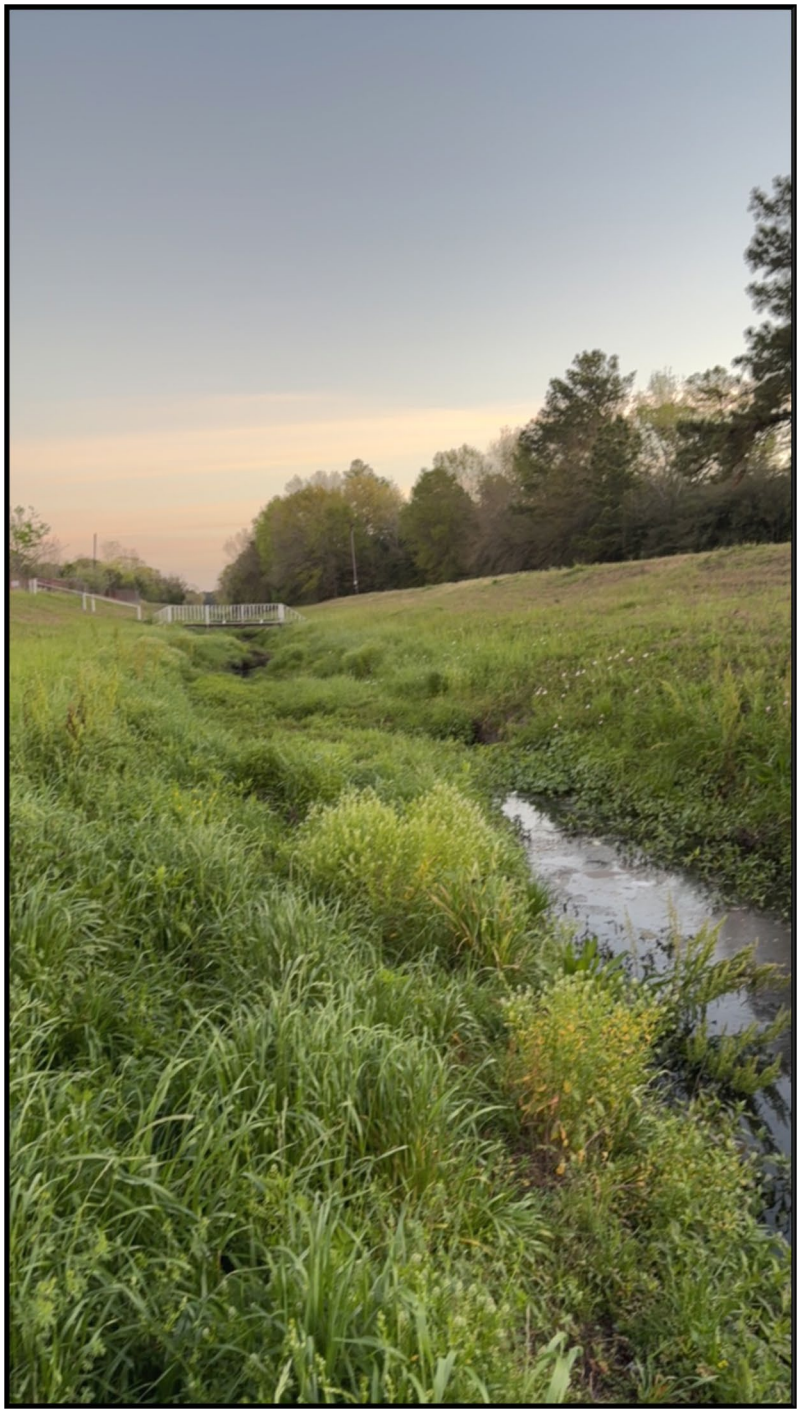
Targeted Bacteria Monitoring Project

FY25 Final Report – Assessment Unit: 1006D_02 Halls Bayou



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Segment Description

H-GAC conducted targeted monitoring on Halls Bayou, a water body within the Bacteria Implementation Group project area (Figure 1). Halls Bayou, Segment ID 1006D (Figure 2) is a tributary to Greens Bayou. This segment is 20.26 miles long and consists of two assessment units (AU) of concern, AU 1006D_01 and AU 1006D_02, and is defined as an unclassified segment from the Greens Bayou confluence upstream to Frick Road in Harris County. Halls Bayou originates near Beltway 8 on the north side and flows southeast towards Interstate 59 in central-north Houston. With the exception of a few forested areas around the watershed, land cover is mostly developed, with 55% of the watershed categorized as medium or high intensity development. There are five Surface Water Quality Monitoring (SWQM) stations located on AU 1006D_02. Stations 11126, 17490, and 17491 are active, while stations 20455 and 20553 are historic.

The TCEQ freshwater primary contact recreation use water quality standard for the pathogen indicator bacteria *Escherichia coli (E. coli)* is a geometric mean at or below 126 colonies/100 mL or a single grab standard of 399 colonies/100 mL. H-GAC staff reviewed the *E. coli* bacteria seven-year geometric mean results for each of these stations. This AU has an *E. coli* bacteria seven-year geometric mean of 1062.2 colonies per 100 milliliters (colonies/100 mL and has a current impairment category of 4a (meaning a total maximum daily load – TMDL has been completed and approved by the Environmental Protection Agency)for indicator bacteria in water.

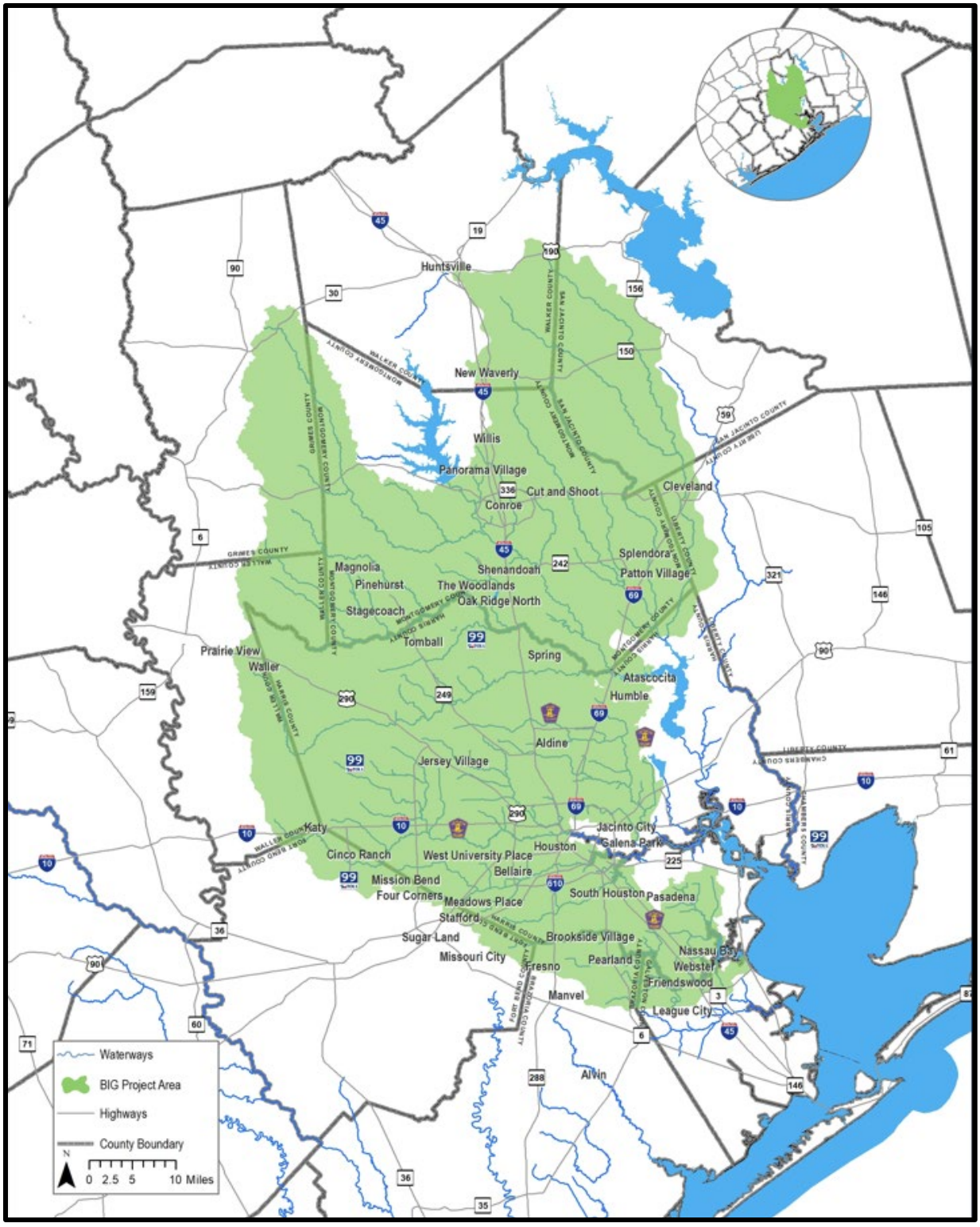

Figure 1. Bacteria Implementation Group Project Area.

