Little River (Subsegment 030804), Louisiana,
Final TMDL for Dissolved Lead

Prepared for:

Louisiana Department of Environmental Quality, Water Quality Assessment Division,

Total Maximum Daily Load Program

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EXECUTIVE SUMMARY

Section 303(d) of the Clean Water Act and the U.S. Environmental Protection Agency's Water Quality Planning and Management Regulations (Title 40 of the *Code of Federal Regulations* Part 130) require states to identify waterbodies that are not meeting water quality standards and to develop total maximum daily loads (TMDLs) of pollutants for those waterbodies. A TMDL establishes the amount of a pollutant that a waterbody can assimilate without exceeding its water quality standard for that pollutant. TMDLs provide the scientific basis for a state to establish water quality-based controls to reduce pollution from both point and nonpoint sources in order to restore and maintain the quality of the state's water resources (USEPA 1991).

A TMDL for a given pollutant and waterbody is composed of the sum of individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background levels. In addition, the TMDL must include an implicit or explicit margin of safety (MOS) to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. The TMDL components are illustrated using the following equation:

$$TMDL = \sum WLAs + \sum LAs + MOS.$$

This dissolved lead TMDL has been developed for Little River, in the Calcasieu River Basin in southwest Louisiana. Little River runs 12 miles from the headwaters to the West Fork Calcasieu River.

For the purpose of TMDL development, the dissolved lead numerical criterion was calculated using the freshwater chronic value for aquatic life protection calculated on the basis of the average hardness values from 2007 and 2008 at Station 844 (Little River east of Buhler, Louisiana). The dissolved lead numerical criterion for Little River was determined to be 0.73 micrograms per liter. For the purpose of this TMDL, dissolved lead was considered to be a conservative parameter. Using the 7Q10 flow at the end of subsegment 030804 and the calculated lead criterion, a TMDL of 0.00034 lb/day was calculated. The TMDL was then allocated to its WLA, MOS, and LA components.

1. Introduction

Section 303(d) of the Clean Water Act and the U.S. Environmental Protection Agency's (EPA's) Water Quality Planning and Management Regulations (Title 40 of the *Code of Federal Regulations* [CFR] Part 130) require states to develop total maximum daily loads (TMDLs) of pollutants for waterbodies that are not supporting their designated uses, even if pollutant sources have implemented technology-based controls. A TMDL establishes the maximum allowable load (mass per unit of time) of a pollutant that a waterbody is able to assimilate and still support its designated uses. The maximum allowable load is determined on the basis of the relationship between pollutant sources and in-stream water quality. A TMDL provides the scientific basis for a state to establish water quality-based controls to reduce pollution from both point and nonpoint sources to restore and maintain the quality of the state's water resources (USEPA 1991).

A TMDL for a given pollutant and waterbody is composed of the sum of individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background levels. In addition, the TMDL must include an implicit or explicit margin of safety (MOS) to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. The TMDL components are illustrated using the following equation:

$$TMDL = \sum WLAs + \sum LAs + MOS.$$

This dissolved lead TMDL has been developed for Little River, which is in the Calcasieu River Basin in southwest Louisiana (Figure 1-1).

LDEQ placed Little River on the state's 303(d) list in 2002 and identified it as not supporting its designated use of fish and wildlife propagation because of organic enrichment and low dissolved oxygen. The state's *2004 Louisiana Water Quality Inventory: Integrated Report (Integrated Report)* lists Little River as not supporting its designated uses of fish and wildlife propagation because of low dissolved oxygen and mercury (LDEQ 2003a). Suspected sources of the impairment for mercury were atmospheric deposition–toxics and unknown. The suspected source of low dissolved oxygen was Natural Conditions–Water Quality Standards Use Attainability Analyses Needed (LDEQ 2005). The state's 2006 *Integrated Report* continues to list the subsegement as impaired because of low dissolved oxygen and mercury but also adds lead as a cause of impairment to the fish and wildlife propagation designated use. The suspected source of lead is unknown (LDEQ 2007). LDEQ included Little River on the state's draft 2008 *Integrated Report* because it found it as not supporting its designated use of fish and wildlife propagation because of lead, mercury, low dissolved oxygen, and low pH. The suspected sources are listed as unknown for lead, unknown and atmospheric deposition–toxics for mercury, Natural Conditions–Water Quality Standards Use Attainability Analyses Needed for low dissolved oxygen, and Natural Conditions–Water Quality Standards Use Attainability Analyses Needed, natural conditions, and silviculture plantation management for low pH (LDEQ 2008).

