

**Total Maximum Daily Loads for Indicator Bacteria  
in the Houston Metropolitan Area**

**Contract No. 582-6-70860  
Work Order 582-6-70860-12**

**Quarterly Report No. 4**

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PREPARED IN COOPERATION WITH THE  
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## INTRODUCTION

Twenty-seven segments in the general Houston Metropolitan Area (see Table 1) are considered impaired water bodies for contact recreation because they do not meet indicator bacteria (*Escherichia coli* (*E. coli*)) water quality standards. These segments are in a number of watersheds in the San Jacinto River basin including, Greens Bayou Watershed, Halls Bayou Watershed, Hunting Bayou Watershed, Brays Bayou Watershed, Sims Bayou Watershed, and the general Houston Ship Channel Watershed.

For the purpose of TMDL development, the project has been subdivided into five sub-projects; Greens Bayou Watershed – Bacteria, Halls Bayou Watershed – Bacteria, Brays Bayou Watershed – Bacteria, Sims Bayou Watershed, and Eastern Houston – Bacteria. The Eastern Houston watershed contains all of the bacteria impaired segments in the Houston Ship Channel and Houston Ship Channel/Buffalo Bayou watersheds. All of these segments are fresh water bodies with contact recreation use and they drain into the tidally influenced Houston Ship Channel and Houston Ship Channel/Buffalo Bayou segments with non-contact recreation use.

Greens Bayou (1016 ) was placed on the Texas Clean Water Act 303(d) List in 1996 and the remaining 26 segments were listed in 2002. All of these segments were placed on the 303(d) list for not meeting contact recreation water quality standards. The purpose of this study is to provide the Texas Commission on Environmental Quality (TCEQ) with the information and assistance necessary for the preparation of a Total Maximum Daily Load (TMDL) for the indicator bacteria (*E. coli*) impairments.

The information gathered under this project will be used to develop the TMDL allocations. First, the TMDL allocations identify how much indicator bacteria (*E. coli*) the water bodies can assimilate and maintain the contact recreation standard (load capacity). Second, the TMDL allocations identify how much reduction is needed to the sources of indicator bacteria (*E. coli*) to reach the contact recreation standard. Reductions are identified for two broad categories of indicator bacteria sources, those sources that are covered by permits referred to as the waste load allocation (WLA) and those sources that are not covered by a permit referred to as the load allocation (LA). This relationship is referred to as the TMDL equation and it is expressed as:  $LC = LA + WLA$ .

In 2000, the State of Texas adopted new bacteria standards for contact recreation. The *E. coli* indicator bacteria standard was adopted for contact recreation in place of the existing fecal coliform indicator bacteria. For fecal coliform, no sample should exceed 400 colony-forming units (cfu) per 100 mL for contact recreation. In addition, the geometric mean should be less than 200 cfu/100 mL. For *E. coli*, no sample should exceed 394 cfu/100 mL and the geometric mean should be less than 126 cfu/100 mL (30 Texas Administrative Code 307.7(b)(A)).

The overall objective of this project is to establish the TMDL allocation equation for the segments listed above.

There are four main tasks for WO 582-6-70860-12:

1. Administer project;
2. Participate in stakeholder process;
3. Analyze FY06 data; and
4. Quality Assurance Project Plan (QAPP)/Sampling Plan/Data Management.

This report describes the progress for the period from June through August 2007 for the metro project.

## **TASK PROGRESS – 3<sup>rd</sup> QUARTER FY07**

### **TASK 1 Administer Project**

An amendment was prepared for the project extending the ending date to November 30, 2007 to allow additional data gathering for TMDL development.

### **TASK 2 Participate in Stakeholder Process**

No stakeholder meetings were held in the past quarter.

### **TASK 3 Analyze FY06 Data**

Data analyses for the FY06 data have been completed. The data has been processed through the quality assurance/quality control protocol. Event-Result files have been prepared and will be forwarded electronically to TCEQ for review and upload.

### **TASK 4 Quality Assurance Project Plan (QAPP)/Sampling Plan/Data Management**

All aspects of this task have been completed. Flow duration and load duration curve analyses were initiated and data development for source assessment is underway. Locations where LDC analyses will be undertaken have been identified and are attached to this report. A “strawman” TMDL report for Sims Bayou is in preparation and will be forwarded to TCEQ for review in the next quarter.

## **FUTURE WORK**

Efforts in the next quarter will be focused on TMDL development for the metro segments.