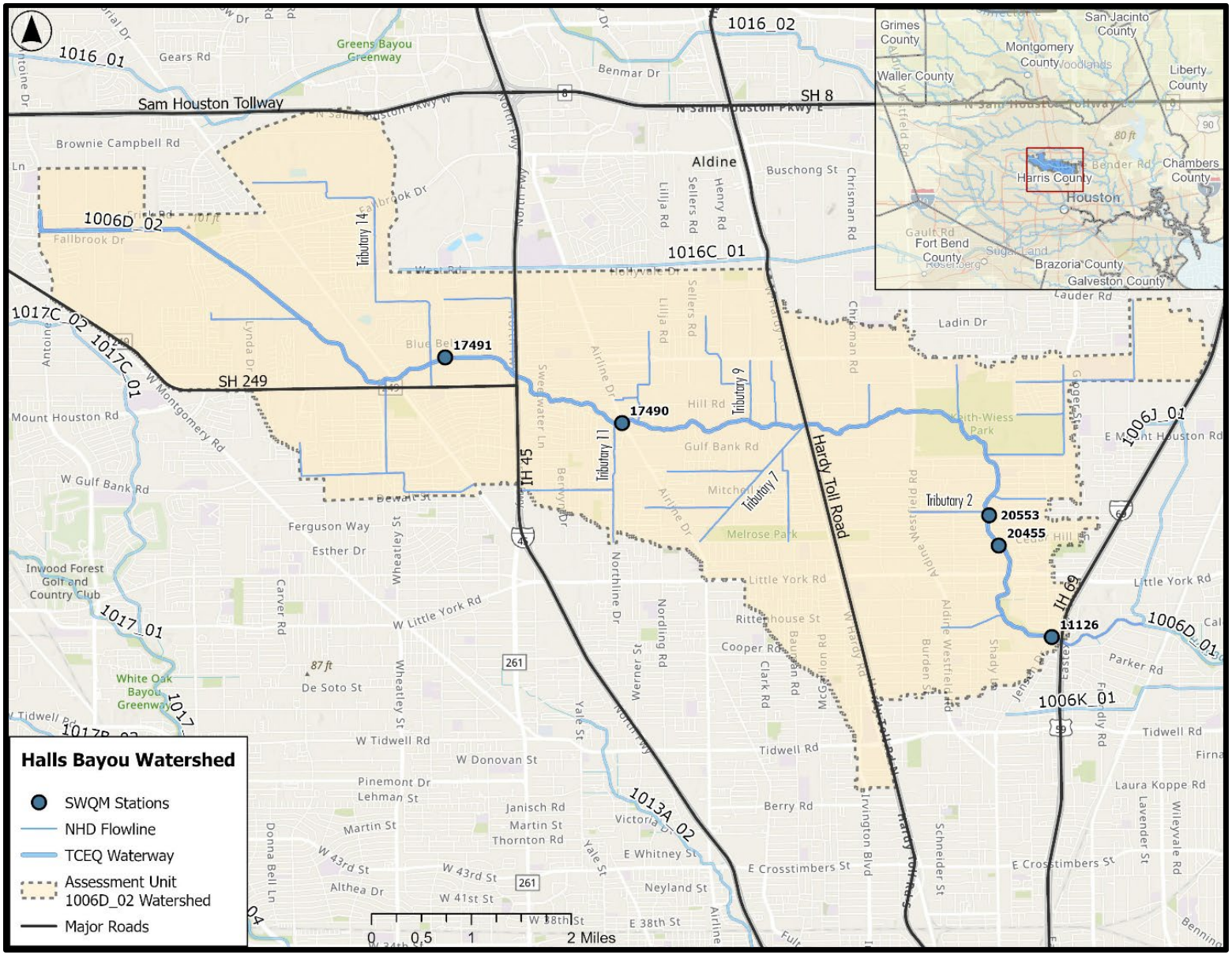

Figure 2. General watershed map of Halls Bayou.

Background

Exceedances of pathogen indicator bacteria (hereafter referred to as indicator bacteria) are the most common reasons for water quality impairments in the H-GAC region. H-GAC, under contract with the Texas Commission on Environmental Quality (TCEQ), facilitates the Bacteria Implementation Group (BIG)[1][2]. There are at least 144 impaired AUs in the BIG project area which covers most segments that are impaired for indicator bacteria within the San Jacinto River Basin, Basin 10, and a few segments within the San Jacinto-Brazos River Basin, Basin 11. One specific strategy to address these impairments is to conduct geographically focused targeted monitoring and monitor best practices that will identify and remove indicator bacteria sources. Targeted monitoring is a systematic method to identify and report sources of elevated indicator bacteria to the appropriate jurisdiction for action which will ideally result in a reduction of bacteria sources within the watershed. Targeted monitoring of water bodies within the BIG have been conducted since the I-Plan was approved in 2013. The methodology was formalized with a quality assurance project plan and completion of the five most and five least impaired water bodies in 2016[3].

H-GAC reviewed information from previous Clean Rivers Program[4] Basin Highlights/Summary Reports[5], BIG annual reports[6], and previous targeted monitoring efforts, to refine our understanding of the spatial distribution of elevated indicator bacteria concentrations in the H-GAC region. In 2024, H-GAC staff completed an intensive desktop review of 24 AUs. Each AU was given a rank based off the seven-year geomean. Five AUs were selected for final review based on: accessibility, length, location within the BIG project area, if the water body was previously sampled with referrals or previously sampled with no action taken, and whether a watershed protection plan was developed. Plum Creek and Willow Waterhole Above Tidal were selected for 2024 targeted monitoring. Halls Bayou was selected for 2025 monitoring due to its lack of previous monitoring efforts and to assist with the Greens Bayou watershed protection plan.

Phase I of this targeted monitoring project included an intensive desktop review of the most up to date imagery available and completed a windshield survey (WS). Phase II of this targeted monitoring project included field investigations (FI) of the AU conducted during dry conditions where all flowing point and non-point sources were evaluated. Phase III includes documentation of findings and sharing with local jurisdictions for possible remediation. Sample collection and laboratory methods, as well as data handling practices for this study are detailed in Appendices B and E of the Houston Area Bacteria Implementation Group Public Participation Project Quality Assurance Project Plan (QAPP) for Monitoring, approved April 5, 2024. All bacteria samples collected during this study were analyzed by a National Environmental

[1] Bacteria Implementation Group (BIG) | Houston-Galveston Area Council (H-GAC)
[2] Bacteria Implementation Group Reports | Houston-Galveston Area Council (H-GAC)
[3] Bacteria Implementation Group Reports | Houston-Galveston Area Council (H-GAC)
[4] Clean Rivers Program | Houston-Galveston Area Council (H-GAC)
[5] Basin Highlights/Summary Reports | Houston-Galveston Area Council (H-GAC)
[6] Bacteria Implementation Group Reports | Houston-Galveston Area Council (H-GAC)

Laboratory Accreditation Program (NELAP) laboratory.

Desktop Review

Methods

A desktop review of the Halls Bayou (1006D_02) watershed to identify any potential point source pollution that may contribute to bacteria loading was completed by H-GAC in February 2025. Google Earth imagery and ArcGIS were utilized to determine the locations of wastewater treatment facilities (WWTF), permitted on-site sewage facilities (OSSFs), potential non-registered OSSFs and the municipal separate storm sewer systems (MS4) jurisdictions within the watershed. Apartment complexes and neighborhoods were also noted, as these can contribute to bacterial sources through sanitary sewer overflows (SSO) and domesticated pets. Bridge crossings and public entry points were identified for WS sample collection based on stream access and spatial distribution along the AU.

Results

The Halls Bayou watershed is characterized by a combination of industrial, commercial, and residential land use. Higher areas of industrial and commercial facilities appear near Hardy Toll Road and I-45 with many residential neighborhoods located along the waterway. The watershed has 41 identified WWTFs and three prominent service area boundaries (SAB) (Figure 3). Areas outside of the SAB are believed to have an estimated 1,935 permitted OSSFs and 1,845 potential unregistered OSSFs. There are several active service connection efforts underway in the watershed. The downstream section of Halls Bayou includes three miles of Halls Bayou Greenway Trail that provides direct public access to the AU and several Harris County Flood Control District detention basins. After completion of the desktop review, 31 locations, spanning the Halls Bayou AU 1006D_01 and 17 tributaries (labeled 1-17 starting downstream) were selected for WS sampling.

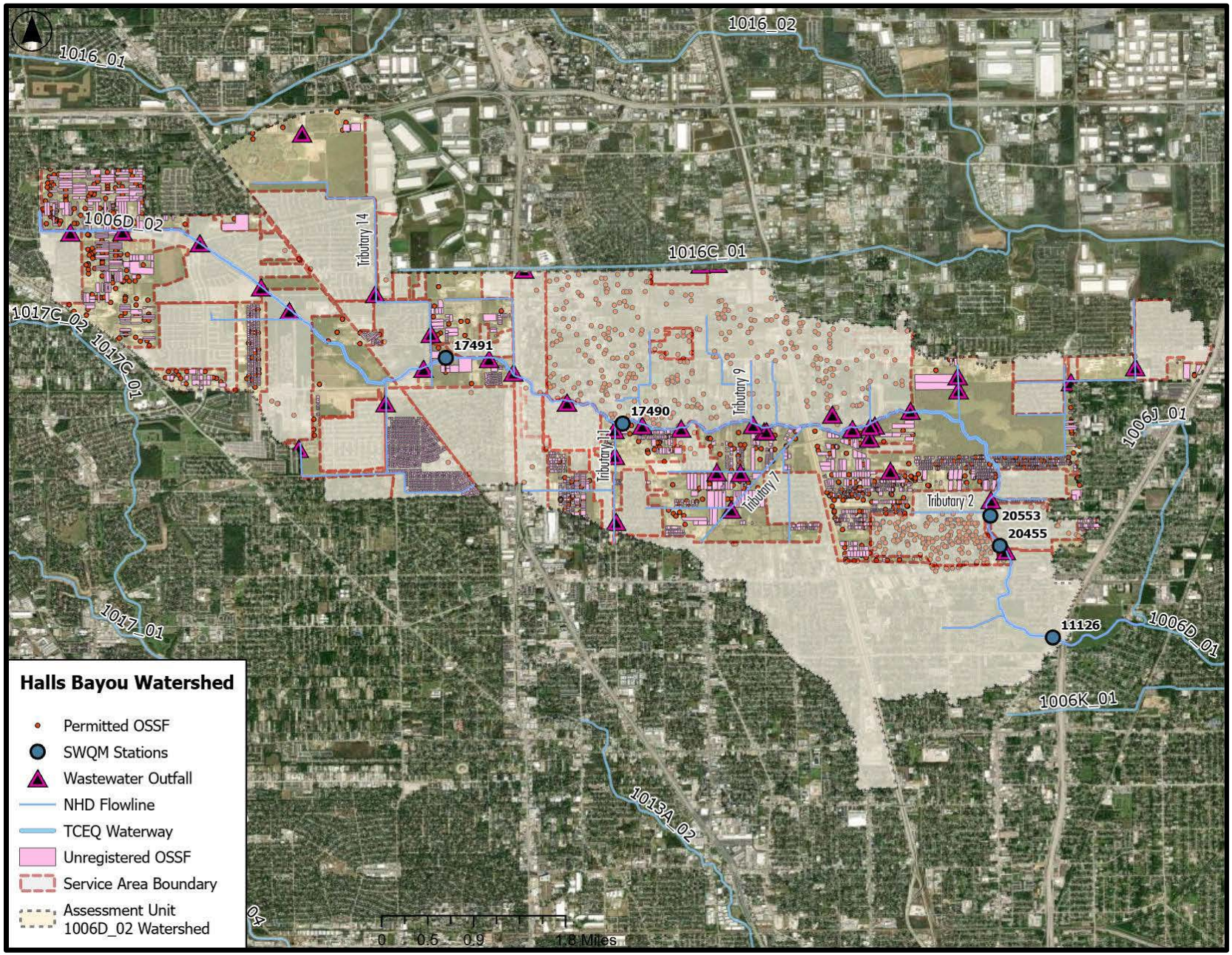

Figure 3. Desktop review results highlighting the locations of permitted OSSFs, SWQM stations, WWTFs, unregistered OSSFs, and service area boundaries within the watershed.

