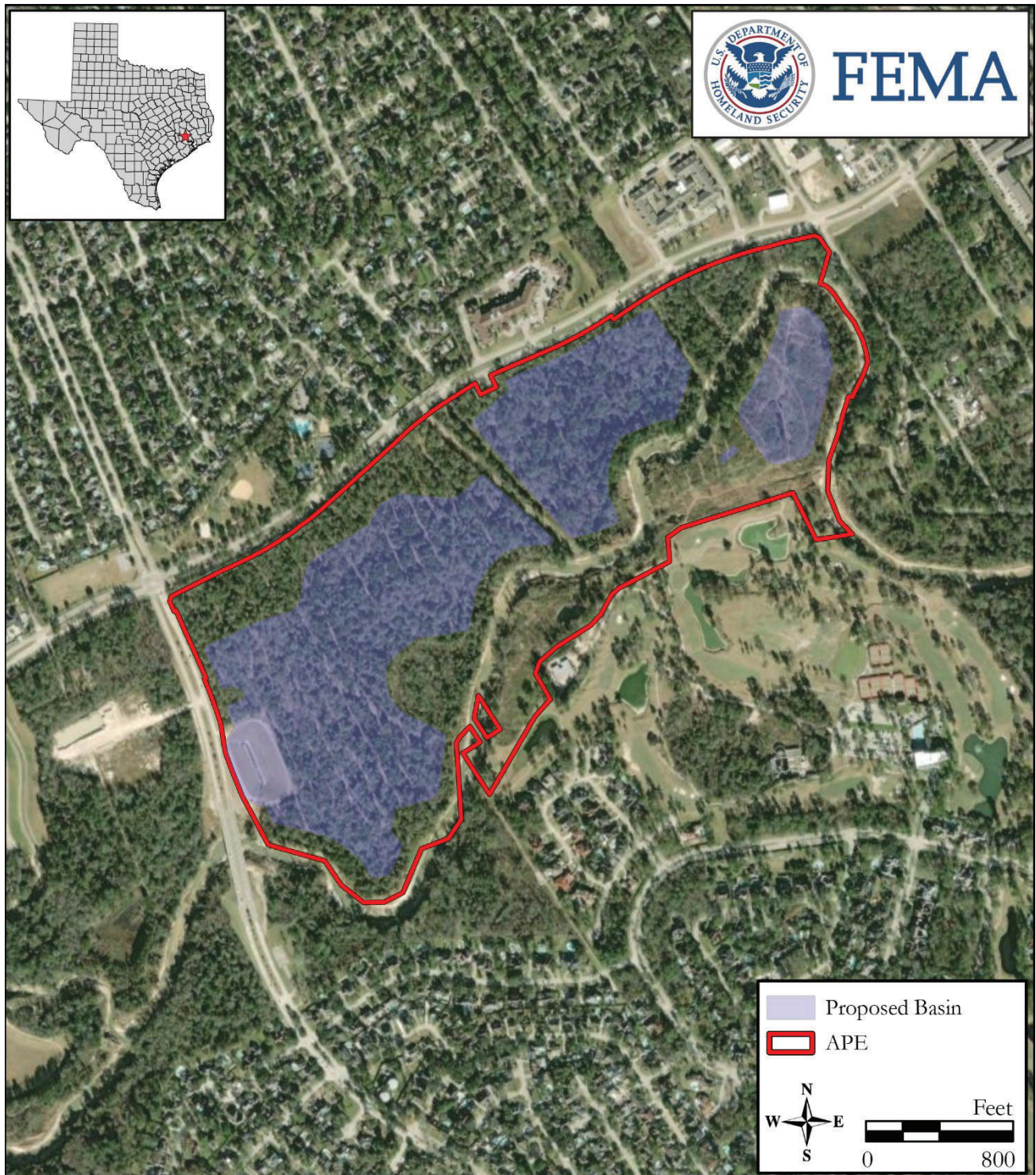


Figure 2. Aerial image showing the location of the T.C. Jester Stormwater Detention Basin APE And proposed basin locations.

From: [Nelson, Tracy](#)
To: [Nelson, Tracy](#)
Subject: FW: Jester Section 106 Submission
Date: Friday, October 6, 2023 9:51:13 AM

From: noreply@thc.state.tx.us <noreply@thc.state.tx.us>
Sent: Wednesday, November 23, 2022 9:02 AM
To: Emily Dale <EDale@rgaincorporated.com>; reviews@thc.state.tx.us
Subject: Section 106 Submission



Re: Project Review under Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas

THC Tracking #202301889

Date: 11/23/2022

TC Jester Stormwater Detention Basin, FEMA LPDM, Harris County Flood Control District (Permit 9565)

At TC Jester Blvd and Cypresswood Dr.
Houston, TX

Description: Description: Previously reviewed under THC Tracking No.202014944 & 202103140. Second Permit No.: 9296

Dear Emily Dale:

Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act and the Antiquities Code of Texas.

The review staff, led by Emily McCuiston and Jonathan Moseley, has completed its review and has made the following determinations based on the information submitted for review:

Above-Ground Resources

- No historic properties are present or affected by the project as proposed. However, if historic properties are discovered or unanticipated effects on historic properties are found, work should cease in the immediate area; work can continue where no historic properties are present. Please contact the THC's History Programs Division at 512-463-5853 to consult on further actions that may be necessary to protect historic properties.

Archeology Comments

- THC/SHPO concurs with information provided.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If the project changes, or if new historic properties are found, please contact the review staff. If you have any questions concerning our review or if we can be of further assistance, please email the

following reviewers: Emily.McCuistion@thc.texas.gov , Jonathan.Moseley@thc.texas.gov.

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit <http://thc.texas.gov/etrac-system>.

Sincerely,



for Mark Wolfe, State Historic Preservation Officer
Executive Director, Texas Historical Commission

Please do not respond to this email.



FEMA

July 1, 2024

Dr. Edward Lengel
State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711-2276

RE: Section 106 Review Consultation,
Harris County Flood Control District (HCFCD) – Temporary Access Road, T.C. Jester
Stormwater Detention Basin Project
City of Houston, Harris County, Texas
FEMA Project Number: LPDM-PJ-06-TX-2022-007
THC Tracking Numbers: 202014944, 202103140, 202301889, 202401904, & 202408345
(latitude 30.03275; longitude -95-46157)

Dear Dr. Lengel:

The Federal Emergency Management Agency (FEMA) will be providing funds authorized under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, as amended, in response to the Harris County Flood Control District (HCFCD) for the above-referenced project in the City of Houston, Harris County, Texas. FEMA is continuing Section 106 review for the project in accordance with the Texas Programmatic Agreement among FEMA, the Texas Historical Commission (THC; SHPO), the Texas Division of Emergency Management (TDEM); and participating Tribes dated March 22, 2022 (2022 Texas PA). FEMA originally consulted with your office regarding the proposed project on October 28, 2022 (THC eTrac # 202301889), but the project has since expanded, therefore we are reinitiating consultation.

It is proposed that federal funding through FEMA's Pre-Disaster Mitigation (PDM) grant program be provided to the HCFCD (Applicant) to construct two stormwater detention basins adjacent to the main stem of Cypress Creek southeast of the intersection of T.C. Jester Boulevard and Cypresswood Drive in Harris County (Undertaking). The purpose of the Undertaking is to reduce flooding risks and damages during heavy rain events by safely storing excess stormwater and slowly releasing it back to the creek when the flood event has passed. Both residential and commercial properties along Cypress Creek and its tributaries have been severely impacted by flooding in the last two decades.

FEMA determined that the Area of Potential Effects (APE) for the proposed Undertaking is the footprint of the project limits of disturbance, which originally included approximately 138.1 acres on the southern side of Cypress Creek. Cultural resource studies were conducted within the original APE and FEMA determined that the proposed Undertaking for the two basins will have No Adverse Effect to Historic Properties. The THC concurred with FEMA's finding of effect on November 23, 2022 (THC eTrac # 202301889).

The proposed Undertaking has been subsequently expanded to include a temporary access road that will extend from T.C. Jester Boulevard following the south bank of Cypress Creek where it will intersect with an existing maintenance road. From this intersection, a permanent access road will be constructed to the proposed Basin 2 of the stormwater detention basin project for the purpose of construction and long term maintenance access. The proposed temporary access road is approximately 1,730 feet long and 20 feet wide, for an approximate area of 0.8 acres. FEMA has determined that the Undertaking's APE should be expanded to incorporate the footprint of the limits of disturbance for the temporary access road (see Figures 1 and 2).

In October 2023, HCFCD submitted a desktop cultural resources assessment for the expanded APE. Based on the results of the desktop assessment, the THC concurred with HCFCD's assessment that no above-ground resources were present within the project APE or would be affected by the Undertaking but that an archaeological survey would be required within the expanded APE (THC eTrac #202401904).


In March 2024, HCFCD undertook an intensive cultural resources survey of the expanded APE. Field investigations involved a pedestrian survey of the entire 0.8-acre expanded APE and the excavation of eight shovel test pits. All shovel tests were negative, and no additional artifacts or other cultural resources were identified within the expanded APE. Based on the results of the intensive cultural resources survey, THC concurred with HCFCD's finding of No Historic Properties Affected on May 8, 2024 (THC eTrac #202408345).

Based on the completed cultural resources surveys and above information, FEMA has determined that **No Historic Properties** will be **Affected** in the expanded APE as a result of the Undertaking.

We respectfully request your review of this Undertaking within 30 days in accordance with Stipulation I.E.2(c) of the 2022 Texas PA. Your prompt review of this project is greatly appreciated. Should you need additional information please contact Dorothy Cook, Senior Environmental Protection Specialist, at dorothy.cook@fema.dhs.gov or (940) 435-9275.

Sincerely,

DOROTHY K
COOK

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DWC

LaToya Leger-Taylor
Regional Environmental Officer
FEMA Region 6

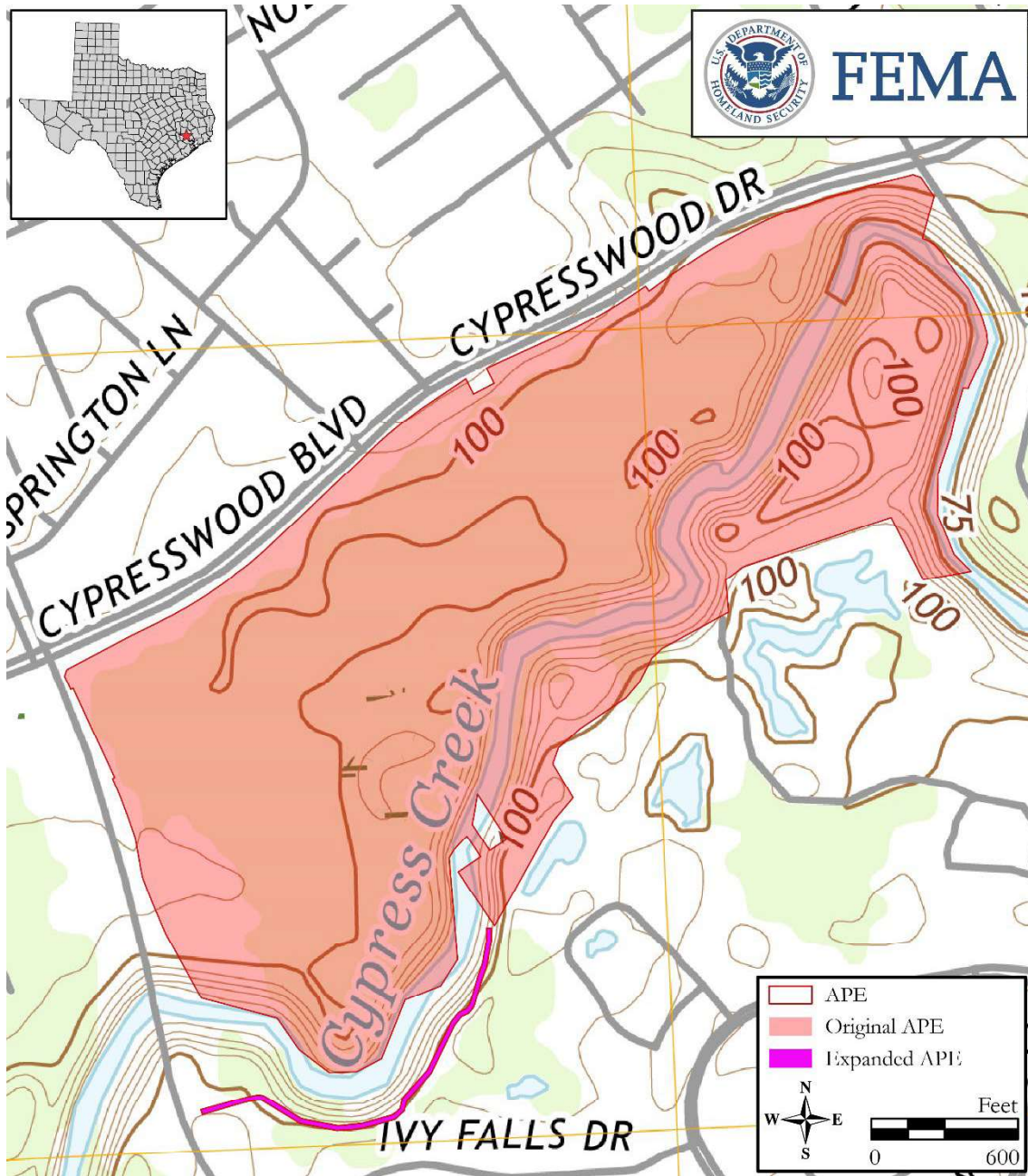


Figure 1. Excerpt from the Spring, Texas 7.5 Minute Series USGS topographic quadrangle map (2019) showing the Expanded APE for the T.C. Jester Stormwater Detention Basin.