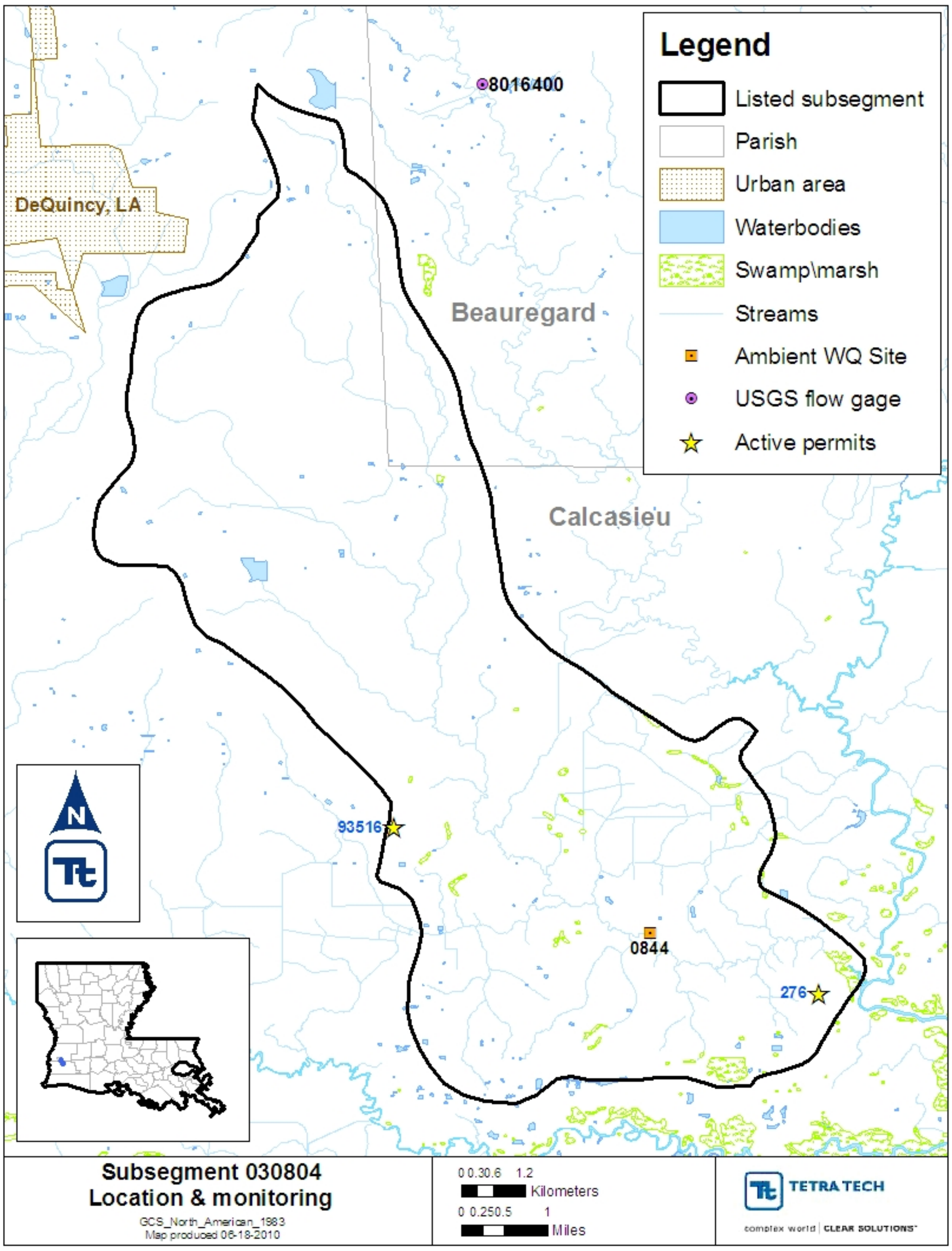

Figure 1-1. Subsegment 030804 (Little River) location and monitoring.

2. Study Area Description

2.1 Calcasieu River Basin—Little River

Little River is in the Calcasieu River Basin in southwest Louisiana. It runs 12 miles from the headwaters to the West Fork Calcasieu River.

The Little River watershed is a 36.1-square-mile-area in southwest Louisiana. Average precipitation in the watershed is 56 inches. The river flows for 12 miles and is about 6 feet wide at the headwaters, and the bayou's width generally increases as it progresses downstream. Forestry is the dominant land use in the watershed (52 percent), and swamps and bottomland hardwoods dominate the lower reaches of the river. Pasture grazing land is the second-most prevalent land use, composing 42 percent of the area. The riparian zone, which is wider than 100 feet on both sides, along Little River is in excellent condition. Hardwoods are in large patches throughout the watershed. Some areas contain long needle pines, which are harvested for timber when they mature. In 2003 approximately, 5–10 percent of the area in the watershed was harvested for timber (LDEQ 2003b).

The Calcasieu River Basin is in southwestern Louisiana. The river begins in the hills west of Alexandria, Louisiana, and flows south for approximately 160 miles to the Gulf of Mexico. The mouth of the river is approximately 30 miles east of the Texas-Louisiana border. (LDEQ 1996). The basin encompasses the hill region of the state, the terrace region, and a section of the coastal marsh. The upper end of the basin consists of pine-forested hills, while the lower end of the basin consists of brackish and salt marshes. Originally, much of the area was covered by tall prairie grasses, among which were scattered clumps of trees (LDEQ 2003b).

