## 2. NEED AND PURPOSE

The Willow Waterhole Bayou watershed in Council District K is heavily urbanized with extensive residential and commercial development, substantial portions of which were severely impacted by flooding in 2015 and 2016. The need is simply defined as to provide alternative means of flood reduction within the local watershed. Inclusion of a geographic limit within the purpose statement is necessary in this case as flood risk management needs are addressed within a watershed unit. The watershed unit limits the geographical range of alternatives from a practicable perspective. For the proposed project, the direct purpose is to construct stormwater detention basins to reduce flood risk to hundreds of residential and commercial structures in the Willow Waterhole Bayou drainage area.

## 3. PROJECT ALTERNATIVES

An alternatives analysis facilitates the applicant to view the project from a different perspective by examining practicable alternatives to the proposed discharge into the waters of the United States that have potentially less damaging consequences. For projects that are not water-dependent, the 404(b)(1) guidelines establish the rebuttable presumption that practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise" (40 CFR Section 230.10(a)(3)). In making its permit decision, the Applicant must demonstrate and USACE must find that there are no available, practicable alternatives that would avoid the use of special aquatic sites. If no practicable avoidance alternative is found to be available and there is more than one practicable alternative with impacts to special aquatic sites, then the USACE may only approve the LEDPA. The guidelines also include the presumption that all practicable alternatives to the proposed discharge that do not involve a discharge into a special aquatic site (even though there may be impacts to streams or other water features) would have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise. The evaluation considers the No Action Alternative which includes an alternative that would involve no discharges into waters of the United States or permit denial. It also considers on-site alternatives, such as modifications to the site layout, design options, or other factors that could reduce the amount of impacts to waters of the United States.

A threshold consideration in this analysis is whether the Project is water-dependent. The Section 404(b)(1) Guidelines state that if an activity associated with the discharge proposed for a special aquatic site does not require access or proximity to, or siting within, a special aquatic site (e.g. wetlands) to fulfill its basic purpose, the activity is not water-dependent. As defined, the Project proposes the construction of a detention basin to meet regional watershed need for flood reduction. Whereas flood reduction projects may often propose the modification of waters of the United States, or outfall to waters of the United States, the Project is not inherently water-dependent as detention basins can be constructed in non-wetland areas. A rebuttal of alternatives is required.

## 3.1 ALTERNATIVES SCREENING PROCESS

This section describes the alternatives screening process that was conducted to identify the project alternatives carried forward for evaluation. This evaluation includes an explanation of why some alternatives were eliminated from detailed study, because they were either clearly impracticable or unreasonable. The alternatives screening typically utilize a three-level screening process:

- Level 1 Screening: consideration of alternative sites that achieve the project purpose;
- Level 2 Screening: consideration of on-site alternatives in terms of the practicability of logistics and cost; and
- Level 3 Screening: evaluation of alternatives and their effect on environmental resources.

Alternatives that satisfy both Level 1 and Level 2 Screening criteria are carried forward for evaluation under Level 3 Screening, the analysis of which is the basis for identifying the LEDPA.

### 3.1.1 Level 1 Screen: Site Alternatives

The initial inquiry into alternatives explores the availability and suitability, from a logistic standpoint, of alternative properties, or in the case of the proposed project, alternative solutions which may involve different combinations of properties. These criteria are designed to exclude from further evaluation alternatives which would clearly not be practicable due to unavailability to Applicant or as a result of logistical challenges that do not advance the purpose or need for the Project. This coarse level of screening is undertaken first because it may eliminate the need to evaluate other information relative to the LEDPA such as the presence and/or function of water of the United States, or the presence/absence of threatened or endangered species.

Any geographic extent of potential alternative sites is limited to the Willow Waterhole Bayou watershed in consideration of the area of need and Project sponsor. Several management solutions to address flood reduction needs in the region are being considered by multiple entities. However, the scale of that need is too broad in scope, and construction of many projects will eventually be needed to meet the overall regional need. This alternatives analysis focus on one local component of the regional need.

The primary selection criteria used for screening potential alternative sites include the following:

- Alternatives must have geometrical suitability to allow for the design of the intended facility.
- Alternatives must be absent of substantial physical constraints that would preclude the site use for the intended purpose or as a less damaging alternative.

- Alternatives must be available to the Applicant.

**Figure D-3** shows the Willow Waterhole Bayou watershed and the overall extent of development. As shown in the graphic, most of the watershed is completely developed. Site alternatives include not only some of the only remaining vacant land in the watershed but also include the acquisition and demolition of developed sites. All build alternatives a defined by one or multiple detention sites, as summarized below:

**Alternative CF-1**: This alternative was modeled by Cobb Fendley and is detailed in the August 31, 2016 memorandum by Tetra Tech (**Appendix A**). This alternative consists of three proposed detention basins/ponds, one of which includes the Spellman Detention Basin (Pond 1). Pond 2 and Pond 3 include occupied multi-family residences.