Windshield Survey

Methods

The purpose of the WS is to provide a spatial snapshot of the bacteria levels in the watershed during dry weather conditions. Greater than 72 hours without significant rainfall is required to be considered dry weather conditions. This ensures that, at the time of sampling, the segment is not stormwater influenced. Surface grab samples were collected at bridge crossings and other public access points along the Halls Bayou AU 1006D_02 and at the most downstream accessible locations of tributaries to the AU. A long arm sampler or bucket were utilized for sample collection. Latitude and longitude, photos, and detailed descriptions of sample locations were also documented. Any observed potential bacteria sources not previously identified during the desktop review were noted during the WS. The results from the WS were used to select areas within the watershed for further study through the field investigation phase.

Results

The WS for Halls Bayou was conducted on February 4th, 2025, five days after the last significant rainfall in the watershed (0.16 inches). A total of 28 samples were collected across the 31 WS sites identified during the desktop review. Sever of the WS sites were not sampled due to dry conditions and accessibility issues. Bacteria results from the ambient water samples collected ranged from less than 100 colonies/100 mL to greater than 242,000 colonies/100 mL (Figure 4, Table 1). The highest values were samples collected at the most easily accessible downstream locations of 5 tributaries that flow into Halls Bayou (gray rows indicated in Table 1). These values ranged from 3,150 colonies/100 mL at tributary 7 to greater than 242,000 colonies/100 mL at tributary 11. Two samples collected on the main AU had elevated values believed to result from discharge from the tributaries identified for field investigation which include values of 54,800 colonies/100 mL approximately 0.06 mi downstream of Tributary 11 and 6,370 colonies/100 mL approximately 0.78 mi downstream of Tributary 11. These results informed the decision to focus the intensified field investigation to these five tributaries with the highest indicator bacteria results. All other samples collected on the main AU range from less than 100 colonies/100mL to 1,890 colonies/100mL. Observations during the WS include areas with large amounts of litter and areas where livestock have open access to the water body.

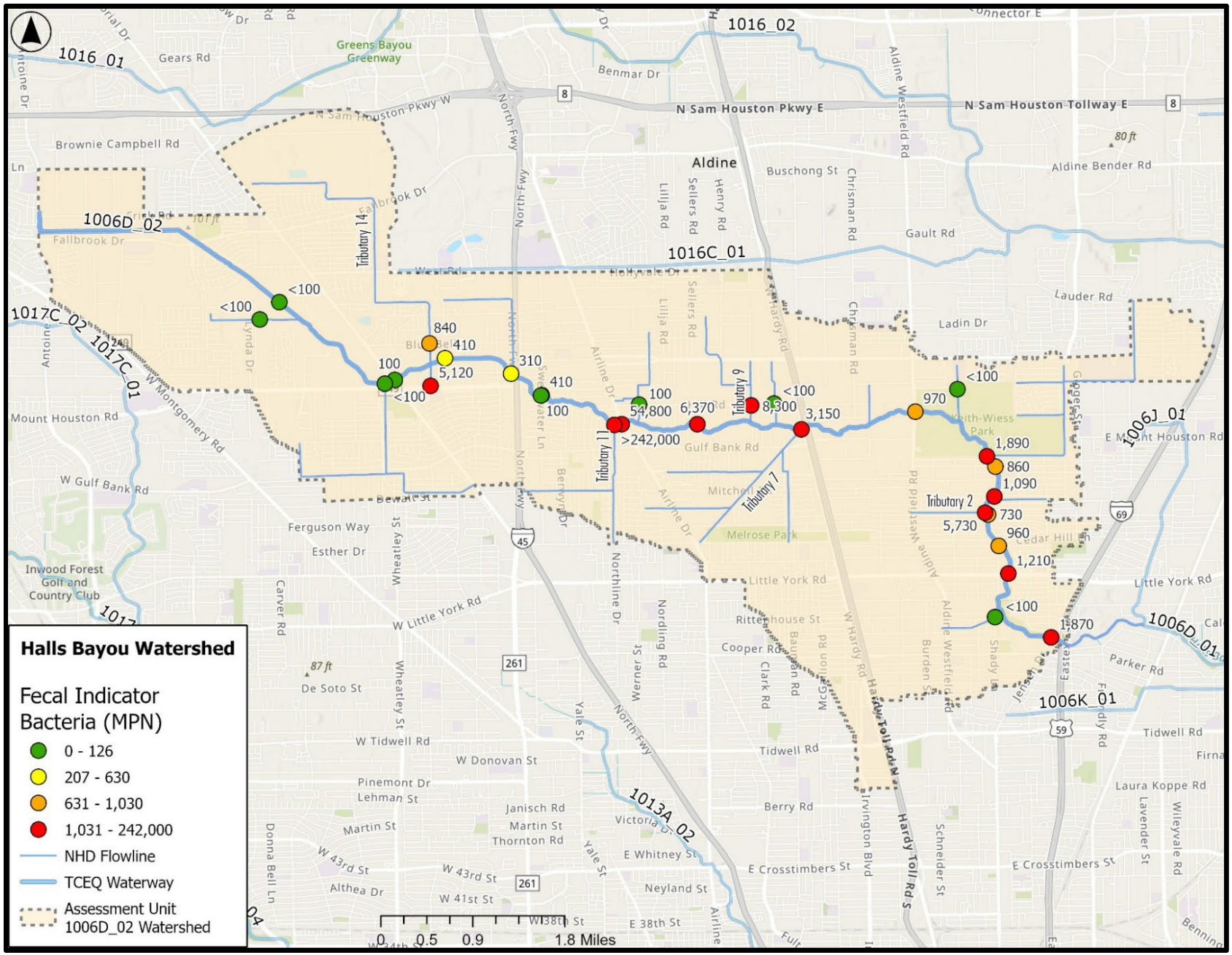

Figure 4. Halls Bayou (1006D_02) windshield survey results. Sampling was conducted on 02/04/2025

Table 1. Halls Bayou (1006D_02) windshield survey bacteria results from tributaries identified for field investigation sampling. Samples collected on 2/4/2025. US=upstream, DS=downstream, LB=left bank, RB=right bank. Gray rows indicate the samples collected on the 5 tributaries selected for the field investigation.

Sample ID	Latitude	Longitude	*E. coli* Sample Results (colonies/100 mL)	Field Observations
WS-1	29.8619	-95.3350	1870	Sampled from bridge crossing, observed litter US of AU, storm drains on LB and RB
WS-2 T1	29.8649	-95.3485	<100	Observed litter and various debris scattered around site location, appears to be storm water drain US, apartment complex nearby
WS-3	29.8712	-95.3546	1210	Woody debris under bridge, appears to be outfall pipe on LB
WS-4	29.8752	-95.3613	960	Sample under bridge, two flowing outfalls on RB, another outfall on US LB
WS-5	29.8797	-95.3711	730	Litter under bridge on LB, chickens with free access to water body on RB, two outfalls on RB, stray dogs seen walking on RB
WS-6 T2	29.8800	-95.3769	5,730	Chickens with free access to tributary, sample taken near outfall pipe, litter observed
WS-7	29.8823	-95.3750	1,090	Originally going to take sample at incoming T3 however inaccessible due to steep banks, took sample at main AU near outfall on LB, debris in water body, stray dogs observed
WS-8	29.8866	-95.3801	860	Mound of tree debris
WS-9 T4	29.8882	-95.3784	1,890	Outfall on RB
WS-10 T5	29.8978	-95.3861	<100	Three outfalls on LB and RB, sewage smell while walking along tributary, dead hawk on bank where sample was taken
WS-11	29.8946	-95.3946	970	Outfall on LB and RB.
WS-12 T6	29.8937	-95.3431	N/A	Dry tributary, did not sample, litter nearby and outfall pipe on tributary
WS-13 T7	29.8921	-95.3971	3,150	Bucket sample, outfall pipe on RB, tires on RB, snapping turtle in water
WS-14	29.8895	-95.3982	N/AN/A	Pathway to sample site was inaccessible, did not sample
WS-15 T8	29.8957	-95.4086	<100	Leaf litter in water body where sample was taken
WS-16	29.8896	-95.4088	N/A	Site inaccessible, did not sample
WS-17 T9	29.8955	-95.4131	8,300	Outfalls on LB and RB, litter scattered throughout site
WS-18	29.8928	-95.4226	6,370	Shallow water on main AU, observed ditch that was inaccessible but flowing into main AU where ambient sample was taken
WS-19 T10	29.8956	-95.4249	100	Litter at sample site including vehicle part DS, storm water drain where sample was taken and sheen on water body
WS-20	29.8928	-95.4247	54,800	Outfall pipes on LB and RB DS from where sample was taken, litter on RB
WS-21 T11	29.8927	-95.4299	>242,000	Sampled under bridge near culverts, observed small WWTF US
WS-22	29.8970	-95.4313	410	Outfall observed to be sealed off by mud, litter and debris at site

Sample ID	Latitude	Longitude	*E. coli Sample Results (colonies/100 mL)*	Field Observations
WS-23 T12	29.8969	-95.3412	100	Tributaries drainage area into main AU is concrete
WS-24	29.9001	-95.4494	310	Possible homeless encampment on RB under bridge
WS-25	29.9024	-95.4466	410	Shallow under bridge where sample was taken, sewage smell, outfalls on LB and RB, tires scattered throughout site
WS-26 T13	29.9045	-95.3425	840	Two outfalls on RB near where sample was taken
WS-27 T14	29.8984	-95.3441	5,120	Two outfalls just before culvert opening on US from where sample was taken, turtles in water body
WS-28	29.8992	-95.3445	100	Outfalls on LB and RB US of sample location, litter scattered throughout site, observed sealed outfall US
WS-29 T15	29.8987	-95.3432	<100	Homeless encampment under bridge, litter observed, culvert opening next to homeless encampment
WS-30 T16	29.9079	-95.3430	<100	Two outfalls DS, culvert openings US, observed some litter nearby and turtles
WS-31	29.9104	-95.3443	<100	Sheen on water surface, observed outfall pipe on US LB, WWTF on LB

Field Investigation

Methods

The purpose of the FI is to identify direct sources of elevated bacteria to refer to local jurisdictions. The FI is an intensive survey where a team of two walk the water body starting at the downstream most accessible point (in an effort to minimize disturbance) and proceed upstream, collecting bacteria samples from sources flowing into the segment. All samples were collected during dry-weather conditions with no significant rainfall within the watershed at least 72 hours prior to sampling. Direct samples were collected from sources (non-submerged pipe or outfall with enough water flowing to collect a direct water sample) whenever possible but all other source types were reported as follows:

- Submerged Source (partially or fully submerged source in the receiving water body but with enough water to reach sample arm/bottle as far in as possible to get a sample)
- Earthen Ditch (ditch flowing into main tributary with enough water to reach sample arm/bottle as far upstream as possible to get sample)
- Mixing Zone (if outfall, pipe, or ditch does not have enough water to get a sample and must be taken in the downstream mixing zone)
- Ambient Sample (sample taken without a specific point source or to better characterize the spatial bacteria concentration)

Samples were labeled with a P (pipe) when a specific source could be associated with bacteria results and with an A (ambient) when a specific source could not be identified. Samples designated with a U (upstream) include those that were collected directly upstream of a mixing zone or submerged sample source to compare bacteria results. For all field investigations latitude, longitude, inner diameter (in), pipe material, water depth (in) inside the outfall, site conditions, and photos were collected utilizing the ArcGIS Survey 123 application.