The hill region includes the longleaf pine forests, maximum elevations and relief, dendritic and trellis drainage, interior salt domes, wolds or cuestas (hard sedimentary rock), ironstone, excellent surface and groundwater resources, mature soils and the oldest rocks in the state. The soil types consist of coastal plain soils and flatwoods soils. Vegetation includes longleaf pine forests (longleaf pines, slash pines, some hardwoods) and bottomland hardwoods (cottonwood, sycamore, willow, water oaks, gum, maple, loblolly pine) (LDEQ 2003b).

The terrace region includes intermediate elevations and relief, older alluvium, and a large percentage of tabular surfaces. The terraces range from flatwoods to prairies. The flatwoods consist of mixed longleaf forests, bagols, pimple mounds, dendritic drainage, flatwoods soils. Vegetation includes flatwoods (longleaf pine, oak, palmetto, wiregrass), cypress forests (cypress, tupelo), and bottomland hardwoods. The prairies consist of prairie grassland, prairie soils, pimple mounds, dendritic streams, ice-age channels, and platin or marais (small, shallow undrained ponds in the prairies). Vegetative cover consists of prairie vegetation (bluestem, broomsedge), cypress forests, and bottomland hardwoods (LDEQ 2003b).

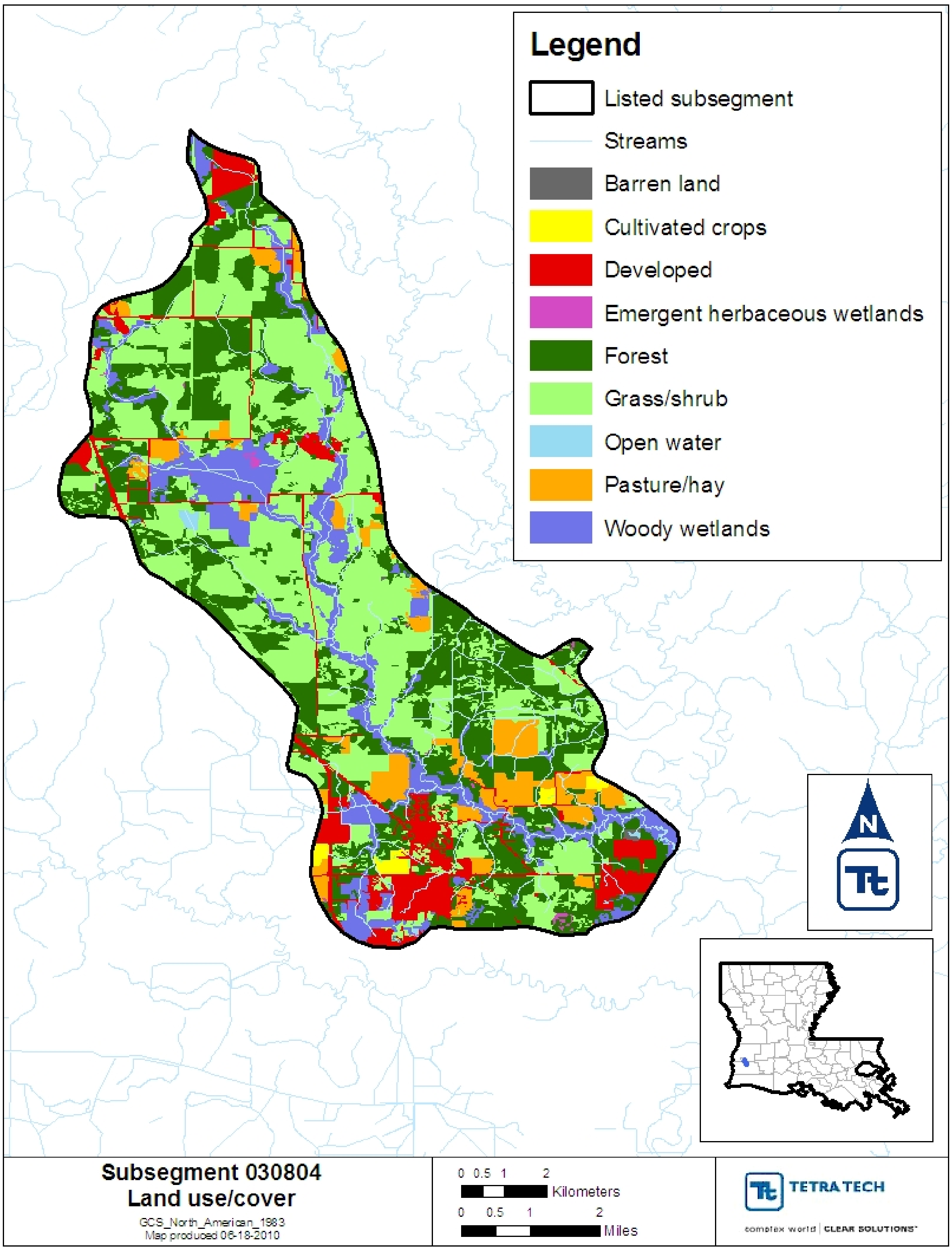

Figure 2-1. Land use in subsegment 030804 (Little River).

