

Targeted Bacteria Monitoring Project

Field Investigation Draft Report

Assessment Unit 1101D_01, Unnamed Tributary of Robinson



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Segment Description

Robinson Bayou is Segment 1101D, is 4.34 km long, and is defined as from the confluence with Clear Creek to 0.53 km upstream of Webster Street in Galveston County (Figure 1). Two assessment units (AU) are included on the segment: AU 1101D_01 is the non-tidal portion of Robinson Bayou, while AU 1101D_02 is the tidal portion. Abilene Street delineates the location where Robinson Bayou becomes tidally influenced. There are three current and historic surface water quality monitoring (SWQM) stations located on this segment: one is located on AU 1101D_01 (station ID: 16486) while two stations are located on AU 1101D_02 (station IDs: 16475 and 16572). This AU has been selected for targeted monitoring due to a bacteria (*Escherichia coli*) seven-year geometric mean of 305.4 MPN/100 mL (H-GAC QAPP, 2022). The AU is listed for exceedances of bacteria in the water (Recreation Use) with an impairment category of 4a and a 5c impairment for dissolved oxygen (Aquatic Life Use) (TCEQ, 2022). The potential sources of bacteria impairments are non-point source pollution, unspecified domestic waste, and urban stormwater (TCEQ, 2022). This AU was monitored previously as part of the FY20-21 Targeted Monitoring Study.

The contributing watershed for this segment is 6 km² (Data source: H-GAC, SWRC, 2023). The soil types in the watershed have medium to very slow infiltration rates (Data source: United States Department of Agriculture Hydrologic Soil Groups from gSSURGO 2016), while the land cover is predominately developed (78.95%) (Data source: National Land Cover Database NLCD 2019). There are not any permitted wastewater outfalls in the watershed (Data source: H-GAC). There are 683 documented permitted and 41 documented unpermitted on-site sewage facilities (OSSF) within the watershed (Data source: H-GAC).

Background

Clean Rivers Program (CRP) routine monitoring data are analyzed each year as part of the Houston-Galveston Area Council (H-GAC) Basin Summary/Basin Highlights Report process. Bacteria continues to be the most prevalent pollutant in the H-GAC CRP Basins (H-GAC, 2022). The Bacteria Implementation Group (BIG), formed in 2008, oversees the Total Maximum Daily Load (TMDL) Implementation Plan (I-Plan). The BIG requested that H-GAC produce a list of the water bodies with the highest bacteria concentrations in the BIG project area and conduct targeted monitoring to identify potential bacteria sources.

Houston-Galveston Area Council, using information from previous Basin Highlights/Summary Reports, BIG annual reports, and previous targeted monitoring efforts, identified and selected waterways for targeted bacteria monitoring to refine our understanding of the spatial distribution of elevated bacterial concentrations contributing to these waterways. Phase 1 of this targeted monitoring project includes an intensive desktop review of the most up to date imagery available and compilation of data from field investigations (FI) conducted in 2021.

Phase 2 of this targeted monitoring project includes a FI of the entire AU conducted during dry conditions where all flowing point and non-point sources are evaluated.