Results

Tributaries 11 and 2 were investigated on February 27th, 2025, four days after significant rainfall within the watershed and Tributaries 14, 9, and 7 were investigated on March 18th, 2025, fourteen days after significant rainfall. Field staff walked approximately 6.06 miles and collected a total of 94 samples across all five tributaries (Figure 5). Nineteen referrals were made to proper authorities with E. *coli* values ranging from 2,110 colonies/100mL to >242,000 colonies/100mL. All samples collected are listed in tables by tributary with referral sites highlighted in gray.

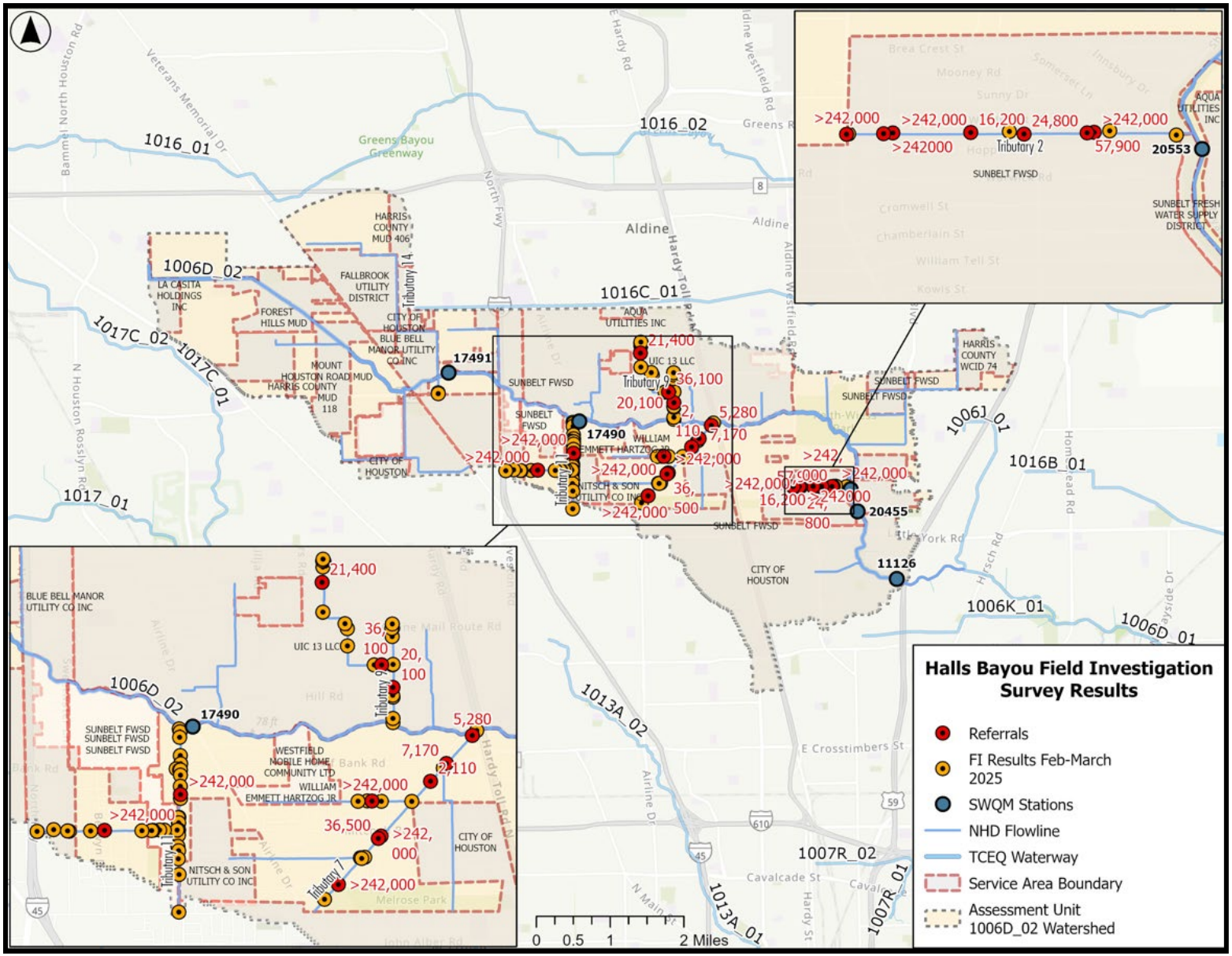

Figure 5. Halls Bayou (1006D_02) field investigation survey results.

Tributary 11

The initial access point on tributary 11 featured a small WWTF in Pine Oak Mobile Home Community. Tributary 11 is located around 3 main service area boundaries: Sunbelt FWSD, City of Houston, and NITSCH & Son Utility Co., Inc. There are various clusters of permitted and non-registered OSSFs in this area. An active SWQM station, 17490, is located to the east of the sampling location on the main AU. Field staff made their way down into the water body and took their first sample in front of two culvert openings before beginning their extended walk. A total of 38 samples were collected (Figure 6 and Table 2). Of the samples collected, 26 reflected a bacteria level greater than the primary contact recreation single sample criterion of 399 colonies/100 mL. Although these samples were all higher than the single sample criterion, there were only two locations (FI-T11-11P and FI-T11-31P) that were recommended for further investigation as they had the highest bacteria levels seen for this tributary. Areas suggested for further investigation are detailed in the Referrals to Local Jurisdictions section of the report.

For each of the tributaries, field staff took ambient samples at the initial access points as close to the previous WS sample as possible to compare results and to note whether there were any significant changes. For Tributary 11, the *E. coli* levels seen for sample FI-T11-01A (77,000 colonies/100mL) decreased from the previous sample WS-21 (>242,000 colonies/100 mL) but was still well above the single sample criterion.

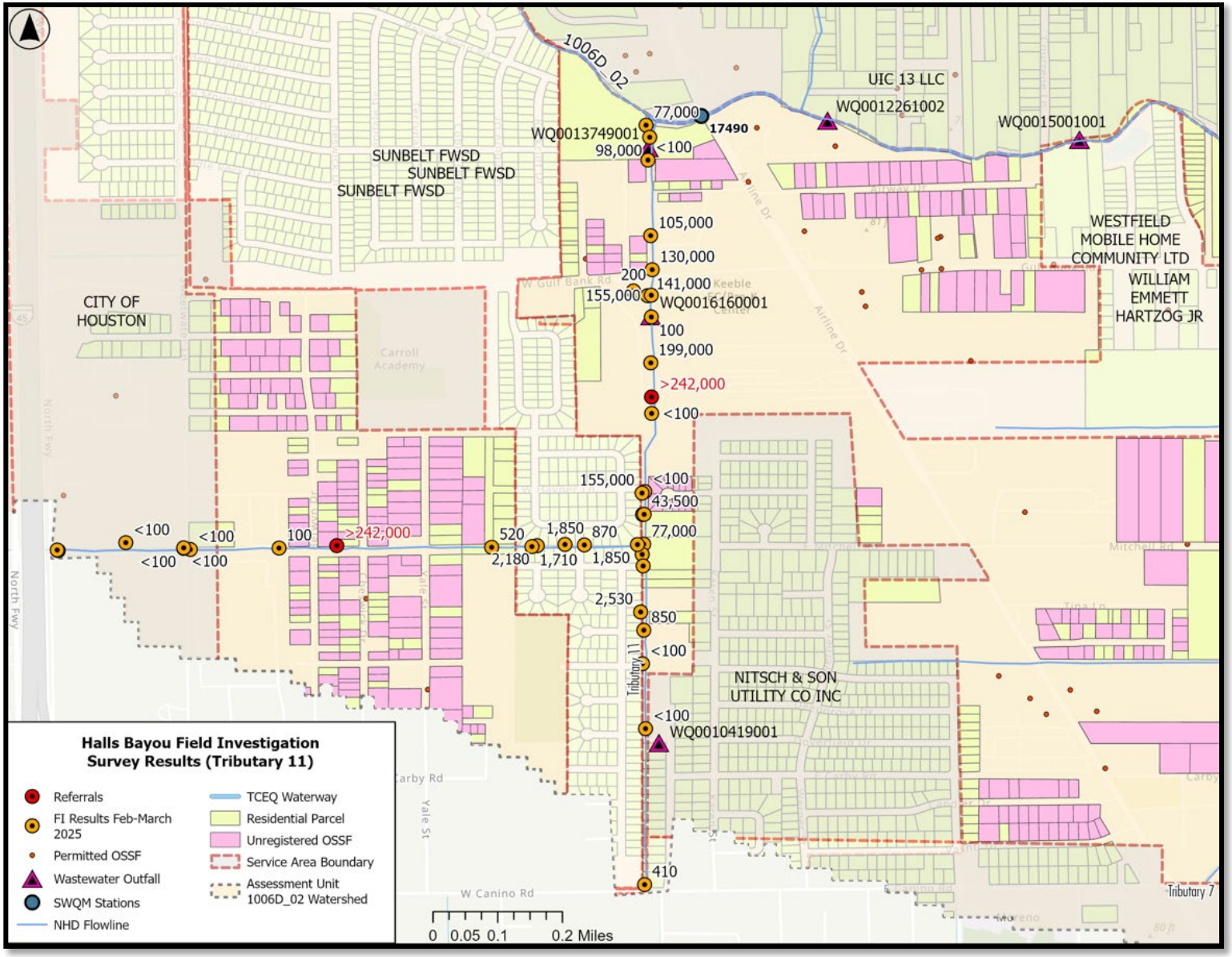

Figure 6. Tributary 11 field investigation results from 2/27/2025 on Halls Bayou (1006D_02).

Table 2. Field investigation bacteria results from tributary 11 sampled on 2/27/2025 on Halls Bayou (1006D_02). Referrals are highlighted in gray. US=upstream, DS=downstream, LB=left bank, RB=right bank.