Land use data from the 2001 National Land Cover Database (NLCD) were used in Table 2-1 and Figure 2-1. NLCD 2001 is a land-cover database composed of land cover, impervious surface, and canopy density data. NLCD 2001 uses improved classification algorithms, which result in data with more precise rendering of spatial boundaries between the 16 classes than those obtained using NLCD 1992 (USEPA 2007). The differences in the 2001 and 2003 land use results could be from the differing land use assessment approaches. Both sources have the majority of the land use in the watershed as forest and grass/shrub.

Table 2-1. Subsegment 030804 land use (NLCD 2001)

Land use	Percent
Open water	0.29%
Developed	9.12%
Barren land	0.09%
Forest	30.72%
Grass/shrub	38.88%
Pasture/hay	6.84%
Cultivated crops	0.73%
Woody wetlands	13.08%
Emergent herbaceous wetlands	0.25%

Source: USEPA 2007

2.2 Water Quality Data

There is one water quality station on Little River with lead data. Station 844 (Little River east of Buhler, Louisiana) has had four dissolved lead observations collected since 2004. Appendix A contains the raw water quality data. The lead data were plotted over time for subsegment 030804 (Figure 2-2). No distinct seasonal trends or patterns can be seen in the water quality data.

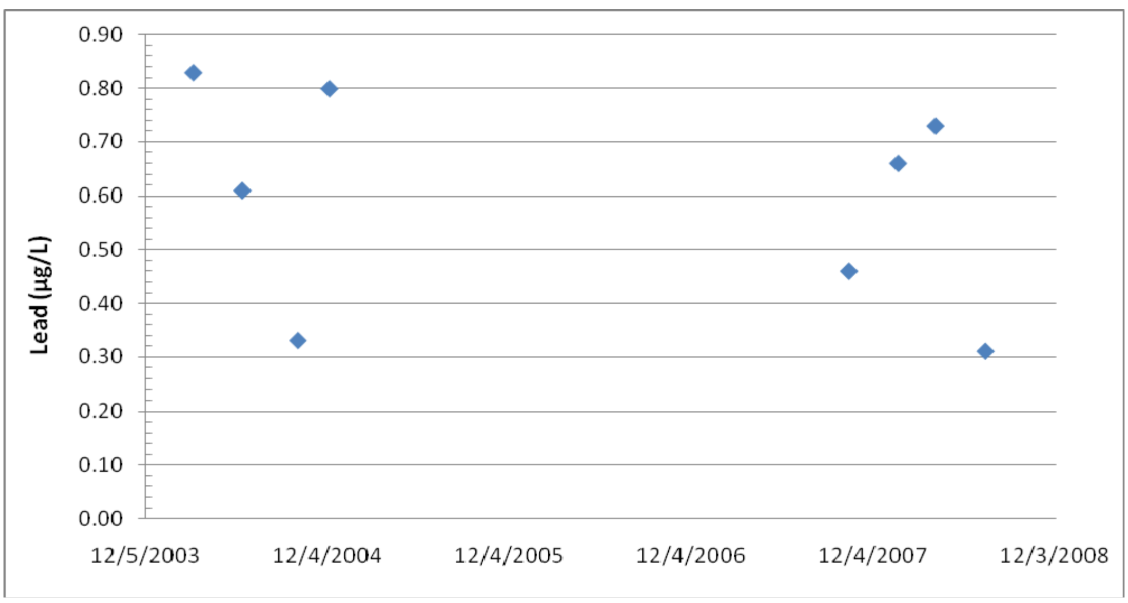

Figure 2-2. Lead data at station 844.

2.3 Water Quality Standards and Criteria

The designated uses for subsegment 030804 include primary and secondary contact recreation, propagation of fish and wildlife, and agriculture. Primary contact recreation includes any recreational or other water contact activity involving prolonged or regular full-body contact with the water and in which the probability of ingesting appreciable amounts of water is considerable. Examples of that type of water use include swimming, water skiing, and diving (LDEQ 2007). Secondary contact recreation includes any recreational or other water contact activity in which prolonged or regular full-body contact with the water is either incidental or accidental, and the probability of ingesting appreciable amounts of water is minimal. Examples of that type of water use include fishing, wading, and boating (LDEQ 2007). The criteria for protection of aquatic life are based on acute and chronic concentrations in fresh and marine waters and are developed primarily for attainment of the fish and wildlife propagation use.