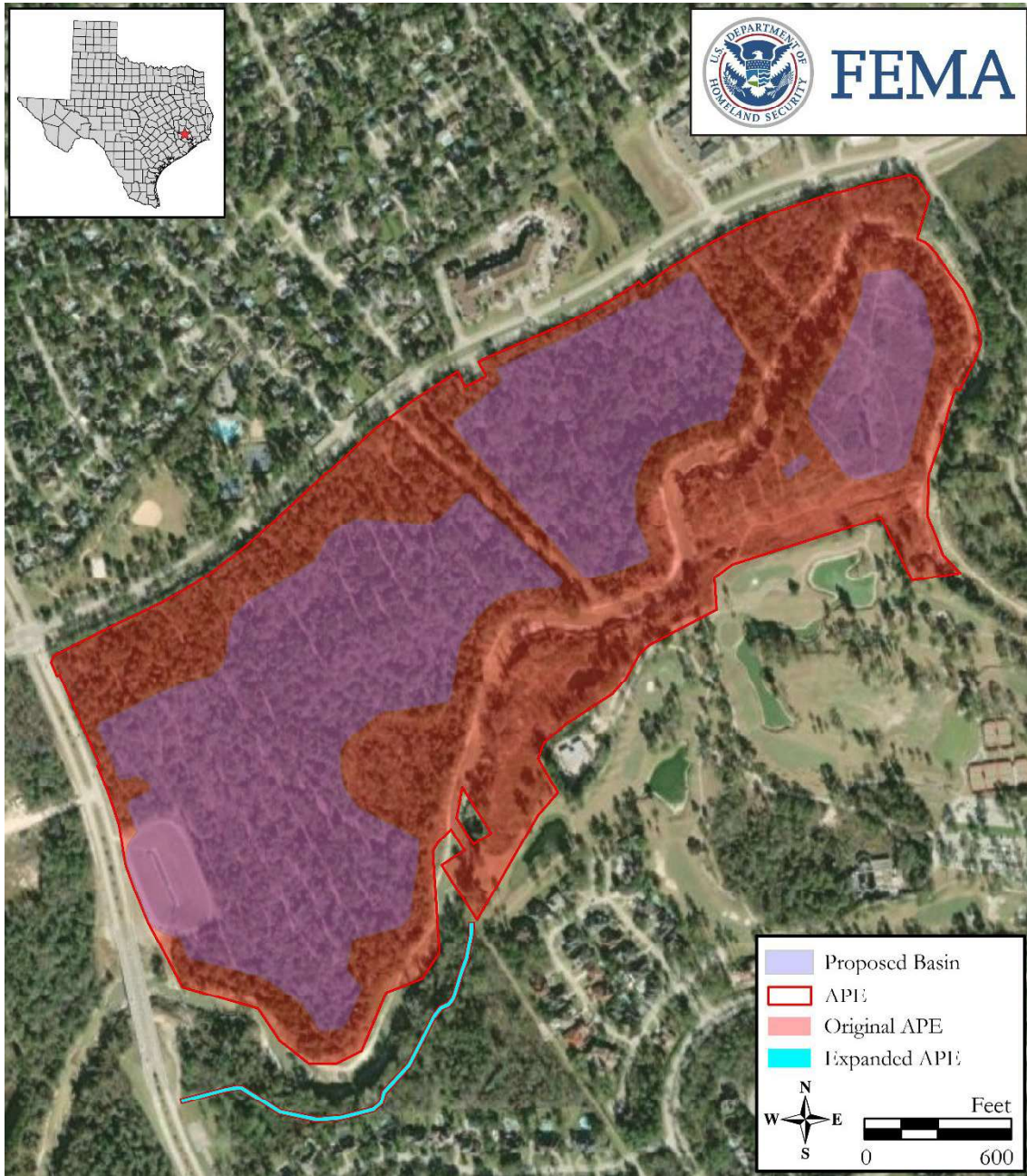


Figure 2. Aerial image showing the expanded APE of the T.C. Jester Stormwater Detention Basin

From: [Cook, Dorothy](#)
To: [Nelson, Tracy](#); [Debbie Bevin](#)
Subject: FW: Temporary Access Road, TC Jester Stormwater Detention Basin Project
Date: Tuesday, July 9, 2024 12:55:06 PM

From: noreply@thc.state.tx.us <noreply@thc.state.tx.us>
Sent: Tuesday, July 9, 2024 12:32 PM
To: FEMA-R6-EHP <FEMA-R6-EHP@fema.dhs.gov>; reviews@thc.state.tx.us
Subject: Temporary Access Road, TC Jester Stormwater Detention Basin Project

CAUTION: This email originated from outside of DHS. DO NOT click links or open attachments unless you recognize and/or trust the sender. Please select the Phish Alert Report button on the top right of your screen to report this email if it is unsolicited or suspicious in nature.



Re: Project Review under Section 106 of the National Historic Preservation Act
THC Tracking #202411847
Date: 07/09/2024
Temporary Access Road, TC Jester Stormwater Detention Basin Project (Permit 31660)
Houston
Houston, TX

Description: Expanded APE to include temporary access road. eTrac #s associated with this: 202014944, 202103140, 202301889, 202401904, & 202408345

Dear FEMA Region6 EHP:

Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act.

The review staff, led by Justin Kockritz and Emily McCuiston, has completed its review and has made the following determinations based on the information submitted for review:

Above-Ground Resources

- THC/SHPO concurs with information provided.
- No historic properties are present or affected by the project as proposed. However, if historic properties are discovered or unanticipated effects on historic properties are found, work should cease in the immediate area; work can continue where no historic properties are present. Please contact the THC's History Programs Division at 512-463-

5853 to consult on further actions that may be necessary to protect historic properties.

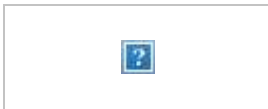
Archeology Comments

- THC/SHPO concurs with information provided.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If the project changes, or if new historic properties are found, please contact the review staff. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: justin.kockritz@thc.texas.gov, Emily.McCuistion@thc.texas.gov .

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit <http://thc.texas.gov/etrac-system>.

Sincerely,



for Bradford Patterson
Chief Deputy State Historic Preservation Officer

Please do not respond to this email.

COMANCHE NATION



U.S. Department of Homeland Security-FEMA Region 6
Attn: Mr. Robert W. Scoggin
800 N. Loop 288
Texas 76209

November 2, 2022

Re: Section 106 Review Consultation

Harris County Flood Control District (HCFCD)-T.C.Jester Stormwater Detention Basin
City of Houston, Harris County, TX.,FEMA Project Number-LPDM-PJ-06-TX.-2022-007
THC Tracking Number : 202014944 & 202103140

Dear Mr. Scoggin :

In response to your request, the above reference project has been reviewed by staff of this office to identify areas that may potentially contain prehistoric or historic archeological materials. The location of your project has been cross referenced with the Comanche Nation site files, where an indication of ***“No Properties”*** have been identified. (IAW 36 CFR 800.4(d)(1)).

Please contact this office at (580) 492-1153) if you require additional information on this project.

This review is performed in order to identify and preserve the Comanche Nation and State cultural heritage, in conjunction with the State Historic Preservation Office.

Regards

Comanche Nation Historic Preservation Office
Theodore E. Villicana , Technician
#6 SW “D” Avenue, Suite C
Lawton, OK. 73502

Consult Response delayed due to Covid-19 work conditions.



U.S. Department of Homeland Security
FEMA Region 6
800 N. Loop 288
Denton, TX 76209

FEMA

October 28, 2022

RE: Section 106 Review Consultation
Harris County Flood Control District (HCFCD)-T.C. Jester Stormwater Detention Basin
City of Houston, Harris County, Texas
FEMA Project Number: LPDM-PJ-06-TX-2022-007
THC Tracking Number: 202014944 & 202103140
(latitude 30.03275; longitude -95.46157)

To: Representatives of Federally recognized Tribes with Interest in this Project Area

The Federal Emergency Management Agency (FEMA) will be providing funds authorized under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, as amended, to the Harris County Flood Control District (HCFCD) for the above-referenced project in Harris County, Texas. FEMA is initiating Section 106 review for the above referenced project based on your Tribe's ancestral interest in the project area.

It is proposed that federal funding through FEMA's Pre-Disaster Mitigation (PDM) grant program will be provided to the HCFCD (Applicant) via the Texas Division of Emergency Management (TDEM) to construct two stormwater detention basins adjacent to the main stem of Cypress Creek southeast of the intersection of T.C. Jester Boulevard and Cypresswood Drive in Harris County (Undertaking). The purpose of the project is to reduce flooding risks and damages during heavy rain events by safely storing excess stormwater and slowly releasing it back to the creek when the flooding has passed. Both residential and commercial properties along the Cypress Creek and its tributaries have been severely impacted by flooding in the last two decades.

FEMA has determined that the Area of Potential Affect (APE) for the proposed Undertaking is the footprint of the project limits of disturbance, which includes approximately 138.1 acres on the southern side of Cypress Creek, centered at latitude 30.03275; longitude -95.46157 (see Figures 1 and 2).

We are writing to request your comments on historic properties of cultural or religious significance to your Tribe that may be affected by the proposed Undertaking. Any comments you may have on FEMA's findings and recommendations should also be provided.

In February 2020, the HCFCD initiated cultural resources studies of the project APE in compliance with the Antiquities Code of Texas (Texas Natural Resources Code, Title 9, Chapter 191). In February and March 2020, Gray & Pape, Inc. completed an intensive archaeological survey and deep testing study within the portion of the APE that lies between Cypress Creek to the south and Cypresswood Drive to the north. An additional parcel on the western side of T.C. Jester Boulevard, which has since been removed from the project, was also investigated. No previously recorded archaeological sites, National Register listed or eligible properties, or cemeteries were identified within the project area during background research, and the survey and testing did not identify any new archaeological sites

within the parcel that is currently included in the APE. Gray & Pape recommended no further work within the current APE. On July 28, 2020, the Texas Historical Commission (THC) issued electronic review comments for the report and concurred with the recommendations.

In September 2020, Gray and Pape conducted an archaeological deep testing study on the remaining portion of the APE, south of Cypress Creek. Background research indicated that previously recorded archaeological site 41HR732, a Paleoindian site, lies within the APE. The site was recorded with two possible locations based on the mapped and digitized coordinate information. The investigation resulted in the excavation of 25 trenches, none of which were positive for cultural materials. While Gray & Pape did not recommend avoidance of either possible location of 41HR732, they recommended monitoring during earth moving activities in the vicinity of the site. In an email dated December 15, 2020, the THC stated that they did not require monitoring but would concur should the client have concerns. On October 24, 2022, FEMA reached out to the THC for additional guidance, and received confirmation that monitoring would be warranted based on the reported Paleoindian component of the site.

