

Final Environmental Assessment

City of Huntsville

Town Creek Drainage Improvement

Project

HMGP-DR-1791-TXProject #120

Walker County, Texas

*May 2015*



**Federal Emergency Management Agency**  
**Department of Homeland Security**  
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## Acronyms

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

## 1.0 INTRODUCTION

### 1.1 Project Authority

The City of Huntsville (applicant) is proposing channelization improvements to the existing downtown Huntsville segment of the Town Creek drainage, including both open channel and enclosed underground structures, in Huntsville, Walker County, Texas (see **Appendix A: Location Map**). The City is requesting funds for the project from the Federal Emergency Management Agency (FEMA) under the Hazard Mitigation Grant Program (HMGP) under project number HMGP-DR-1791-TX Project #120.

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

### 1.2 Project Location

The project location is Town Creek from the crossing at 7<sup>th</sup> Street southeast through the City of Huntsville to the rail line crossing near Bearkat Boulevard in the City of Huntsville, Walker County, Texas (see **Appendix A: Location Map**). The existing site contains the downtown segment of Town Creek (see **Appendix B: Site Photography**). The enclosed sections of Town Creek run from Avenue J to 13<sup>th</sup> Street, 11<sup>th</sup> Street to Avenue N, and at various roadway crossings. The project boundary borders recreational land uses from 7<sup>th</sup> Street to Avenue N, residential, commercial and governmental land uses (including City government buildings and the Walls Unit of the Texas Department of Criminal Justice (TDCJ)) from Avenue N to Bearkat Boulevard, and institutional (Sam Houston State University [SHSU]) and commercial land uses along Bearkat Boulevard to the project terminus.. The approximate area of the proposed project is 2.34 acres. The proposed project is located within the Bryan District of the Texas Department of Transportation (TxDOT) and is within the Houston-Galveston Area Council (H-GAC) Transportation Management Area (TMA).

## 2.0 PURPOSE OF AND NEED FOR THE PROJECT

The downtown segment of Town Creek is currently at full capacity during normal rain events. It is vulnerable to flooding from heavy rains, including hurricanes, and if flood waters were to breach the current creek system, several local homes; government facilities such as City Hall, the Walker County Annex building, and the library; businesses; and personal property within and potentially outside the regulatory floodplain would be at risk. As the City of Huntsville serves as a shelter city during hurricane evacuations of the coastal public and prison populations, flooding or structural collapse during a hurricane event has the potential to impact emergency response measures and vulnerable segments of the public. The railroad tanker cars comprising the downtown subterranean segments of Town Creek have exceeded their design life, and structural degradation of these segments create potential collapse hazards. Safety of

motorists and citizens would be threatened if the current structure failed. The needs for the proposed project are therefore to: (1) stabilize the slope and underground structures to prevent erosion and subsidence, and (2) prevent flooding in downtown Huntsville during heavy rainfall events.

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

### **3.0 ALTERNATIVES**

#### *3.1 No Action Alternative*

Under the No Action Alternative, nothing would be done to stabilize existing drainage structures or to minimize flooding to downtown Huntsville. The No Action Alternative does not meet the proposed project's purpose and need. The No Action Alternative would require more maintenance and cause increased risk of flooding dangers to government facilities, local residences, personal property, and individuals. As the underground segments of Town Creek continue to deteriorate, risks of structural failure, including formation of sinkholes, increases. The Downtown segment of Town Creek is currently at full capacity during normal rain events. It is vulnerable to flooding from heavy rain events and if flooding water were to breach the current creek system, several local homes, critical government facilities and personal property would be at risk.

#### *3.2 Proposed Action Alternative*

Under the Proposed Action Alternative, the City of Huntsville proposes to stabilize the slopes and cross-sections, remove and/or replace deteriorating and insufficient existing underground drainage structures, install velocity control structures to mitigate erosive shear forces, and create and improve detention ponds along approximately 1.5 miles of Town Creek between 7<sup>th</sup> Street and Bearkat Boulevard in downtown Huntsville (see **Appendix A: Location Map and Site Plan**).

At the northern project terminus, two railroad tanker cars utilized as the Town Creek culvert crossing at 7<sup>th</sup> Street would be replaced with four reinforced concrete box (rcb) culverts, quadrupling the capacity at this crossing. No channel improvements are proposed between 7<sup>th</sup> Street and 10<sup>th</sup> Street. At 10<sup>th</sup> Street, a single rcb culvert would be replaced with three rcb culverts. Channel improvements proposed from 10<sup>th</sup> Street to Avenue N consist of cross section modifications which would create uniform slopes without impacting below the Ordinary High Water Mark (OHWM) of Town Creek. The stone wall that lines portions of Town Creek in this section will not be altered and will remain intact. From Avenue N to 11<sup>th</sup> Street, two underground drainage lines consisting of buried railroad tanker cars would be replaced with two underground rcb drainage lines, tripling the capacity of this drainage structure. Although no improvements are planned for the culvert crossing of 11<sup>th</sup> Street, a new headwall with wingwalls would be placed at the southern entrance to this culvert. From 11<sup>th</sup> Street to Avenue M, full channel improvements would be performed, creating uniform creek slopes via extensive reshaping of the creek

banks without impacting below the OHWM of Town Creek. An existing bulkhead on the west bank of Town Creek in this vicinity would be left in place, as would the concrete channel located along approximately 200 linear feet of Town Creek immediately north of Avenue M. At Avenue M, a single rcb culvert would be replaced with three rcb culverts, more than quadrupling the capacity at this crossing. From Avenue M to 13<sup>th</sup> Street, minor channel improvements would be performed, creating uniform creek slopes through minor reshaping of the creek banks without impacting below the OHWM of Town Creek. From 13<sup>th</sup> Street to Avenue J, an existing underground drainage structure composed of railroad tanker cars welded together and buried would be replaced with two underground rcb lines, more than quadrupling the capacity of this drainage structure.

The U.S. Army Corps of Engineers has permitted the channel work in Town Creek from 14<sup>th</sup> Street and Avenue J to 17<sup>th</sup> Street and Bearkat Boulevard (see Appendix E). Between Avenue J and Avenue I, full channel improvements would be performed, creating uniform creek slopes and bottoms with a shelf on the western bank. At Avenue I, a single rcb culvert would be replaced with a larger rcb culvert, doubling the capacity at this crossing. From Avenue J to a point approximately 350 feet east of Avenue J, full channel improvements would be performed, creating uniform creek slopes and bottoms with a shelf on the western bank. From a point approximately 350 feet east of Avenue J to a point approximately 800 feet further east, full channel improvements would create an in-channel detention facility with uniform creek slopes and meandering creek bottom within an expanded creek ROW. A four-foot tall drop structure would be placed at the downstream end of the detention facility. Land currently owned by TDCJ and SHSU would be utilized for the ROW expansion. From the southern end of the proposed detention facility to the southern terminus of the proposed project, full channel improvements would be performed, creating uniform creek slopes and bottoms via full reshaping of the creek.

The proposed slope stabilization and cross section improvements would be constructed along 2,333 linear feet of the current Town Creek. The current cross section improvements would be built to reinforce the existing slope on site. Slope stabilization would occur at limited locations mostly consisting of headwalls and wingwalls at roadway overpasses and a bulkhead from 11<sup>th</sup> Street to a point approximately 325 feet east of 11<sup>th</sup> Street. Materials used to stabilize the slope include a combination of riprap, articulated concrete blocks, and concrete stabilization material based on design plans. Riprap and articulated concrete blocks, where used, would be placed on top of existing vegetation to provide the opportunity for vegetation re-growth between gaps. Existing underground drainage structures consisting of welded 72-inch diameter rail tanker cars would be either removed or abandoned and filled in-place. The 1,580 linear feet of new underground drainage structures would typically consist of two 10-foot x 6-foot rcb storm sewers. An existing detention area utilized as a sports field at SHSU would undergo cross-section improvements to correct existing hydrological deficiencies. Detention ponds proposed as part of this project would be constructed on public land and would not represent changes to land use.

The Proposed Action Alternative would require additional ROW and public easements at various locations, and would be constructed on properties owned by the City of Huntsville, Walker County, SHSU and TDCJ, as well as some private residences and commercial businesses. Acquisitions of ROW and/or easements from private landowners would be funded by FEMA. No buildings would be

demolished as part of the proposed project; however, portions of the TDCJ property to be acquired are currently utilized for vehicle storage. Approximately 1-2 dozen automobiles, pickup trucks, vans and medium trucks would be removed from this vicinity prior to project development.