The aquatic life criterion was used for this TMDL along with the 7Q10 flow for the waterbody. Metals criteria are based on hardness concentrations in ambient waters. The criterion was calculated from the freshwater chronic criteria equation (LDEQ 2009):

$$\text{Criterion} = e^{((1.2730 \times (ln(\text{hardness}))) - 4.7050)} \times (1.46203 - (0.145712 \times ln(\text{hardness})))$$

Hardness concentrations from the past 5 years at station 844 were averaged and used in calculating the lead criteria. The average hardness concentration for the subsegment 030804 is 32.74 milligrams per liter (mg/L). The applicable chronic lead criterion, therefore, is 0.73 µg/L. The criterion applies at all times. The available dissolved lead data and the sample exceedances are shown in Appendix A.

The Louisiana water quality standards also include an antidegradation policy (*Louisiana Administrative Code* Title 33, Part IX, Section 1109.A), which states that state waters exhibiting high water quality should be maintained at that high level of water quality. If that is not possible, water quality of a level that supports the designated uses of the waterbody should be maintained. The designated uses of a waterbody may be changed to allow a lower level of water quality only through a use attainability study. LDEQ has developed this TMDL to be consistent with the state's antidegradation policy (LDEQ 2000).

2.4 Flow

No active U.S. Geological Survey (USGS) flow monitoring gages are on subsegment 030804. USGS gage 08016400 (Beckwith Creek near DeQuincy, Louisiana), with a drainage area of 148 square miles, is in a nearby subsegment. The critical low flow (7Q10) for that gage was calculated as 0.35 cubic feet per second (cfs) (Ensminger and Wright 2003).

2.5 Identification of Sources

Louisiana's draft 2008 *Integrated Report* states that the suspected source of the lead impairment in Little River, subsegment 030804, is unknown (LDEQ 2008). LDEQ has established a group of reference streams throughout the state that exhibit near-pristine characteristics and have no man-made sources discharging or contributing runoff into them. Two of the reference streams in the Calcasieu Basin—Six Mile Creek and Beckwith Creek—were found as not supporting the lead criteria during the 2000 305(b) assessment. Therefore, LDEQ concluded that natural background loading is the dominant source of lead in Little River (LDEQ 2004).

Information on point source dischargers in the subsegment was obtained from LDEQ's permitting database (TEMPO) and Electronic Document Management System (EDMS). According to the TEMPO database, there are four permitted point sources are discharging into subsegment 030804. However, only two of these facilities have discharges that may contain lead. In both cases, the facilities are permitted for stormwater.

Table 2-2 Summary of LPDES permits containing limits for lead in subsegment 030804

AI #	Permit #	Outfall	Facility name	Exp. date	Facility type	Outfall type	Receiving waterbody
276	LA0058882	001	CECOS International, Inc	11/01/11	Electric, Gas, and Sanitary Services	Stormwater	Little River
		002				Stormwater	Little River
		003				Stormwater	West Fork Calcasieu River
93516	LAR05N447		Nick A Doucet 27 #1 Production Facility	05/01/11	Oil and Gas Extraction	MSGP - stormwater	To a swale to an unnamed ditch to Little River

3. TMDL Load Calculations

A TMDL is the total amount of a pollutant that can be assimilated by the receiving waterbody while still achieving water quality standards. In TMDL development, allowable loadings from all pollutant sources that cumulatively amount to no more than the TMDL must be established and thereby provide the basis for establishing water quality-based controls.

A TMDL for a given pollutant and waterbody is composed of the sum of individual WLAs for point sources, LAs for nonpoint sources and natural background levels. In addition, the TMDL must include an implicit or explicit MOS to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. The TMDL components are illustrated using the following equation:

$$TMDL = \sum WLAs + \sum LAs + MOS.$$

TMDLs are typically expressed as a mass loading (e.g., pounds per day).

Both section 303(d) of the Clean Water Act and the regulations at 40 CFR 130.7 require that TMDLs include an MOS to account for uncertainty in available data or in the actual effect that controls will have on the loading reductions and receiving water quality. The MOS may be expressed explicitly as unallocated assimilative capacity or implicitly using conservative assumptions in establishing the TMDL. For a more detailed discussion of the MOS, see Section 3.4.

3.1 Load Determination for Little River (030804)

The sampling events used as the basis for this TMDL were performed to meet the needs of the state to develop the *Integrated Report*, which includes the biennial section 305(b) report (*Water Quality Inventory*) and the section 303(d) list of impaired waters. The data are adequate for a conservative TMDL according to the assumption that no fate and transport mechanisms are present in the waterbodies. Data gathering did not include any flow measurements, any hardness measurements, nor any upstream sampling and measurements for background conditions. Without such data, fate and transport modeling and calculating reductions required from current loads are not possible.