FEMA recommends that for all ground-disturbing activities that occur within the vicinity of 41HR732, HCFCD must retain an SOI-qualified archaeologist to perform archaeological monitoring during these activities. If potential archaeological features or artifacts are observed, HCFCD will immediately cease construction in that area and notify TDEM and FEMA. FEMA will work with the THC Archaeology Division and Federally recognized Tribes with Interest in the project area to develop a plan. An appropriate buffer radius will be placed around the identified area and no construction activities may resume in the buffer area until FEMA, in consultation with the THC Archaeology Division and Federally recognized Tribes with Interest in the project area, has provided written notification to resume construction. At the completion of the archaeological monitoring, an archaeological monitoring report detailing the results of the effort will be prepared and submitted to FEMA. Archaeological monitoring is not required on the remainder of the APE; however, should any artifacts be identified during construction, the same process will apply.

Based on the completed cultural resource surveys and above information, including implementation of FEMA's proposed recommendations, FEMA has determined that the proposed Undertaking will have **No Adverse Effect to Historic Properties.**

Please provide your comments within 30 days of receipt of this letter. If you concur with FEMA's determination, please sign below. If you notify us that your review identifies cultural properties within the APE, or project work discloses the presence of archeological deposits, FEMA will contact your Tribe to continue consultation.

Your prompt review of this project is greatly appreciated. Should you need additional information please contact Robert Scoggin, EHP Tribal Liaison at Robert.w.scoggin@fema.dhs.gov (202) 716-4139.

Sincerely,
DOROTHY
K COOK
Kevin Jaynes
Regional Environmental Officer
FEMA Region 6

DWC for

Digitally signed by
DOROTHY K COOK
Date: 2022.10.27
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Concurrence by:

Date:

Tribe

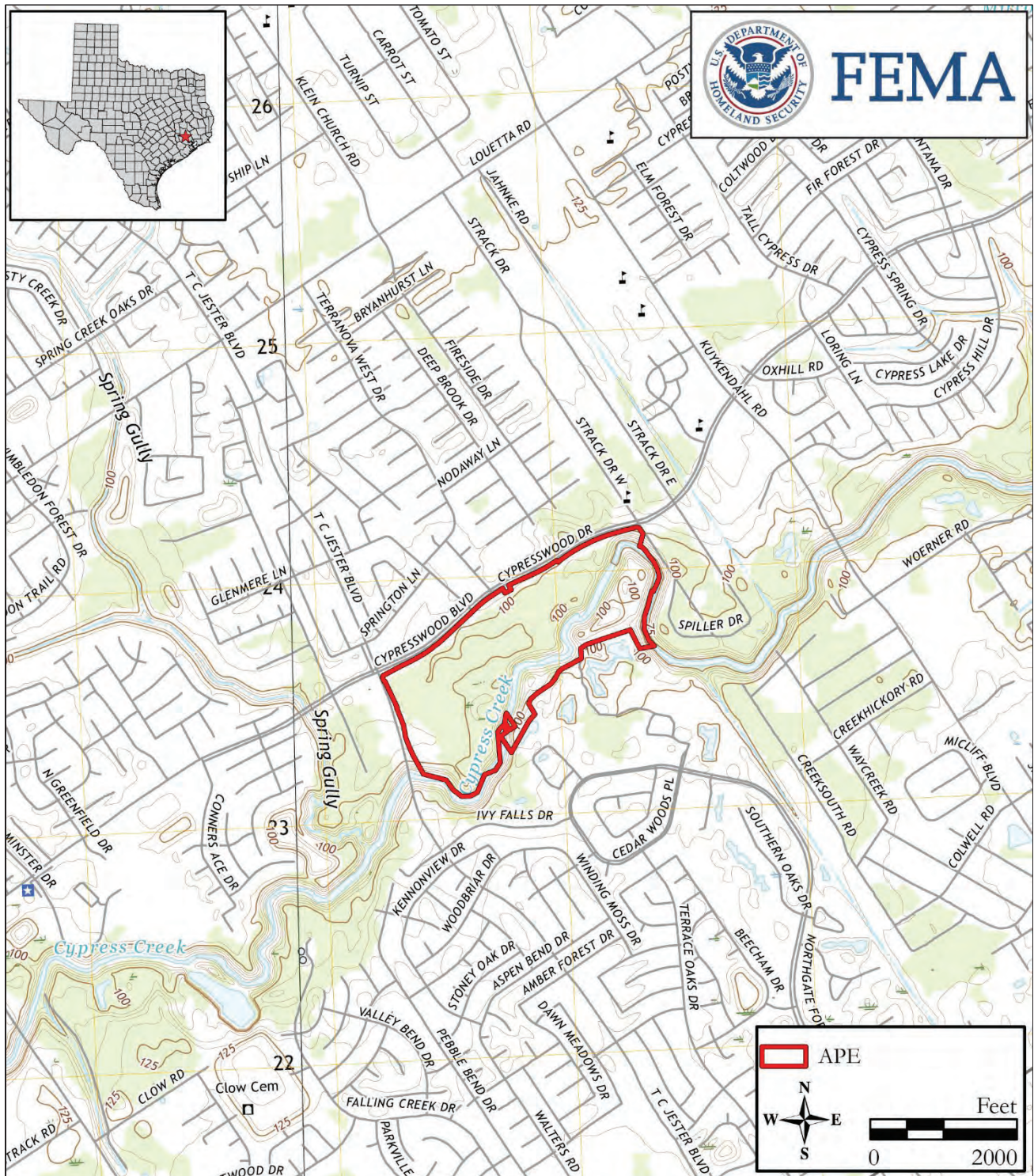


Figure 1. Excerpt from the Spring, Texas 7.5 Minute Series USGS topographic quadrangle map (2019) showing the location of the T.C. Jester Stormwater Detention Basin APE.

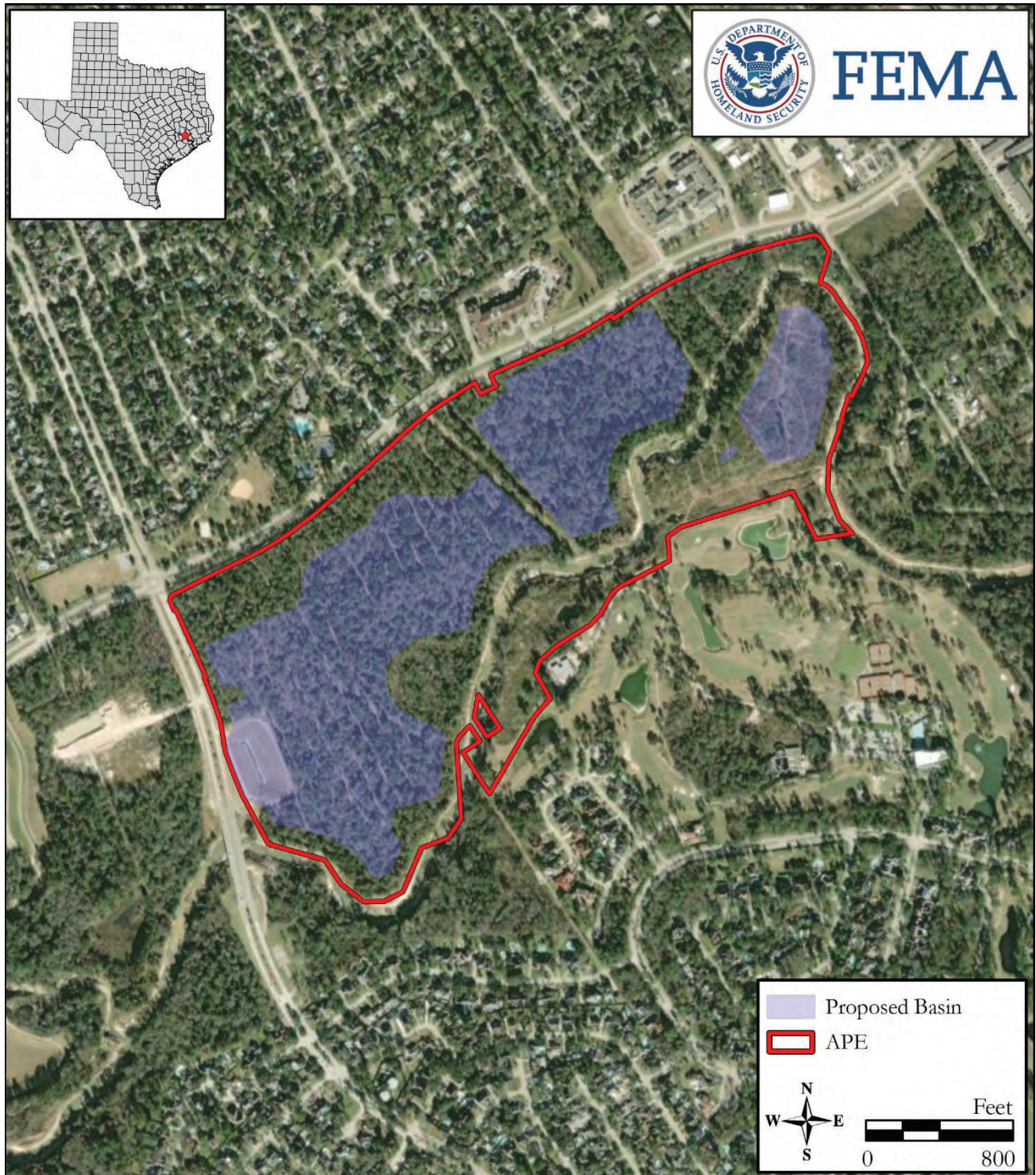


Figure 2. Aerial image showing the location of the T.C. Jester Stormwater Detention Basin APE And proposed basin locations.

From: [Nelson, Tracy](#)
To: [Nelson, Tracy](#)
Subject: FW: For Review and Signature: Section 106 consultation letters for LPDM-PJ-06-TX-2022-007 HCFCJ Jester
Date: Friday, October 6, 2023 9:58:02 AM

From: Cook, Dorothy <dorothy.cook@fema.dhs.gov>
Sent: Friday, October 28, 2022 9:12 AM
To: Emily Dale <EDale@rgaincorporated.com>; Nelson, Tracy <nelsont@cdmsmith.com>
Subject: Re: For Review and Signature: Section 106 consultation letters for LPDM-PJ-06-TX-2022-007 HCFCJ Jester

Thanks! Letters went today to Kiowa, Tonkawa, Comanche Nation, and Alabama Coushatta. Their comment period times out on 11/28

Get [Outlook for iOS](#)

From: Emily Dale <EDale@rgaincorporated.com>
Sent: Friday, October 28, 2022 9:00:02 AM
To: Cook, Dorothy <dorothy.cook@fema.dhs.gov>; Nelson, Tracy <nelsont@cdmsmith.com>
Subject: RE: For Review and Signature: Section 106 consultation letters for LPDM-PJ-06-TX-2022-007 HCFCJ Jester

CAUTION: This email originated from outside of DHS. DO NOT click links or open attachments unless you recognize and/or trust the sender. Please select the Phish Alert Report button on the top right of your screen to report this email if it is unsolicited or suspicious in nature.

Good morning, Tracy and Dorothy-

Thank you for the review and comments on the consult letters. I am submitting this project through eTrac now.

Emily

Emily Dale
Senior Archaeologist/GIS Specialist

Richard Grubb & Associates, Inc.
P: 919-238-4596 x 404 | C: 225-348-6001
www.rgaincorporated.com



U.S. Department of Homeland Security
FEMA Region 6
800 N. Loop 288
Denton, TX 76209
FEMA

October 28, 2022

RE: Section 106 Review Consultation
Harris County Flood Control District (HCFCD)-T.C. Jester Stormwater Detention Basin
City of Houston, Harris County, Texas
FEMA Project Number: LPDM-PJ-06-TX-2022-007
THC Tracking Number: 202014944 & 202103140
(latitude 30.03275; longitude -95.46157)

To: Representatives of Federally recognized Tribes with Interest in this Project Area

The Federal Emergency Management Agency (FEMA) will be providing funds authorized under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, as amended, to the Harris County Flood Control District (HCFCD) for the above-referenced project in Harris County, Texas. FEMA is initiating Section 106 review for the above referenced project based on your Tribe's ancestral interest in the project area.