### *3.3 Alternatives Considered but not Carried Forward*

Due to the nature of the proposed project, no other alternative stream alignments were considered during the planning portion of this project. However, alternatives with greater detention and less channel modification, as well as alternatives with less detention and greater channel modification, were considered (see Step 3 of the floodplain 8-step review in Appendix D).

## **4.0 AFFECTED ENVIRONMENT AND IMPACTS**

### *4.1 Project Setting and Land Use*

The proposed project is located within the City of Huntsville, Walker County, Texas. In the vicinity of the project site, land use includes recreational land uses from 7<sup>th</sup> Street to Avenue N, residential, commercial and governmental land uses (including City government buildings and the Walls Unit of the TDCJ) from Avenue N to Bearkat Boulevard, and institutional (SHSU) and commercial land uses along Bearkat Boulevard to the project terminus. Town Creek provides drainage from runoff and rain events for the local existing development. The surrounding vicinity of the project area includes residential, commercial, and public sections of the City of Huntsville (see **Appendix C**).

#### *4.1.1 Geology and Soils*

The U.S. Geological Survey (USGS) 7.5-minute topographic map of the project area (No. 3095-314) indicates the proposed project area ranges in elevation between approximately 316 - 400 feet above mean sea level (amsl) (see **Appendix C**). The topographic map shows Town Creek within the immediate project area. The surface topography of the proposed project site generally slopes down to the west and northwest away from Peckerwood Hill and toward Parker Creek.

The subject property lies on the Fleming geological formation, as described in the Soil Survey of Walker County (SCS, 1979) and the Natural Resources Conservation Service (NRCS) online soil survey database. The dominant soils in the project area are listed as Annona-Urban land complex (1), Depcor-Urban land complex (8), and Gowker and Kanebreak soils, frequently flooded (21).

Annona-Urban land complex, 1 to 8 percent slopes (1) is a gently sloping to sloping soil on convex uplands. The soil is typically brown sandy loam to a depth of 8 inches, over mottled red, gray, and brownish yellow clays to a depth of 70 inches. Included with this soil in mapping are small areas of Depcor, Gunter, Huntsburg, Houston Black, and Kanebreak soils. These inclusions make up less than 5 percent of any mapped area. Annona soils are somewhat poorly drained and surface runoff is slow. Permeability and internal drainage are very slow. The Annona-Urban land complex is not listed as a hydric soil, and therefore, is not normally associated with wetlands.

Depcor-Urban land complex, 1 to 8 percent slopes (8), consists of moderately well drained, slowly permeable soils on slightly convex uplands. The soil is typically yellow-brown loamy fine sandy to a depth of 28 inches, over red sandy clay loam to a depth of 80 inches. Included with this soil in mapping are small areas of Annona, Gunter, Huntsburg, and Kanebreak soils. The Depcor-Urban land complex is not considered a hydric soil and would typically not be associated with a wetland.

Gowker and Kanebreak soils, frequently flooded (21) is a nearly level, slightly acid soil on floodplains. The surface layers range from 0 to 30 inches in thickness and is very dark grey or black clay. From 30 to 60 inches it shades from dark grey clay to brown sandy clay loam. These soils are moderately well drained with slow permeability. Included with this soil in mapping are small areas of Kaman, Kaufman, and Trinity soils. Kanebreak soils within the Gowker and Kanebreak soils unit are considered a hydric soil.

*No Action Alternative* – Under the No Action Alternative, no construction would occur and erosion impacts to the banks of Town Creek would continue. Subterranean downtown segments of Town Creek composed of railroad tanker cars past their design life would continue to degrade, leading to eventual structural failure and collapse.

*Proposed Action Alternative* – Under the Proposed Action Alternative, construction would consist of widening and stabilizing open channels, excavating and/or regrading of detention ponds, and using open excavations to remove existing underground drainage structures as well as install new underground drainage structures. Any excavated soil and waste materials would be managed and disposed of in accordance with applicable local, State, and Federal regulations. If contaminated materials are discovered during the construction activities, the work would cease until appropriate procedures and permits can be implemented.

#### 4.1.2 Prime and Unique Farmlands

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

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

*Proposed Action Alternative* – Under the Proposed Action Alternative, construction would only occur within the existing Town Creek in downtown Huntsville between 7<sup>th</sup> Street and Bearkat Boulevard. The project area is classified as developed and urbanized, and the additional ROW and easements required are also classified as developed and urbanized. Therefore, the Proposed Action Alternative is exempt from the requirements of FPPA. No coordination with the NRCS is required.

#### 4.1.3 Beneficial Landscape Practices

In accordance with the Executive Memorandum of August 10, 1995, all agencies shall comply with the NEPA as it relates to vegetation management and landscape practices for all federally assisted projects. The Executive Memorandum directs that where cost-effective and to the extent practicable, agencies will (1) use regionally native plants for landscaping; (2) design, use, or promote construction practices that minimize adverse effects on the natural habitat; (3) seed to prevent pollution by, among other things, reducing fertilizer and pesticide use; (4) implement water-efficient and runoff reduction practices; and (5) create demonstration projects employing these practices.

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

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

#### 4.1.4 Air Quality

The Clean Air Act (CAA) requires that states adopt ambient air quality standards. The standards have been established in order to protect the public from potentially harmful amounts of pollutants. The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six air pollutants. These pollutants include sulfur dioxide (SO<sub>2</sub>), particulate matter with a diameter less than or equal to 2.5 micrometers (PM<sub>2.5</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), and lead (Pb). The EPA has designated specific areas as NAAQS attainment or non-attainment areas. Nonattainment areas are any areas that do not meet (or that contribute to ambient air quality in a nearby area that does not meet) the quality standard for a pollutant. Attainment areas are any areas that meet ambient air quality standards. Walker County is not part of the Houston-Galveston-Brazoria non-attainment region which is currently designated as marginal non-attainment for the eight-hour ground level ozone standard. Walker County is in attainment with all criteria pollutants and, therefore, meets ambient air quality standards.

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

*Proposed Action Alternative* – Under the Proposed Action Alternative, no long-term impacts to air quality would occur. Pollutant emissions from construction equipment may result in minor temporary effects to air quality in the area immediately surrounding the proposed construction activity. To reduce the short-term temporary impact to air quality, the construction contractors would be required to wet down the construction areas when necessary to minimize the generation of dust. Emissions from fuel-burning internal combustion engines (e.g. heavy equipment and earthmoving machinery) could temporarily increase the levels of some of the criteria pollutants, including CO, NO<sub>2</sub>, O<sub>3</sub>, PM<sub>2.5</sub>, and non-criteria pollutants such as volatile organic compounds. To reduce the emission of criteria pollutants, fuel-burning equipment running times would be kept to a minimum and engines would be properly maintained.

## 4.2 Water Resources

### 4.2.1 Surface Water

The Texas Commission on Environmental Quality's (TCEQ) 2010 Texas Clean Water Act Section 303(d) List (approved November 18, 2011) identifies impaired waters (i.e., water bodies that do not meet minimum standards in specific categories). There is one water body located within the project area. Town Creek is not designated as an impaired water body on the 303(d) list, and does not discharge into an impaired water body. The flow of surface water onto the project alignment area appears to flow in a northwesterly direction through downtown Huntsville.

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

*Proposed Action Alternative* – Temporary short term impacts to downstream surface waters may occur during the construction period due to soil erosion. The applicant would be required to prepare a Storm Water Pollution Prevention Plan (SW3P) and obtain a National Pollutant Discharge Elimination System (NPDES) permit. Implementation of appropriate Best Management Practices (BMPs) would be required at the construction location. BMPs would be implemented in accordance with the permits. These BMPs would include review of construction plans and municipal inspection of construction activities, use of soil retention features and grass lined channels, installation of silt fences, sediment basins and rock dams, preserving natural vegetation where feasible, and revegetating bare soils, as well as designated areas for vehicle maintenance, vehicle washing, and concrete washout. Portions of the proposed project site are designed to be covered with riprap or other concrete stabilization material.

### 4.2.2 Groundwater

The subject property is underlain by the Gulf Coast aquifers. The principal fresh water aquifers in Walker County are the Jasper and the Evangeline Aquifers, and the Catahoula Sandstone. The Gulf Coast Aquifers are typically at least 2,500 feet thick in Walker County.

The Catahoula Sandstone, consisting to sandy, tuffaceous mudstone in the upper portion and coarse sand in the lower portion, represents the principal subsurface water supply source for City of Huntsville and surrounding communities. The Gulf Coast Aquifer is noted for its abundance of good quality groundwater and is considered one of the most prolific aquifers in the Texas Coastal Plain. Individual sand beds are characteristically tens of feet thick. Public water supply wells completed within the Catahoula Sandstone in this area are typically screened within a depth interval of 150 feet to 1000 feet below ground surface.

