

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

**Contract No. 582-6-70860  
Work Order 582-6-70860-17**

**Final Report**

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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 (segment 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 eleven tasks for WO 582-6-70860-17:

1. Administer Project;
2. Participate in Public/Advisory Group Process;
3. Compile Data;
4. Define Water Quality Targets;
5. Pollutant Source Assessment;
6. Development of Load Duration Curves for Contact Recreation Segments;
7. Development of TMDLs for Contact Recreation Segments;
8. Historical Data Gathering and Analysis for 5c Segments;
9. Preparation of Draft TMDL Report
10. Revise Draft Technical Guidance Reports, and
11. Mass Balance Tools.

This report describes the progress for the period from September 2007 through August 2008 for the metro project.

## **TASK PROGRESS**

### **TASK 1 Administer Project**

UH administered all aspects of the project during the fiscal yr.

### **TASK 2 Participate in Public/Advisory Group Process**

Numerous public participation meetings were set-up by TCEQ and HGAC for the metro project. Slides were prepared for all the watersheds and transmitted to TCEQ, and Geographic Information Systems (GIS) data layers were prepared and transmitted to HGAC for development of maps and graphic illustrations to support the meetings. The project team attended all meetings and participated in technical support activities.

Additionally, a Bacteria Implementation Group (BIG) meeting was held on January 29, 2008. The team attended the meeting and provided support to the TCEQ and HGAC.

Since January 2008, a number of meetings have been held for the Bacteria Implementation Group (BIG). The team attended all meetings and supported the TCEQ and HGAC by providing materials for the meetings.

### **TASKS 3-11 TMDL Development Tasks**

Draft Technical Guidance Documents were completed for all metro segments and have been transmitted to TCEQ for review. Additionally, data gathering for the 5c segments was completed for all the metro segments and will be documented in future reports.

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                       |