

Missouri Department of Natural Resources  
**Total Maximum Daily Load Information Sheet**

## Brushy Creek

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### Waterbody Segment at a Glance:

**County:** Texas  
**Nearby Cities:** Houston  
**Length of impairment:** 0.4 miles  
**Pollutant:** Biochemical Oxygen Demand (BOD) and Volatile Suspended Solids (VSS)  
**Source:** Houston Brushy Creek Wastewater Treatment Plant



**TMDL Priority Ranking:** TMDL approved 2005

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### Description of the Problem

#### Beneficial uses of Brushy Creek

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Protection of Human Health associated with Fish Consumption

#### Use that is impaired

- Protection of Warm Water Aquatic Life

#### Standards that apply

- The Missouri Water Quality Standard, found in 10 CSR 20-7.031 Table A, for dissolved oxygen (related to BOD) in streams is 5.0 mg/L (milligrams per liter or parts per million) or the natural dissolved oxygen profile of the stream, whichever is less.
- The standards for volatile suspended solids (VSS) are found in the general criteria section of the Missouri Water Quality Standards at 10 CSR 20-7.031(3)(A) and (C). Here it states:
  - Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses
  - Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses.

### Background Information and Water Quality Data

Any waterbody that was listed for Non-Filterable Residue (NFR) in 1998, such as Brushy Creek, is now being listed as Volatile Suspended Solids (VSS). This change was made to better distinguish between organic solids coming from wastewater treatment plants (VSS) and mineral solids (soil or

mineral particles) coming from soil erosion or erosion of mine waste materials or stockpiles (Non-Volatile Suspended Solids or NVSS).

Dissolved oxygen in the creek's water is reduced by wastewater high in Biochemical Oxygen Demand (BOD) and most aquatic organisms require high levels of oxygen to survive. Brushy Creek has low dissolved oxygen as well as an accumulation of objectionable solids downstream from the Houston Wastewater Treatment Plant (WWTP). These bottom deposits are considered VSS that have settled onto the bottom of the stream. This can smother the natural substrate (materials in the streambed), aquatic invertebrate animals (like water insects and crayfish) and fish eggs. As with all wastewater discharges in Missouri, the Houston WWTP has to meet the requirements of a discharge permit issued by Missouri Department of Natural Resources. The TMDL is a calculation of how much BOD and VSS the stream can handle before it becomes impaired. This has been translated into new permit limits that will improve the quality of the wastewater discharge. This, in turn, will improve the water quality in Brushy Creek. The TMDL was approved by the Environmental Protection Agency November 30, 2005.

The results of water quality studies from 2001 and 2002 on Brushy Creek near Houston are given below. These data show that low levels of dissolved oxygen do occur in the section of Brushy Creek just downstream from the Houston WWTP.

### Water Quality Data for Brushy Creek near Houston 2001-2002

Site Name	Year	Mo	Day	Time	DO	NH3N	NO3N	TP	TSS	CBOD
Brushy Creek just above Hwy 63	2002	7	23	540	5.5	0.02499	0.34	0.06	6	0.99
Brushy Creek just above Hwy 63	2002	7	23	1415	9.3	0.02499	0.41	0.02499	8	0.99
Brushy Creek just above Hwy 63	2002	7	24	530	5.7	0.02499	0.37	0.02499		0.99
Brushy Creek just above Hwy 63	2002	7	24	1340	9.2	0.02499	0.31	0.02499		0.99
Brushy Creek just above Hwy 63	2002	8	6	530	4.6	0.02499	0.24	0.02499	7	0.99
Brushy Creek just above Hwy 63	2002	8	6	1310	8.5	0.02499	0.22	0.02499	6	0.99
Brushy Creek just above Hwy 63	2002	8	7	545	4.6	0.02499	0.24	0.02499	5	0.99
Brushy Creek just above Hwy 63	2002	8	7	1405	8.2	0.02499	0.22	0.02499		0.99
Brushy Creek 0.1 miles above Houston WWTP	2001	4	24		9.7				2,499	0.99
Brushy Creek 0.1 miles above Houston WWTP	2001	8	16	600	4.8	0.02499	1.58	0.02499	2,499	
Brushy Creek 0.1 miles above Houston WWTP	2001	8	16	1300	8.3	0.02499	1.45	0.02499	5	
Brushy Creek 0.1 miles above Houston WWTP	2002	7	23	600	5.5	0.06	0.83	0.07	9	2
Brushy Creek 0.1 miles above Houston WWTP	2002	7	23	1330	10	0.02499	0.71	0.06	20	0.99
Brushy Creek 0.1 miles above Houston WWTP	2002	7	24	550	6.3	0.02499	0.81	0.05		0.99
Brushy Creek 0.1 miles above Houston WWTP	2002	7	24	1315	10	0.02499	0.79	0.06		0.99
Brushy Creek 0.1 miles above Houston WWTP	2002	8	6	545	5.4	0.02499	0.9	0.02499	16	0.99
Brushy Creek 0.1 miles above Houston WWTP	2002	8	6	1300	8.4	0.02499	0.84	0.02499	13	0.99
Brushy Creek 0.1 miles above Houston WWTP	2002	8	7	545	5.2	0.02499	0.87	0.02499		0.99
Brushy Creek 0.1 miles above Houston WWTP	2002	8	7	1400	9.4	0.02499	0.91	0.02499	7	0.99
Houston WWTP Outfall 001	2001	4	24		6				56	33
Houston WWTP Outfall 001	2001	8	16		3.6					
Houston WWTP Outfall 001	2001	8	16		5.4	4.5	13.9	7.31	35	
Houston WWTP Outfall 001	2002	7	23	615	6.1					
Houston WWTP Outfall 001	2002	7	23	1345	6.9	1.34	14.9	3.81	32	16