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

*Proposed Action Alternative* – Construction activities would not reach a sufficient depth to impact groundwater; therefore, no adverse effects to groundwater are expected to occur. The proposed project is not expected to alter rainfall drainage patterns or contaminate or otherwise adversely affect the public water supply, water treatment facilities, or water distribution systems. If the proposed action requires

additional excavation to groundwater depths, the applicant would consult the EPA and TCEQ to identify appropriate mitigation measures.

#### 4.2.3 Floodplains

Executive Order (EO) 11988 (Floodplain Management) requires Federal agencies to avoid direct or indirect support of development within floodplains whenever there is a practicable alternative. FEMA uses Flood Insurance Rate Maps (FIRM) to identify regulatory floodplains for the National Flood Insurance Program (NFIP). Consistent with EO 11988, FIRMs were examined during the preparation of this EA. The USGS 7.5-minute topographic map of the Huntsville Quadrangle (No. 3095-314) indicates the proposed project area ranges in elevation between approximately 335 feet amsl to approximately 400 feet amsl. Surface water and drainage systems within the project area generally flow from the southeast to northwest, draining into Parker Creek.

Walker County is a participant in the NFIP. According to FIRM Panel No. 48471C0360D (published August 16, 2011) portions of the slope stabilization project are located inside the 100-year floodplain of Town Creek (see **Appendix C**).

Under existing conditions, stormwater flows are conveyed by Town Creek into Parker Creek.

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

*Proposed Action Alternative* – Although portions of the project area do lie within the 100-year flood zone, no adverse impacts to the floodplain are anticipated. The proposed project would not increase the base flood elevation to a level that would violate applicable floodplain regulations and ordinances. Water surface elevation of Town Creek would be lowered as part of this project. All appropriate coordination with the local Floodplain Administrator (including a CLOMR/LOMR) would be performed prior to construction. The project engineer has certified the proposed project as “no-rise”. The City of Huntsville must coordinate with the local floodplain administrator and obtain required permits prior to initiating work. All coordination pertaining to these activities and applicant compliance with any conditions should be documented and copies forwarded to the state and FEMA for inclusion in the permanent project files. The City of Huntsville must prepare and provide Public Notice issued 15 days prior to the start of construction of any final decision where proposed floodplain or wetland project is the only practicable alternative.

An 8-Step Narrative for Floodplains and Wetlands has been performed, and can be found in Appendix D.

#### 4.2.4 Waters of the United States (Including Wetlands)

Section 404 of the Clean Water Act (CWA) regulates the discharge of fill material into Waters of the U.S., including wetlands. The act authorizes the issuance of permits for such discharges as long as the proposed activity complies with environmental requirements specified in Section 404(b)(1) of the Act. The U.S. Army Corps of Engineers (USACE), under CWA authority, regulates fill within Waters of the

U.S. through general and individual permits. The act authorizes the issuance of permits for such discharges as long as the proposed activity complies with environmental requirements specified in Section 404(b)(1) of the Act. EO 11990, Protection of Wetlands, directs federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands on federal lands.

The site was visited on October 28, 2011 by William Proctor and Chris Thayer of Berg Oliver Associates, Inc. (BOA), and on December 7, 2011 by William Proctor and Andy Boswell of BOA. Using the diagnostic criteria set forth in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region to the Corps of Engineers Wetland Delineation Manual – Technical Report Y-87-1 (Version 2.0) for sampling hydrology, soils and vegetation, the site was evaluated for the presence of wetlands that would be classified as Jurisdictional Waters of the U.S. (Waters). As part of a comprehensive assessment of the property, upland (non-wetland) areas were identified and sampled according to the same aforementioned guidance manual as well. Based upon methodology described on page 63 of the Corps of Engineers Wetland Delineation Manual, transects must be performed on properties greater than 5 acres in size, though as described under Part IV: Section D: Subsection 2: 65: Step 3 of the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region to the Corps of Engineers Wetland Delineation Manual – Technical Report Y-87-1, there can be flexibility when site-specific conditions require modification of field procedures. With the use of infrared photography, aerial photography, and topographic maps, it was determined that transects were not needed for this particular project. The irregular shape of the tract (primarily linear), presence of existing structures, and the readily accessible landscape are valid reasons why transects were not performed on the subject property.

All waters were logged in the field during site reconnaissance. GPS satellite equipment was used to locate the boundary of the jurisdictional areas based upon the USACE, Galveston District October 22, 2003 memorandum titled “SWG-Standard Operating Procedures (SOP); Recording Jurisdictional Delineations Using Global Positioning Systems”. Collection of data was conducted on October 28 and December 7, 2011 using a Trimble Geo-XT handheld GPS receiver. William Proctor of BOA supervised collection of data to ensure that jurisdictional boundaries were properly documented.

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

The U.S. Fish and Wildlife (USFWS) National Wetland Inventory (NWI) Map of the project area was also reviewed to obtain information on current and historical wetlands within the project vicinity. The NWI map shows that there is one documented Water of the U.S. within the proposed project area (**Appendix C**). One Water of the U.S., Town Creek, was observed within the proposed project area during site reconnaissance. Town Creek would be considered jurisdictional due to its direct connection to Parker Creek, Lake Livingston and the Trinity River, which are Waters of the U.S. Fringe wetlands were identified

within Town Creek but outside of the area of proposed improvements. Town Creek is identified on the Project Layout Map in **Appendix A**.

*No Action Alternative* – No construction would occur and there would be no impacts to Waters of the U.S., including wetlands.

*Proposed Action Alternative* – Although the proposed project consists of approximately 1.5 miles of Town Creek between 7<sup>th</sup> Street and Bearkat Boulevard, only approximately 2,333 linear feet of Town Creek would be impacted. No channel improvements are proposed between 7<sup>th</sup> Street and 10<sup>th</sup> Street, and proposed improvements between 10<sup>th</sup> Street and Avenue J consist of upgrades to underground drainage structures or the banks of Town Creek above the OHWM, which should not require a USACE CWA permit.

Impacts to Town Creek are proposed between Avenue J and Bearkat Boulevard, consisting of full channel improvements to create uniform creek banks and bottoms, with a creek bank shelf and in-channel detention featuring a meandering creek bottom and a drop shelf. These impacts to Waters of the U.S. (including wetlands) required USACE verification and a Clean Water Act Section 401/404 permit authorized by the USACE.

A pre-application meeting to review the project was held on December 12, 2012 at the USACE Galveston District office. The USACE determined from the preliminarily reviewed project plans that the proposed project appeared not meet the intent and the determination of minimal adverse impacts for the Nationwide Permit Program, specifically Nationwide Permit #43 for Stormwater Management Facilities and Nationwide Permit #27 for Habitat Creation. Per USACE, the waterbody proposed for work is not a stormwater management facility but a man-altered tributary to Town Creek. As presented in the pre-application meeting the proposed work exceeded the 300 linear foot limit and the proposed project would have to be processed as an Individual Permit Application, due to the length and nature of the proposed work.

Fringe wetlands located along Town Creek are located beyond proposed project activities; therefore, EO 11990 does not apply. The proposed project minimizes impacts to waters of the U.S. by restricting placement of impervious surfaces to interlocking block pavers and riprap at specific locations within Town Creek, and by conducting most project activities within the historic channel of Town Creek. Stream values would be enhanced with the creation of multiple habitat types within the proposed Town Creek channel, in-line detention, and revegetation in keyholes of interlocking block pavers.