Sample ID	Source Type	Latitude	Longitude	Bank	*E. coli* Sample Results (colonies/100 mL)	Comments
FI-T11-01A	Ambient	29.8926	-95.3983	-	77,000	Ambient sample DS of WWTF in front of two culvert openings, litter scattered throughout
FI-T11-02A	Ambient	29.8923	-95.3982	-	98,000	Ambient sample US of two concrete culverts, observed what appeared to be flowing water inside but could not reach it, potential source in between two concrete culverts
FI-T11-03P	Direct	29.8918	-95.3982	Left	<100	Sample taken directly from flowing outfall
FI-T11-04P	Mixing Zone	29.8901	-95.3982	Left	105,000	Sample taken near metal outfall pipe, slight flow of water, not enough for direct sample
FI-T11-05A	Ambient	29.8894	-95.3981	-	130,000	Ambient sample taken DS of 4 concrete outfall pipes that were not flowing
FI-T11-06P	Submerged	29.8889	-95.3986	Left	200	Concrete pipe partially submerged inside culvert opening
FI-T11-07A	Ambient	29.8888	-95.3982	-	141,000	Ambient sample taken US of culvert opening
FI-T11-08P	Mixing Zone	29.8888	-95.3982	Left	155,000	Took sample below slightly flowing outfall pipe, water depth < 0.25 inch in pipe
FI-T11-09P	Direct	29.8883	-95.3982	Left	100	Water depth < 0.25 inch in pipe, direct sample from flowing outfall
FI-T11-10A	Ambient	29.8873	-95.3982	-	199,000	Ambient sample taken near ditch within trib.
FI-T11-11P	Mixing Zone	29.8865	-95.3982	Right	>242,000	Sample taken below ditch coming into tributary, designated as mixing zone
FI-T11-12P	Direct	29.8862	-95.3982	Left	<100	Direct sample, water depth < 0.25 inch in pipe
FI-T11-13P	Submerged	29.8844	-95.3983	Right	<100	Outfall partially submerged, water depth < 0.25 inch in pipe
FI-T11-14U	Ambient	29.8844	-95.3984	-	155,000	Ambient sample taken upstream from outfall sample 13
FI-T11-15P	Mixing Zone	29.8839	-95.3984	Left	64,900	Sampled in mixing zone, water depth < 0.25 inch in pipe
FI-T11-16A	Ambient	29.8839	-95.3983	-	43,500	Ambient sample taken within trib. just near sample 15
FI-T11-17A	Ambient	29.8832	-95.3983	-	77,000	Ambient sample taken DS of side channel at “T”
FI-T11-18P	Mixing Zone	29.8830	-95.3984	Left	54,800	Concrete pipe slightly dripping, unable to take direct sample, water depth < 0.25 inch in pipe
FI-T11-19P	Mixing Zone	29.8828	-95.3983	Left	30,800	Unable to take direct sample, water depth < 0.25 inch in pipe
FI-T11-20A	Ambient	29.8817	-95.3984	-	2,530	Ambient sample taken DS of tree debris blockage along concrete lined trib.

Sample ID	Source Type	Latitude	Longitude	Bank	*E. coli* Sample Results (colonies/100 mL)	Comments
FI-T11-21P	Mixing Zone	29.8813	-95.3983	Left	850	Sampled in mixing zone, water depth < 0.25 inch in pipe
FI-T11-22P	Direct	29.8806	-95.3984	Left	<100	Observed riparian growth and mud just in front of pipe that blocked flow to main trib. so designated as direct sample collection
FI-T11-23P	Direct	29.8791	-95.3983	Right	<100	Direct sample from high flow outfall
FI-T11-24P	Mixing Zone	29.8756	-95.3983	-	410	Sampled DS from flowing outfall, water hitting mud and flowing back in
FI-T11-25A	Ambient	29.8832	-95.3985	-	1,850	Ambient sample taken within incoming trib., concrete lined ditch
FI-T11-26A	Ambient	29.8832	-95.3997	-	870	Ambient sample taken just before culvert openings underneath bridge
FI-T11-27A	Ambient	29.8832	-95.4001	-	1,850	Ambient sample taken near culvert openings
FI-T11-28P	Mixing Zone	29.8832	-95.4007	Left	2,180	Sampled in mixing zone, water depth < 0.25 inch in pipe
FI-T11-29U	Ambient	29.8832	-95.4008	-	1,710	Sample taken US from sample 28
FI-T11-30P	Direct	29.8832	-95.4017	Right	520	Direct sample taken from outfall
FI-T11-31P	Direct	29.8832	-95.4052	Left	>242,000	Direct sample taken from outfall, water depth < 0.25 inch in pipe
FI-T11-32P	Direct	29.8832	-95.4065	Right	100	Direct sample taken from large outfall, water depth < 0.25 inch in pipe, shopping cart nearby
FI-T11-33P	Submerged	29.8831	-95.4085	Right	<100	Partially submerged outfall, outfall was partially crushed so diameter may not be accurate
FI-T11-34A	Earthen Ditch	29.8831	-95.4086	Right	<100	Sampled RB ditch next to two culvert openings
FI-T11-35A	Earthen Ditch	29.8832	-95.4086	Left	<100	Sampled LB from flowing earthen open top ditch
FI-T11-36P	Mixing Zone	29.8833	-95.4099	Left	<100	Took sample from mixing zone of two submerged outfalls, first sample pipe measurement was 54 in, second pipe was 24 in., unable to take water depth
FI-T11-37A	Ambient	29.8831	-95.4114	Right	10,200	Trib. goes underground into culvert from here, sample taken from RB within culvert
FI-T11-38A	Ambient	29.8831	-95.4114	Left	10,500	Trib. goes underground into culvert from here, sample taken from LB from within culvert

Tributary 2

Tributary 2's initial access point was at the most downstream location before an outfall leading out to the main AU. A historical SWQM station, 20553, is located to the east of the first sampling location on the main AU, and a permitted WWTF is observed upstream (Figure 7). A considerable amount of litter was observed in the outfall near where field staff collected the first sample. A total of 11 samples were collected (Table 3). Field staff noted that throughout this survey, multiple PVC pipes with water flowing into the tributary were observed coming from residential properties. This tributary falls within the Sunbelt FWSD service area boundary, and it appears that the tributary does not directly intersect with permitted and non-registered OSFFs.

Of the samples collected, 9 reflected a bacteria level greater than the primary contact recreation single sample criterion of 399 colonies/100 mL. Seven locations were recommended for further investigation as they had the highest bacteria levels seen for this tributary. Areas suggested for further investigation are detailed in the Referrals to Local Jurisdictions section of the report.

For comparison, the ambient sample, FI-T2-39A, collected during the field investigation *E. col*i result was 1,080 colonies/100 mL, while the ambient sample collected at approximately the same location during the WS, WS-6, had a result of 5,730 colonies/100 mL.

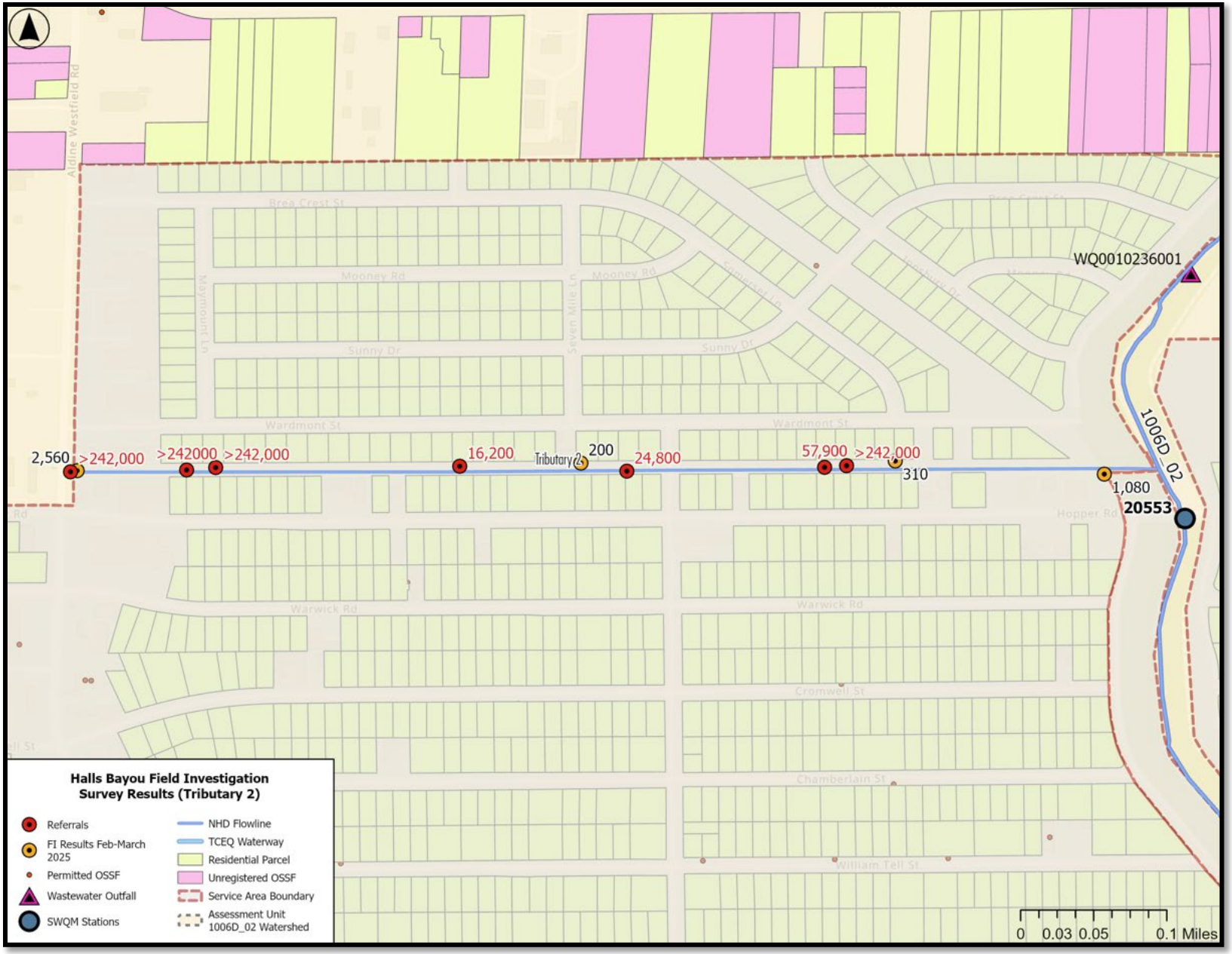

Figure 7. Tributary 2 field investigation results from 2/27/2025 on Halls Bayou (1006D_02).

Table 3. Field investigation bacteria results from tributary 2 sampled on 2/27/2025 on Halls Bayou (1006D_02). Referrals are highlighted in gray. US=upstream, DS=downstream, LB=left bank, RB=right bank.