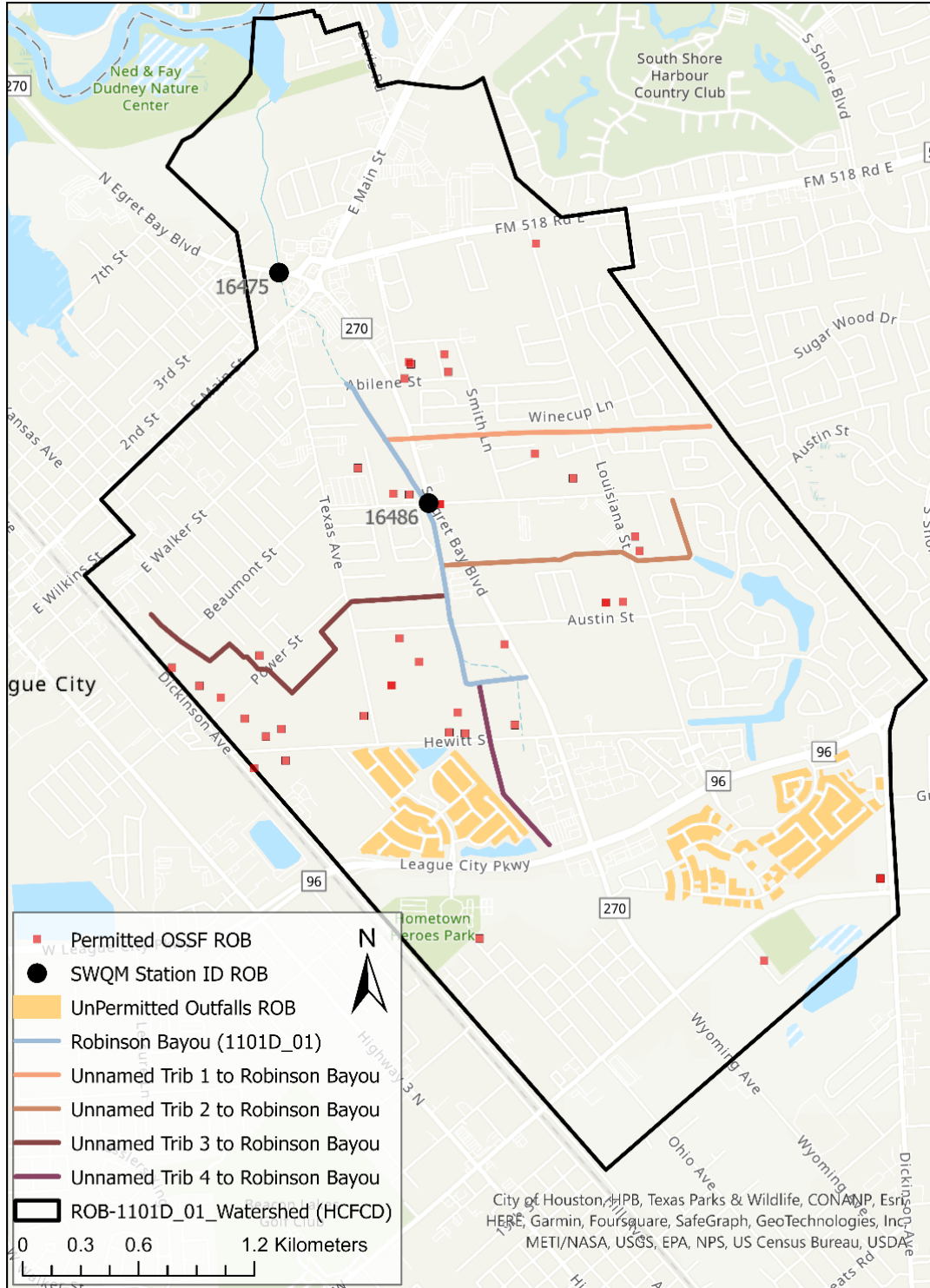


Figure 1: Watershed Map for Robinson Bayou (Assessment Unit 1101D_01).

Desktop Review

Methods

The intensive desktop review included an evaluation of permitted discharges, outfalls, and potential sources of point and nonpoint source pollution that may contribute to bacteria loading in the AU. Using Google Earth imagery and GIS, the locations of wastewater treatment facilities, permitted on-site sewage facilities (OSSFs), and potential locations of unpermitted OSSFs were identified. If present, other potential sources such as landfills and industrial facilities were also identified. Parks were noted as these can contribute to bacterial sources through runoff of animal wastes but also provide opportunity for contact recreation. Bridge crossings and other public entry points were identified to provide access into the stream to collect bacteriological samples. The Environmental Institute of Houston conducted this review in 2021 and AU 1101D_01 was reviewed again prior to beginning the 2023 FI.

Results

The results of the desktop review indicated that four unnamed tributaries run into Robinson Bayou. The course of this AU has been corrected from previous maps reported after the 2021 FI indicated a different route of the water (Oakley, 2021). Robinson Bayou and contributing unnamed tributaries are surrounded by residential neighborhoods, trails, woody areas, schools, and commercial businesses. Publicly accessible entry points into Robinson Bayou were identified at Abilene Street, Webster Street, South 270, Austin Street, and finally Egret Bay Boulevard. An access point to enter the first unnamed tributary of Robinson Bayou was identified just south of Paintbrush Avenue and South Egret Bay Boulevard continuing east in the tributary towards Smith Lane, Louisiana Avenue, and finally at the end of the cul-de-sac of Purple Horse Drive. An access point to enter the second unnamed tributary of Robinson Bay was identified at 29.508775, -95.069656 on South Egret Bay Boulevard, continuing east in the tributary towards Louisiana Avenue, Astoria Lane, Lombardia Drive, and finally at Milano Lane. The third unnamed tributary can be accessed at Austin Street and Robinson Bayou heading upstream. Following the unnamed tributary west, an access point is on Texas Avenue, Power Street, and at Beaumont Street. The fourth unnamed tributary to Robinson Bayou can be accessed via South Egret Boulevard heading downstream and then at Hewitt Street, and finally at League City Parkway.

Windshield Survey

Methods

Field events must take place during dry weather (after 3 or more days without significant rainfall in the watershed). This ensures that any flowing water into the segment is not stormwater. Windshield surveys (WS) of the watershed were conducted in 2021 and bacteria sampling was

performed at public access points throughout the AU (primarily at bridge crossings). The survey consisted of driving the catchment area to confirm identified pollution sources found during the desktop review and to find any potential sources not identified during that review. Bridge crossings chosen for sampling were spatially distributed to provide a spatial snapshot of bacteria concentrations in the AU and identify sections of the AU where elevated bacteria concentrations were found. Those areas with elevated bacteria levels identified in the WS monitoring were focused on during the FI of the FY20-21 study. The results from the 2021 sampling events were used to plan the 2023 FI. Therefore, a WS was not completed in 2023.

Assessment Units, sample collection and laboratory methods, and data handling practices for the 2021 study are detailed in Appendix J of the FY 2020-2021 H-GAC Multi-Basin Clean Rivers Program Quality Assurance Project Plan (H-GAC QAPP, 2020). For all WS bacteria monitoring conducted in 2021, field personnel documented the latitude and longitude of sample location. All bacteria samples were analyzed by a National Environmental Laboratory Accreditation Program (NELAP)-Accredited laboratory.

Results

The WS was conducted on February 9, 2021. At that time, it had been four days since the last significant rainfall in the watershed. A total of six samples were collected on AU 1101D_01 and four on contributing tributaries during the WS. Bacteria results from the ambient water samples collected during the WS ranged from 10 to 857 MPN/100ML.

Field Investigation

Methods

The following methods were used for both the FI in 2021 and 2023. Assessment Units, collection and laboratory methods, and data handling practices for the 2023 FI are detailed in Appendix J of the FY 2022-2023 H-GAC Multi-Basin Clean Rivers Program Quality Assurance Project Plan (H-GAC QAPP, 2022). The FI was a thorough survey where a team of two, either walked or paddled the entire assessment unit and sampled dry-weather flow into the segment. Water could be flowing in from a pipe, culvert, natural tributary, or earthen/concrete-lined ditch. Flowing water was categorized into two source types: permitted outfalls or unpermitted outfalls. Permitted outfalls included wastewater facilities and municipal separate storm sewer systems (MS4). Any pipe greater than 12 inches (in.) in diameter was assumed to be permitted by our field crews.