An Individual Permit Application was submitted to USACE on December 31, 2012. The initial Application was reviewed and assigned Permit Application number SWG-2012-01017. The USACE judged this Application to be incomplete and requested additional information as a prerequisite for full review. The additional information requested included adjacent landowner contact information, TCEQ Tier II Questionnaire and Alternatives Analysis Checklist, GPS coordinates of proposed project limits, revised and updated project drawings (including typical sections), wetland delineation identifying any on-

site fringe wetlands, and an expanded statement describing how impacts to waters of the U.S. were avoided, minimized and compensated for if needed. This additional information was provided to the USACE on March 25, 2013. USACE deemed the Application complete and issued a Public Notice on January 28, 2014, requesting review and commentary from other agencies and interested parties. A separate Joint Public Notice was issued by USACE and the City of Huntsville on April 2, 2014. Comments in response to these Notices were received from the EPA, USFWS, TCEQ, TPWD, the Texas General Land Office (GLO), and the Sierra Club. Most of the comments focused on how well the project improves natural functioning of Town Creek and requests for use of the Natural Channel Design Review Checklist, the 2013 Galveston District Level 1 Stream Tool and Stream Tool SOP. These comments were addressed by performing additional review of the proposed design using the requested tools. These comments were responded to in a letter dated May 23, 2014. Further coordination was initiated via an Interagency Coordination Notice (ICN) in August 2014. Comments in response to the ICN were received from the EPA and TPWD, and responded to in a letter dated September 17, 2014. The comments focused on how well the specific details of the project improve natural functioning of Town Creek and whether or not specific alterations of the existing Town Creek contribute to improvements in the natural functioning of the Creek. Further refinement of the proposed project, including the Proposed Work Plan, Adaptive Management Plan, Datasheets, etc., was performed between August and November 2014. The revised Individual Permit was approved by USACE on December 23, 2014 and is valid until December 31, 2020. The approved permit and the USACE's Statement of Findings are found in **Appendix E**.

#### *4.3 Biological Resources*

Most of the above-ground portions of the proposed project site are currently covered with dense herbaceous and/or woody vegetation. The project site passes through downtown Huntsville, much of which is paved or maintained as very short grasses, providing little to no wildlife habitat. Undeveloped wooded properties along Town Creek provide some habitat for urban wildlife.

##### *4.3.1 Wildlife*

The proposed project area is located in an area containing existing dense herbaceous and/or woody vegetation and commercial and residential areas. Mammals likely to be found in the area include domestic dogs and cats, raccoons, armadillos, skunks, and squirrels, although none were observed during site reconnaissance activities. Common reptiles in the county include snakes and turtles. Frogs, toads and other amphibians are also well distributed throughout the county. Various birds, crayfish, fish, and frogs were observed within, or adjacent to, the proposed project area.

Congress passed the Endangered Species Act (ESA) in 1973 to protect and recover imperiled species and the ecosystems upon which they depend. The ESA is administered by USFWS and the National Marine Fisheries Service (NMFS). Under the ESA, species may be listed as "endangered," or in danger of extinction throughout all or a significant portion of its range, or "threatened," or likely to become endangered within the foreseeable future. Under Section 7 of the ESA, FEMA is required to determine the impact that federal actions may have on federally endangered or threatened species and consult with the USFWS when required. According to the USFWS endangered and threatened species list, the red-cockaded woodpecker, *Picoides borealis*, is present in Walker County. No critical habitat is designated in

the project area (<http://www.fws.gov/southwest/es/EndangeredSpecies/lists>). The Bald Eagle, also present in Walker County, has been delisted as a threatened or endangered species and its recovery is being monitored. However, the eagle is still protected under the Bald and Golden Eagle Protection Act, which prohibits take of bald eagles, including their parts, nests, or eggs, and the Migratory Bird Treaty Act, which protects birds that migrate across international borders and prohibits take of migratory bird species.

Site visits conducted on October 28, 2011 and December 7, 2011 did not reveal any specimens, nests, or primary habitat of the red-cockaded woodpecker or the bald eagle within the proposed project area. Areas of dense woody vegetation present did not contain stands greater than ten acres in size possessing large numbers of mature pines free of dense mid- and understory vegetation as preferred by red-cockaded woodpeckers, and no rivers or large lakes as preferred by Bald Eagles were present. No evidence of any listed species residing or utilizing the project area was observed.

A check of the Texas Parks and Wildlife Department's (TPWD's) "live" version of the Natural Diversity Database (NDD) in conjunction with GIS (geographic information system) was obtained on January 16, 2012. In addition, TPWD provided comments on the project in March 2015. According to TPWD, there have been no federally-listed or state-listed species documented within a 1.5-mile radius of the proposed project site. Information gathered from the public indicates that the state threatened Alligator Snapping Turtle is known to exist in Town Creek from 11<sup>th</sup> Street to 13<sup>th</sup> Street.

*No Action Alternative* – There would not be any impact to biological resources, including Federally protected species.

*Proposed Action Alternative* – Under the Proposed Action Alternative, approximately 1.46 acres of vegetation would be replaced with landscaped and maintained vegetation. This acreage is scattered along the length of the proposed project and is not concentrated in any one area. The red-cockaded woodpecker nests and roosts exclusively in old growth pine trees that are still living. These woodpeckers live in mature pine forests—specifically those with longleaf pines averaging 80 to 120 years old and loblolly pines averaging 70 to 100 years old. The project area includes some scattered mature pine trees, but in small isolated stands with a dense understory. Red-cockaded woodpeckers prefer areas that are open and park-like in character rather than the dense understory that was noted on the site visits. No woodpecker activity was noted during the site visits and none of the mature pines that were observed showed signs of cavity excavation. In addition, based on data received from USFWS, no known populations of woodpeckers are located in or near the project area. FEMA has determined that the proposed project will have no effect on the red-cockaded woodpecker. As no critical habitat is designated in Walker County, the Proposed Action Alternative would not adversely impact any critical habitat.

The City of Huntsville will limit vegetation management work during the peak migratory bird nesting period of April 1 through July 15 as much as possible to avoid destruction of individuals, nests, or eggs. If vegetation clearing activities must occur during the nesting season, the City of Huntsville will implement measures such as additional surveys prior to construction to ensure active nests are not present

prior to vegetation clearing. No vegetation containing active nests, eggs, or young will be removed should they occur on the project site. Construction activities will be excluded from a minimum zone of 100 meters around any raptor nest.

The City of Huntsville will advise construction contractors of the potential presence of the Alligator Snapping Turtle within Town Creek. The City must comply with Chapters 67 and 68 of the Texas Parks and Wildlife Code which regulates state-listed species. The proposed action must not result in the take of any state listed species as defined in Section 1.101(5) of the Texas Parks and Wildlife Code.

#### 4.3.2 Vegetation

The proposed project site is located within the Oak Woods and Prairies Ecoregion of Texas. According to the TPWD's The Vegetation Types of Texas (1984), the proposed site is located within the Pine-Hardwood Forest (42) and Other Native and Introduced Grasslands (45) vegetation regions. The vegetation within most of the project area would most closely fit the description of Pine-Hardwood Forest and is dominated by a mix of loblolly pine (*Pinus taeda*), sugarberry (*Celtis laevigata*), sweetgum (*Liquidambar styraciflua*), sycamore (*Platanus occidentalis*), Eastern red cedar (*Juniperus virginiana*), Chinese privet (*Ligustrum sinense*), Johnson grass (*Sorghum halepense*), western ragweed (*Ambrosia psilostachya*), Texas lantana (*Lantana horrida*) and greenbriar (*Smilax bona-nox*). The vegetation within the northernmost segment of the project area would most closely fit the description of Other Native and Introduced Grasslands and is dominated by Johnson grass (*Sorghum halepense*), elephant ear (*Colocasia esculenta*), alligatorweed (*Alternanthera philoxiroides*), combleaf mermaidweed (*Proserpinaca pectinata*), and swamp smartweed (*Polygonum hydropiperoides*).

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

*Proposed Action Alternative* – Under the Proposed Action Alternative, impacts to vegetation would occur to areas where detention ponds are created or rehabilitated, as well as where the open channel of Town Creek would undergo cross-section improvements; however, the detention ponds and unpaved portions of the improved Town Creek would provide the opportunity for vegetation re-growth. Areas currently occupied by dense woody vegetation would be replaced with maintained herbaceous vegetation in the mitigation ponds and along Town Creek. Approximately 1.46 acres of dense woody vegetation would be replaced with landscaped and maintained vegetation.

#### 4.3.3 Invasive Species

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

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

*Proposed Action Alternative* – Under the Proposed Action Alternative, vegetation would not be removed in such a way to create bare soils. Construction activities include the placement of materials on top of existing vegetation providing the opportunity for vegetation re-growth. Soil disturbance would be minimized to ensure that invasive species would not establish in the project ROW.

#### 4.3.4 Essential Fish Habitat

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

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

*Proposed Action Alternative* – No tidally influenced waters would be impacted by the slope stabilization. There is no essential fish habitat in the project area. Therefore, under the Proposed Action Alternative, no impact to essential fish habitat would occur and coordination with the NMFS is not required.

#### 4.4 Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA), as amended, and implemented by 36 CFR Part 800, requires Federal agencies to consider the effects of their actions on historic properties and provide the State Historic Preservation Office (SHPO) an opportunity to comment on Federal projects prior to implementation. Historic properties are those included in or eligible for inclusion in the National Register of Historic Places (NRHP) and may include archaeological sites, buildings, structures, sites, objects, and districts. The Area of Potential Effect (APE) of a federal undertaking is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The APE for this project has been identified on the “Project Layout Map” (See **Appendix A**).