**Alternative TT-1**: This alternative was modeled by Tetra Tech as provided in the June 23, 2017 memorandum (**Appendix B**), and includes the Spellman Detention Basin only. The location alternative includes concrete pipe outfalls to the adjacent Fondren Diversion Channel.

**Alternative TT-2**: This alternative was also modeled by Tetra Tech, includes the Spellman Detention Basin, and the addition of the Bob White Detention Basin. The Bob White Detention Basin location utilizes an urban vacant lot. This alternative includes maintains the outfalls to the adjacent Fondren Diversion Channel (Spellman), and adds a concrete overflow spillway to Willow Water Hole (Bob White).

### 3.1.2 Level 2 Screen: On-site Alternatives

All sites utilize the Spellman Detention Basin location. Each of these site alternatives included alternative design-specific components, thereby expanding the possible alternatives ultimately evaluated to serve the project purpose. However, all design-specific alternatives require the use of the entirety of the Spellman Basin site. Therefore, none of the combination of project alternatives provide a practicable means to minimize the effect on environmental resources. In the absence of environmental factors being a distinguishing factor beyond the Level 2 Screening, and the LEDPA may be evaluated solely on practicability and ability to best serve the project purpose.

As noted in **Appendix A**, several modeling assumptions in the CF-1 Alternative, there is concern as to whether the project would be capable of satisfactorily addressing the project purpose. In addition to this concern, there is question as to whether the costs shown for acquisition of the existing apartment complexes and self-storage facility are representative of the true costs to acquire, demolish, and abandon the properties. There will be significant relocation costs, moving costs (for both people and property), permitting costs, waste characterization, and haul off costs. These costs are likely to double to cost of the

project. The social impact of family displacement within the apartment complexes could be significant if children are required to change schools in the middle of the years, bus routes to jobs and schools are no longer readily accessible, and families must arrange for different child care services. This alternative was therefore eliminated as a practicable alternative.

### 3.2 PROJECT AND ALTERNATIVES

Both Tetra Tech alternatives remain practicable alternatives, and both have identical impacts to aquatic resources. Therefore, selection of the preferred alternative would be that which best addresses the project purpose in light of cost and logistics. As shown in the following tables, each of the projects provide comparable benefits, with each providing reduction in the water surface elevation during the 100-year flood event by 0-0.40 feet, benefitting 309 homes for each alternative. However, the cost of adding the Bob White Detention Basin added an estimate 10% increase in acquisition and construction costs, while only providing the benefit of increasing the amount of flood reduction in the 0.20-0.40 range. This was deemed an insufficient increase in cost for benefit gained. **Alternative TT-1** was chosen as the preferred alternative.

**Table 1. Alternative TT-1, Spellman Detention Basin only**

| | |
|---|---|
| Houses removed from the floodplain | 1 |
| Houses within flood reduction range 0 - 0.20 feet | 151 |
| Houses within flood reduction range 0.20 – 0.40 feet | 154 |
| Houses within flood reduction range 0.40 – 0.60 feet | 3 |
| **TOTAL** | **309** |

**Table 2. Alternative TT-2, Spellman and Bob White Detention Basins**

| | |
|---|---|
| Houses removed from the floodplain | 2 |
| Houses within flood reduction range 0 - 0.20 feet | 47 |
| Houses within flood reduction range 0.20 – 0.40 feet | 257 |
| Houses within flood reduction range 0.40 – 0.60 feet | 3 |
| **TOTAL** | **309** |

# 4. ALTERNATIVES ANALYSIS

## 4.1 PROPOSED PROJECT IMPACTS

The proposed project will impact waters of the United States on site consisting 0.91-acre of emergent wetland and 0.20-acre of scrub-shrub wetland. Placement of fill within Fondren Diversion Channel and Willow Water Hole will be associated with protective armoring at-grade within existing channelized systems and is considered a temporary impact (i.e. no loss).

## 4.2 NO ACTION ALTERNATIVES

The No Action Alternative must be retained for analysis to disclose to decision makers the environmental impacts that would arise without implementation of the preferred alternative. The No Action Alternative represents what would happen at the site were the preferred alternative not implemented. Under the No Action Alternative, aquatic features associated with the Spellman Detention Basin could remain in their current state. However, the no build alternative would involve the termination of the land sale to the Applicant. The current owner would likely develop the site into single-family residences (since the owner is a developer and the parcels have already been platted). The Bob White Detention Basin alone would not provide adequate stormwater storage for significant flood reduction, nor would a reduced scale of the Spellman Detention that avoids impacts. Even if the latter effectively served the project purpose, the avoided resources would be adversely indirectly impacted by the substantial modification of local drainage patterns. The No Action Alternative may be summarily rejected.