When flowing water was observed from a permitted outfall, two samples were collected. One sample was collected immediately downstream of the outfall where the flowing outfall was mixing with the ambient water. The second sample was taken upstream of the flowing outfall outside of the realm of influence from the outfall to provide the ambient bacteria levels of the assessment unit in that area. The second type of source was an unpermitted outfall, which was any other

flowing source of water that was not assumed to be permitted including flowing small (<12 in. diameter) “homemade” pipes and tributaries.

When a flowing unpermitted outfall was observed, the bacteria sample was taken directly from the source. If the source was a flowing pipe, the sample was collected directly from the pipe, before it entered the segment. If it was an open-top earthen ditch or natural tributary, the sample was collected from far enough into the inflow source that there was no mixing with the receiving water. In some cases, when no flowing permitted or unpermitted outfalls were observed in an extended section of the segment, a single ambient reference sample was taken mid-stream. Left and right bank references are oriented with the observer facing downstream.

For all FIs, the field team recorded location of the flowing outfall (latitude and longitude), the diameter, material, and water depth of the flowing outfall, and documented site conditions by taking photos and other relevant notes. All bacteria samples were collected following procedures listed in Appendix J of the FY 2022-2023 H-GAC Multi-Basin Clean Rivers Program Quality Assurance Project Plan (H-GAC QAPP, 2022) and analyzed by a National Environmental Laboratory Accreditation Program (NELAP)-Accredited laboratory.

2021 Results and Recommendations

The results from the WS were used to prioritize the FI in 2021 to focus on the main Robinson Bayou assessment unit and the two tributaries on the eastern side of the Bayou which had the highest ambient bacteria results from the WS (Unnamed Trib 1: 355 MPN/100 mL and Unnamed Trib 2: 794 MPN/10 mL). The FI was conducted on March 11, 2021 (6 days since last significant rainfall) and a total of 53 bacteria samples were collected. During the 2021 FI, Robinson Bayou and three unnamed tributaries resulted in multiple culverts and pipes contributing to elevated bacteria levels. The values of the bacteria samples collected from downstream of permitted outfalls, or directly from unpermitted outfalls are illustrated in Figure 2. A total of nine referral locations with elevated *E. coli* bacteria levels measured during the FI in 2021 were recommended for further investigation by the proper authorities (Oakley, 2021). Based on these results, a second FI on this segment was recommended to be sampled in 2023.

Because no elevated bacteria levels were observed downstream of this AU during the 2021 FI, only the above-tidal portion of this segment was sampled in 2023 (AU 1101D_01). Based upon the results of the 2021 FI, a FI covering the entire length of the AU was recommended. The first unnamed tributary at the northern portion of Robinson Bayou exhibited the highest bacteria levels of all of the unnamed tributaries during the 2021 FI and as time allowed, was sampled again in 2023. A sample was taken at the confluence of the western most unnamed tributary to Robinson Bayou during the 2021 WS and FI and the bacteria levels were < 126 therefore it was not recommended to be sampled in 2023.