Site Name	Year	Mo	Day	Time	DO	NH3N	NO3N	TP	TSS	CBOD
Houston WWTP Outfall 001	2002	7	24	600	4.4					
Houston WWTP Outfall 001	2002	7	24	1335	5.8	2.6	14.7	4.61		19
Houston WWTP Outfall 001	2002	8	6	600	2.9					
Houston WWTP Outfall 001	2002	8	6	1310	5.8	2.24	16.9	4.65	16	15.6
Houston WWTP Outfall 001	2002	8	7	615	3.3					
Houston WWTP Outfall 001	2002	8	7	1345	5.8	2.16	15.6	4.55	12	11.6
Brushy Creek 0.3 miles below Houston WWTP	2001	4	24		10.8				2,499	2
Brushy Creek 0.3 miles below Houston WWTP	2001	8	16	615	0.5	0.91	3.94	1.67	2,499	
Brushy Creek 0.3 miles below Houston WWTP	2001	8	16	1400	13.9	0.13	2.59	0.95	2,499	
Brushy Creek 0.3 miles below Houston WWTP	2002	7	23	630	3.8	0.15	2.79	0.77	6	2
Brushy Creek 0.3 miles below Houston WWTP	2002	7	23	1300	13.8	0.06	2.11	0.61	6	5
Brushy Creek 0.3 miles below Houston WWTP	2002	7	24	630	2.6	0.02499	1.9	0.46		0.99
Brushy Creek 0.3 miles below Houston WWTP	2002	7	24	1300	13.8	0.07	2.23	0.62	2,499	0.99
Brushy Creek 0.3 miles below Houston WWTP	2002	8	6	615	1.7	0.13	2.8	0.65	5	0.99
Brushy Creek 0.3 miles below Houston WWTP	2002	8	6	1345	11	0.02499	2.84	0.67	7	0.99
Brushy Creek 0.3 miles below Houston WWTP	2002	8	7	630	1.8	0.25	2.51	0.66		0.99
Brushy Creek 0.3 miles below Houston WWTP	2002	8	7	1300	13.5	0.02499	2.51	0.63	2,499	0.99
Brushy Creek 1.5 miles below Houston WWTP	2002	7	23	605	5.7	0.02499	2	0.41	6	0.99
Brushy Creek 1.5 miles below Houston WWTP	2002	7	23	1325	14.7		2.06	0.45	2,499	0.99
Brushy Creek 1.5 miles below Houston WWTP	2002	7	24	610	5.2	0.02499	1.82	0.44		0.99
Brushy Creek 1.5 miles below Houston WWTP	2002	7	24	1320	10.8	0.02499	1.69	0.42		0.99
Brushy Creek 1.5 miles below Houston WWTP	2002	8	6	605	5.1	0.02499	1.96	0.38	7	0.99
Brushy Creek 1.5 miles below Houston WWTP	2002	8	6	1350	10.9	0.02499	2.22	0.39	6	0.99
Brushy Creek 1.5 miles below Houston WWTP	2002	8	7	620	5.5	0.02499	2.2	0.44	2,499	0.99
Brushy Creek 1.5 miles below Houston WWTP	2002	8	7	1330	10.9	0.02499	2.79	0.49	5	0.99
Brushy Creek 2.7 miles below Houston WWTP	2002	7	23	625	4.4	0.02499	1.52	0.37	5	0.99
Brushy Creek 2.7 mile below Houston WWTP	2002	7	23	1350	13.6	0.02499	1.64	0.37	5	0.99
Brushy Creek 2.7 miles below Houston WWTP	2002	7	24	550	4.2	0.02499	1.75	0.4		0.99
Brushy Creek 2.7 miles below Houston WWTP	2002	7	24	1300	9.6	0.02499	1.49	0.4		0.99
Brushy Creek 2.7 miles below Houston WWTP	2002	8	6	630	4	0.02499	1.58	0.35	8	0.99
Brushy Creek 2.7 miles below Houston WWTP	2002	8	6	1430	9.3	0.02499	1.33	0.33	7	0.99
Brushy Creek 2.7 miles below Houston WWTP	2002	8	7	640	4.6	0.02499	1.8	0.37	2,499	0.99
Brushy Creek 2.7 miles below Houston WWTP	2002	8	7	1305	7.8	0.02499	1.6	0.36	5	0.99