## 4.3 LEAST ENVIRONMENTALLY DAMAGING PRACTICABLE ALTERNATIVE

In identifying a project that impacts all waters of the United States as the LEDPA, one must demonstrate that any alternative that results in any minimization of impacts to the aquatic environment (i.e.; less damaging alternative) is not practicable. This demonstration must consider both off-site and on-site alternatives. As demonstrated herein, alternatives to address the project need and purpose are geographically limited, and avoidance measures on-site are not practicable. The No Build Alternative does not address the project need. The preferred alternative was deemed a practicable alternative and is also the LEDPA.

# 5. MITIGATION PLAN

Direct permanent impacts to aquatic resources will be compensated through the use of a mitigation bank whose service areas include the project. Please refer to **Attachment E** of the individual permit application for a description of mitigation, and how mitigation units were calculated.

# ALTERNATIVES ANALYSIS FIGURES


**Spellman Detention Basin**
**Houston, Texas**

**Figure D-1:**
**Vicinity Map**

## Legend

Study Area

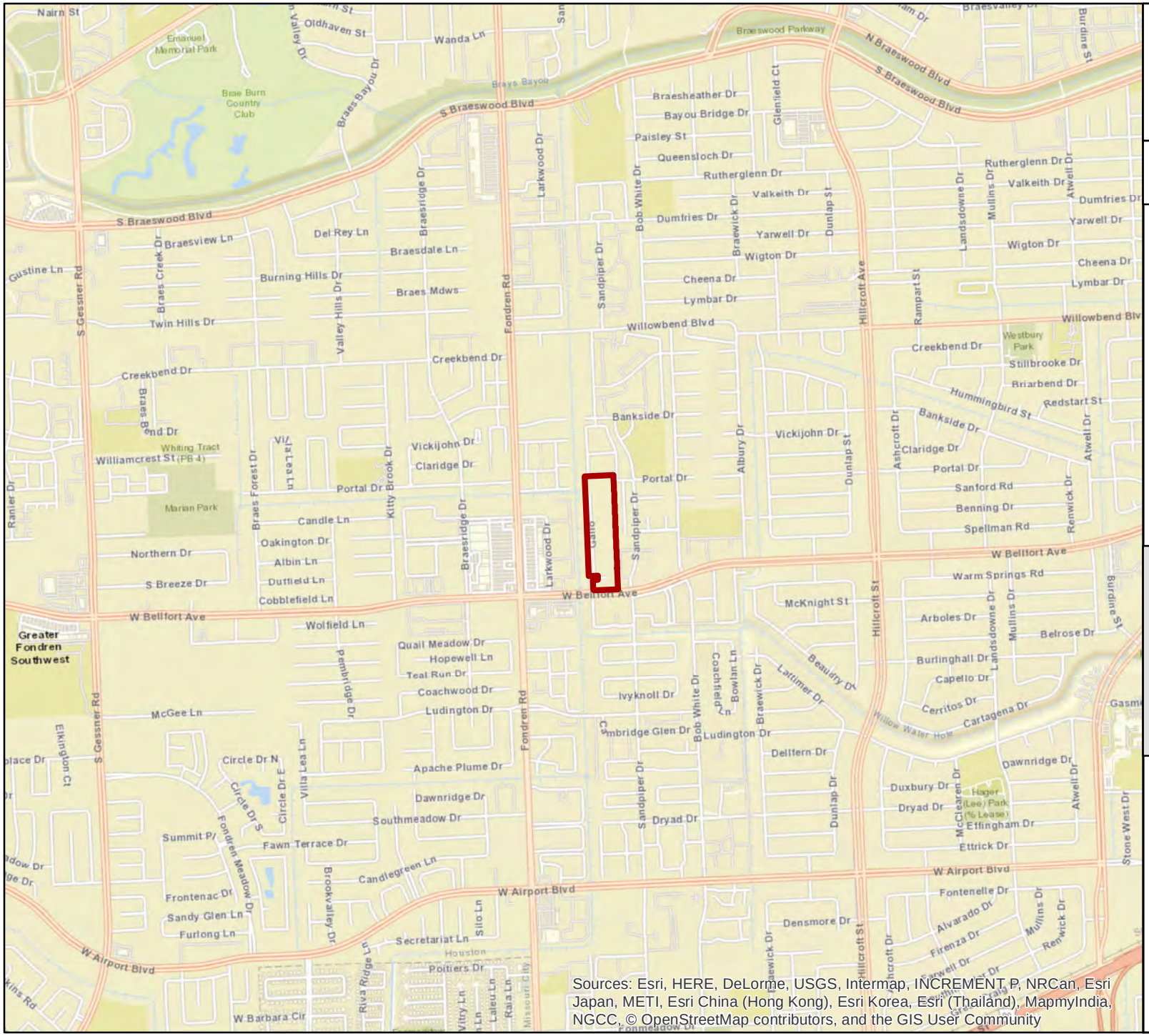
HALFF

AVO 31051

N

0 2.5 5

Miles




**Spellman Detention Basin**
**Houston, Texas**

**Figure D-2:**
**Project Location Map**

## Legend

Study Area

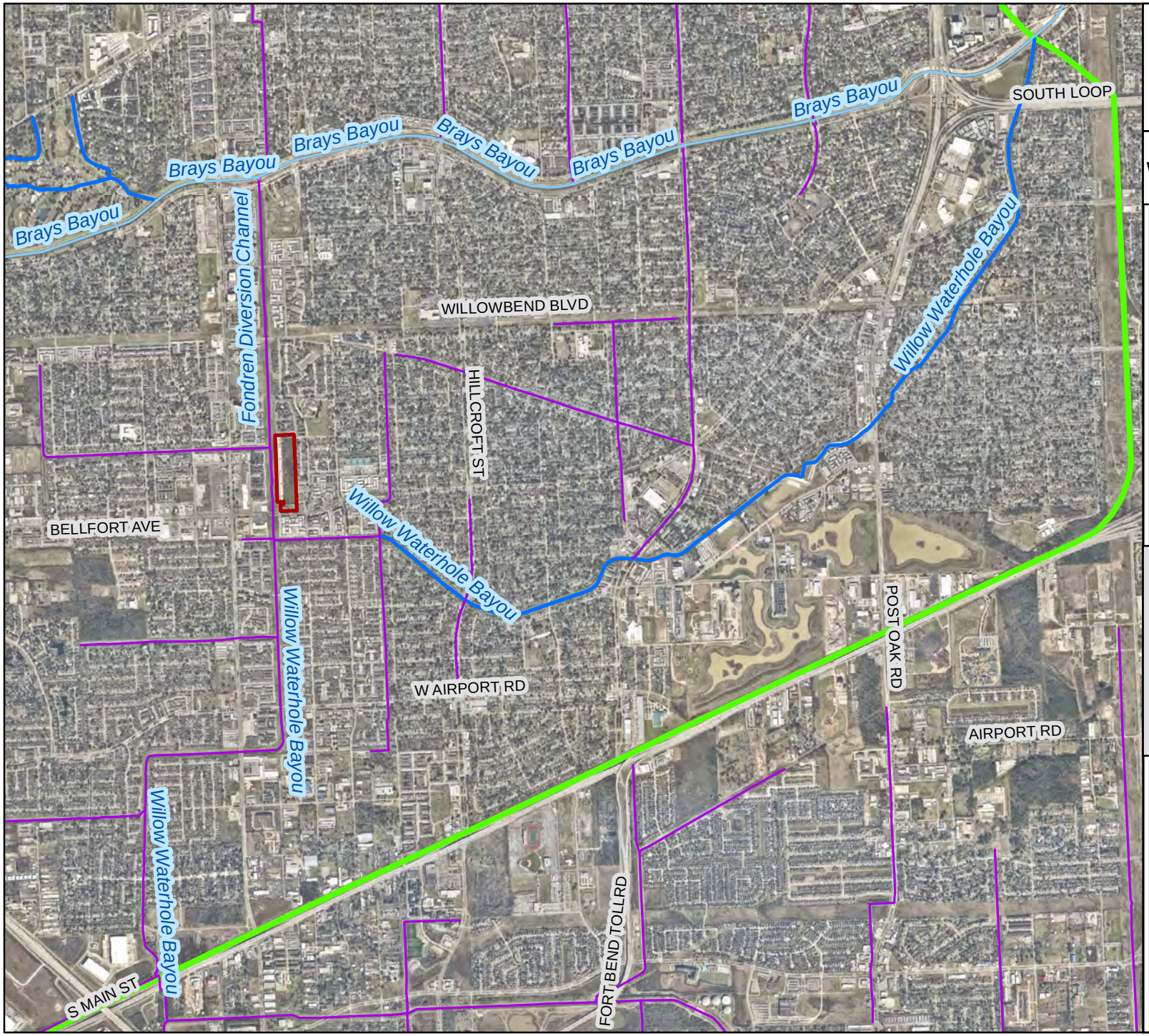

HALFF

AVO 31051

N

0 1,000 2,000

Feet




**Spellman Detention Basin**
**Houston, Texas**

**Figure D-3:**
**Willow Waterhole Bayou Watershed Map**

## Legend

- Study Area
- HUC 14 Watershed

### NHD Flowline

- Artificial Path
- Canal/Ditch
- Stream/River


HALFF

AVO 31051

N

0 1,500 3,000

Feet