The project would involve removal and/or replacement of existing underground drainage structures, and cross section improvements to open channels along approximately 1.5 miles of Town Creek in an area that was extensively modified for the present downtown Huntsville area, including a public park, the Walls Unit of TDCJ, and SHSU. It is evident from a review of recent aerial photographs, project location photographs, and topographic maps that the soils mapped for the location have been heavily disturbed by modern landscape modifications to accommodate commercial and institutional development.

A review of known cultural resources in proximity to the proposed project site has been conducted. The online records of the NRHP (<http://www.nps.gov/nr/>) and the Texas Historical Commission (THC) (<http://atlas.thc.state.txw.us>) were used for this records review. Both websites indicated three archaeological sites, 23 historical markers, three cemeteries, and two NRHP-listed properties within a 1-mile radius of the proposed site (see **Appendix E**). None of these cultural resources were recorded within or immediately adjacent to the APE. Although the underground drainage structures were installed in the

1960's, these structures were not identified as significant historical architectural features, as the drainage structure consists of railroad tanker cars repurposed for a use not inherent to their original design.

Based on the results of archival research performed, a review of recent aerial photography, and an analysis of topographic and geological characteristics associated with the APE, an archaeological survey with shovel testing and targeted mechanical deep testing was initially recommended for any undisturbed sections of Town Creek where widening of the open channel and excavation of an in-channel detention basin is proposed. This recommendation was based on incomplete project design drawings available at the time. Although this recommendation (in a letter drafted August 2011) received THC concurrence, it was not acted upon pending updates of project design drawings. Upon review of updated designs, the recommendations for Cultural Resources investigation were amended. Archaeological investigation was not warranted along previously channelized sections of Town Creek, especially within existing downtown city streetscapes. This revised recommendation, which covered the entire proposed project instead of just portions upon which construction activities would occur, was drafted in a letter to THC dated February 2015. This revised recommendation received concurrence from THC on February 24, 2015.

*No Action Alternative* – No construction would occur and no cultural (historic or archaeological) resources would be affected.

*Proposed Action Alternative* – As there are no archaeological sites registered within or directly adjacent to the APE, and no historic properties located within or immediately adjacent to the APE, no impacts to archaeological or cultural resources are anticipated. Agency review and comment regarding the proposed project and findings were initiated in a letter to the THC dated February 4, 2015 (see **Appendix E**). THC communicated their concurrence with the conclusions on February 24, 2015.

Due to the proximity to several previously identified archaeological sites, and the comments received during the public comment period concerning archaeology, this undertaking will include the following condition should an inadvertent discovery occur:

*In the event that archaeological deposits, including any Native American pottery, stone tools, bones, or human remains, are uncovered, the project shall be halted and the City of Huntsville shall stop all work immediately in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. The City must secure the area, and ensure that access to the sensitive area is restricted. In the event of an unexpected discovery, or if it appears that an Undertaking has affected a previously unidentified property or affected a known historic property in an unanticipated manner, the City shall immediately notify Texas Division of Emergency Management (TDEM), who shall immediately notify FEMA of the discovery. Upon notification of the unanticipated discoveries, or unanticipated affects, FEMA would consult with the State Historic Preservation Office (SHPO) or Tribal Historic Preservation Office (THPO) and Tribes. Work in sensitive areas cannot resume until consultation is completed and appropriate measures have been taken to ensure that the project complies with the National Historic Preservation Act.*

#### 4.5 Socioeconomic Data

The proposed project site is located in the City of Huntsville and is bound by recreational land uses from 7<sup>th</sup> Street to Avenue N, residential, commercial and governmental land uses (including City government buildings and the Walls Unit of the TDCJ) from Avenue N to Bearkat Boulevard, and institutional (SHSU) and commercial land uses along Bearkat Boulevard to the project terminus. The project site is located within census tracts 7905, 7906, and 7907 of Walker County. The total population of the census tracts as measured by the U.S. Census Bureau (USCB) 2010 Census, was 20,214, with approximately 91.0% of citizens over the age of 16 participating in the work force. Leading employment sectors are government (36.1%) service providing and related occupations (42.3%), goods and producing occupations (9.9%), and trade, transportation, and utility occupations (8.7%).

*No Action Alternative* – Under the No Action Alternative, socioeconomic impacts would occur during heavy rain events, because the risk for flooding and seepage would increase for the local residences if the slope is not supported. The slope along Town Creek would also continue to erode and sediment from runoff would accumulate along the banks and bottoms of Town Creek, decreasing water quality.

*Proposed Action Alternative* – Socioeconomic impacts would be minimal as the stabilization would decrease seepage and flooding risk considerably. No impacts to community cohesion are anticipated with the Proposed Action Alternative. There would be no displacements based on the proposed project plans. The design and construction of the proposed project would create temporary jobs.

#### 4.6 Environmental Justice

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

The City of Huntsville has a population of 38,548 individuals. According to the U.S. Census Bureau (USCB) 2000 Census, in 1999 the median household income reported in the City of Huntsville was \$28,335, with 28.6 percent of individuals living below the poverty level. The median household income in all of Walker County was \$34,214, with 22.1 percent of individuals living below the poverty level. The median household income in the State of Texas was \$48,199, with 16.8 % of individuals living below the poverty level.

According to the USCB 2010 Census, minorities represented 46.7, 41.5, and 54.7 percent, respectively, of the City of Huntsville, Walker County, and the State of Texas populations. The following table shows the specific racial composition of the City of Huntsville, Walker County, and the State of Texas populations.

**Table 1: Demographic Characteristics of the Project Study Area**

Characteristic	City of Huntsville	Walker County	State of Texas
Total Population	38,548	6,8617	25, 451,561
White	53.3%	58.5%	45.3%
Black	25.2%	22.2%	11.5%
Native American	0.2%	0.3%	0.3%
Asian	1.3%	0.1%	3.8%
Native Hawaiian or Pacific Islander	0.0%	0.0%	0.1%
Some Other or Multiple Races	1.3%	1.3%	1.4%
Hispanic	18.7%	16.8%	37.6%
Median Income	\$28,354	\$34,214	\$48,199

*No Action Alternative* – Under the No Action Alternative, no disproportionately high and adverse impacts to minority or low income populations would occur. Flooding risks would increase for all residents and business owners near Town Creek.

*Proposed Action Alternative* – No disproportionately high and adverse impacts on minority or low-income portions of the population are anticipated. No impacts to community cohesion are anticipated with any of the alternatives. The proposed project is anticipated to benefit all who live/work in the project area, or travel through it, by reducing the flooding risks. The design and construction of the proposed project would also create temporary jobs.

#### 4.7 Traffic

The proposed project area includes portions of downtown Huntsville along Town Creek from 7<sup>th</sup> Street to 17<sup>th</sup> Street and Avenue O to Avenue H (see Appendix A for map). Major roadways in the immediate vicinity of the proposed project include Sam Houston Avenue, University Avenue, Bearkat Boulevard, and 11<sup>th</sup> Street, portions of which include segments of U.S. Route 190 and State Highways 30 and 75.

*No Action Alternative* – No construction would occur and there would be no construction-related impacts to traffic. However, the streets in the project area would remain vulnerable to flooding and the passage of vehicles during flood events.

*Proposed Action Alternative* – Short-term temporary impacts to traffic flow on local streets during construction are anticipated. It is not anticipated that any roadways to be fully closed during construction but lane closures will be expected. There will be no traffic impacts across Sam Houston Avenue and 11th Street. Those crossings will be bored since they are both roads that are managed by the Texas Department of Transportation. Parking areas will be affected during construction, however the contractor will work with local businesses to keep open as many spaces as possible. The proposed project is not on a new roadway alignment or part of existing roadway improvements. Except for during construction work, the

proposed project would not affect traffic. Upon completion, the project would not increase capacity or traffic load. There are no anticipated long-term impediments to traffic, and the project is expected to reduce flooding of roads in the project area for a beneficial long-term outcome.