Calculating the TMDL

Dissolved lead was treated as a conservative parameter. The following equation was used to calculate the dissolved lead TMDL. The TMDL calculations are shown below.

$$TMDL \text{ (lb/day)} = (lead\ criterion \text{ [mg/L]}) \times (critical\ flow \text{ [mgd]}) \times 8.345$$

where 8.345 is a conversion factor. Only observed data from during 2005 and after were used in this TMDL. The critical flow from USGS gage 08016400 was area weighted to obtain the flow for this subsegment. The drainage area of the USGS gage is 148 square miles, and the area of the subsegment is 36 square miles making the critical flow 0.085 cfs.

Lead criterion = 0.73 µg/L = 0.00073 mg/L

Critical flow (7Q10) = 0.085 cfs = 0.055 mgd

TMDL = (0.00073 mg/L) × (0.055 mgd) × 8.345 = 0.000337 lb/day

3.2 Wasteload Allocation (WLA)

The WLA portion of the TMDL equation is the total loading of a pollutant that is assigned to point sources. Stormwater loading is usually based on average annual rainfall, while the TMDL is calculated at critical low (7Q10) flow. Since these two conditions are not compatible, LDEQ assumes that stormwater runoff is zero when developing a TMDL at critical low flow. All of the individual point source facilities identified in Section 2.5 are permitted to discharge to subsegment 030804. For this TMDL, which is being developed at 7Q10 flow, facility stormwater flows should be assumed to be zero.

WLAs were calculated at each outfall for all permitted point sources in subsegment 030804 (Table 3-1). The equation for WLA calculation is:

$$WLA \text{ (lbs/day)} = (limit \text{ [mg/L]}) \times (flow \text{ [gpd]}) \times 0.000008345$$

where 0.000008345 is a conversion factor. Subsegment 030804 does not contain actively permitted facilities with lead limitations (excluding stormwater). Therefore, the WLA is zero.

Table 3-1. WLA summary for subsegment 030804 for total lead

AI #	Permit #	Outfall	Facility name	Outfall type	Flow type	Flow (gpd)	Limit type	Total		Dissolved	
								Limit (µg/L)	Lead (lb/d)	Limit (µg/L)	Lead (lb/d)
276	LA0058882	001	CECOS International, Inc	Stormwater	Expected	0	Daily max.	150	0[a]	29.96	0[a]
		002		Stormwater	Expected	0	Daily max.	150	0[a]	29.96	0[a]
		003		Stormwater	Expected	0	Daily max.	150	0[a]	29.96	0[a]
93516	LAR05N447	001	Nick A Doucet 27 #1 Production Facility	MSGP - stormwater	Not avail.		None		0		0

[a] This TMDL is being developed for critical low-flow conditions (7Q10). Under low-flow conditions, the WLA for all stormwater discharges will be 0.0 lb/d because the flow will be 0.0 mgd. However, existing stormwater permits limits continue to apply to all stormwater discharges.

LPDES permitted discharges without lead effluent limitations have been determined to not be sources of lead. For these dischargers, LDEQ is not providing allocations or permit limits. If at some point in the future, LDEQ determines that any of the discharges may contain lead, wasteload allocations may be provided along with the appropriate permit conditions.

3.3 Seasonal Variability

Because ambient monitoring data indicate that there is little variability of trace metals levels throughout the year, LDEQ has not defined a critical season.

3.4 Margin of Safety (MOS)

The Clean Water Act requires that TMDLs take into consideration an MOS. The MOS is the portion of the pollutant loading reserved to account for any uncertainty in the data. There are two ways to incorporate the MOS. One is to implicitly incorporate it by using conservative model assumptions to develop allocations. The other is to explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations (USEPA 1991). For this TMDL, an explicit MOS of 20 percent was used. The MOS is 0.000067 lb/day.

3.5 Load Allocation (LA)

The LA is the portion of the TMDL assigned to natural background loadings, nonpoint sources, urban runoff, and other anthropogenic sources. The LA was calculated for this TMDL by subtracting the WLA and MOS from the total TMDL. The LA applies strictly to critical, low-flow conditions. LAs were not allocated to separate nonpoint sources because of the lack of available source characterization data. The LAs include natural background sources. LDEQ also recognizes that stormwater may contribute to the lead impairments for subsegment 030804, however, LDEQ cannot provide an allocation for stormwater with a TMDL developed for critical, low-flow conditions.

$$\sum LAs = TMDL - \sum WLAs - MOS$$

$$\sum \text{LAs} = 0.000337 - 0 - 0.000067$$

$$\sum \text{LAs} = 0.000270 \text{ lb/day}$$

4. Monitoring Plan

LDEQ uses funds provided under section 106 of the Clean Water Act and under the authority of the Louisiana Environmental Quality Act to run a program for monitoring the quality of the state's surface waters. The LDEQ Surveillance Section collects surface water samples at various locations using appropriate sampling methods and procedures to ensure the quality of the data collected. The objectives of the surface water monitoring program are to determine the quality of the state's surface waters, develop a long-term database for water quality trend analysis, and monitor the effectiveness of pollution controls. The data obtained through the surface water monitoring program are used to develop the state's biennial *Water Quality Inventory* and the section 303(d) list of impaired waters. That information is also used to establish priorities for LDEQ's nonpoint source program.