Sample ID	Source Type	Latitude	Longitude	Bank	*E. coli* Sample Results (colonies/100 mL)	Comments
FI-T2-39A	Ambient	29.8800	-95.3447	-	1,080	Ambient sample at most DS location before outfall to Halls Bayou
FI-T2-40P	Direct	29.8801	-95.3468	Left	310	Direct sample at metal outfall on LB, DS of this sample and before sample 39 smelled strongly of manure and saw dead chicken
FI-T2-41P	Direct	29.8800	-95.3473	Right	>242,000	Black pipe from property on RB, two pipes leaking from property and water carried down by sampled pipe, strong sewer smell in air, water depth < 0.25 inch in pipe
FI-T2-42P	Direct	29.8800	-95.3475	Right	57,900	Two white plastic pipes from property on right bank slowly leaking, sample taken at one leaking faster on the right, 3 more personal pipes from properties passed on way to next road but they were dry, water depth < 0.25 inch in pipe
FI-T2-43P	Earthen Ditch	29.8800	-95.3495	Right	24,800	Water flowing down RB from fence on property, can't see a pipe but designated as P, water depth < 0.25 inch
FI-T2-44P	Direct	29.8801	-95.3500	Left	200	Sample from metal outfall on LB, pipe kind of crushed
FI-T2-45P	Direct	29.8800	-95.3512	Left	16,200	White PVC pipe from property on LB, water depth < 0.25 inch in pipe but water accumulating in depression on bank below pipe
FI-T2-46P	Direct	29.8800	-95.3536	Left	>242,000	PVC pipe from property on LB, two pipes stacked on top of each other but bottom one is flowing, water depth < 0.25 inch in pipe
FI-T2-47P	Direct	29.8800	-95.3539	Right	>242,000	PVC pipe from property on RB, water depth < 0.25 inch in pipe
FI-T2-48P	Direct	29.8800	-95.3550	Left	2,560	Sample from outfall on LB at start of trib. at Aldine Westfield, possibly homeless encampment in US concrete culvert under bridge
FI-T2-49P	Submerged	29.8800	-95.3551	Right	>242,000	Sampled from outfall on RB at start of trib. at Aldine Westfield, larger outfall slightly crushed

Tributary 14

Sample collection for tributary 14 was at a singular area, featuring four samples in total (Figure 8 and Table 4). The initial sample obtained was an ambient grab just downstream of three outfalls located near the property of Vida City Church. Field staff took note of the stagnant water and what appeared to be an oil sheen on the water's surface. Due to the prioritization of the other four tributaries based on their significantly higher *E. coli* levels, no referrals were recommended for tributary 14 at this time. All samples had bacteria results greater than the primary contact recreation single sample criterion of 399 colonies/100 mL.

Figure 8. Tributary 14 field investigation sampling locations of 3 outfall pipes sampled on 3/18/2025.

Table 4. Field investigation bacteria results from tributary 14 sampled on 3/18/2025 on Halls Bayou (1006D_02). Referrals are highlighted in gray. US=upstream, DS=downstream, LB=left bank, RB=right bank.

Sample ID	Source Type	Latitude	Longitude	Bank	*E. coli* Sample Results (colonies/100 mL)	Comments
FI-T14-01A	Ambient	29.8984	-95.4247	-	1,210	Ambient sample DS of three outfalls, sheen on water, water stagnant
FI-T14-02P	Submerged	29.8983	-95.4247	Right	520	Submerged outfall on RB, water stagnant
FI-T14-03P	Submerged	29.8983	-95.4247	Left	860	Took sample from outfall on LB, water stagnant
FI-T14-04P	Submerged	29.8982	-95.4247	-	860	Took sample from within middle outfall, bank location is non-applicable, water stagnant

Tributary 9

Tributary 9 flows into Halls Bayou approximately 0.53 mi west of Hardy Toll Road and continues upstream (northwest) past Aldine Mail Route Road for 1.40 mi. A total of 24 samples were collected with *E. coli* results ranging from less than 100 colonies/100mL to 51,700 colonies/100mL (Figure 9 and Table 5). Two referrals are recommended for this tributary, both were samples collected directly from pipes. The field staff noted an oil sheen in the tributary near site FI-T9-12P and a white film on the surface with a strong sewage smell at FI-T9-05P. The third referral (FI-T9-20A) was collected from an earthen ditch where field staff observed a horse stable on the left bank. Although one sample (FI-T9-03A) had the highest bacteria levels in this tributary, it was not recommended for referral since it was an ambient sample taken with no observed sources nearby. This tributary is located in the Aldine Village residential area in the UIC 13 LLC (Utilities Investment) service area boundary.

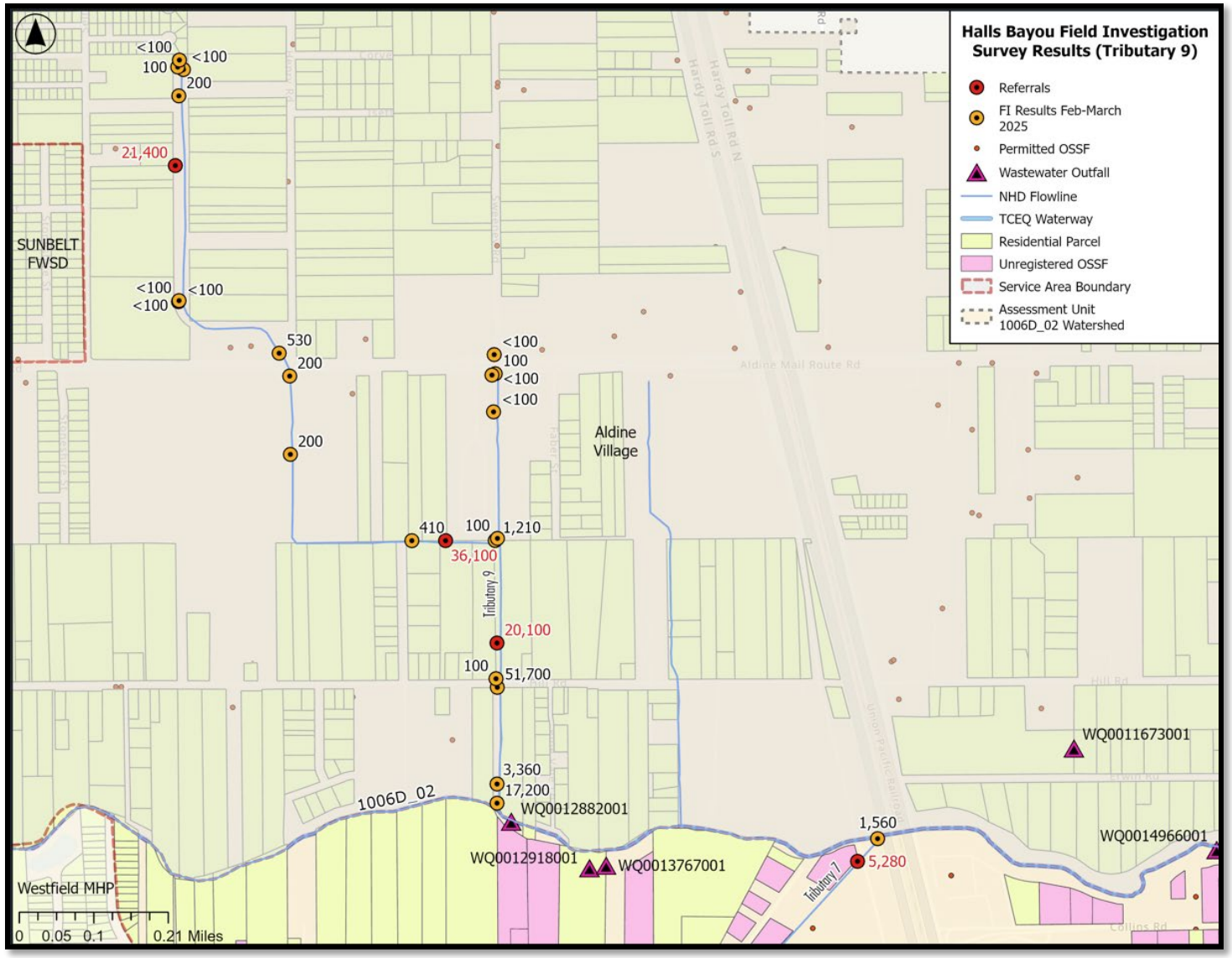

Figure 9. Tributary 9 field investigation results from 3/18/2025 on Halls Bayou (1006D_02).

Table 5. Field Investigation results from tributary 9 sampled on 3/18/2025 on Halls Bayou (1006D_02). Referrals are highlighted in gray. US=upstream, DS=downstream, LB=left bank, RB=right bank.

Sample ID	Source Type	Latitude	Longitude	Bank	*E. coli* Sample Results (colonies/100 mL)	Comments
FI-T9-01A	Ambient	29.8932	-95.3785	-	17,200	Ambient sample within trib., observed flow, construction vehicle on LB
FI-T9-02P	Direct	29.8936	-95.3785	Right	3,360	Took sample from outfall on RB with trickling water flow
FI-T9-03A	Ambient	29.8955	-95.3785	-	51,700	Took ambient sample DS of bridge, metal debris in trib.
FI-T9-04P	Direct	29.8957	-95.3785	Right	100	Sample was taken from outfall with trickling flow, US bridge on RB, water depth < 0.25 inch in pipe
FI-T9-05P	Direct	29.8964	-95.3785	Right	20,100	Direct sample from outfall that had white film within, sewage smell originating from outfall, LB has wooden and metal shacks with horses, horses also observed on RB
FI-T9-06A	Ambient	29.8985	-95.3785	-	1,210	Ambient sample, appears that during storm flow water velocity is scouring LB
FI-T9-07A	Ambient	29.8986	-95.3785	-	100	Took ambient sample in trib. right of previous sample
FI-T9-08P	Direct	29.9012	-95.3786	Right	<100	Took sample from small pool just below outfall pipe, water not flowing and disconnected from main trib., water depth < 0.25 inch in pipe
FI-T9-09P	Submerged	29.9019	-95.3785	Left	<100	Observed 4 culverts, sample location was at left culvert, took sample inside and from mouth of side culvert, stagnant water at the mouth of culvert
FI-T9-10P	Submerged	29.9019	-95.3786	Right	<100	Took sample from within culvert on RB at same overall location as previous sample, culvert did not extend underneath road
FI-T9-11P	Submerged	29.9023	-95.3785	Left	<100	Sampled from side culvert on LB US of previous sample location, observed bones in trib.
FI-T9-12P	Direct	29.8985	-95.3795	Left	36,100	Took sample from outfall with trickling water flow, observed oil sheen in trib., water depth < 0.25 inch in pipe
FI-T9-13A	Ambient	29.8985	-95.3802	Right	410	Took ambient sample in what appeared to be a pool within trib., observed pvc pipe on RB near resident homes but no flow
FI-T9-14A	Ambient	29.9003	-95.3827	-	200	Took ambient sample at pool within trib., soccer field on RB, construction property on LB, observed surface scum
FI-T9-15A	Ambient	29.9019	-95.3827	-	200	Location at intersection of Aldine Mail Rte. Rd and Henry Rd, sampled from just outside of culvert, film/surface scum pooling at sample point, DS of bridge where there are multiple culverts
FI-T9-16A	Ambient	29.9024	-95.3829	-	530	Took ambient sample in pool within trib. US of previous sample location on other side of road, extreme amount of dirt, litter and debris blocking culvert
FI-T9-17P	Direct	29.9034	-95.3850	Right	<100	Sample location had 3 outfall pipes all flowing, took sample from left most pipe on RB
FI-T9-18P	Direct	29.9034	-95.3850	Right	<100	Took sample from middle outfall at same location as previous sample point
FI-T9-19P	Direct	29.9034	-95.3850	Right	<100	Took direct sample from right most outfall from previous location, detention basin on RB, observed ducks, note for detention basin applies to samples 17 and 18
FI-T9-20A	Earthen Ditch	29.9062	-95.3850	Right	21,400	Sampled from earthen ditch, flow was slightly trickling, observed horse on LB near sample point, feces on RB, designated as ambient due to specific source not seen

Sample ID	Source Type	Latitude	Longitude	Bank	*E. coli* Sample Results (colonies/100 mL)	Comments
FI-T9-21P	Mixing Zone	29.9076	-95.3850	Right	200	Sampled in pool of trib. just below moist outfall pipe
FI-T9-22A	Ambient	29.9081	-95.3849	-	<100	Trib. splits off into another unnamed trib. on LB, took ambient sample
FI-T9-23P	Submerged	29.9082	-95.3850	Right	100	Took sample at mouth of outfall, water is stagnant, RB of trib. where previous sample was taken
FI-T9-24P	Submerged	29.9083	-95.3850	-	<100	Sampled from partially submerged outfall at US location of trib.