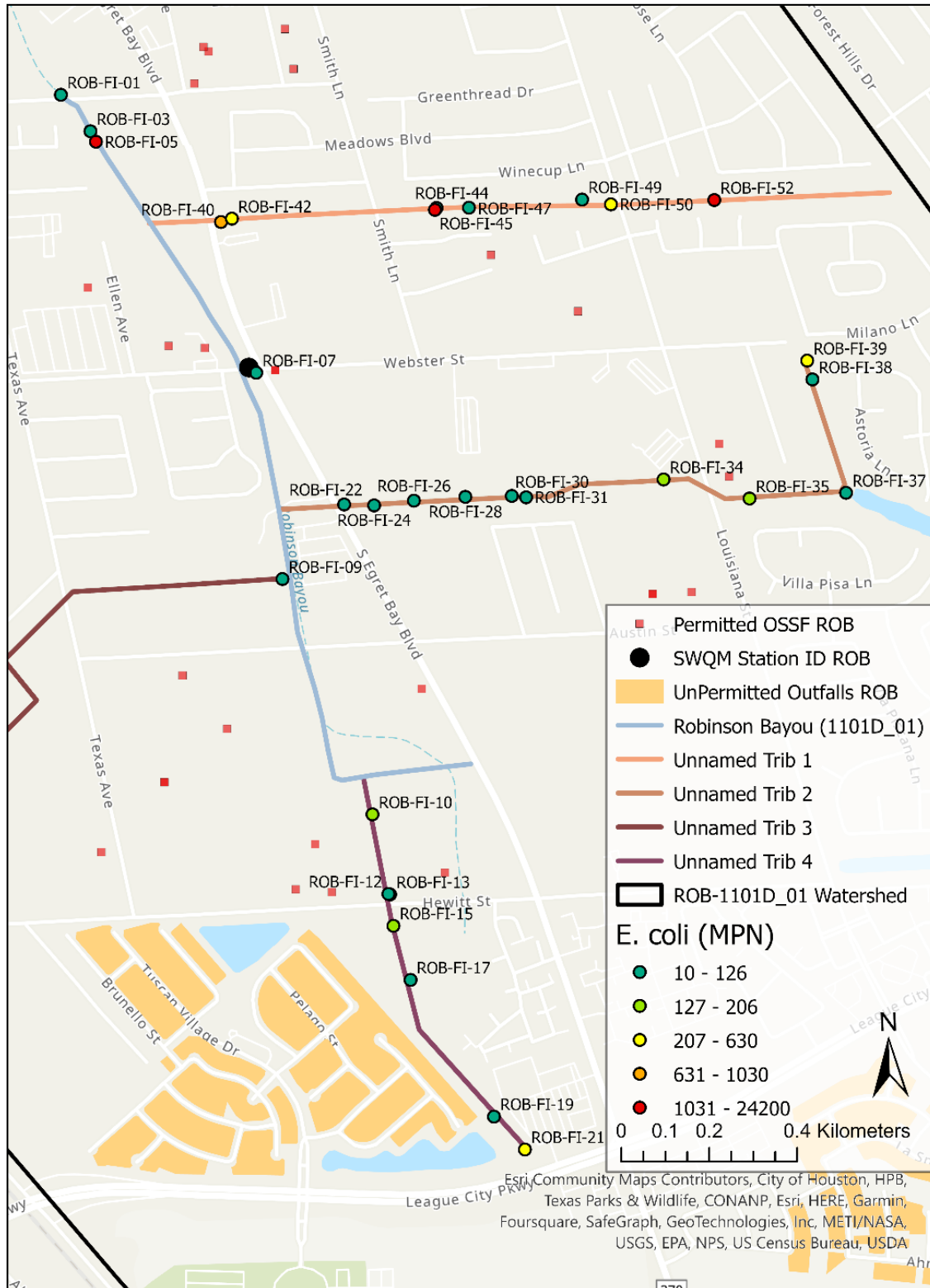


Figure 2: Field investigation bacteria sampling results from 03/11/2021 on Robinson Bayou (AU 1101D_01).

2023 Results

The FI was conducted on May 2, 2023 (three days since last significant rainfall) and a total of 70 bacteria samples were collected. The values of the bacteria samples collected from downstream of permitted outfalls, directly from unpermitted outfalls, or as ambient samples are summarized in Table 1 and Figure 3. Based on the data collected, four locations with elevated *E. coli* bacteria levels measured during the field investigation are recommended for high priority, and three locations for low priority investigation by the proper authorities. These locations are summarized in Table 1 (highlighted in grey) and Figure 4. In addition, one location was flagged where the ambient sample had elevated bacteria levels with no obvious explanations. High priority sites had the highest potential bacteria loading observed and are recommended to be the areas for local authorities to focus efforts on should there be insufficient resources to address all referral sites. As time and resources allow the low priority and investigate further referrals also are recommended for further investigation. Further investigation of these areas by the proper authorities is recommended. Each of these referrals are summarized by site, herein. The referral summaries are listed in order of priority (High, Low, then Investigate Further). Within each priority group, sites are listed from downstream to upstream.

While not related to bacteria, the field crew observed a flow diversion structure that is washing out and causing a bank failure just upstream of Louisiana Ave and the Unnamed Tributary #2 bridge crossing at approximately 29.50854, -95.06004. If the proper authorities are not aware of this infrastructure failure it is recommended that they investigate this further.



Figure 5. Bank collapse at water diversion structure.

Table 2: Field investigation bacteria results from sampling on 5/2/2023 on Robinson Bayou (Assessment Unit 1101D_01). Referrals: N = No, Y-H = Yes – High Priority, Y-L = Yes-Low Priority, IF = Investigate Further, LB = Left Bank, RB= Right Bank, US = Upstream, DS = Downstream.

Sample ID	Lat	Long	DS or Direct <i>E. coli</i> Sample Results (MPN/100 mL)	US <i>E. coli</i> Sample Results (MPN/100 mL)	Difference* DS - US (MPN/100 mL)	Referral	Comments
ROB-FI2-01	29.51704	-95.07520	100	NA	NA	N	Ambient sample bottom of segment.
ROB-FI2-02-D	29.51643	-95.07486	200	310	-110	N	Submerged pipe on left bank, unable to see flow, but can hear trickle inside pipe.
ROB-FI2-04-D	29.51621	-95.07474	200	200	0	N	Pipe on left bank. Water flowing under, not through.
ROB-FI2-T1-01	29.51454	-95.07339	520	NA	NA	N	Ambient sample at first trib.
ROB-FI2-05-D	29.51345	-95.07271	410	200	210	Y-L	Rusted out pipe, extends into Bayou, submerged. Right bank. Unable to tell if flowing.
ROB-FI2-06-D	29.51190	-95.07152	100	100	0	N	Submerged pipe on left bank. RV Parks on left bank.
ROB-FI2-07-D	29.51023	-95.07102	200	100	100	N	Submerged pipe on left bank. Unable to tell if flowing.
ROB-FI2-T3-01	29.50711	-95.07055	200	NA	NA	N	Ambient sample at Trib. 3.
ROB-FI2-08	29.50711	-95.07049	520	NA	NA	N	Ambient sample up from Trib. 3.
ROB-FI2-09-D	29.50694	-95.07040	310	970	-660	N	Pipe of right bank with vegetation growing on it. Water flows down concrete.
ROB-FI2-10-D	29.50585	-95.07032	850	< 100	750	Y-H	Pipe on left bank trickling - submerged. Pipe on RB across from sample has small trickle. Did not sample right bank.
ROB-FI2-NS-01	29.50376	-95.06980	NA	NA	NA	N	Concrete is wet on cracks. No obvious source.
ROB-FI2-11	29.50309	-95.06839	< 100	NA	NA	N	Ambient sample.
ROB-FI2-12-D	29.50225	-95.06877	510	100	410	Y-H	Pipe on right bank. Water brown. Water bubbling up from substrate. Pipe submerged sediment in pipe appears reddish. Pipe across (left bank) wet but not flowing.
ROB-FI2-NS-02	29.50121	-95.06852	NA	NA	NA	N	Not sampled pipe. Wet at entrance, no flow.
ROB-FI2-13-D	29.50057	-95.06846	100	< 100	0	N	Culvert submerged on left bank.
ROB-FI2-14-D	29.50057	-95.06838	< 100	< 100	0	N	Concrete culvert submerged on right bank. Upstream sample same as 13.
ROB-FI2-15-D	29.49995	-95.06832	100	100	0	N	Submerged pipe of LB. Many apple snails and eggs.