#### 4.8 *Noise*

Noise is generally defined as unwanted sound. Sound is most commonly measured in decibels (dB) on the A-weighted scale, which is the scale most similar to the range of sound that the human ear can hear. The Day-Night Average Sound Level (DNL) is an average measure of sound. The DNL descriptor is accepted by Federal agencies as a standard for estimating sound impacts and establishing guidelines for compatible land uses. EPA guidelines and those of many other Federal agencies state that outdoor sound levels in excess of 55 dB DNL are "normally unacceptable" for noise-sensitive land uses such as residences, schools, or hospitals. Noise associated with the construction of the project is difficult to predict. Heavy machinery, the major source of noise in construction, is constantly moving in unpredictable patterns. However, construction normally occurs during daylight hours when occasional loud noises are more tolerable. No potential receivers would be expected to be exposed to construction noise for a long duration; therefore, any extended disruption of normal activities is not expected. Provisions would be included in the plans and specifications that require the contractor to make every reasonable effort to minimize construction noise through abatement measures such as work-hour controls and proper maintenance of muffler systems.

*No Action Alternative* – No construction would occur and there would be no impacts to noise levels.

*Proposed Action Alternative* – Temporary short-term increases in noise levels are anticipated during the construction period. To reduce noise levels during that period, construction activities would take place during working hours enforceable by local ordinance. Equipment and machinery used at the project site would meet all local, State, and Federal noise regulations.

#### 4.9 *Hazardous Materials*

A Limited Phase I Environmental Site Assessment was conducted in conformance with the scope and limitations of ASTM (American Society for Testing and Materials) Practice E 1527-00 for the proposed project located along Town Creek through downtown in Huntsville, Walker County, Texas.

Hazardous substances/materials are defined as any solid, liquid, contained gaseous or semi-solid waste, or any combination of regulated wastes that may pose a potential hazard to human health and the environment. Hazardous substances are primarily generated by industry, hospitals, research facilities, and the government. Improper management and disposal of hazardous substances can lead to pollution of groundwater or other drinking water supplies, and the combination of surface water and soil.

The Phase I Site Assessment consisted of review of the Federal and State environmental databases; a site visit and a quality assurance/quality control review to confirm the information provided in the databases and to document any additional field observations; and the review of facility-specific information. A regulatory database report was prepared to obtain information concerning facilities that handle hazardous

materials or regulated substances/materials that are recorded in databases maintained by the State and/or Federal government regulatory agencies. The databases that were searched and the corresponding search distances from the project corridor are listed below in **Table 2**.

**Table 2: Federal and State Environmental Record Sources**

Database	Search Radius
Federal Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list including: CERCLA and CERCLA NFRAP	0.50-mile
Federal National Priority List (NPL)	1.0-mile
Federal Resource Conservation Recovery Act (RCRA) Corrective Action System (CORRACTS) and Treatment, Storage, and Disposal (TSD) facilities list	1.0-mile
Federal Resource Conservation and Recovery Information System (RCRIS) list (RCRA Generators) and TCEQ Industrial Hazardous Waste (IHW) list	0.125-mile
Federal Emergency Response Notification System (ERNS) list	0.125-mile
Federal Toxic Chemical Release Inventory System (TRI) list	0.25-mile
State-equivalent CERCLIS	0.50-mile
State-equivalent NPL/State Superfund (TxSSF or ST NPL) list	1.0-mile
State landfill and/or solid waste disposal site (TxLF or SWLF) list and Closed Landfill Inventory (CLI) list	1.0-mile
State registered Petroleum Storage Tank (PST) facilities	0.125-mile
State registered Leaking Petroleum Storage Tank (LPST) facilities list	0.50-mile
Federal or State Institutional Control/Engineering Control (IC and/or EC) lists	0.50-mile
Registered Dry Cleaners (DC)	0.50-mile
State Spills (TxSpill) list	0.125-mile
Texas Voluntary Cleanup Program (TxVCP) or Texas Innocent Owner/Operator (TxIOP) list	0.50-mile

The ASTM regulatory database search reported a total of thirty-eight (38) regulatory facilities within the AAI (“All Appropriate Inquiries”) ASTM-designated distance search range as follows: one (1) RCRA TSD facility, seventeen (17) LPST facilities, thirteen (13) PST/underground storage tank (UST) facilities, two (2) RCRA Notifier facilities, four (4) dry cleaner facilities, and one (1) IHW facility. A map showing the location of the sites is provided in **Appendix F: Hazardous Materials Records Map**.

Some sites may be recorded in more than one database. A summary of the regulatory database facilities is provided in **Table 3**.

**Table 3: Regulatory Database Facilities**

Facility Name	Address and Distance/Direction	Facility Type
TDCJ Huntsville Unit/Motor Pool Unit	815 12th St. 0.18 miles N	RCRA TSD and Gen (TXD097678577), IHW (ID No. 71197) LPST (ID No. 103829), and PST (ID No. 57937) Facility. RCRA CESQG, no recorded violations for more than 20 years. UST system removed from ground, LPST incident closed by TCEQ. IHW registration inactive, no recorded violations or corrective actions. Given these facts and distance from property, not considered environmental concern to proposed project.
Charlie’s Used Cars	1402 Sam Houston Ave Target Property	PST (ID No. 2234) and LPST (ID No. 96224) Facility. UST system removed from ground, LPST incident closed by TCEQ. Site is located at SW corner of Sam Houston Ave. and 14th St., and is NOT within or directly adjoining project area. TCEQ files are not available for this release; however, review of data for adjoining release indicates little likelihood project would encounter affected groundwater from this site. Not considered an environmental concern at this time.
Diamond	1328 Sam Houston Ave	PST (ID No. 17930) and LPST (ID No. 111647) Facility. UST system

Facility Name	Address and Distance/Direction	Facility Type
Shamrock/MS Express	0.02 miles SW	removed from ground and/or permanently filled in place, LPST incident closed by TCEQ. Site is actually located at NW corner of Sam Houston Ave. and 14th St., and adjoins shopping center at SW corner of Sam Houston Ave. and 13th St. TCEQ files were reviewed for this release, and data indicates little likelihood project would encounter affected groundwater from this site. Not considered an environmental concern at this time.
Citgo	1329 Sam Houston Ave Target Property	PST (ID No. 19019) facility. Site is actually located at NE corner of Sam Houston Ave. and 14th St., and adjoins subject site to south, rather than being located within project area. Regulatory database information indicates the UST systems were removed from the ground and/or permanently filled in place, and no LPST incident is recorded. Not considered an environmental concern to the project at this time.
Wilburn Dickerson Chevron/Miller's Service Station	1504 11th St. 0.07 miles SW	LPST (ID No. 101943) and PST (ID No. 42162) facility. Site is located at NW corner of 11th St. and Ave. N ½. UST system has been removed from ground, and TCEQ has closed LPST incident. However, last round of GW monitoring in December 2006 indicates BTEX/MTBE concentrations about TRRP Tier 1 Residential PCL's. Site is considered a potential environmental concern to project at this time. Discussion of potential strategies provided in paragraph below.
Huntsville 295 C O WL8350/Huntsville Dial 295 C O WL8350	1014 3th St. 0.08miles N	PST (ID No. 19596) and LPST (ID No. 116575) facility. Regulatory database information indicates one 10,000 gallon UST has been removed, and a diesel UST with a capacity of approximately 5,000 gallons remains in use. LPST incident has been closed by TCEQ. Not considered an environmental concern to project at this time.
Western Beverage/Tune Up Plus	Ave O on 11th St/ 1506 11th St. 0.09 miles SW	PST (ID No. 10432) and LPST (ID No. 105747) facility. 1,000 gallon UST was removed, soil contamination only, LPST incident closed by TCEQ. Not considered an environmental concern to project at this time.
U Rent Um	1410 Sycamore 0.2 miles NE	PST (ID No. 20316) and LPST (ID No. 103310) facility. UST system has been removed, minor soil contamination only, LPST incident closed by TCEQ. Not considered an environmental concern to project at this time.
Huntsville Nissan/Huntsville Chev Nissan	1569 11th St. 0.21 miles W	PST (ID No. 60485) and LPST (ID No. 113218) facility. UST system has been removed from ground, LPST incident closed by TCEQ. Not considered an environmental concern to project at this time.
Gulf Oil Corp 107711	1603 S. Sam Houston Ave 0.22 miles S	PST (ID No. 28537) and LPST (ID No. 93522) facility. UST system removed from ground, LPST incident closed by TCEQ. Not considered an environmental concern to project at this time.
Future Walgreens Former Gas Station	1570 11th St. 0.23 miles SW	LPST (ID No. 113449) facility. Information on UST removal not available in regulatory database information, but Walgreens now exists on-site. GW impacted, case closed by TCEQ. Not considered an environmental concern to project at this time.
Martinez Gulf	1608 11th St. 0.29 miles SW	LPST (ID No. 106581) facility. UST system removed from ground. GW impacted, case closed by TCEQ. Not considered an environmental concern to project at this time.
Jay's Grocery and Market	561 S. Sam Houston Ave 0.30 miles NE	LPST (ID No. 98329) facility. UST system still in use. GW impacted, case closed by TCEQ. Not considered an environmental concern to project at this time.
Otis Appliance TXDOT ROW	800 11th St. 0.31 miles NE	LPST (ID No. 117512) facility. Information on UST removal not available in regulatory database information. GW impacted, case closed by TCEQ. Not considered an environmental concern to project at this time.
Stop n Go 2802	525 11th St. 0.33 miles NE	LPST (ID No. 109807) facility. UST system still in use. No GW impacted, case closed by TCEQ. Not considered an environmental concern to project at this time.