LDEQ has implemented a watershed approach to surface water quality monitoring. Through that approach, the entire state is sampled on a 4-year cycle. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the 4-year cycle. Sampling is conducted monthly to yield approximately 12 samples per site during each year the site is monitored. Sampling sites are where they are considered representative of the waterbody. Within each basin, all monitored subsegments will be sampled over the year or years specified under each cycle period. Little River was monitored with the Calcasieu River Basin in 2004, 2005, 2008, and 2009. Water quality assessments for the 305(b)/303(d) *Integrated Report* will be conducted for each basin following the last year of its monitoring period. Usually125 waterbody subsegments are monitored each month under the program. Under the current monitoring schedule, approximately one-half of the state's waters are newly assessed for section 305(b) and section 303(d) listing purposes for each biennial cycle, with sampling occurring statewide each year. The 4-year cycle follows an initial 5-year rotation that covered all basins in the state according to the TMDL priorities.

Monitoring allows LDEQ to determine whether any improvement has occurred in water quality after the TMDLs have been implemented. When LDEQ evaluates monitoring results at the end of each year, it may add waterbodies to or remove them from the section 303(d) list of impaired waterbodies.

5. Public Participation

Federal regulations require LDEQ to notify the public and seek comments concerning the TMDLs it prepares. This TMDL was developed under contract to LDEQ, and LDEQ will hold a public review period seeking comments, information, and data from the public and any other interested party. The notice for the public review period will be published in local and state newspapers and on LDEQ's electronic notification system. The TMDL report will be available on LDEQ's TMDL Web site at www.deq.louisiana.gov/portal/default.aspx?tabid=1563. The public review period will last for 30 days. LDEQ will review all comments received, and this TMDL might be revised to reflect comments if appropriate.

6. References

Ensminger, P.A., and L.S. Wright. 2003. *Low-flow Characteristics of Louisiana Streams.* U.S. Geological Survey Water Resources Technical Report Number 70. Louisiana Department of Transportation and Development, Baton Rouge, LA.

LDEQ (Louisiana Department of Environmental Quality). 1996. *1996 Louisiana Water Quality Inventory: Integrated Report*. Louisiana Department of Environmental Quality, Baton Rouge, LA. <http://www.deq.louisiana.gov/portal/tabid/2201/Default.aspx>. Accessed June 21, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2000. *Environmental Regulatory Code,* Part IX. Water Quality Regulations. LAC33:IX.1109.A. Louisiana Department of Environmental Quality, Baton, Rouge, LA.

LDEQ (Louisiana Department of Environmental Quality). 2003a. *2002 Louisiana Water Quality Inventory: Integrated Report*. Louisiana Department of Environmental Quality, Baton Rouge, LA. <http://www.deq.louisiana.gov/portal/tabid/2201/Default.aspx>. Accessed June 9, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2003b. *Watershed Implementation Plan, Little River, Subsegment 030804*. Nonpoint Source Unit. < http://nonpoint.deq.louisiana.gov/wqa/links/watershedplan/calcasieu/Little River Implementation Plan.pdf>. Accessed June 21, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2004. *Watershed Implementation Plan, Bayou Serpent, Subsegment 030701*. Nonpoint Source Unit. <http://nonpoint.deq.louisiana.gov/wqa/links/watershedplan/calcasieu/Bayou%20Serpent%20Implementation%20Plan.pdf>. Accessed April 14, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2005. *2004 Louisiana Water Quality Inventory: Integrated Report*. Louisiana Department of Environmental Quality, Baton Rouge, LA. <http://www.deq.louisiana.gov/portal/tabid/2201/Default.aspx>. Accessed June 9, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2007. *Environmental Regulatory Code*. Part IX, Water Quality Regulations. Chapter 11. Surface Water Quality Standards. Louisiana Department of Environmental Quality, Baton Rouge, LA.

<http://www.deq.louisiana.gov/portal/Portals/0/planning/regs/title33/33v09.pdf>. Accessed April 14, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2008. *2008 Draft Louisiana Water Quality Inventory: Integrated Report*. Louisiana Department of Environmental Quality, Baton Rouge, LA. <http://www.deq.louisiana.gov/portal/LinkClick.aspx?fileticket=I4PibcgdTUA%3d&tabid=2986>. Accessed June 14, 2010.

LDEQ (Louisiana Department of Environmental Quality). 2009. *Environmental Regulatory Code*. Part IX, Water Quality Regulations. Section 1113. Surface Water Quality Standards. Louisiana Department of Environmental Quality, Baton Rouge, LA.