It is proposed that federal funding through FEMA's Pre-Disaster Mitigation (PDM) grant program will be provided to the HCFCD (Applicant) via the Texas Division of Emergency Management (TDEM) to construct two stormwater detention basins adjacent to the main stem of Cypress Creek southeast of the intersection of T.C. Jester Boulevard and Cypresswood Drive in Harris County (Undertaking). The purpose of the project is to reduce flooding risks and damages during heavy rain events by safely storing excess stormwater and slowly releasing it back to the creek when the flooding has passed. Both residential and commercial properties along the Cypress Creek and its tributaries have been severely impacted by flooding in the last two decades.

FEMA has determined that the Area of Potential Affect (APE) for the proposed Undertaking is the footprint of the project limits of disturbance, which includes approximately 138.1 acres on the southern side of Cypress Creek, centered at latitude 30.03275; longitude -95.46157 (see Figures 1 and 2).

We are writing to request your comments on historic properties of cultural or religious significance to your Tribe that may be affected by the proposed Undertaking. Any comments you may have on FEMA's findings and recommendations should also be provided.

In February 2020, the HCFCD initiated cultural resources studies of the project APE in compliance with the Antiquities Code of Texas (Texas Natural Resources Code, Title 9, Chapter 191). In February and March 2020, Gray & Pape, Inc. completed an intensive archaeological survey and deep testing study within the portion of the APE that lies between Cypress Creek to the south and Cypresswood Drive to the north. An additional parcel on the western side of T.C. Jester Boulevard, which has since been removed from the project, was also investigated. No previously recorded archaeological sites, National Register listed or eligible properties, or cemeteries were identified within the project area during background research, and the survey and testing did not identify any new archaeological sites

within the parcel that is currently included in the APE. Gray & Pape recommended no further work within the current APE. On July 28, 2020, the Texas Historical Commission (THC) issued electronic review comments for the report and concurred with the recommendations.

In September 2020, Gray and Pape conducted an archaeological deep testing study on the remaining portion of the APE, south of Cypress Creek. Background research indicated that previously recorded archaeological site 41HR732, a Paleoindian site, lies within the APE. The site was recorded with two possible locations based on the mapped and digitized coordinate information. The investigation resulted in the excavation of 25 trenches, none of which were positive for cultural materials. While Gray & Pape did not recommend avoidance of either possible location of 41HR732, they recommended monitoring during earth moving activities in the vicinity of the site. In an email dated December 15, 2020, the THC stated that they did not require monitoring but would concur should the client have concerns. On October 24, 2022, FEMA reached out to the THC for additional guidance, and received confirmation that monitoring would be warranted based on the reported Paleoindian component of the site.

FEMA recommends that for all ground-disturbing activities that occur within the vicinity of 41HR732, HCFCD must retain an SOI-qualified archaeologist to perform archaeological monitoring during these activities. If potential archaeological features or artifacts are observed, HCFCD will immediately cease construction in that area and notify TDEM and FEMA. FEMA will work with the THC Archaeology Division and Federally recognized Tribes with Interest in the project area to develop a plan. An appropriate buffer radius will be placed around the identified area and no construction activities may resume in the buffer area until FEMA, in consultation with the THC Archaeology Division and Federally recognized Tribes with Interest in the project area, has provided written notification to resume construction. At the completion of the archaeological monitoring, an archaeological monitoring report detailing the results of the effort will be prepared and submitted to FEMA. Archaeological monitoring is not required on the remainder of the APE; however, should any artifacts be identified during construction, the same process will apply.

Based on the completed cultural resource surveys and above information, including implementation of FEMA's proposed recommendations, FEMA has determined that the proposed Undertaking will have **No Adverse Effect to Historic Properties.**

Please provide your comments within 30 days of receipt of this letter. If you concur with FEMA's determination, please sign below. If you notify us that your review identifies cultural properties within the APE, or project work discloses the presence of archeological deposits, FEMA will contact your Tribe to continue consultation.

Your prompt review of this project is greatly appreciated. Should you need additional information please contact Robert Scoggin, EHP Tribal Liaison at Robert.w.scoggin@fema.dhs.gov (202) 716-4139.

Sincerely,
DOROTHY
K COOK
Kevin Jaynes
Regional Environmental Officer
FEMA Region 6

DWC for

Digitally signed by
DOROTHY K COOK
Date: 2022.10.27
17:07:55 -05'00'

Concurrence by:

Date:

Tribe

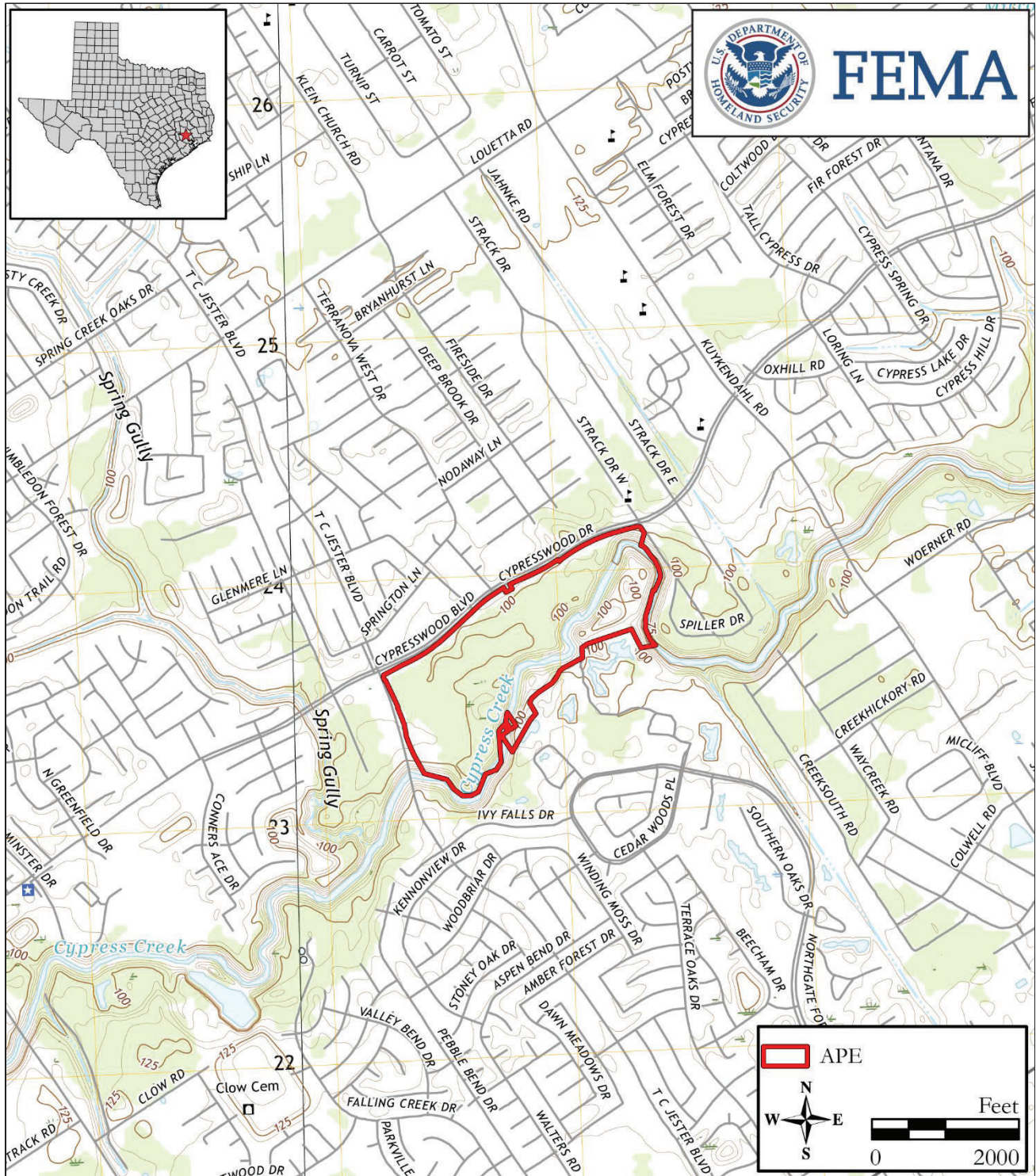


Figure 1. Excerpt from the Spring, Texas 7.5 Minute Series USGS topographic quadrangle map (2019) showing the location of the T.C. Jester Stormwater Detention Basin APE.

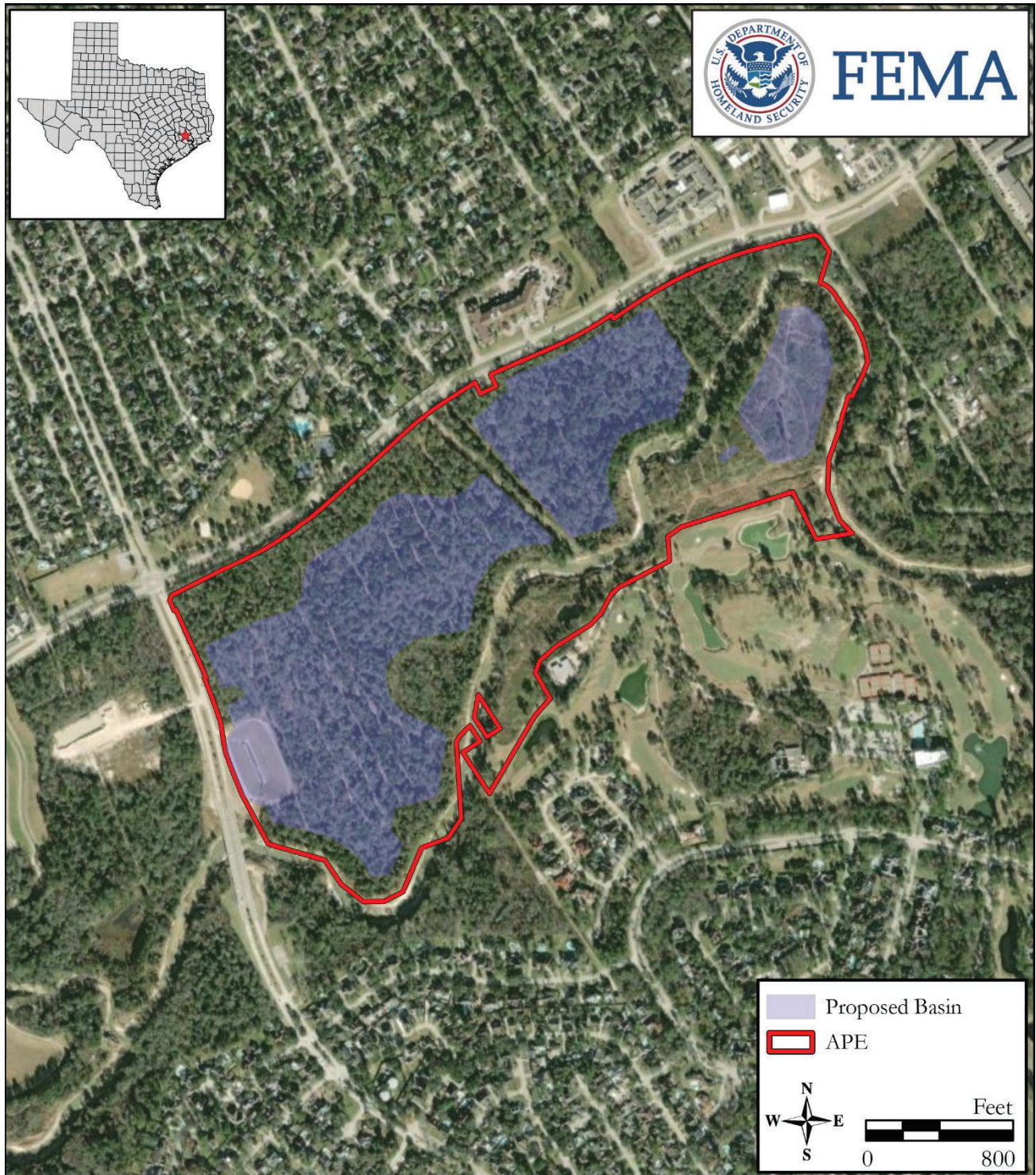


Figure 2. Aerial image showing the location of the T.C. Jester Stormwater Detention Basin APE And proposed basin locations.