<b>Facility Name</b>	<b>Address and Distance/Direction</b>	<b>Facility Type</b>
Circle K 82	520 E. 11th St. 0.39 miles NE	LPST (ID No. 97380) facility. UST system still in place. No GW impacted, case closed by TCEQ. Not considered an environmental concern to project at this time.
Huntsville Municipal Airport	N. Hwy 75 @ Sam Houston Ave. 0.43 miles E	LPST (ID No. 97379) facility. UST system removed from ground. No GW impacted, case closed by TCEQ. Not considered an environmental concern to project at this time.
Boettchers Mill Store	201 Boettchers Mill Dr. 0.43 miles E	LPST (ID No. 102341) facility. UST system removed from ground. GW impacted, case closed by TCEQ. Not considered an environmental concern to project at this time.
Citgo	1329 Sam Houston Ave Target Property	PST (ID # 19019) facility. Site located at NE corner of Sam Houston Ave & 14th St. NOT within project area. Is site of current Allstate Insurance building adjoining project area to S. USY system removed from ground and/or permanently filled in place. No LPST incidents recorded. Not considered an environmental concern to project at this time.
Transit Mix Concrete and Materials	615 16th St. 0.04 miles NE	PST (ID No. 52639), RCRA Notifier (TXD988065272), and IHW facility (ID No. 20786). Facility contains one above ground storage tank (AST) that has been removed from service, and has been verified as a RCRA non-generator. IHW listing is inactive. No recorded violations or corrective actions, not considered an environmental concern to project.
Goodyear Tire & Rubber	1412 Sam Houston 0.06 miles S	PST (ID No. 13205) facility. Waste oil UST removed from ground, no LPST incident recorded. Not considered an environmental concern to project.
Southwestern Bell Telephone Co.	912 N. Ave. 0.07 miles E	UST (19233) facility. UST facility removed from ground, no LPST incident recorded. No considered an environmental concern to project at this time.
Jif E Mart 1	1233 11th St 0.1 miles NE	PST facility (ID No. 17886). Facility contains two (2) 6,000 gallon USTs and one (1) 3,000 gallon UST, all for gasoline storage. Systems appear to be in compliance with current PST/RPR regulations, and no LPST incidents are recorded. Not considered an environmental concern to project at this time.
Eugene McCaffety	1711 Sycamore 0.11 miles E	PST (ID No. 42479) facility. UST system removed from ground, no LPST incident recorded. Not considered an environmental concern to proposed project at this time.
66 Car Care Center	1502 Sam Houston Ave 0.14 miles S	PST (ID No. 61017) facility. UST system removed from ground, no LPST incident recorded. Not considered an environmental concern to proposed project at this time.
Huntsville Funeral Home	1215 15th St. 0.15 miles S	PST (ID No. 53535) facility. UST system removed from ground, no LPST incident recorded. Not considered an environmental concern to proposed project at this time.
Goines Texaco	912 Sam Houston Ave 0.18 miles NE	PST (ID No. 19018) facility. UST system permanently filled in place, no LPST incident recorded. Not considered an environmental concern to proposed project at this time.
U-Rent-M	1410 Sycamore 0.20 miles NE	PST (ID No. 20316) facility. UST system removed from ground, no LPST incident recorded. Not considered an environmental concern to proposed project at this time.
Miller Memorial US Army Reserve Center	920 S. Sam Houston Ave 0.21 miles NE	PST (ID No. 69236) and RCRA Generator. Site is an active conditionally exempt small quantity generator (CESQG) and contains an active, in ground, oil/water separator. No violations are recorded for the facility, and it is not considered an environmental concern to the proposed project at this time.
Pookies Exxon	901 11th St. 0.22 miles NE	PST (ID No. 45460) facility. Two (2) USTs removed from ground, one (1) gasoline UST remains in place. Installed in 2004, appears to be in compliance with current PST/RPR regulations. No LPST

Facility Name	Address and Distance/Direction	Facility Type
		incidents recorded. Not considered an environmental concern to proposed project at this time.
C K Cleaners	1310 Sam Houston Ave 0.01 miles NE	RCRA Notifier (TXR000070664) and DCRP (104958251) facility. Verified non-generator under RCRA, drop station only in DCRP. Facility located in shopping center at SW corner of Sam Houston Ave & 13th St, Drop station only status verified during site recon. Not considered an environmental concern to project at this time.
Lucky Star Cleaners	1402 Sam Houston Ave Target Property	DCRP (1057890002) facility. Drop station only. Not observed within or adjoining project area during site reconnaissance. Not considered an environmental concern to the project at this time.
Clothes N Time	1329 University Ave Target Property	DCRP (104402680) facility. Drop station only. Not observed within or adjoining project area during site reconnaissance. Not considered an environmental concern to the project at this time.
Lucky Star Cleaners	40 State Highway 75 N 0.24 miles SW	DCRP (103962148) facility. Active facility registration, indicating dry cleaning likely performed on-site. Due to distance from project area, not considered an environmental concern to the project at this time.

The contractor would take appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. The use of construction equipment within sensitive areas would be minimized or eliminated entirely. All construction materials used for this project would be removed as soon as work schedules permit. Any unanticipated hazardous materials and/or petroleum contamination encountered during construction would be handled according to applicable federal and state regulations.

*No Action Alternative* – No construction would occur and there would be no impacts to hazardous materials or waste.

*Proposed Action Alternative* – One (1) of the above-listed regulatory facilities was identified to be a potential recognized environmental condition to the project site. The site is the Wilburn Dickerson Chevron/Millers Service Station at 1504 11<sup>th</sup> Street. The leaking petroleum storage tank (LPST) incident was closed by TCEQ in April 2007. However, data from the December 2006 monitoring event indicated benzene concentrations in MW-5 (closest to Town Creek) were above Texas Risk Reduction Program (TRRP) Tier 1 Residential Protective Concentration Levels (PCLs). This raises the possibility that contaminated groundwater may be encountered during construction activities in this area, if excavation depths in this area would be far enough below ground surface to encounter groundwater. However, in this area groundwater was identified as being at least 15 feet below the surface; proposed excavation activities are not anticipated to be deeper than 10 feet. At this time no new ROW is proposed to be acquired in this area. Therefore, at this time no construction exposure or acquisition of liability is anticipated as part of this project. If the proposed project were to be revised to include either ROW acquisition or deeper excavation, it may be prudent to sample and analyze groundwater in this area to assess potential worker exposure and/or disposal costs prior to beginning construction.

No other hazardous materials or waste impacts are anticipated. Any hazardous materials discovered, generated, or used during construction would be handled and disposed of in accordance with applicable local, State, and Federal regulations.

#### 4.10 Safety

Temporary disruption of typical traffic flow along adjacent and intersecting roads such as Bearkat Boulevard and 11<sup>th</sup> Street may occur during construction of the proposed project; traffic disruption would be confined to large trucks and machinery associated with construction (see **Appendix A: Location Map**).

Construction may temporarily degrade air quality through dust and exhaust gases associated with construction equipment. Measures to control dust would be considered and incorporated into the final design and construction specifications. The contractor would also take appropriate control measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. The use of construction equipment within sensitive areas would be minimized or eliminated entirely. All construction materials used for this project would be removed as soon as work schedules permit. All construction activities would be performed using qualified personnel trained in the proper use of the appropriate equipment, including all appropriate safety precautions. All activities would be conducted in a safe manner and in accordance with the standards specified in the Occupational Safety and Health Administration (OSHA) regulations. The appropriate signage and barriers should be in place prior to construction activities to alert pedestrians and motorists of the project activities.

*No Action Alternative* – The No Action Alternative would have a negative effect on the general safety of the residents surrounding the proposed project area. The lack of the slope stabilization, detention, and upgraded underground drainage structures would continue to put homes, property, and life in jeopardy during heavy rain events when flooding occurs.