Sample ID	Lat	Long	DS or Direct <i>E. coli</i> Sample Results (MPN/100 mL)	US <i>E. coli</i> Sample Results (MPN/100 mL)	Difference* DS - US (MPN/100 mL)	Referral	Comments
ROB-FI2-16-D	29.49880	-95.06800	< 100	< 100	0	N	D-Sample is from mixing of 2 culverts on RT Bank, both drain a detention basin behind an apartment building. Ducks in detention basin. Nutria observed just DS of site.
ROB-FI2-17-D	29.49595	-95.06615	< 100	100	0	N	Cement pipe on LB. Egret and whistling ducks at site. Also observed turtles and apple snail eggs. Scum/sheen on water surface where US sample was collected.
ROB-FI2-18-D	29.49532	-95.06549	100	200	-100	N	Sample from DS of cement apron draining 3 pipes that run under TX-96. Top/end of segment.
ROB-FI2-T1-02-D	29.51454	-95.07185	310	200	110	Y-L	Cement pipe right bank 3m from US of bridge. Trickle.
ROB-FI2-T1-03-D	29.51458	-95.07156	300	410	-110	N	RB Pipe. Field off LB with goats observed US of this sample and DS of Smith Ln.
ROB-FI2-T1-NS-03	29.51459	-95.06968	NA	NA	NA	N	Pipe not sampled - wet inside but no flow.
ROB-FI2-T1-NS-04	29.51462	-95.06831	NA	NA	NA	N	Pipe on right & left bank 3m from downstream side of bridge, both moist.
ROB-FI2-T1-NS-02	29.51462	-95.06806	NA	NA	NA	N	Unsampled pipe 1 meter from upstream. Very slow drip.
ROB-FI2-T1-04-D	29.51467	-95.06675	310	300	10	N	Submerged pipe on left bank. Pipe on opposite bank, moist, not flowing.
ROB-FI2-T1-05-D	29.51465	-95.06599	< 100	100	0	N	Left bank pipe.
ROB-FI2-T1-NS-01	29.51469	-95.06489	NA	NA	NA	N	On RB, not sampled. Standing water in pipe. Not flowing.
ROB-FI2-T1-06-D	29.51464	-95.06425	100	100	0	N	Left bank pipe.
ROB-FI2-T1-07-D	29.51462	-95.06268	< 100	200	-100	N	DS sample taken from 2m downstream side of bridge and US sample taken US of bridge. Square cement pipes submerged. Right bank pipe 6ft, Left bank pipe 46in.
ROB-FI2-T1-08-D	29.51461	-95.06233	200	200	0	N	Submerged cement pipe RB. 8m from US side of bridge.
ROB-FI2-T1-09	29.51464	-95.06023	< 100	NA	NA	N	Smells of effluent. Square concrete pipe; Right bank. Last source of water upstream.
ROB-FI2-T2-01	29.50862	-95.07045	200	NA	NA	N	Ambient.
ROB-FI2-T2-NS-01	29.50862	-95.07027	NA	NA	NA	N	Not sampled. 2 pipes across from each other - corrugated plastic - wet, not flowing.

Sample ID	Lat	Long	DS or Direct <i>E. coli</i> Sample Results (MPN/100 mL)	US <i>E. coli</i> Sample Results (MPN/100 mL)	Difference* DS - US (MPN/100 mL)	Referral	Comments
ROB-FI2-T2-NS-02	29.50866	-95.06903	NA	NA	NA	N	Moist pipe on RB, corrugated plastic. Dog walker on LB near bridge.
ROB-FI2-T2-02-D	29.50865	-95.06898	410	100	310	Y-H	LB - water in pipe, dripping.
ROB-FI2-T2-03-D	29.50864	-95.06848	200	310	-110	N	LB - water in pipe, dripping.
ROB-FI2-T2-NS-03	29.50865	-95.06754	NA	NA	NA	N	Not sampled - RB - choked with veg. Plastic coated pipe.
ROB-FI2-T2-NS-04	29.50871	-95.06631	NA	NA	NA	N	Not sampled metal pipe, RB, choked with veg.
ROB-FI2-T2-NS-05	29.50870	-95.06592	NA	NA	NA	N	Not sampled pipes, both banks moist, vegetated
ROB-FI2-T2-04-D	29.50873	-95.06521	310	200	110	Y-L	RB - collapsed concrete below metal pipe. DS sample taken from pool in broken concrete.
ROB-FI2-T2-05-D	29.50868	-95.06493	6,700	< 100	6,600	Y-H	Square, LB, good flow.
ROB-FI2-T2-NS-06	29.50890	-95.06364	NA	NA	NA	N	Not sampled, LB, plastic coated pipe, vegetated, moist.
ROB-FI2-T2-06-D	29.50896	-95.06167	100	< 100	0	N	RB. Coordinates are from 20m from US, RB side of bridge.
ROB-FI2-T2-NS-07	29.50892	-95.06134	NA	NA	NA	N	Not sampled. LB, plastic coated pipe, vegetated, moist. Note for city-diversion washed out US of 07-U.
ROB-FI2-T2-07-D	29.50895	-95.06107	< 100	< 100	0	N	LB culvert. Heavy flow entering culvert. Unable to see source. Coordinates DS of bridge.
ROB-FI2-T2-08-D	29.50895	-95.06107	< 100	< 100	0	N	Center culvert. Can hear flow. Decaying fish US of 07-U, US sample taken US of bridge.
ROB-FI2-T2-09-D	29.50895	-95.06107	< 100	< 100	0	N	RB culvert.
ROB-FI2-T2-10-D	29.50848	-95.05965	100	100	0	N	LB.
ROB-FI2-T2-11	29.50854	-95.05733	< 100	NA	NA	N	Ambient sample. Lake on LB overflowing into trib.
ROB-FI2-T2-12	29.50874	-95.05743	< 100	NA	NA	N	Ambient sample US of lake inflow.
ROB-FI2-T2-13-D	29.50884	-95.05743	100	< 100	0	N	Submerged pipe on LB. Unable to see flow.
ROB-FI2-T2-14-D	29.51086	-95.05809	< 100	970	-870	N	LB; plastic coated pipe. Unsure if it is flowing, submerged.
ROB-FI2-T2-15	29.51126	-95.05821	1,560	NA	NA	IF	Ambient at top of segment. Submerged pipe.