COMANCHE NATION



U.S. Department of Homeland Security-FEMA Region 6
Attn: Mr. Robert W. Scoggin
800 N. Loop 288
Texas 76209

November 2, 2022

Re: Section 106 Review Consultation

Harris County Flood Control District (HCFCD)-T.C.Jester Stormwater Detention Basin
City of Houston, Harris County, TX.,FEMA Project Number-LPDM-PJ-06-TX.-2022-007
THC Tracking Number : 202014944 & 202103140

Dear Mr. Scoggin :

In response to your request, the above reference project has been reviewed by staff of this office to identify areas that may potentially contain prehistoric or historic archeological materials. The location of your project has been cross referenced with the Comanche Nation site files, where an indication of ***“No Properties”*** have been identified. (IAW 36 CFR 800.4(d)(1)).

Please contact this office at (580) 492-1153) if you require additional information on this project.

This review is performed in order to identify and preserve the Comanche Nation and State cultural heritage, in conjunction with the State Historic Preservation Office.

Regards

Comanche Nation Historic Preservation Office
Theodore E. Villicana , Technician
#6 SW “D” Avenue, Suite C
Lawton, OK. 73502

Consult Response delayed due to Covid-19 work conditions.



U.S. Department of Homeland Security
FEMA Region 6
800 N. Loop 288
Denton, TX 76209

FEMA

July 1, 2024

RE: Section 106 Review Consultation,
Harris County Flood Control District (HCFCD) – Temporary Access Road, T.C. Jester
Stormwater Detention Basin Project
City of Houston, Harris County, Texas
FEMA Project Number: LPDM-PJ-06-TX-2022-007
(latitude 30.03275; longitude -95.46157)

To: Representatives of Federally recognized Tribes with Interest in this Project Area

The Federal Emergency Management Agency (FEMA) will be providing funds authorized under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, as amended, to the Harris County Flood Control District (HCFCD) for the above-referenced project in Harris County, Texas. FEMA is continuing Section 106 review for the above referenced project based on your Tribe's ancestral interest in the project area. FEMA originally notified your Tribe regarding the proposed project on October 28, 2022, but the project has since expanded, therefore we are asking for your review and reconsideration of the expanded project.

It is proposed that federal funding through FEMA's Pre-Disaster Mitigation (PDM) grant program be provided to the HCFCD (Applicant) to construct two stormwater detention basins adjacent to the main stem of Cypress Creek southeast of the intersection of T.C. Jester Boulevard and Cypresswood Drive in Harris County (Undertaking). The purpose of the Undertaking is to reduce flooding risks and damages during heavy rain events by safely storing excess stormwater and slowly releasing it back to the creek when the flood event has passed. Both residential and commercial properties along Cypress Creek and its tributaries have been severely impacted by flooding in the last two decades.

FEMA has determined that the Area of Potential Affect (APE) for the proposed Undertaking is the footprint of the project limits of disturbance, which originally included approximately 138.1 acres on the southern side of Cypress Creek. The proposed Undertaking has been subsequently expanded to include a temporary access road that will extend from T.C. Jester Boulevard along the south bank of Cypress Creek until it intersects with an existing maintenance road. From this intersection, a permanent access road will be constructed to the proposed Basin 2 of the stormwater detention basin project for the purpose of construction and long-term maintenance access. The proposed temporary access road is approximately 1,730 feet long and 20 feet wide, for an approximate area of 0.8 acres. FEMA has determined that the Undertaking's APE should be expanded to incorporate the limits of disturbance footprint for the temporary access road (see Figures 1 and 2).

We are writing to request your comments on historic properties of cultural or religious significance to your Tribe within the expanded APE identified above, that may be affected by the proposed Undertaking. Any comments you may have on FEMA's findings and recommendations should also be provided.

In October 2023, HCFCD submitted a desktop cultural resources assessment for the expanded APE to the Texas Historical Commission (THC). Based on the results of the desktop assessment, the THC concurred with HCFCD's assessment that no above-ground resources were present within the project APE or would be affected by the Undertaking but that an archaeological survey would be required within the expanded APE (THC Tracking #202401904).

In March 2024, HCFCD undertook an intensive cultural resources survey of the expanded APE. Field investigations involved a pedestrian survey of the entire 0.8-acre expanded APE and the excavation of eight shovel tests. All shovel tests were negative, and no additional artifacts or other cultural resources were identified within the expanded APE. Based on the results of the intensive cultural resources survey, THC concurred with HCFCD's finding of No Historic Properties Affected on May 8, 2024 (THC Tracking #202408345).

Based on the completed cultural resources surveys and above information, FEMA has determined that **No Historic Properties** will be **Affected** in the expanded APE as a result of the Undertaking.

Please provide your comments within 30 days of receipt of this letter. If you notify us that your review identifies cultural properties within the APE, or project work discloses the presence of archeological deposits, FEMA will contact your Tribe to continue consultation.

Your prompt review of this project is greatly appreciated. Should you need additional information please contact Robert Scoggin, EHP Tribal Liaison at Robert.w.scoggin@fema.dhs.gov (202) 716-4139.

Sincerely,
**DOROTHY K
COOK**

Digitally signed by DOROTHY
K COOK
Date: 2024.07.01 13:12:29
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DWC

LaToya Leger-Taylor
Regional Environmental Officer
FEMA Region 6

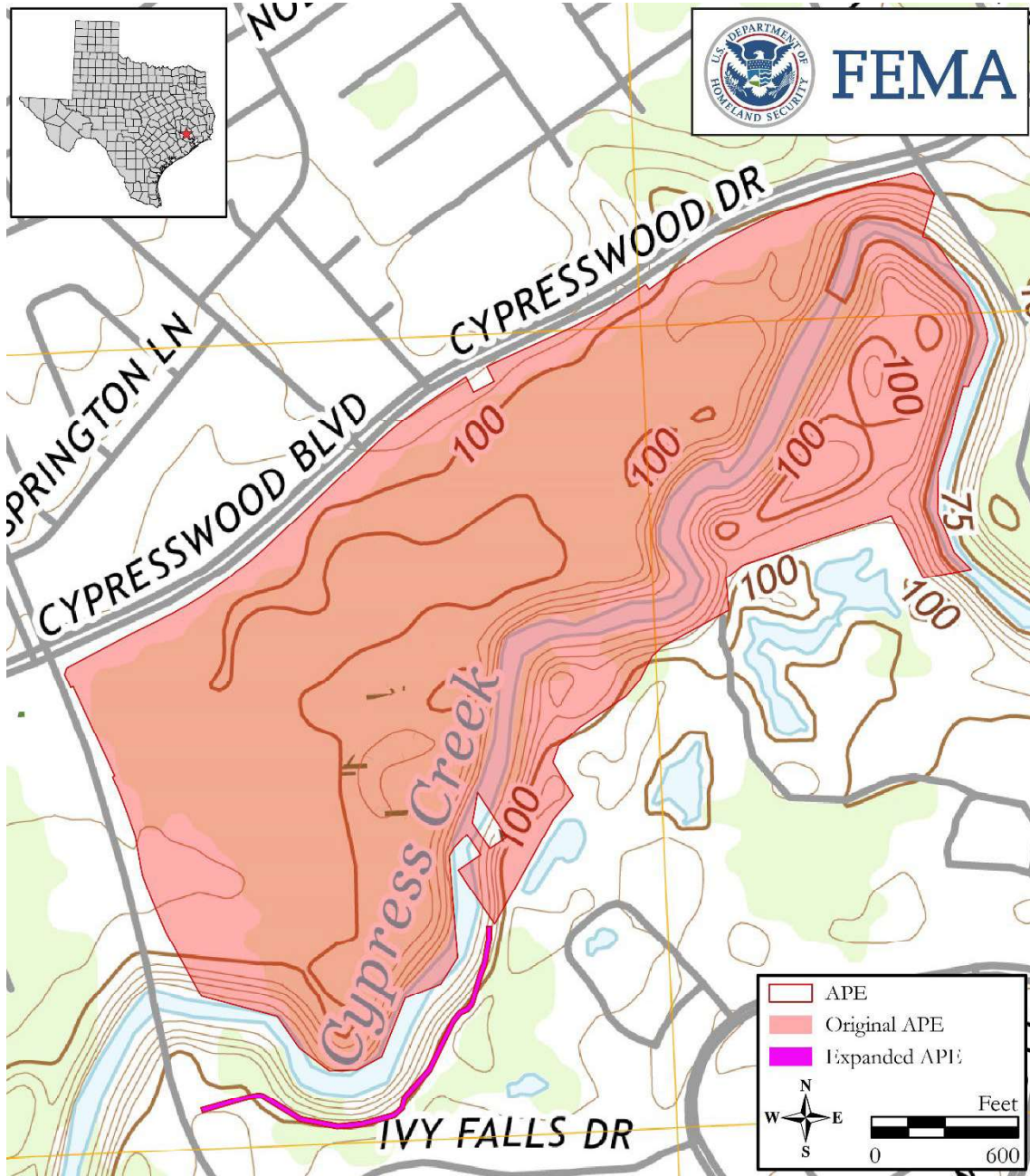


Figure 1. Excerpt from the Spring, Texas 7.5 Minute Series USGS topographic quadrangle map (2019) showing the expanded APE for the T.C. Jester Stormwater Detention Basin.

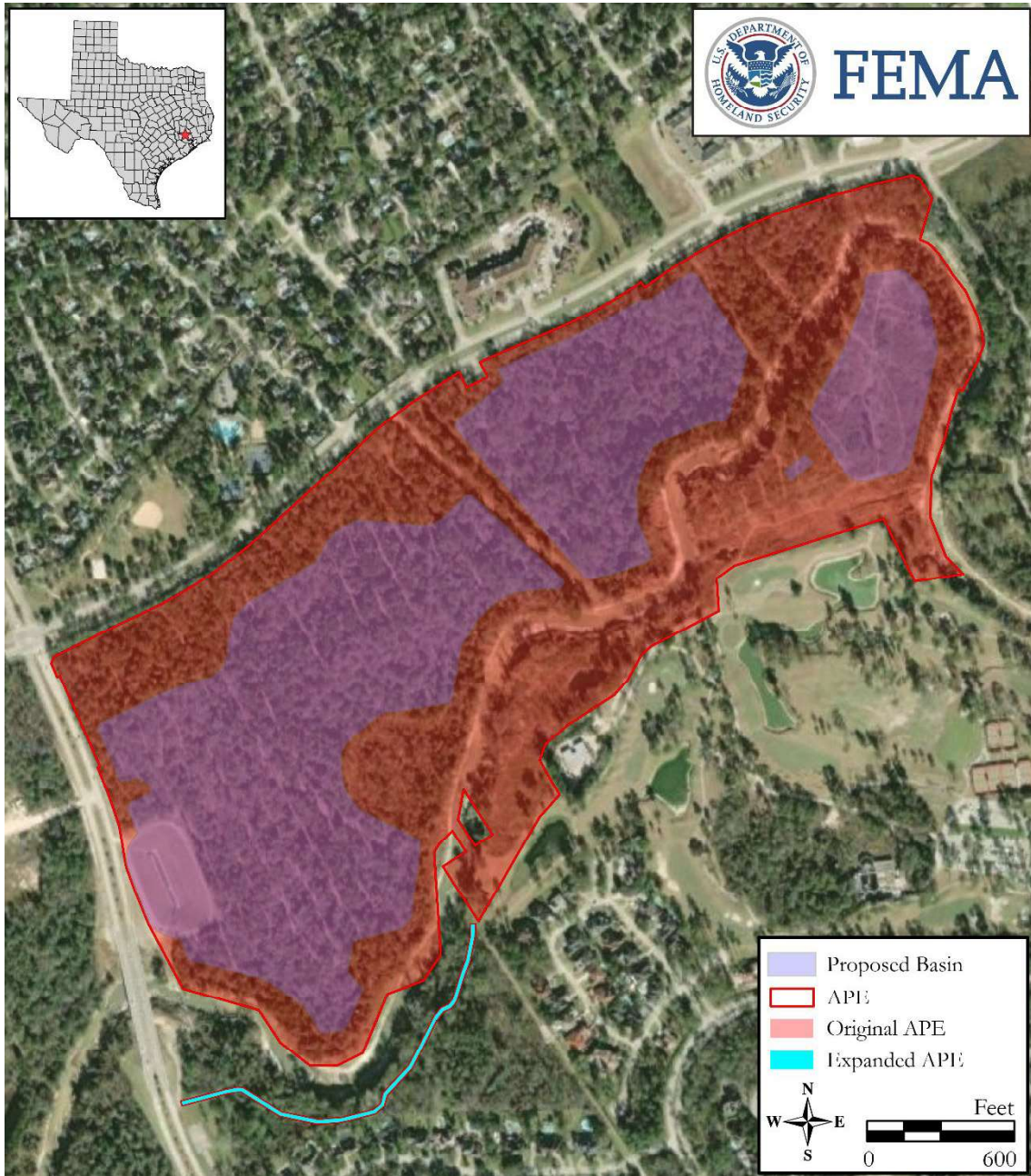


Figure 2. Aerial image showing the expanded APE of the T.C. Jester Stormwater Detention Basin.