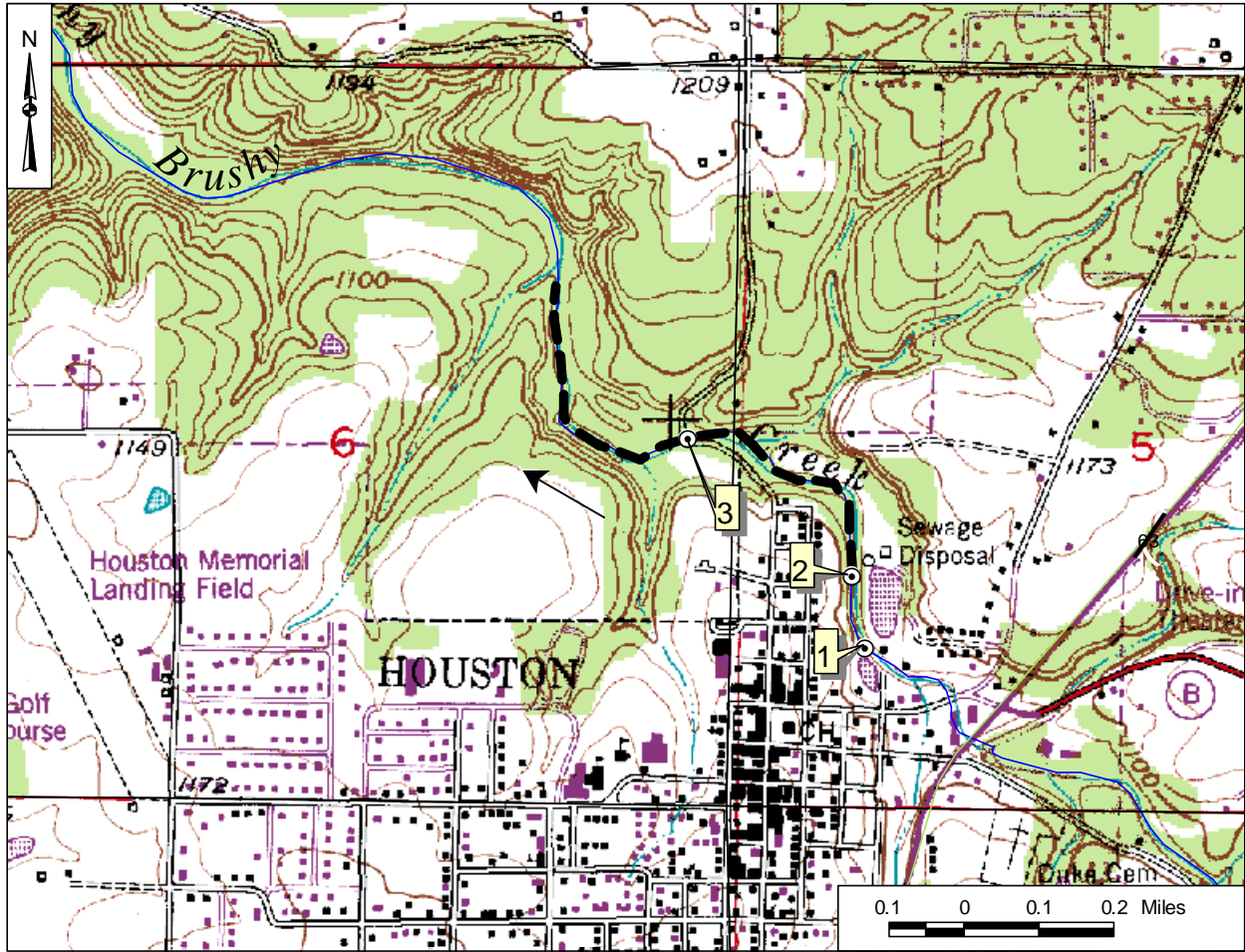
Source: Missouri Department of Natural Resources

Abbreviations defined:

Mo = Month; Time is 24-hour time: 615 = 6:15 a.m.;1345 = 1:45 p.m.; DO = Dissolved Oxygen. Missouri Water Quality Standards mandate at least 5 mg/L; NH3N = Ammonia Nitrogen; NO3N = Nitrate Nitrogen; TP = Total Phosphorus; TSS = Total suspended solids; CBOD = Carbonaceous Biochemical Oxygen Demand

See map of the area on the next page.

**Brushy Creek in Texas County, Missouri,  
Showing the Impaired Segment and the Sampling Sites**



----- Impaired Segment                      → Direction of Flow

Site Index	
1	Brushy Creek 0.1 mile above Houston WWTP
2	Houston WWTP Outfall #001
3	Brushy Creek 0.3 mile below Houston WWTP

**For more information call or write:**  
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 P.O. Box 176, Jefferson City, MO 65102-0176  
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 (573) 522-9920 fax  
 Program Home Page: [www.dnr.mo.gov/env/wpp/index.html](http://www.dnr.mo.gov/env/wpp/index.html)