*Proposed Action Alternative* – The Proposed Action Alternative would have a positive effect on the general safety of the residents by increasing stabilization of the slope, improving water detention and underground drainage capacity during flooding events and, therefore, reducing the risk of life and property damage during heavy rain events. The proposed project activities also plan to prevent erosion along the banks of Town Creek which would have a positive effect on water quality.

#### 4.11 Mitigation Measures

All mitigation measures associated with the Proposed Action Alternative are summarized in **Table 4**.

**Table 4: Summary Table**

Affected Environment	Impacts	Mitigation
Geology and Soils	No impacts to underlying geology are anticipated. Shallow soils and rock on the proposed project would be disturbed during construction.	Excavated soil and waste materials would be managed and disposed of in accordance with applicable local, State, and Federal regulations. If contaminated materials are discovered during the construction activities, the work would cease until appropriate procedures and permits can be implemented.

Affected Environment	Impacts	Mitigation
Prime and Unique Farmland	Prime farmland soils are not present at the proposed project.	None
Air Quality	No long-term impacts are anticipated for the drainage improvements; however, short-term impacts may occur during construction.	Construction contractors would be required to water down the construction areas when necessary to minimize dust, to keep fuel-burning equipment running times to a minimum and keep engines properly maintained.
Surface Water	Temporary short-term impacts to downstream surface waters may occur during construction.	A SW3P must be prepared and a NPDES permit must be obtained prior to construction. BMPs, such as installing silt fences and revegetating bare soils, would minimize runoff.
Groundwater	No impacts to groundwater are anticipated.	If the proposed action would require additional excavation to groundwater depths, the applicant would consult with EPA and TCEQ to identify the appropriate mitigation.
Floodplains	No impacts to the floodplain are anticipated.	All appropriate coordination with the local Floodplain Administrator would be performed prior to construction.
Waters of the U.S. including Wetlands	Impacts to ~1.46 acres (4,570 linear feet) of Town Creek are anticipated to occur during construction.	The City must comply with all conditions of U.S. Army Corps of Engineers Permit No. SWG-2012-01017 and Texas Commission on Environmental Quality Section 401 Clean Water Act water quality certification. For portions of the project affecting Town Creek that are not included as part of permit SWG-2012-01017, the City must coordinate with and obtain any required Section 404 Permit(s) from the USACE and/or any Section 401/402 Permit(s) from the State prior to initiating work, and comply with all conditions of the required permit(s).
Biological Resources	No impacts to federally protected species are anticipated.	<p>The City of Huntsville will limit vegetation management work during the peak migratory bird nesting period of April 1 through July 15 as much as possible to avoid destruction of individuals, nests, or eggs. If vegetation clearing activities must occur during the nesting season, the City of Huntsville will implement measures such as additional surveys prior to construction to ensure active nests are not present prior to vegetation clearing. No vegetation containing active nests, eggs, or young will be removed should they occur on the project site. Construction activities will be excluded from a minimum zone of 100 meters around any raptor nest.</p> <p>The City of Huntsville will advise construction contractors of the potential presence of the Alligator Snapping Turtle within Town Creek. The City must comply with Chapters 67 and 68 of the Texas Parks and Wildlife Code which regulates state-listed species. The proposed action must not result in the take of any state listed species as defined in Section 1.101(5) of the Texas Parks and Wildlife Code.</p>

Affected Environment	Impacts	Mitigation
Cultural Resources	No impacts to archaeological or cultural resources are anticipated.	In the event that archaeological deposits, including any Native American pottery, stone tools, bones, or human remains, are uncovered, the project shall be halted and the City of Huntsville shall stop all work immediately in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. The City must secure the area, and ensure that access to the sensitive area is restricted. In the event of an unexpected discovery, or if it appears that an Undertaking has affected a previously unidentified property or affected a known historic property in an unanticipated manner, the City shall immediately notify Texas Division of Emergency Management (TDEM), who shall immediately notify FEMA of the discovery. Upon notification of the unanticipated discoveries, or unanticipated affects, FEMA would consult with the State Historic Preservation Office (SHPO) or Tribal Historic Preservation Office (THPO) and Tribes. Work in sensitive areas cannot resume until consultation is completed and appropriate measures have been taken to ensure that the project complies with the National Historic Preservation Act.
Socioeconomic Resources	No adverse impacts to Socioeconomic resources are anticipated.	None
Environmental Justice	No disproportionately high and adverse impacts on minority or low-income portions of the population are anticipated.	None
Noise	Temporary short-term impacts in noise levels are anticipated during construction.	To reduce noise levels during construction, construction activities would take place during working hours enforceable by local ordinance.
Traffic	Minor temporary increase in the volume of construction traffic on roads in the immediate vicinity is anticipated. No other impacts are anticipated after construction is complete.	Construction vehicles and equipment would be stored on site during the project construction and appropriate signage would be posted on affected roadways.
Hazardous Material	Contaminated groundwater may be encountered during construction activities in the vicinity of the Wilburn Dickerson Chevron/Millers Service Station.	It may be prudent to sample and analyze groundwater in this area to assess potential worker exposure and/or disposal costs prior to beginning construction. Any hazardous materials discovered, generated, or used during construction would be handled and disposed of in accordance with applicable local, State and Federal regulations.
Safety	Construction activities could present safety risks to those performing the activities. No long-term negative safety impacts are anticipated.	All construction activities would be performed using qualified personnel trained in the proper use of the appropriate equipment, including all appropriate safety precautions. All activities would be conducted in a safe manner and in accordance with the standards specified in OSHA regulations. The appropriate signage and barriers should be in place prior to construction

Affected Environment	Impacts	Mitigation
		activities to alert pedestrians and motorists of the project activities.

## 5.0 CUMULATIVE IMPACTS

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

The proposed project site is located in an area which is currently developed with residences, downtown commercial and government buildings, a public park, a State prison, and SHSU. There are few surrounding vacant tracts which limits opportunity for future expansion within the area. SHSU’s 2020 Master Plan identifies several alternative expansion plans, including proposed new dorms, class buildings, and parking facilities. Of these, none are proposed in close proximity to Town Creek. There have been no other projects identified in the surrounding areas, and due to the highly developed setting, future projects are not likely within the surrounding project area.

The proposed project would have permanent impacts which could be considered positive for the community. The cross section improvements to open channels and removal and/or replacement of existing underground drainage structures along the downtown segment of Town Creek would reduce flooding during heavy rainfall events and control erosion along Town Creek.

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

## 6.0 PUBLIC INVOLVEMENT

FEMA is the lead agency for ensuring environmental compliance for the proposed Town Creek Drainage Improvement project. It is the goal of the lead agency to be responsive to the needs of the community and the purpose and need of the proposed action, while meeting the intent of Federal environmental and cultural resource laws, including NEPA, and complying with all necessary provisions. The draft EA was made available for public comment from March 29 to April 13, 2015. A hard copy of the draft EA was displayed at the City of Huntsville City Hall and electronic copies were posted to the FEMA website and also available upon request from FEMA. A public notice would be published in the *Huntsville Item* to inform the public of the report availability. FEMA received nineteen sets of comments from 3 individuals

during the comment period (see **Appendix G**) and has given due consideration to these comments prior to FEMA's approval of the final EA

In addition to the FEMA public comment, USACE held a public comment period for the issuance of the Clean Water Act permit for a portion of the project from April 2 to May 2, 2014. An additional interagency coordination notice was issued by USACE on August 19, 2014 which solicited input from a limited number of interested parties.

## **7.0 AGENCY COORDINATION AND PERMITS**

To date, the THC has been contacted by letter requesting project review during the preparation of this EA. Concurrence was received December 8, 2011. A second letter requesting project review revised to reflect entire project length and amended recommendations was sent in February 2015. Final concurrence was received February 24, 2015. Responses received to date are included in **Appendix E**.

The proposed slope stabilization would improve and create riparian habitats within approximately 1.46 acres (4,570 linear feet) of jurisdictional waters. Coordination with USACE determined that an Individual Permit was applicable. A Section 404 Individual Permit was issued by the USACE on December 23, 2014 and is included in **Appendix E**.

TPWD responded to a request for comments/input on the proposed project. TPWD made several comments regarding Migratory Birds, Wetlands and Aquatic Resources, T&E Species, and Vegetation. The EA has been revised to address these comments as appropriate, and a response letter was drafted and submitted to TPWD. The comment letter from TPWD and a response letter are included in **Appendix E**.

The City of Huntsville will coordinate with the local floodplain administrator and obtain and comply with any required floodplain permit.

In accordance with applicable local, State, and Federal regulations, the applicant will be responsible for acquiring any other necessary permits prior to commencing construction at the proposed project site.

## 9.0 REFERENCES

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