COMANCHE NATION



U.S. Department of Homeland Security
FEMA Region 6
Attn: Mr. Robert W. Scoggin
800 N. Loop 288
Texas 76209

July 15, 2024

Re: Section 106 Review Consultation, Harris County Flood Control District
(HCFCD) – Temporary Access Road, T.C. Jester Stormwater Detention
Basin Project – City of Houston, Harris County, Texas
FEMA Project Number- LPDM-PJ-06-TX-2022-007
(Lat. 30.03275, Long. -95.46157)

Dear Mr. Scoggin:

In response to your request, the above reference project has been reviewed by staff of this office to identify areas that may potentially contain prehistoric or historic archeological materials. The location of your project has been cross referenced with the Comanche Nation site files, where an indication of “*No Properties*” have been identified. (IAW 36 CFR 800.4(d)(1)).

Please contact this office at (580) 492-1153) if you require additional information on this project.

This review is performed in order to identify and preserve the Comanche Nation and State cultural heritage, in conjunction with the State Historic Preservation Office.

Regards

Comanche Nation Historic Preservation Office
Theodore E. Villicana , Technician
#6 SW “D” Avenue, Suite C
Lawton, OK. 73502

Appendix C. EPA Environmental Justice Screening Report



EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Harris County, TX

0.1 miles Ring around the Area
 Population: 1,188
 Area in square miles: 0.30



4x7.2, 2023
 TFC Jenker
 19028
 0 0.07 0.14 0.28
 0 0.06 0.13 0.26 km
 See Comments, Map, Comments, Share, Download, City of Houston with the Harris County Environmental Justice Office. Contact the EJSP team at ejsp@harriscountytx.gov. © 2023 Harris County, TX. All rights reserved.

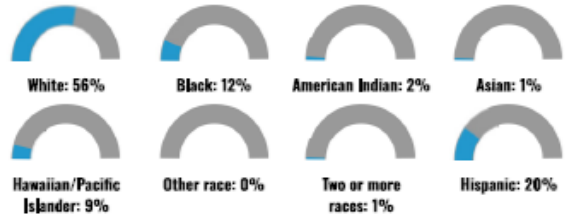
COMMUNITY INFORMATION



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
No language data available.	

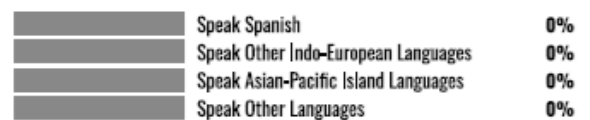
BREAKDOWN BY RACE



BREAKDOWN BY AGE



LIMITED ENGLISH SPEAKING BREAKDOWN



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control.

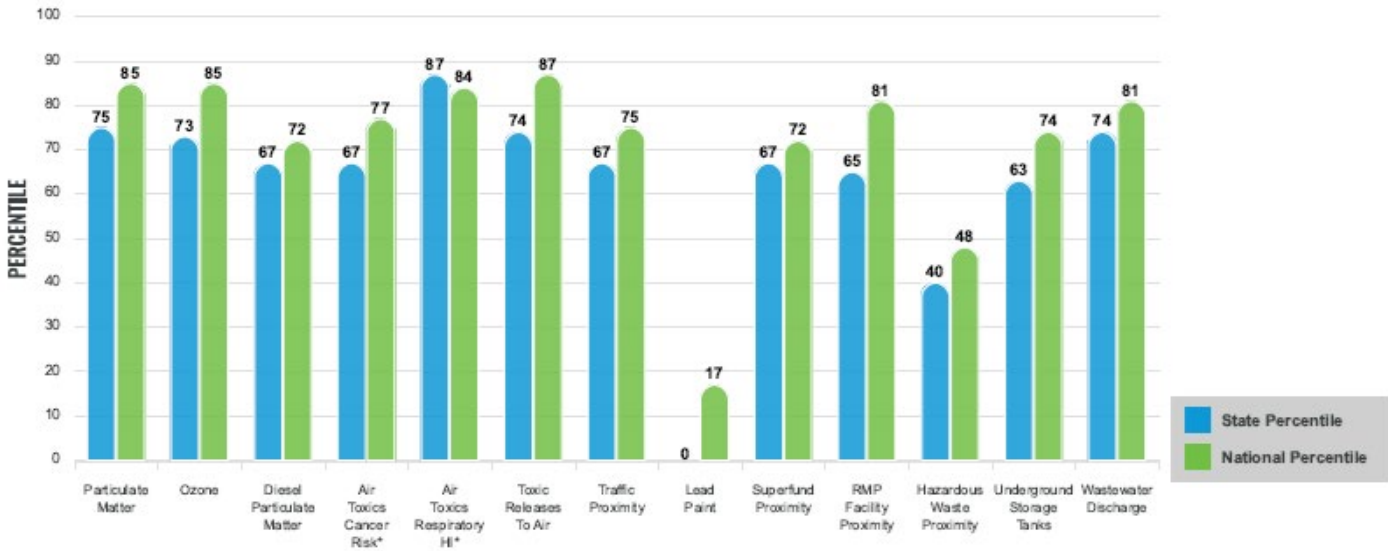
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the [EJScreen website](#).

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low incomes and people of color populations with a single environmental indicator.

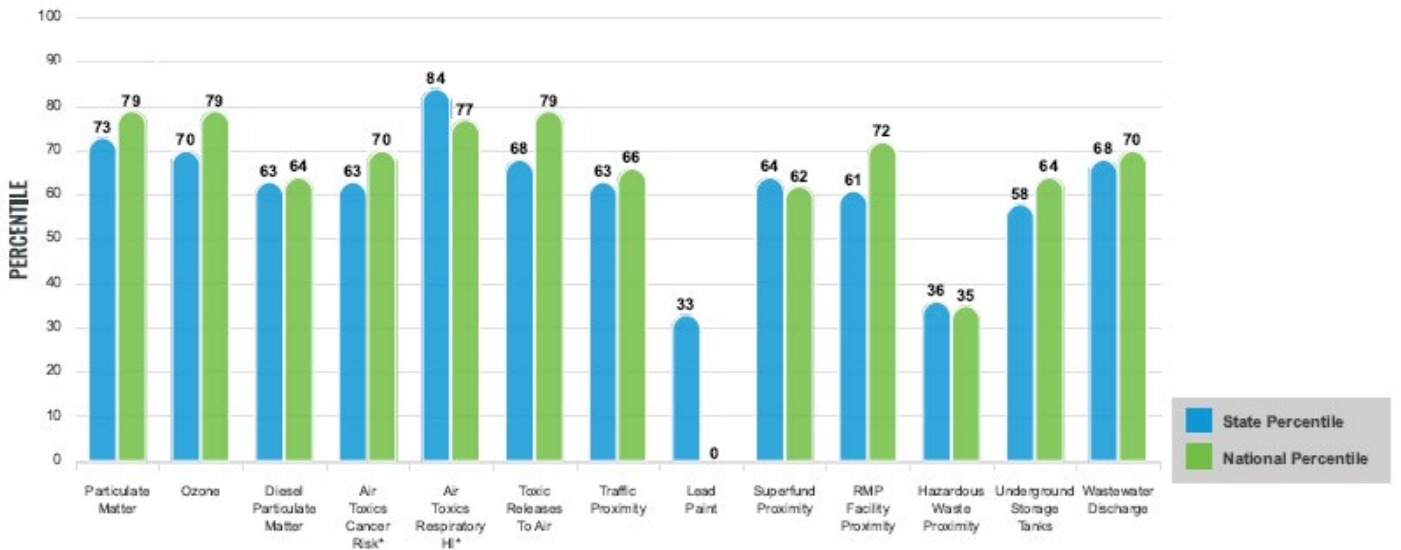
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide perspective on how the selected block group or buffer area compares to the entire state or nation.

Report for 0.1 miles Ring around the Area

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	10.3	9.11	88	8.08	94
Ozone (ppb)	68.7	64.6	77	61.6	91
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	0.272	0.218	68	0.261	62
Air Toxics Cancer Risk* (lifetime risk per million)	30	28	44	25	52
Air Toxics Respiratory HI*	0.4	0.3	80	0.31	70
Toxic Releases to Air	11,000	12,000	80	4,600	93
Traffic Proximity (daily traffic count/distance to road)	160	150	73	210	69
Lead Paint (% Pre-1960 Housing)	0.031	0.17	42	0.3	22
Superfund Proximity (site count/km distance)	0.075	0.085	68	0.13	57
RMP Facility Proximity (facility count/km distance)	0.72	0.63	73	0.43	83
Hazardous Waste Proximity (facility count/km distance)	0.15	0.75	31	1.9	28
Underground Storage Tanks (count/km ²)	2.7	2.3	66	3.9	64
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.033	0.91	82	22	76
SOCIOECONOMIC INDICATORS					
Demographic Index	42%	46%	47	35%	66
Supplemental Demographic Index	12%	17%	37	14%	46
People of Color	44%	58%	37	39%	62
Low Income	40%	34%	62	31%	69
Unemployment Rate	1%	5%	27	6%	23
Limited English Speaking Households	0%	8%	0	5%	0
Less Than High School Education	1%	16%	13	12%	13
Under Age 5	8%	6%	68	6%	76
Over Age 64	9%	14%	33	17%	22
Low Life Expectancy	18%	20%	31	20%	39

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund.....0
 Hazardous Waste, Treatment, Storage, and Disposal Facilities.....0
 Water Dischargers.....0
 Air Pollution.....0
 Brownfields.....0
 Toxic Release Inventory.....0

Other community features within defined area:

Schools0
 Hospitals0
 Places of Worship0

Other environmental data:

Air Non-attainment Yes
 Impaired Waters Yes

Selected location contains American Indian Reservation Lands* No
 Selected location contains a "Justice40 (CEJST)" disadvantaged community Yes
 Selected location contains an EPA IRA disadvantaged community Yes

Report for 0.1 miles Ring around the Area

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	18%	20%	31	20%	39
Heart Disease	4.4	5.9	26	6.1	17
Asthma	8	9.2	10	10	6
Cancer	5.2	5.2	54	6.1	29
Persons with Disabilities	9.7%	12.3%	36	13.4%	30

CLIMATE INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	57%	10%	95	12%	96
Wildfire Risk	0%	30%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	30%	15%	84	14%	88
Lack of Health Insurance	22%	18%	68	9%	94
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	No	N/A	N/A	N/A	N/A

Footnotes

Report for 0.3 miles Ring around the Area

Appendix D. Public Notice

**Federal Emergency Management Agency
PUBLIC NOTICE**

Notice of Availability of the Draft Environmental Assessment for the Harris County Flood Control District, T.C. Jester Stormwater Detention Basin Project, LPDM-PJ-06-TX-2022-007.