USEPA (U.S. Environmental Protection Agency). 1991. *Guidance for Water Quality-Based Decisions: The TMDL Process*. EPA 440/-4-91-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

USEPA (U.S. Environmental Protection Agency). 2007. Multi-Resolution Land Characteristics Consortium (MRLC). 2001 National Land Cover Database (NLCD 2001). <http://www.epa.gov/mrlc/nlcd-2001.html>. Accessed May 5, 2010.

Appendix A. Hardness, TSS, and Lead Monitoring Data

Table A-1. Hardness and total suspended solids data for station 844

Site	Collection date[a]	Hardness (mg/L)	TSS (mg/L)
Little River east of Buhler, Louisiana	1/26/99	23.4	12.5
Little River east of Buhler, Louisiana	2/23/99	24.1	16
Little River east of Buhler, Louisiana	3/23/99	19.9	7
Little River east of Buhler, Louisiana	4/28/99	51	21
Little River east of Buhler, Louisiana	5/25/99	36.2	14
Little River east of Buhler, Louisiana	6/22/99	23.9	4
Little River east of Buhler, Louisiana	7/27/99	29.2	4
Little River east of Buhler, Louisiana	8/24/99	47.1	32
Little River east of Buhler, Louisiana	9/28/99	38.6	14
Little River east of Buhler, Louisiana	10/26/99	28.9	4
Little River east of Buhler, Louisiana	11/23/99	41.6	9.5
Little River east of Buhler, Louisiana	12/1/99	41.5	8
Little River east of Buhler, Louisiana	1/21/04	13.2	10.5
Little River east of Buhler, Louisiana	2/10/04	19.6	31.5
Little River east of Buhler, Louisiana	3/9/04	30.4	7.5
Little River east of Buhler, Louisiana	4/13/04	45.8	7
Little River east of Buhler, Louisiana	5/11/04	23.2	5
Little River east of Buhler, Louisiana	6/15/04	48.5	10
Little River east of Buhler, Louisiana	7/20/04	41.9	13
Little River east of Buhler, Louisiana	8/10/04	35.3	ND (4)[b]
Little River east of Buhler, Louisiana	10/5/04	34.5	4
Little River east of Buhler, Louisiana	10/19/04	31.3	20
Little River east of Buhler, Louisiana	11/16/04	19.8	5
Little River east of Buhler, Louisiana	12/7/04	16.3	19
Little River east of Buhler, Louisiana	10/16/07	44.5	8
Little River east of Buhler, Louisiana	11/6/07	32.8	6
Little River east of Buhler, Louisiana	12/3/07	24.7	5.5
Little River east of Buhler, Louisiana	1/23/08	23.6	6
Little River east of Buhler, Louisiana	2/13/08	27.3	37.5
Little River east of Buhler, Louisiana	3/11/08	21.5	21
Little River east of Buhler, Louisiana	4/7/08	26.6	9
Little River east of Buhler, Louisiana	5/5/08	52.7	12
Little River east of Buhler, Louisiana	6/10/08	48.6	6.5
Little River east of Buhler, Louisiana	7/16/08	19.6	8
Little River east of Buhler, Louisiana	8/18/08	38.2	6

a. Data from before 2005 were not included in TMDL analysis.
b. This result was below the detecting limit, which was 4 mg/L..

Table A-2. Hardness summary statistics for station 844

Statistic	Hardness[a]	TSS[a]
Minimum (mg/L)	19.6	5.5
Maximum (mg/L)	52.7	37.5
Average (mg/L)	32.74	11.41
Count	11	11

a. Data from before 2005 were not included in TMDL analysis.

Table A-3. Dissolved lead data for station 844

Site	Collection date	MDL (µg/L)	Type	Result (µg/L)[a]
Little River east of Buhler, Louisiana	2/23/99		Filtered	5
Little River east of Buhler, Louisiana	5/25/99		Filtered	5
Little River east of Buhler, Louisiana	8/24/99		Filtered	5
Little River east of Buhler, Louisiana	11/23/99		Filtered	5
Little River east of Buhler, Louisiana	3/9/04	0.01	Filtered	0.83
Little River east of Buhler, Louisiana	6/15/04	0.01	Filtered	0.61
Little River east of Buhler, Louisiana	10/5/04	0.01	Filtered	0.33
Little River east of Buhler, Louisiana	12/7/04	0.01	Filtered	0.8
Little River east of Buhler, Louisiana	10/16/07		Filtered	0.46
Little River east of Buhler, Louisiana	1/23/08		Filtered	0.66
Little River east of Buhler, Louisiana	4/7/08		Filtered	0.73
Little River east of Buhler, Louisiana	7/16/08		Filtered	0.31

a. Exceedances of the calculated standard are bold. Data from before 2005 were not included in TMDL analysis.

Table A-4. Dissolved lead summary statistics for station 844

Statistic	Value[a]
Minimum (µg/L)	0.31
Maximum (µg/L)	0.73
Average (µg/L)	0.54
Count	4
Percentage of data that violate the standard	25%

a. Data from before 2005 were not included in TMDL analysis.