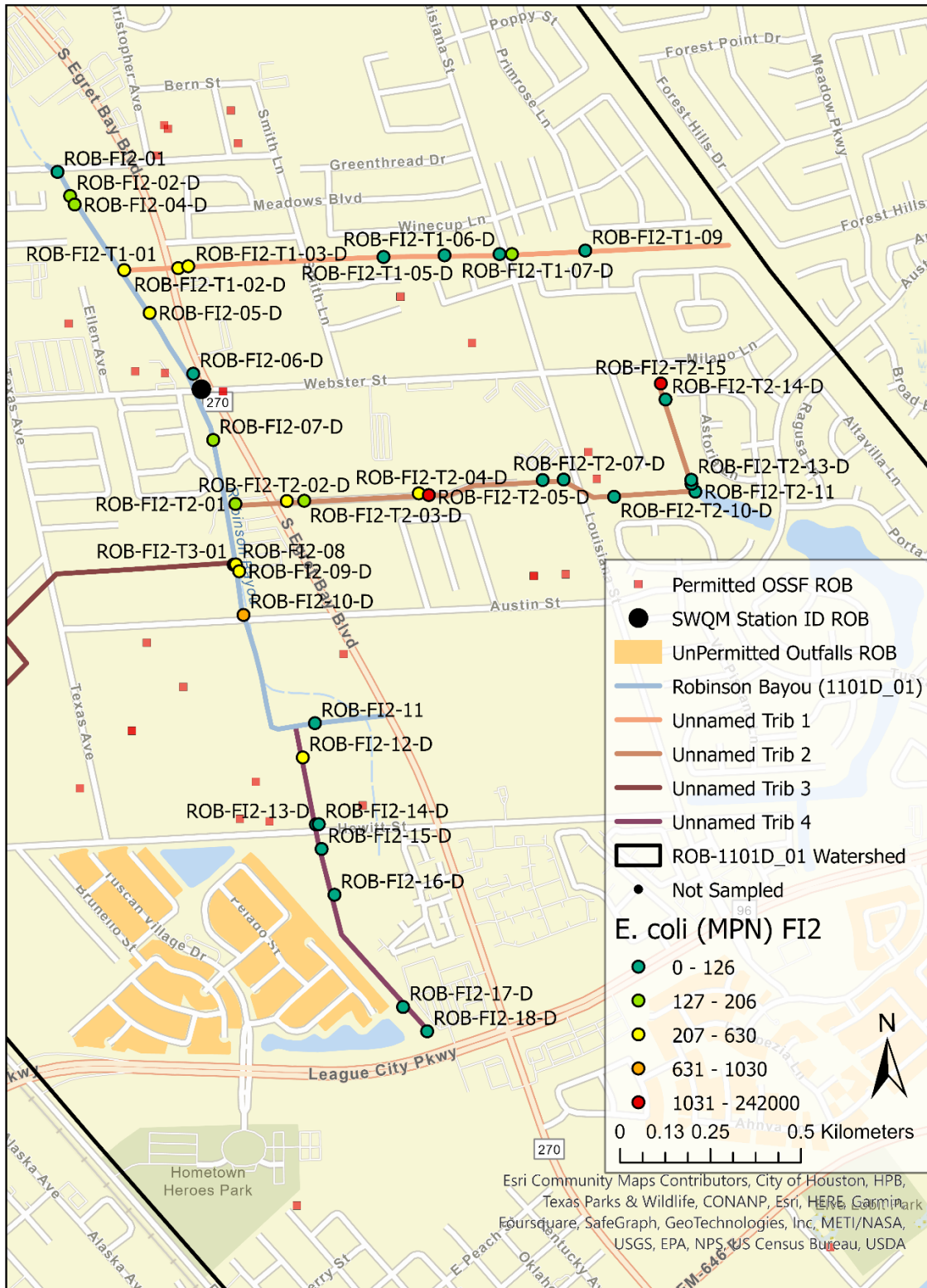


Figure 3: Field investigation bacteria sampling results from 5/2/2023 on Robinson Bayou (Assessment Unit 1101D_01).