Interested persons are hereby notified that the Harris County Flood Control District (HCFCD) has applied to the Federal Emergency Management Agency (FEMA), through the Texas Division of Emergency Management (TDEM) for Legislative Pre-Disaster Mitigation (LPDM) grant funding as authorized by Section 203 of the Stafford Act. PDM is designed to assist states, territories, federally recognized tribes, and local communities to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on federal funding in future disasters. This notice also serves as FEMA's final notice under Executive Order 11988 for Floodplain Management and Executive Order 11990 for Protection of Wetlands as the proposed action affects floodplain and wetland resources.

FEMA proposes to provide funding to HCFCD to construct two wet-bottom stormwater detention basins in the upper part of the Cypress Creek watershed, north of the Houston metro area. Basin 1A and Basin 2 would be constructed adjacent to Cypress Creek, southeast of the intersection of T.C. Jester Boulevard and Cypresswood Drive. HCFCD is also proposing to construct a third stormwater detention basin directly southwest of Basin 1A with non-FEMA funding. This third basin would incorporate an existing detention basin, Unit Number K500-15-00, which is immediately east of T.C. Jester Boulevard. Under the Cypress Creek Watershed Implementation Program, HCFCD would construct a series of stormwater detention basins and other drainage infrastructure along Cypress Creek and its tributaries, for flood relief in the vicinity, which includes residential and commercial properties.

(1) Under the No Action alternative, there would be no FEMA funding for the construction of two stormwater detention basins near the intersection of T.C. Jester Boulevard and Cypresswood Drive. Without the new stormwater detention, there would be no change to the flood elevations along Cypress Creek. Flooding within the surrounding residential neighborhood and commercial properties along Cypress Creek and its tributaries would continue, resulting in repetitive damage to property and infrastructure, and public health and safety would continue to be at risk. In addition, the intensity and frequency of storms are increasing, and severe rain events that result in flooding are also expected to increase in frequency and intensity, which would lead to more prolonged and damaging floods in the vicinity under the No Action alternative.

(2) Under the Proposed Action, HCFCD would construct two stormwater detention basins adjacent to the main stem of Cypress Creek, on land owned by HCFCD. The project would comprise two wet-bottom basins, referred to as Basin 1A and Basin 2. A wet-bottom basin is designed to contain a permanent pool of water throughout the year that can support the growth of aquatic vegetation. The Proposed Action would require tree and vegetation removal and grading within the footprints of the basins. A third basin, adjacent to Basin 1A and identified as Basin 1B, is part of the Regional Drainage Plan, but it is not funded under the Proposed Action as it is expected to be funded by state community-directed funding under the Community Development Block Grant-Mitigation (CDBG-MIT) funding.

A draft Environmental Assessment (EA) has been prepared to assess the potential impacts of the proposed action and alternatives on the human and natural environment in accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR Parts 1500 – 1508), FEMA's Instruction 108-1-1 for implementing NEPA, the National Historic Preservation Act, Executive Order 11988, Executive Order 11990, and 44 CFR Part

The draft EA evaluates alternatives that provide for compliance with applicable environmental laws. The alternatives evaluated include (1) No Action; and (2) Proposed Action as described above.

The draft EA is available for review and comment from **November X to December X, 2024** at the HCFCD Brookhollow Building, 9900 Northwest Freeway, Houston, TX 77092, from 8:00 A.M. to 5:00 P.M. An electronic or hard copy version of the draft EA can be requested from Dorothy Cook, FEMA Region 6, Email: dorothy.cook@fema.dhs.gov or viewed on FEMA's website at <https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa-repository> or the HCFCD website at <https://www.hcfcd.org/Activity/Active-Projects/Cypress-Creek/TC-Jester-Stormwater-Detention-Basin-K500-23-00>.

The comment period will end 30 days from the initial notice publication date. Written comments on the draft EA can be mailed or emailed to Dorothy Cook, Senior Environmental Protection Specialist, FEMA Region 6, 800 N Loop 288, Denton, TX 76209; Email: dorothy.cook@fema.dhs.gov. If no substantive comments are received, the draft EA will become final and a Finding of No Significant Impact (FONSI) will be issued for the project. Substantive comments will be addressed as appropriate in the final documents.

Appendix E. Draft Finding of No Significant Impact



FEMA

**FINDING OF NO SIGNIFICANT IMPACT
HARRIS COUNTY FLOOD CONTROL DISTRICT
TC JESTER STORMWATER DETENTION BASIN PROJECT
HARRIS COUNTY, TEXAS
LPDM-PJ-06-TX-2022-007**

BACKGROUND

In accordance with the Federal Emergency Management Agency's (FEMA) Instruction 108-1-1, an Environmental Assessment (EA) has been prepared pursuant to Section 102 of the National Environmental Policy Act (NEPA) of 1969, as implemented by the regulations promulgated by the President's Council on Environmental Quality (CEQ; 40 CFR Parts 1500-1508). The purpose of the Project is to reduce flood hazards along the main stem of Cypress Creek within the T.C. Jester area in Harris County, Texas. This EA informed FEMA's decision on whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).

Harris County Flood Control District (HCFCD) has applied through the Texas Division of Emergency Management (TDEM) for FEMA Legislative Pre-Disaster Mitigation (LPDM) funding under project LPDM-PJ-06-TX-2022-007, to reduce flooding within the surrounding residential neighborhood and commercial properties along Cypress Creek and its tributaries; reduce repetitive damage to property and infrastructure; and improve public health and safety within the T.C. Jester area in Harris County, Texas. Through LPDM, FEMA provides funds to eligible state, local, tribal and territorial entities to implement sustainable cost-effective measures designed to reduce the risk to individuals and property from future natural hazards, while also reducing reliance on federal funding from future disasters. The PDM Grant Program is authorized under Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act 42 United States Code (U.S.C.) 5133, as amended by the Disaster Recovery Reform Act of 2018. These LPDM funds were made available through Congressionally directed spending in the 2022 Department of Homeland Security Appropriations Act (Pub. L. No. 117-103).

Two project alternatives were evaluated in this EA: 1) No Action Alternative; 2) Proposed Action Alternative.

Under the No Action Alternative, there would be no FEMA funding for the construction of two stormwater detention basins near the intersection of T.C. Jester Boulevard and Cypresswood Drive. Without the new stormwater detention, there would be no change to the flood elevations along Cypress Creek. Flooding within the surrounding residential neighborhood and commercial properties along Cypress Creek and its tributaries would continue, resulting in repetitive damage to property and infrastructure, and public health and safety would continue to be at risk. In addition, the intensity and frequency of storms is increasing and severe rain events that result in flooding are also expected to increase in frequency and intensity, which would lead to more

prolonged and damaging floods in the vicinity under the No Action Alternative. The No Action Alternative would not meet the purpose and need of the proposed project.

Under the Proposed Action Alternative, HCFCD would construct two stormwater detention basins adjacent to the main stem of Cypress Creek, on land owned by HCFCD. The project would comprise two wet-bottom basins, referred to as Basin 1A and Basin 2. A wet-bottom basin is designed to contain a permanent pool of water throughout the year that can support the growth of aquatic vegetation. The Proposed Action would require tree and vegetation removal and grading within the footprints of the basins.

Detention Basins 1A and 2 would be constructed by excavating soil to achieve the proposed depth and side slope configuration. The excavated soil would be used to construct the berm around the outer perimeter of the basins. The project footprint would be approximately 68 acres. The Proposed Action would provide approximately 0.44 feet of flood reduction during the 10-year storm event, and a maximum reduction of approximately 0.35 feet during the 100-year event. The berm around each basin would be approximately 30 feet wide and would be used for maintenance access. The basin would be vegetated with grasses and aquatic plants. Existing trees and vegetation would be preserved within the 160-foot-wide forested buffer zone between the basin disturbance areas and Cypress Creek. An approximate 50-foot-wide vegetation buffer would be maintained between Basin 1A and an existing sanitary sewer line that parallels Cypresswood Drive. Construction is anticipated to take approximately 2 years to complete. Construction equipment would include large and medium excavators, backhoes, skid steers, dozers, roll-backs, dump trucks, gooseneck trailers, and cement mixers.

Both basins would have a 100-foot-wide inflow weir with a maximum 4:1 side slope. Basin 1A would have a 48-inch-diameter reinforced concrete pipe outfall to the creek and Basin 2 would have a 36-inch diameter high-density polyethylene outfall pipe. Both outfalls would have riprap erosion protection installed with topsoil placed over the riprap within the grass-lined channels.

A new temporary access road for the construction of Basin 2, approximately 1,627 feet long, would be installed along the south bank of Cypress Creek until it intersects with the existing maintenance road. From the intersection of these two access roads, a new permanent access road would be constructed to Basin 2 that would be approximately 2,732 feet long. Construction of the temporary portion of the access road would include the cutting of some trees to the ground but would not include removal of the root balls. A top layer of aggregate would be applied to serve as a temporary driving surface. The area would be restored upon completion of the project, including the removal of as much aggregate as practicable and revegetation along the route.

A public notice was posted in the local newspaper and on FEMA's and HCFCD's websites. The draft EA was made available for public comment for 30 days on FEMA's website and upon request in hard or electronic copy from FEMA. No comments were received from the public during the comment period.

FINDING OF NO SIGNIFICANT IMPACT

The Proposed Action as described in the EA would not significantly impact climate change or cultural resources. During construction, short-term, minor/negligible impacts to soils, air quality, surface water quality, hazardous materials, transportation, and noise are anticipated. The project would result in short- and long-term, negligible, adverse effect on wetlands from the loss of the forested wetland area and functions. Purchase of wetland credits from an existing mitigation bank would result in no net loss. FEMA has determined the proposed action may affect, and is likely to adversely affect the alligator snapping turtle and may affect, but is not likely to adversely affect the tri colored bat. Avoidance and minimization measures are required to be implemented to reduce impacts to these species that are proposed for listing under the Endangered Species Act. No long-term significant adverse impacts are anticipated, however there would be minor, long-term adverse effects on vegetation, wildlife, and migratory birds. All adverse impacts to the proposed project site and surrounding areas would be minimized and/or mitigated through required project conditions. The project would result in long term beneficial impacts to invasive species, floodplain function, minority and low-income populations, utilities and public services, and public health and safety.

CONDITIONS

The following conditions must be met as part of this project. Failure to comply with these conditions may jeopardize the receipt of federal funding.

1. Any change to the approved scope of work will require re-evaluation for compliance with NEPA and other Laws and Executive Orders.
2. This review does not address all federal, state, and local requirements. Acceptance of federal funding requires recipient to comply with all federal, state and local laws. Failure to obtain all appropriate federal, state and local environmental permits and clearances may jeopardize federal funding.
3. Areas of exposed soils will be kept wet or covered to reduce fugitive dust.
4. All construction equipment will meet current EPA emissions standards.
5. HCFCD must implement a Stormwater Pollution Prevention Plan (SWPPP) that includes erosion and sediment control practices and best management practices (BMPs) in accordance with the TCEQ Stormwater General Permit for Construction Activities.
6. HCFCD is responsible for coordinating with and obtaining any required Section 404 Permit(s) from the United States Army Corps of Engineers (USACE) and/or any Section 401/402 Permit(s) from the State prior to initiating work. The applicant must comply with all conditions of the required permit(s), including any mitigation for loss of jurisdictional wetlands. All coordination pertaining to these activities should be retained as part of the project file in accordance with the respective grant program instructions.