Tributary 7

Tributary 7 flows into Halls Bayou near Hardy Toll Road and continues upstream (southwest) near Airline Drive for approximately 1.46 mi. A total of 17 samples were collected with *E. coli* results ranging from less than 100 colonies/100mL to > 242,000 colonies/100mL (Figure 10 and Table 6). Out of all samples collected, there are a total of 7 referrals. All referrals were samples collected directly from pipes ranging from 2 inches to 72 inches in diameter with ≤ 0.25 inches of water flowing out. This tributary does not intersect with any service area boundaries and flows through residential parcels with potentially unregistered OSSF.

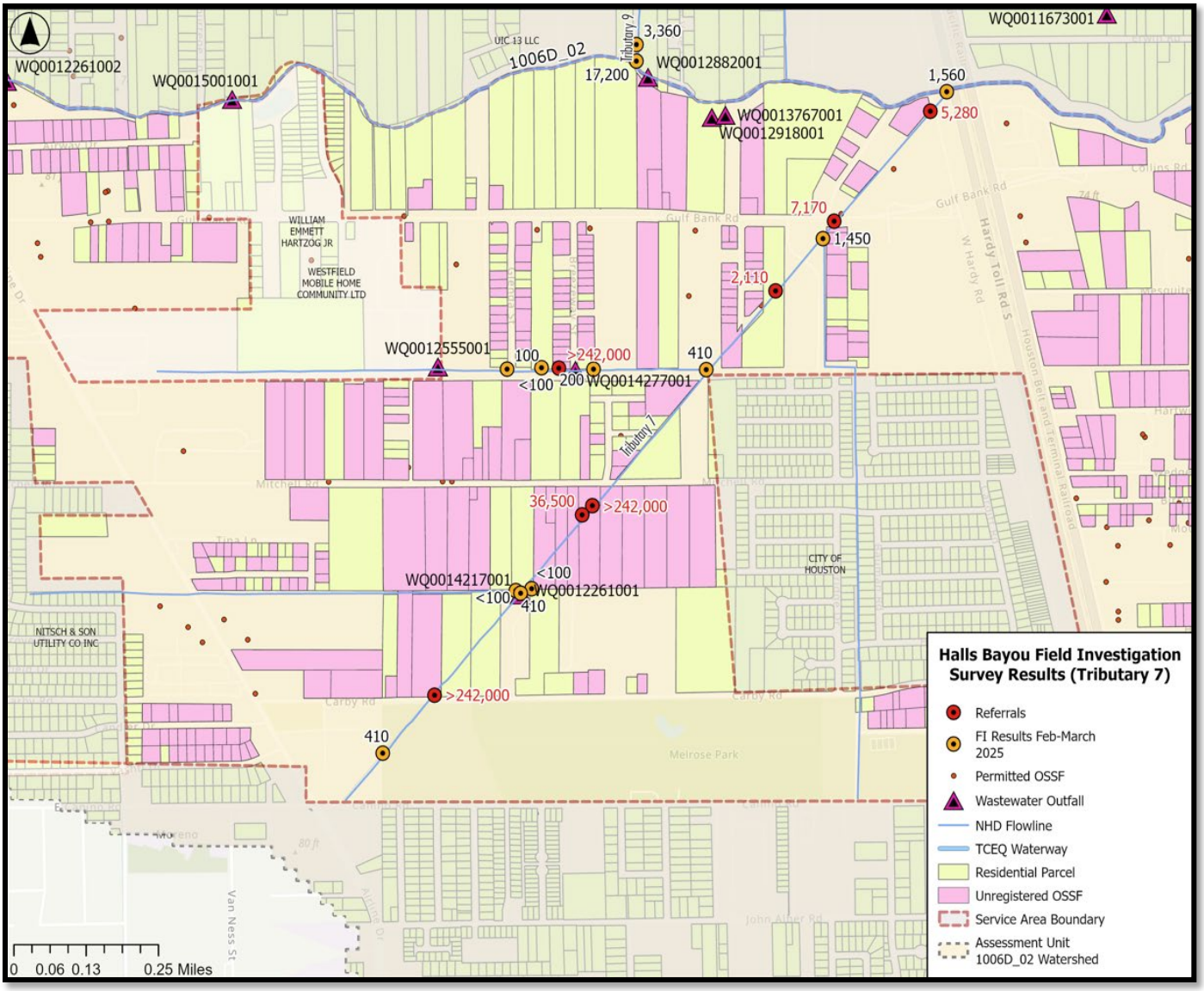

Figure 10. Tributary 7 field investigation results from 3/18/2025 on Halls Bayou (1006D_02).

Table 6. Field investigation bacteria results from tributary 7 sampled on 2/27/2025 on Halls Bayou (1006D_02). Referrals are highlighted in gray. US=upstream, DS=downstream, LB=left bank, RB=right bank.

Sample ID	Source Type	Latitude	Longitude	Bank	*E. coli* Sample Results (colonies/100 mL)	Comments
FI-T7-01A	Ambient	29.8925	-95.3707	-	1,560	Ambient sample at start of trib.
FI-T7-02P	Direct	29.8920	-95.3711	Right	5,280	Direct sample from corrugated pipe, slight sheen on water, water depth < 0.25 inch in pipe
FI-T7-03P	Direct	29.8894	-95.3735	Left	7,170	Pipe US of bridge with bottom fallen out but has water dripping out, water depth < 0.25 inch in pipe, chicken with access to water on RB
FI-T7-04A	Earthen Ditch	29.8890	-95.3738	Right	1,450	Sample taken about 3 meters into trib.on RB
FI-T7-05P	Direct	29.8878	-95.3750	Left	2,110	Water depth < 0.25 inch in pipe
FI-T7-06A	Earthen Ditch	29.8859	-95.3767	Left	410	Sample taken about 3 meters in trib. on LB
FI-T7-07P	Direct	29.8827	-95.3796	Left	>242,000	Water depth < 0.25 inch in pipe; pipe located further up the bank but is trickling with water into tributary
FI-T7-08P	Direct	29.8825	-95.3798	Left	36,500	Water depth < 0.25 inch in pipe, small pipe located further up the bank but trickling water into main trib
FI-T7-09P	Direct	29.8807	-95.3811	Right	<100	Pipe at end of ditch on RB
FI-T7-10A	Earthen Ditch	29.8807	-95.3815	Left	410	Sample taken about 5 meters into ditch
FI-T7-11P	Direct	29.8806	-95.3814	Right	<100	Direct sample taken from pipe located on bank but flowing into tributary
FI-T7-12P	Direct	29.8782	-95.3835	Right	>242,000	Water coming from pipe is blue and smells like cleaning solution and toilet; water flowing out < 0.25 inch
FI-T7-13A	Ambient	29.8768	-95.3848	-	410	Can't continue walking US due to fence, trib. goes underground into culvert from here; took ambient sample as far into concrete culvert as we could reach
FI-T7-14P	Direct	29.8859	-95.3796	Left	200	Discharging a white soapy smelling liquid, water depth less than 0.25 inch
FI-T7-15P	Direct	29.8859	-95.3804	Left	>242,000	< 0.25 inch water in pipe
FI-T7-16P	Direct	29.8859	-95.3809	Left	<100	Pipe dripping slowly into a pool that flows into the trib., direct water sample, < 0.25 inch water in pipe
FI-T7-17A	Ambient	29.8859	-95.3817	-	100	Trib continues US, ambient sample taken at the end of the sampling day

Referrals to Local Jurisdictions

While many of the FI samples exhibited elevated bacteria levels, the sites recommended for referral were determined to be the likely sources of highest bacteria pollution and therefore the priority for further investigation. Nineteen sites are recommended for referrals to the appropriate jurisdiction for further investigation and are itemized herein (Table 7).

Table 7. List of Referrals by local jurisdiction

Sample ID	Source Type	Latitude	Longitude	Jurisdiction
FI-T11-11P	Mixing Zone	29.8865	-95.3982	Airline Improvement District
FI-T11-31P	Direct	29.8832	-95.4052	Airline Improvement District
FI-T2-41P	Direct	29.8800	-95.3473	East Aldine Management District
FI-T2-42P	Direct	29.8800	-95.3475	East Aldine Management District
FI-T2-43P	Earthen Ditch	29.8800	-95.3495	East Aldine Management District
FI-T2-45P	Direct	29.8800	-95.3512	East Aldine Management District
FI-T2-46P	Direct	29.8800	-95.3536	East Aldine Management District
FI-T2-47P	Direct	29.8800	-95.3539	East Aldine Management District
FI-T2-49P	Submerged	29.8800	-95.3551	East Aldine Management District
FI-T9-05P	Direct	29.8964	-95.3785	Airline Improvement District
FI-T9-12P	Direct	29.8985	-95.3795	Airline Improvement District
FI-T9-20A	Earthen Ditch	29.9062	-95.3850	N/A
FI-T7-02P	Direct	29.8920	-95.3711	N/A
FI-T7-03P	Direct	29.8894	-95.3735	Airline Improvement District
FI-T7-05P	Direct	29.8878	-95.3750	Airline Improvement District
FI-T7-07P	Direct	29.8827	-95.3796	Airline Improvement District
FI-T7-08P	Direct	29.8825	-95.3798	Airline Improvement District
FI-T7-12P	Direct	29.8782	-95.3835	Airline Improvement District
FI-T7-15P	Direct	29.8859	-95.3804	Airline Improvement District

Referral site: FI-T11-11P

Sample FI-T11-11P (>242,000 colonies/100 mL) was collected in the mixing zone below a ditch with little flow coming into Tributary 11 on the right bank (Figure 11). The ditch appeared to be stemming from under metal fences which, upon further inspection were determined to be surrounded by properties featuring a livestock area and Sunny Flea Market at 8705 Airline Drive. This location was just downstream from a bridge crossing with three culvert openings.