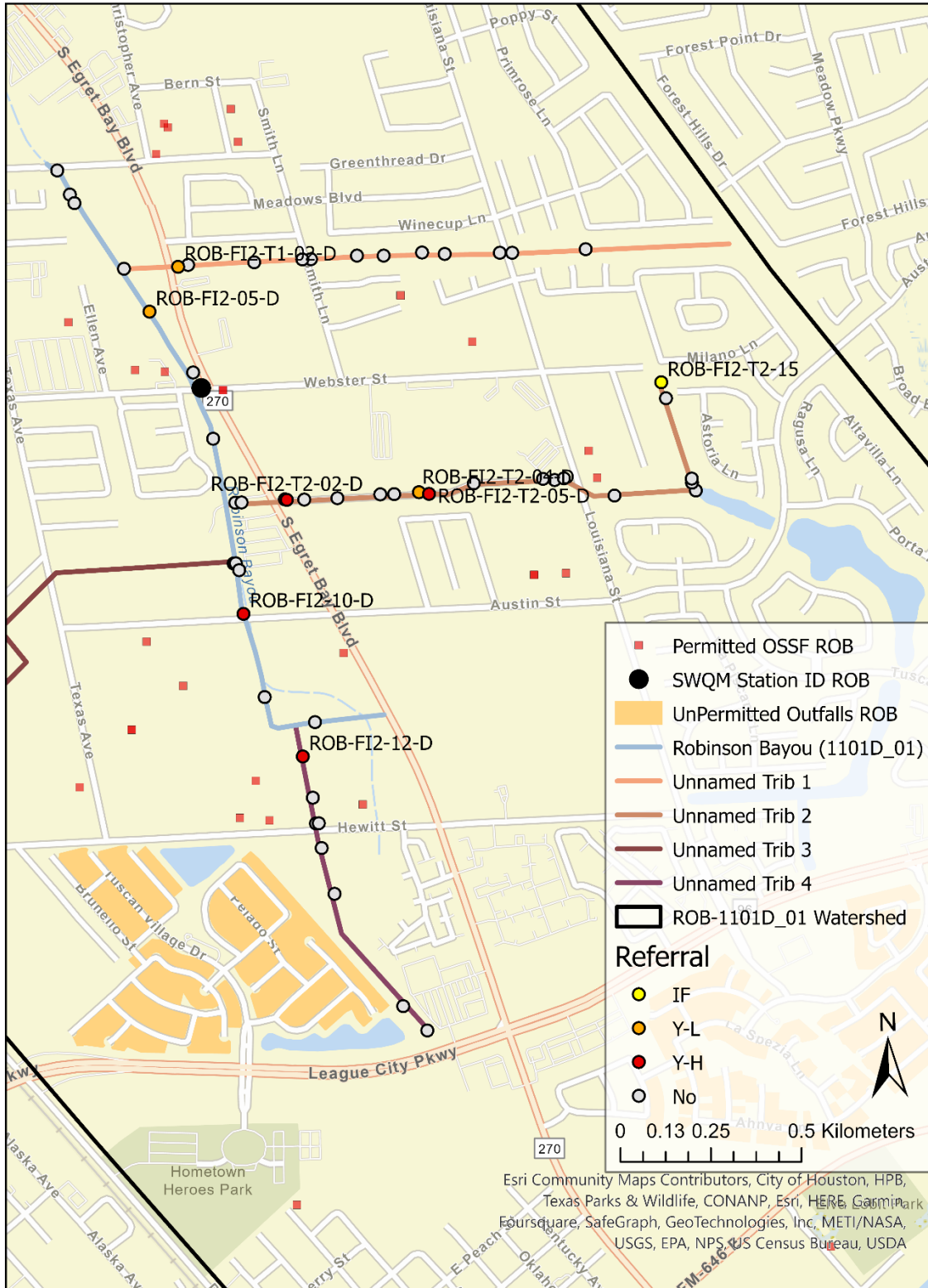


Figure 4: Field investigation sites sampled on 5/2/23 and identified for referral to the proper authorities on Robinson Bayou (Assessment Unit 1101D_01).

Referral site: ROB-FI2-10-D- High Priority

This is a 45 in. diameter metal pipe located on the left bank of Robinson Bayou. Water within the partially submerged pipe was 2 in. deep and trickling into the segment. There was a pipe on the right bank across from the sampled pipe that had a very small trickle but was not sampled. There are large lot single-family homes located in the area on the left bank, several of which have permitted OSSFs. A sample taken at the mouth of the submerged pipe had a bacteria value of 850 MPN/100 mL. The ambient sample collected upstream of the pipe had a bacteria value of < 100 MPN/100 mL. This pipe is a high priority referral site for the proper local authority.



Referral site: ROB-FI2-12-D- High Priority

This is a 24 in. diameter metal pipe located on the right bank of Robinson Bayou. Water within the partially submerged pipe was 5 in. deep and flow was observed to be “bubbling” up from the substrate into the segment (white arrow). The substrate in the pipe was reddish in color. There was a pipe across the bayou (left bank) that was moist but not flowing which was not sampled. There are large lot single-family homes located in the area on the right bank. A sample taken at the mouth of the submerged pipe had a bacteria value of 510 MPN/100 mL. The ambient sample collected upstream of the pipe had a bacteria value of 100 MPN/100 mL. This pipe is a high priority referral site for the proper local authority.



Referral site: ROB-FI2-T2-02-D- High Priority

This is a 24 in. diameter corrugated plastic coated pipe located on the left bank of Unnamed Tributary #2 to Robinson Bayou. Water within the pipe was 0.25 in. deep and dripping into the segment. There is a condominium complex located in the area on the left bank. A sample taken 0.1 m downstream of the pipe had a bacteria value of 410 MPN/100 mL. The ambient sample collected upstream of the pipe had a bacteria value of 100 MPN/100 mL. This pipe is a high priority referral site for the proper local authority.



Referral site: ROB-FI2-T2-05-D- High Priority

This is an approximately 60 in. diameter square concrete pipe located on the left bank of Unnamed Tributary #2 to Robinson Bayou. Water within the pipe was 0.25 in. deep and steadily flowing into the segment. There are single-family homes located in the area on the left bank. A sample taken 3 m downstream of the pipe had a bacteria value of 6,700 MPN/100 mL. The ambient sample collected upstream of the pipe had a bacteria value of < 100 MPN/100 mL. This pipe is a high priority referral site for the proper local authority.



Referral site: ROB-FI2-05-D- Low Priority

This is a 12 in. diameter rusted metal pipe located on the right bank of Robinson Bayou. Water within the partially submerged pipe was 8.5 in. deep and the field crew was unable to tell if it was flowing into the segment. There is an undeveloped tract of land located in the immediate area on the right bank. A sample taken at the mouth of the submerged pipe had a bacteria value of 410 MPN/100 mL. The ambient sample collected upstream of the pipe had a bacteria value of 200 MPN/100 mL. This pipe is a low priority referral site for the proper local authority.