7. HCFCD is required to coordinate with the local floodplain administrator and obtain required permits prior to initiating work, including any necessary certifications that encroachments within the adopted regulatory floodway would not result in any increase in flood levels within the community during the occurrence of the base flood discharge. Applicant must comply with any conditions of the permit and all coordination pertaining to these activities should be retained as part of the project file in accordance with the respective grant program instructions.
8. Silt fencing made of woven non-monofilament geotextile fabric will be installed along the perimeter of active construction areas to minimize erosion and sedimentation into the aquatic environment. Silt fence installation will be installed such that it is buried to a depth of 6 in (0.15 m) and has a height of 24 in (0.61 m). Silt fencing in flood prone areas will be removed when a major storm event is anticipated but will be replaced after the storm passes. The biological monitor will inspect the silt fencing for trapped wildlife before construction begins each day. Hydro-mulching and hydro-seeding will be used for final site stabilization. The hydro-mulch used will not contain microplastics.
9. After riprap is installed to stabilize stream banks beneath the proposed detention basin outfalls, the riprap will be covered with the native soil material displaced during the installation activities.
10. A bird nest survey will be conducted within 5 days of any vegetation disturbance, regardless of time of year. Any nests found, will receive a species-specific buffer, biweekly monitoring, and be avoided until the nest is no longer occupied.
11. Construction activities will not occur when there a rain event that releases more than 2 inches of precipitation over a 24-hour period at which point construction may resume.
12. Employees and contractors, with the exception of truck drivers, will be provided with environmental awareness training by a qualified biologist. This training will familiarize personnel with the species and their habitats that may occur on-site, measures to be implemented to protect this species, and project boundaries. Because truck drivers change daily, it is impracticable to ensure all truck drivers are provided with this training. Therefore, the use of disposal material trucks within 160 ft (48.8 m) of Cypress Creek will be prohibited. Signage will be posted on-site, and plans will identify where signs will be placed for truck exclusion areas.
13. A permitted biological monitor (e.g. authorized TPWD scientific collection permit for Alligator Snapping Turtle (AST) and Service Section 10 permit if the species is listed) will be on-site during all activities that may result in encounters with ASTs (e.g., during any clearing or construction work within 656 ft (200 m) of Cypress Creek if work starts prior to installation of wildlife exclusion fencing and within 200 ft (61 m) for work starting after installation of the exclusion fence. The biological monitor will be responsible for surveys to look for adults, juveniles, hatchlings, and nests prior to initiating mechanical removal of woody and brush vegetation. They will also be responsible for inspecting exclusion fencing or any open trenches daily to ensure that the

fence is not compromised or breached and no turtles are entangled or trapped in fences or open trenches.

- The biological monitor will also be responsible for surveying any in water work areas prior to construction. The biological monitor should first survey the submerged areas visually for AST surfacing for normal respiration (once every 20 to 60 minutes).
 - The applicant will provide pre-construction education and training of construction crews by providing educational materials developed by the biological monitor on the identification of AST and avoidance requirements of this conference opinion or biological opinion (if listed) during construction activities.
14. Construction personnel will be directed to avoid impacts on logs, cutbanks, root balls, and similar in-water structural features typically used by AST for cover. If avoidance is not feasible, existing in-water structural features will be removed temporarily and relocated as near as possible to where the in-water structure originated during post construction activities. The on-site permitted biological monitor will advise construction personnel of structures to avoid impacts to the in-water structure and where to relocate any in-water structural features that cannot be avoided.
15. Construction activities within 200 ft (61 m) of the water's edge where exclusion fencing is installed will be avoided during the peak AST nesting and breeding season (i.e., April 1 through June 30).
16. Wildlife exclusion fencing will be installed along the outer edge of the 160-ft-wide (48.8-m-wide) forested buffer (the edge closest to the proposed construction within AST nesting habitat), in the water directly adjacent to where shoreline protection is being installed, and around the perimeter of any open trenches to prevent AST from entering construction areas. Trench walls will be excavated at 30-degree angles to allow AST or other animals to escape if they enter the trench. Wildlife exclusion fencing will consist of 16-ft (4.9-m) by 4-ft (1.2-m) feedlot panels with 4-in (0.1-m) by 4-in (0.1-m) openings made of 4 to 14.5-gauge galvanized wire, or similar materials that won't collapse, and do not have the potential to entangle wildlife. Fence posts (4 ft (1.2 m) tall) will be installed at 6-ft (0.15-m) intervals to support and secure the fencing. The fencing will be buried 1-ft (0.3-m) deep so that the above ground portion is 3-ft (0.9 m) high. This type of exclusion fence must be inspected daily to ensure that it is not compromised or breached. Any necessary exclusion fence repairs or replacements will be made immediately. The on-site permitted biological monitor will inspect exclusion fences and open trenches daily for trapped wildlife before construction can begin each day (details are included in BA, Section 2.5.1).
17. Each encounter with an AST will be treated on a case-by-case basis. If an AST is found, the following will apply:
- If an AST is detected within 200 ft (61 m) of work activities in the action area (terrestrial or aquatic environments) that may result in the harm, injury, or death to the animal, all work activities will cease immediately, and the on-site permitted

biological monitor will be notified immediately. The permitted biological monitor will then notify TPWD and USFWS before taking any action.

- Based on the professional judgment of the permitted biological monitor, if project activities can be conducted without harming or injuring the AST, the individual maybe left at the location of discovery and monitored by the biological monitor until AST moves out of the action area. All project personnel will be notified of the finding and at no time will work occur within 200 ft (61 m) of an AST without the biological monitor being present.
- Based on the professional judgment of the permitted biological monitor, if project activities cannot be conducted without harming or injuring the AST, all work will cease until the AST leaves the area(e.g., turtle crawls back to the water and swims at least 200 ft(61 m) away from construction activities. Under no circumstances should the AST or other wildlife be harmed or harassed (e.g., herded back into water)by construction crews or the permitted biological monitor.
- If an AST is observed or found within the construction area that will not leave on its own accord within 4 hours of detection, then the permitted biological monitor will notify TPWD's Kelly Norrid at 281-908-3569, to provide guidance or assist on the individual's capture and arrangements for release at a designated relocation site within the Cypress Creek watershed.
- AST that are captured during construction activities will be detained individually in a large plastic or similar container, with at least 3 in(0.08 m)of water and covered with branches or vegetation to calm it until relocation to a designated holding site or release site is arranged. If project work takes place in the summer temperatures above 80°F (26.6°C)or winter temperatures below 60°F(15.6°C), the turtle will be kept in a shaded or protected area to avoid overheating or exposure to elements. AST may not be handled or detained on site without a permitted biological monitor present. AST may not be stored in vehicles or closed containers. If more than one AST is detained during construction, then AST relocations may need to occur at a frequency greater than once per day.

18. The following site restrictions will be implemented to avoid or minimize effects on the AST:

- Trash, food, food containers, and food waste will be secured at all times by individual workers or placed in animal-proof trash containers placed at the work site. The contents of trash containers will be transferred from the work site at the end of each day.

19. The applicant will restore9.8 ac (0.04 km²)of AST nesting habitat within the detention basins and restore all temporary roads and work spaces to former AST nesting habitat.

20. All operators, employees, and contractors (with the exception of truck drivers) working in the project area for more than 1 day, including access roads and staging areas, will be educated on tri-colored bat (TCB) and informed of all applicable avoidance and minimization measures (AMMs).

21. Only the number of trees necessary to implement project construction activities safely would be removed during all phases/aspects of the project (e.g., basins, access road alignments, temporary work areas, etc.).
22. Tree clearing will not occur during pupping season (May 1 – July 15) when juveniles cannot fly.
23. Tree removal activities within TCB suitable habitat or travel corridors will be timed to avoid summer occupancy season (March 15 – July 15) when bats are present and roosting in trees on their summer home range and/or roosting in colonies. If tree removal must occur during the summer occupancy season, a pre-construction acoustic survey, using Service recommended protocols, will be conducted by a qualified biologist to identify maternal roosts potentially containing flightless pups, at least one month prior to the proposed tree removal action. If a maternal roost is identified, no trees may be removed within 1,000 ft (305 m) of the roost tree for a period of four weeks, or if a subsequent acoustic survey confirms that all pups have left the maternal roost.
24. Tree removal will be limited to the areas specified in project plans and clearing limits will be marked in the field (e.g., install brightly colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits). All contractor personnel will be directed to stay out of exclusion areas.
25. Prior to any project related culvert modification, a culvert survey using Service recommended survey protocols for culvert surveys (USFWS 2024b, Appendix K) would be conducted by a qualified biologist to identify the presence or absence of hibernating or roosting TCBs. If TCB are found within the culvert then the culvert is being used for winter torpor, or the culvert is being used as an incidental roost site by bats outside of torpor periods. If TCB are positively identified during a culvert survey assessment or if species identification cannot be verified at a culvert with evidence of use, the applicant will coordinate with TCCPESFO within 24 hours to determine next steps. For other species of bat identified, the applicant will coordinate with the appropriate state agency (Texas Parks and Wildlife Department (TPWD)). If TCB are found in the culvert during winter season (December 15 – February 15), then culvert removal or replacement activities will be delayed until the applicant conducts subsequent surveys and provides evidence that no bats are present prior to commencing construction activities; and the qualified biologist will continue to monitor the culvert for TCB until the replacement or removal operation is complete. The applicant will not exclude TCB from roosting in existing culverts in the action area.
26. Within the portion of TCB range where bats remain active year-round and continue to roost in trees during the winter, and where mean winter temperatures fall below 40°F (4.4 °C) for three (3) consecutive days between December 15 and February 15, the tree clearing activities will immediately halt until temperatures reach above 40°F and remain above 40°F (4.4 °C) for a 24-hour period after the initial temperature drop.

27. HCFCD shall immediately contact the Service's Texas Coastal and Central Plains Ecological Services Field Office (TCCPESFO) at 281-282-8282 to report direct encounters between the TCB and AST and project workers and their equipment whereby incidental take in the form of harassment, wounding, or killing occurs. If the encounter occurs after normal working hours, HCFCD shall contact the TCCPESFO at the earliest possible opportunity by the next working day. When injured or killed individuals of the species are found in the proposed project area, HCFCD shall also follow the steps outlined in the Salvage and Disposition of Individuals section below.
28. For those components of the action that will require the capture and relocation of any listed species, HCFCD shall immediately contact the TCCPESFO at 281-286-8282 to report the action. If capture and relocation occur after normal working hours, HCFCD shall contact the TCCPESFO at the earliest possible opportunity by the next working day to report the action.
29. Care should be taken in handling sick or injured specimens to ensure effective treatment and care or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured specimens or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Service Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed (follow the steps outlined in the Salvage and Disposition of Individuals section below).
30. Upon completion of construction, a post-activity report will be prepared by HCFCD and sent to FEMA, who will forward to the Field Supervisor of the TCCPESFO within 60 calendar days. This report shall detail:
 - Dates project activities occurred.
 - Pertinent information concerning the completion of and success in implementing the conservation measures.
 - An explanation of failure to meet such measures, if any.
 - Occurrences of species covered in this opinion encountered during project implementation and project effects, if any.
 - Occurrences of incidental take of covered species if any.
 - For those components of the action that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, HCFCD shall provide a precise accounting to FEMA of the total acreage of habitat impacted and habitat restored to the Service after completion of construction.
 - Other pertinent information.
31. Salvage and Disposition: Upon locating a dead, injured, or sick listed species initial notification must be made to the Service's Law Enforcement Office, 19581 Lee Road, Humble, Texas and 281-876-1520 within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification must be sent to the Law Enforcement Office with a copy to the TCCPESFO.

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen.

32. For all ground-disturbing activities occurring near the identified archaeological site, HCFCD must retain a Secretary of Interior Standards-qualified archaeologist to perform archaeological monitoring during these activities. If potential archaeological features or artifacts are observed, HCFCD would immediately cease construction in that area and notify Texas Division of Emergency Management (TDEM) and FEMA. FEMA would work with the Texas Historical Commission (THC) Archaeology Division and federally recognized tribes with interests in the project area to develop a plan. An appropriate buffer radius would be placed around the identified area and no construction activities may resume in the buffer area until FEMA, in consultation with the THC Archaeology Division and federally recognized tribes with interests in the project area, has provided written notification to resume construction. Archaeological monitoring is not required on the remainder of the APE; however, should any artifacts be identified during construction, the same process will apply. At the completion of the archaeological monitoring, an archaeological monitoring report detailing the results of the effort will be prepared and submitted to FEMA.
33. Any hazardous materials discovered, generated, or used during implementation of the Proposed Action must be handled and disposed of in accordance with applicable local, state, and federal regulations.
34. Heavy machinery and equipment will be well maintained. Sound-control devices and mufflers will be used.

CONCLUSION

Based on the findings of the EA, coordination with the appropriate agencies, comments from the public, and adherence to the project conditions set forth in this FONSI, FEMA has determined that the proposed project qualifies as a major federal action that will not significantly affect the quality of the natural and human environment, nor does it have the potential for significant cumulative effects. As a result of this FONSI, an EIS will not be prepared (FEMA Instruction 108-1-1) and the proposed project as described in the attached EA may proceed.

APPROVAL AND ENDORSEMENT

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