Figure 11. Referral Site FI-T11-11P. Map showing proximity to livestock area, Sunny Flea Market, and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T11-31P

This sample was collected directly from the upper flowing PVC pipe on the left bank of the Unnamed Tributary of Halls Bayou between Berwyn and Cheswick Drive (Figure 12). This pipe is five inches in diameter with < 0.25 inches of water within the pipe at the time of sample collection. Bacteria results from this pipe had a value of >242,000 colonies/100mL. This neighborhood was noted during the desktop review to feature both permitted and non-registered OSSF.

Figure 12. Referral Site FI-T11-31P. Map showing proximity to residential neighborhood and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T2-41P

This was a direct sample taken from a four-inch black plastic corrugated pipe on the right bank of the Unnamed Tributary of Halls Bayou (Figure 13). Two pipes were observed leaking from the property, with the water carried down by the sampled pipe with a water depth < 0.25 inches. Field staff noted a potent sewer smell in the air. This sample had a bacteria value of >242,000 colonies/100 mL.

Figure 13. Referral Site FI-T2-41P. Map showing proximity to residential neighborhood and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T2-42P

The location for this sample featured two white plastic pipes on the right bank (Figure 14). Field staff only collected a sample from the pipe on the right due to an insufficient amount of sampleable water flowing from the left pipe. There was a significant amount of roots surrounding the pipe. This sample had a bacteria value of 57,900 colonies/100 mL and was approximately 21.62 meters upstream from referral site FI-T2-41P. Field staff noted that they passed three more small diameter (approximately 4 inch or less) pipes from residential properties on the way to the next sample location, however, they were all dry.

Figure *14. Referral Site FI-T2-42P. Map showing proximity to residential neighborhood and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.*

Referral site: FI-T2-43P

This sample was taken from an open top earthen ditch on the right bank of the Unnamed Tributary of Halls Bayou from a fenced residential property (Figure 15). Field staff noted that a pipe was not observed, and litter was present at the sampling location. The bacteria value at this sample location was 24,800 colonies/100 mL.

Figure 15. Referral Site FI-T2-43P. Map showing proximity to residential neighborhood and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T2-45P

This was a direct sample collected from a small pool of water being held in a depression on the left bank of a slightly flowing four-inch diameter white PVC pipe (Figure 16). This pipe originated from a residential property with a bacteria value of 16,200 colonies/100 mL.

Figure 16. Referral Site FI-T2-45P. Map showing proximity to residential neighborhood, permitted OSSF, businesses and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T2-46P

This was a direct sample from a four-inch PVC pipe on the left bank of the Unnamed Tributary of Halls Bayou (Figure 17). This pipe stemmed from a residential property with two pipes stacked on top of each other, however, only the bottom pipe was flowing. This sample had a bacteria value of >242,000 colonies/100 mL.

Figure 17. Referral Site FI-T2-46P. Map showing proximity to residential neighborhood and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T2-47P

This sample was taken directly from a four-inch white PVC pipe from a residential property on the right bank of the Unnamed Tributary of Halls Bayou with a bacteria value of >242,000 colonies/100 mL (Figure 18). This sample location was 28.32 meters upstream of the previous referral site.

Figure 18. Referral Site FI-T2-47P. Map showing proximity to residential neighborhood, business properties and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T2-49P

Sample FI-T2-49P (>242,000 colonies/100 mL) was a taken from a partially submerged outfall pipe on the right bank at the start of the Unnamed Tributary at Aldine Westfield Road (Figure 19). Another sample was taken from a smaller outfall pipe located on the left bank with a bacteria value of 2,560 colonies/100 mL. This area was just north of the business property featuring a food truck and field staff observed a possible homeless encampment in a concrete culvert under a bridge upstream of the outfalls.

Figure 19. Referral Site FI-T2-49P. Map showing start of tributary, proximity to business property and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T9-05P

Sample FI-T9-05P (20,100 colonies/100 mL) This was a direct sample from a 24-inch outfall pipe on the right bank of the Unnamed Tributary of Halls Bayou (*Figure 20*. Field staff noted a white film inside the pipe and a sewage smell originating from the outfall. This sample point was near wooden and metal shacks that contained horses on the left bank just upstream of the sample location and horses were observed on the right bank. Manufactured homes are present on both banks and towards the east of the sample location there is a large estate featuring a pond in the back.

Figure 20. Referral Site FI-T9-05P. Map showing proximity to horse shacks, manufactured homes, and large estate as well as subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T9-12P

This location is at a point where the Unnamed Tributary of Halls Bayou splits west approximately 370 meters downstream of Aldine Mail Rte. Road (Figure 21). Field staff continued west where they collected a sample directly from the top concrete outfall pipe (36 inches in diameter) on the left bank. The bacteria value of this sample was 36,100 colonies/100 mL. Just north of the sample point, there appeared to be a sizeable property undergoing construction presumably owned by North Houston Pole Line on Aldine Mail Rte. Road. Also, field staff observed an oil sheen in the tributary near the sample location.

Figure 21. Referral Site FI-T9-12P. Map showing proximity to construction property and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T9-20A

Sample FI-T9-20A (21,400 colonies/100 mL) This was an ambient sample taken from overland runoff on the right bank with slightly trickling waterflow (Figure 22). The sample point was located east of Sellers Road just behind what appears to be a mixed-use property.

Figure 22. Referral Site FI-T9-20A. Map showing proximity to surrounding properties and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T7-02P

This pipe was located just upstream of Hardy Street, approximately 75.5 meters upstream of where tributary 7 flows into Halls Bayou (Figure 23). This was a direct sample taken from a 72-inch corrugated pipe on the right bank of the tributary with a bacteria value of 5,280 colonies/100mL. Field staff observed a slight sheen on the water's surface.

Figure 23. Referral Site FI-T7-02P. Map showing tributary 7 and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T7-03P

This was a direct sample taken from a 23 inch slightly crushed metal pipe on the left bank just upstream of a bridge at Gulf Bank Road (Figure 24). This pipe was rusted out on the bottom and had < 0.25 inches of water trickling out. This sample had a bacteria value of 7,170 colonies/100 mL.

Figure 24. Referral Site FI-T7-3P. Map showing proximity to residential property and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T7-05P

Sample FI-T7-05P (2,110 colonies/100 mL) was a direct sample from a corrugated outfall pipe on the left bank of the tributary (Figure 25). The sample location is approximately 78 meters east of Televista Drive behind residential properties and auto sales lots.

Figure 25. Referral Site FI-T7-05P. Map showing proximity to Televista Dr, residential properties, and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T7-07P

Sample FI-T7-07P (>242,000 colonies/100 mL) was directly taken from a pipe with trickling water behind a residential property, approximately 60 meters upstream of Mitchell Road (Figure 26). Based on H-GAC internal datasets, it appears that this sample point is located within a neighborhood that contains unregistered OSSFs.

Figure 26. Referral Site FI-T7-07P. Map showing proximity to residential property and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T7-08P

This sample was a collected on the left bank directly from a pipe with < 0.25 inches of water flowing (Figure 27). The bacteria value of this sample was 36,500 colonies/100 mL. This pipe is located approximately 33.4 meters upstream of the previous referral site (FI-T7-07P) and appears to be stemming from residential properties located in the same neighborhood.

Figure 27. Referral Site FI-T7-08P. Map showing proximity to previous sample FI-T7-07P, residential properties, and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.

Referral site: FI-T7-12P

Sample FI-T7-12P (>242,000 colonies/100 mL) was taken directly from a blue pipe on the right bank of the tributary (Figure 28). Field staff noted that the water flowing out smelled like cleaning solution and sewage. The sample point was located just off Carby Road, approximately 5.0 meters southwest of a property that has a permitted OSSF (197272).

Figure 28. Referral Site FI-T7-12P. Map showing proximity to property with OSSF, neighborhood park, and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line

Referral Site: FI-T7-15P

Sample FI-T7-15P (>242,000 colonies/100 mL) was taken directly from a small pipe on the left bank behind a residential property located on Breezeway Street (Figure 29). A WWTF outfall pipe (permit 14277-001) is located approximately 40.0 meters west/upstream of the sample point just south of what used to be Aldine Oaks Mobile Home Park.

Figure 29. Referral Site FI-T7-15P. Map showing proximity to residential neighborhood, permitted WWTF outfall, closed manufactured *home park, and subset image of tributary view. White arrow indicates direction of flow within the tributary. Blue line indicates tributary line.*

Conclusion

On April 24, 2025, H-GAC met with local jurisdictions to discuss the results of the Targeted Bacteria Monitoring project. During the discussion H-GAC staff presented the results of the project; and brought attention to the referral locations that had particularly high levels of bacteria for tributaries 2, 7, 9, and 11. Based on field observations and staff notes, some of these referral locations are likely raw wastewater (sewage). The City of Houston provided feedback for the delivery of referrals and results in the future, requesting that referrals be provided as an excel file showcasing the referrals and their coordinates. Such a document was provided to them after the April 24th meeting.

Field staff also met internally to discuss recommendations for future Targeted Bacteria Monitoring projects and suggested that stakeholder meetings with local jurisdictions be held after the final report is complete in order to give a more in-depth analysis of the project. Based on sampling results, there is much work to be done for improvement to bring the watershed under the 126 colonies/100 mL recreation use water quality standard for *E. coli.* Once corrections by jurisdictions have been made, a follow-up FI is recommended to measure and document improvements.

H-GAC maintains the on-site sanitary sewage facility permit database that shows permits by age, authorized agent, and the number of on-site sewage facilities per square mile in the Houston-Galveston region. According to the BIG 2022 Annual Report[7], in 2021, there were 57,739 permitted OSSFs and an estimated 124,357 without permits in the BIG project area. East Aldine Management District, Airline Improvement District, and Harris County have already determined several OSSFs to be failing in the Halls Bayou watershed and have utilized grant funding to work towards resolving these issues by installing sanitary sewer service. For example, Harris County and Airline Improvement District provided 45 connections to new sanitary sewer service in 2021 for a total of 321 since 2017 and continue to install sanitary sewer service connections in the Airline region. Additional grant funding will be beneficial to support future corrective actions. H-GAC plans to continue partnering with local jurisdictions to provide specific site locations of outfalls and any other sources affecting the waterbodies during targeted monitoring field investigations.

[7] Bacteria Implementation Group Reports | Houston-Galveston Area Council (H-GAC)