Referral site: ROB-FI2-T1-02-D- Low Priority

This is a 54 in. diameter cement pipe located under the 270 bridge, approximately 3 m from the upstream side of the bridge on the right bank of the Unnamed Tributary #1 to Robinson Bayou. Water within the pipe was 0.1 in. deep and trickling into the segment. There are single-family homes and a roadway located in the area on the right bank. A sample 0.5 m downstream of the pipe had a bacteria value of 310 MPN/100 mL. The ambient sample collected upstream of the pipe had a bacteria value of 200 MPN/100 mL. This pipe is a low priority referral site for the proper local authority.



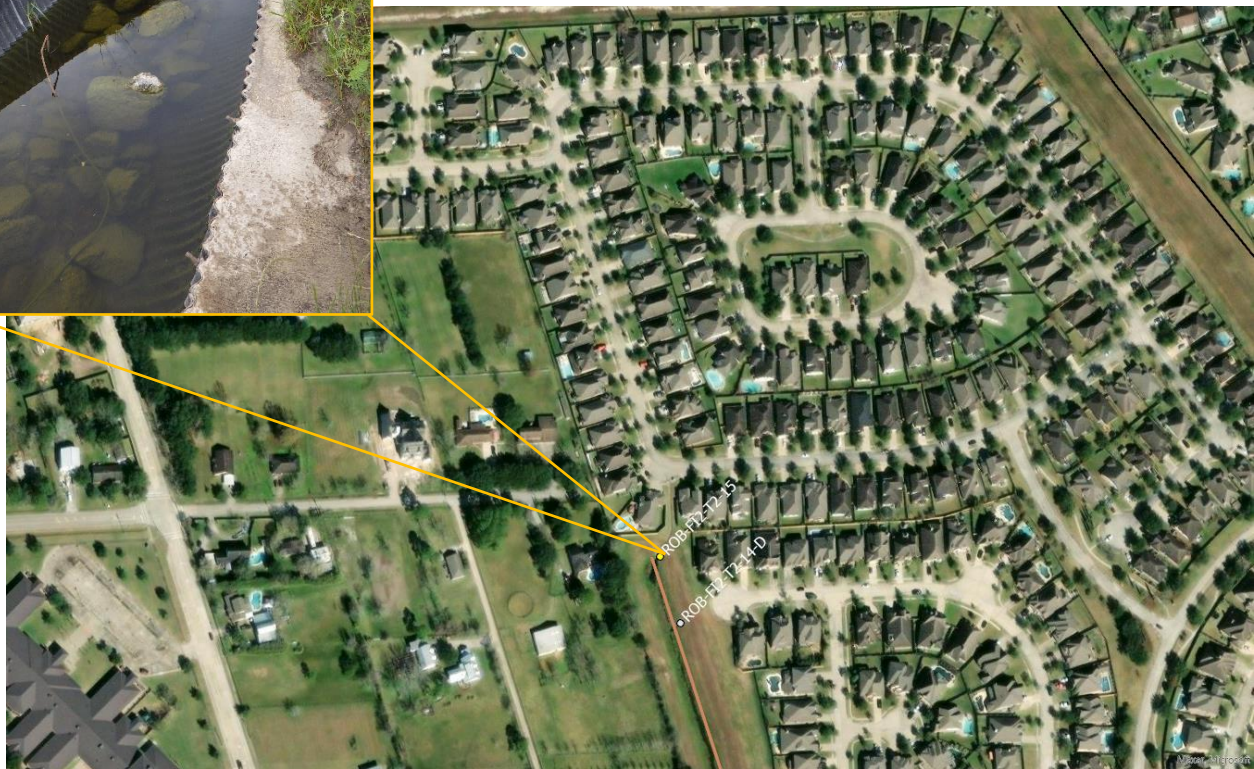
Referral site: ROB-FI2-T2-04-D- Low Priority

This is a 28 in. diameter metal pipe located on the right bank of the Unnamed Tributary #2 to Robinson Bayou. The cement apron around the pipe is broken and the sediment underneath is washed out creating a void where the water was flowing into. Water within the pipe was 0.5 in. deep and trickling behind the broken cement wall and then into the segment. League City Intermediate School is in the area on the right bank. A sample was taken where the water that is flowing behind the broken concrete meets the stream, approximately 3.5 m downstream of the pipe outfall and it had a bacteria value of 310 MPN/100 mL. The ambient sample collected upstream of the pipe had a bacteria value of 200 MPN/100 mL. This pipe is a low priority referral site for the proper local authority.



Referral site: ROB-FI2-T2-15 –Investigate Further

This was a single sample taken at the mouth of a partially submerged corrugated plastic-coated pipe at the most upstream portion of the Unnamed Tributary #2 to Robinson Bayou before the pipe goes underground. The ambient sample taken at the pipe had a bacteria value of 1,560 MPN/100 mL. Further investigation is recommended by the proper local authority to determine the source of elevated bacteria underground and upstream of the segment. There are single-family homes located upstream of the site.



List of Acronyms and Abbreviations

AU	Assessment Unit
BIG	Bacteria Implementation Group
CRP	Clean Rivers Program
DS	Downstream
E. Coli	Escherichia coli
FI	Field Investigation
FY	Fiscal Year
GIS	Geographic Information Systems
H-GAC	Houston-Galveston Area Council
IF	Investigate Further
in.	inch
I	Implementation Plan
km	kilometer
LB	Left Bank
m	meter
mL	milliliter
MPN	Most probable number
N	No
NELAP	National Environmental Laboratory Accreditation Program
NLCD	National Land Cover Database
OSSF	On-Site Sewage Facilities
QAPP	Quality Assurance Project Plan
RB	Right Bank
ROB	Robinson Bayou 1101D_01
SWQM	Surface Water Quality Monitoring
SWRC	Stroud Water Research Center
T or trib.	Tributary
TCEQ	Texas Commission on Environmental Quality
TMDL	Total Maximum Daily Load
US	Upstream
WS	Windshield Survey
Y-H	Yes – High Priority
Y-L	Yes-Low Priority

Literature Cited

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