Table 1. Metro Segments

<b>TMDL Project Name</b>	<b>Segment Number</b>	<b>Segment Name</b>
<b>Eastern Houston - Bacteria</b>	1006F	Big Gulch Above Tidal
	1006H	Spring Gully Above Tidal
	1007F	Berry Bayou Above Tidal
	1007G	Kuhlman Gully Above Tidal
	1007H	Pine Gully Above Tidal
	1007I	Plum Creek Above Tidal
	1007K	Country Club Bayou
	1007M	Unnamed Non-Tidal Tributary of Hunting Bayou
	1007O	Unnamed Non-Tidal Tributary of Buffalo Bayou
	1007R	Hunting Bayou Above Tidal
<b>Greens Bayou Watershed – Bacteria</b>	1016	Greens Bayou Above Tidal
	1016A	Garners Bayou
	1016B	Unnamed Tributary of Greens Bayou
	1016C	Unnamed Tributary of Greens Bayou
	1016D	Unnamed Tributary of Greens Bayou
<b>Halls Bayou Watershed – Bacteria</b>	1006D	Halls Bayou below US 59
	1006E	Halls Bayou above US 59
	1006I	Unnamed Tributary of Halls Bayou
	1006J	Unnamed Tributary of Halls Bayou
<b>Brays Bayou Watershed – Bacteria</b>	1007B	Brays Bayou Above Tidal
	1007C	Keegans Bayou above tidal
	1007E	Willow Waterhole Bayou Above Tidal
	1007L	Unnamed Non-Tidal Tributary of Brays Bayou
	1007P	Brays Bayou Above Tidal
<b>Sims Bayou Watershed – Bacteria</b>	1007D	Sims Bayou Above Tidal
	1007N	Unnamed Non-Tidal Tributary of Sims Bayou
	1007Q	Sims Bayou Above Tidal

### Houston Metro Bacteria TMDLs LDC Stations

7/16/2007

Watershed	Segment	StationID	Indicator Bacteria	Single Sample Criteria (MPN/100ml)	Geometric Mean Concentration (MPN/100ml)	Number of Samples	Number of Samples Exceeding Criteria	% of Samples Exceeding
GREENS BAYOU	1016	11369	EC	394	395	61	27	44%
			FC	400	200	49	15	31%
	1016	11371	EC	394	1046	39	31	77%
			FC	400		142	99	70%
	1016A	11125	EC	394	630	38	20	53%
			FC	400	615	69	35	51%
	1016C	11124	EC	394	1387	57	52	91%
			FC	400	1296	65	54	83%
1016D	16676	EC	394	1781	57	46	81%	
		FC	400	1011	67	40	60%	
1016B	20024 (TBD-02)	EC	394	568	18	9	50%	
HALLS BAYOU	1006J	16665	EC	394	2067	57	50	88%
			FC	400	1519	69	58	84%
	1006I	16666	EC	394	1505	59	51	86%
			FC	400	2325	70	55	79%
	1006E	11126	EC	394	3188	42	39	93%
1006D	20023 (TBD-01)	EC	394	923	17	10	59%	
BRAYS BAYOU	1007B	11309	EC	394	6832	39	39	100%
			FC	400	11620	63	60	95%
	1007B	11140	EC	394	4726	36	35	97%
			FC	400	4799	145	130	90%
	1007B	11138	EC	394	4243	57	56	98%
			FC	400	9516	47	44	94%
	1007C	11169	EC	394	2369	39	39	100%
			FC	400	1946	112	81	72%
	1007E	16652	EC	394	1468	55	41	75%
			FC	400	2046	70	58	83%
1007L	16654	EC	394	1376	39	35	90%	
		FC	400	4487	70	63	90%	
1007P	15848	EC	394	972	56	40	71%	
		FC	400	1465	35	26	74%	

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7/16/2007

Watershed	Segment	StationID	Indicator Bacteria	Single Sample Criteria (MPN/100ml)	Geometric Mean Concentration (MPN/100ml)	Number of Samples	Number of Samples Exceeding Criteria	% of Samples Exceeding
SIMMS BAYOU	1007Q	11135	EC	394	1181	41	31	76%
			FC	40	990	24	15	63%
	1007D	15877	EC	394	1439	41	34	83%
			FC	400	3264	35	33	94%
	1007	11132	EC	394	2018	57	55	96%
			FC	400	5991	159	132	83%
	1007N	16655	EC	394	1013	59	41	69%
			FC	400	1130	64	45	70%
EASTERN HOUSTON	1007R	11129	EC	394	343	43	15	35%
			FC	400	1310	159	107	67%
	1007M	16657	EC	394	647	57	36	63%
			FC	400	1727	70	52	74%
	1007O	16649	EC	394	3032	60	50	83%
			FC	400	5465	68	57	84%
	1006F	16662	EC	394	1208	60	42	70%
			FC	400	2299	67	49	73%
	1006H	16663	EC	394	536	60	37	62%
			FC	400	1378	66	48	73%
	1007K	16650	EC	394	8814	61	59	97%
			FC	400	10854	70	62	89%
	1007I	16658	EC	394	8595	56	51	91%
			FC	400	7829	67	64	96%
	1007H	16659	EC	394	3585	61	56	92%
			FC	400	4308	67	59	88%
1007G	16653	EC	394	2150	61	41	67%	
		FC	400	1874	69	45	65%	
1007F	16661	EC	394	2029	39	38	97%	
		FC	400	1360	66	48	73%	

EC: *E.coli*

FC: Fecal Coliform

Indicate Intensive sampling locations & data included from intensive sampling