

According to the April 2018, ADEM Brownfields Public Record, nine brownfield sites are located in Opelika:

- Diversified Products Tube Mill, 200 Troxel Avenue (10.4 acres).
- Saucer Investments, LLC at 2401 1st Avenue, (2.5 acres).
- Pepperell Mill, 2401 1st Avenue, (14 acres).
- Former Opelika Mills, 1534 1st Avenue, (11.773 acres).
- Opelika #1, Gas Pipeline Row (.2 acres).
- Opelika #2, Gas Pipeline Row, (.1 acres).
- Gas Pipeline Row (.1 acre).
- Charbroil Opelika Facility, 309 Williamson Avenue, (101.77 acres).¹⁹

HISTORICAL WATER QUALITY

Pepperell Branch, with a length of 6.67-miles and a drainage area of 14.58-square miles, is currently on the State of Alabama’s §303(d) List of Impaired Waters. Pepperell Branch has been on the §303(d) list of impaired waters for not meeting its Fish and Wildlife (F&W) water use classifications since 2000. Section (§)303(d) of the Clean Water Act (CWA) and EPA’s Water Quality Planning and Management Regulations (40 CFR Part 130) require that states develop Total Maximum Daily Loads (TMDLs) for waterbodies that are not meeting designated uses. Multiple TMDLs have been developed for Pepperell, including TMDLs for organic enrichment, dissolved oxygen, nutrients, and pathogens (*TMDLs are outlined in more detail under the Water Quality Section*). Many pollutant sources, including human and animal waste, can contribute both *E.coli* and nutrients to waterbodies. Some land practices, including forestry, lawn management, and landscape fertilization can also affect nutrient levels.

Table 4: Water Quality Inventory Listing of Bacteria and Nutrient Concerns for Pepperell Branch Watershed.
Source ADEM.

Assessment Area	Classification	Sources	Concern	Water Quality Standard Violation	Parameter
Pepperell from Sougahatchee Creek to its source	Fish and Wildlife		Pathogens (<i>E. coli</i>)	<i>E. coli</i> (single sample) <i>E. coli</i> (geometric mean)	<i>E. coli</i> bacteria
Saugahatchee Creek to West Point Pepperell	Fish and Wildlife	Industrial, Urban Surface Runoff	Toxicity, Nutrients, Org Enrichment		CBOD5 & NH3-N

Table 5: Potential Pollutant Sources in the Watershed.

Potential Sources	<i>E. coli</i> Bacteria	Nutrients	Other
Urban			
Impervious Surface Runoff	X	X	X
Pet Waste	X	X	
Industry		X	X
Water Management			
Septic Systems	X	X	X
Waste Water Treatment Facilities	X	X	X
Agriculture			
Horses and Cattle	X	X	
Birds			
Ducks, Geese, Turkeys, & Pigeons	X	X	

As mentioned earlier, Section 303(d) of the Clean Water Act and EPA's Water Quality Planning and Management Regulations require states to identify waterbodies, which are not meeting their designated uses. They also must determine the total maximum daily load (TMDL) for pollutants causing use impairment. Pepperell Branch, from Saugahatchee Creek to its source, was placed on Alabama's 1998 Clean Water Act (CWA) §303(d) list of impaired waters for not meeting its Fish & Wildlife (F&W) water use classification. It is listed for nutrients and pathogens from industrial and municipal sources.

In 1997, the TMDL for organic enrichment and dissolved oxygen was written for Pepperell Branch. The adverse impacts measured were high nutrient (nitrogen and phosphorus) and organic matter concentrations from treated municipal and industrial waste discharged into the creek. These high concentrations of pollutants manifest in the water as high algal growth, measured as chlorophyll a, and a measured "sag" or decline (of about 2 mg/L) in dissolved oxygen (DO) from the Pepperell Branch downstream to County Rd 188 Bridge. At that time, the DO sag was attributed to organic pollution coming down Pepperell Branch into the Saugahatchee (Saugahatchee Watershed Management Plan, 2005).

In 2008, the nutrient TMDL was revised since the West Point Stevens Plant stopped discharging. This TMDL notes that there is a 50% reduction needed by NPS to meet its water use classification. The model addressed only phosphorus because nitrogen was not considered a major source of impairment. The model addressed only phosphorus because nitrogen was not considered a major source of impairment. The macroinvertebrate community was determined to be in a poor condition attributed to both sediment and/or chlorides in the watershed.

A TMDL was developed in 2011. *E. coli* loading from urban areas is potentially attributable to multiple sources including storm water runoff, illicit discharges of wastewater, runoff from improper disposal of waste materials, failing septic tanks, sewer overflows due to I&I (infiltration and inflow) and domestic animals.

TMDL Timeline for Pepperell Branch

- Pepperell Branch added to the State of Alabama's §303(d) List of Impaired Waters Pepperell Branch has been on the §303(d) list of impaired waters for not meeting Fish and Wildlife (F&W) water use classifications since 2000.
- It was placed on the 1992 and 1994 §303(d) list for unknown toxicity, Organic Enrichment/Dissolved Oxygen (OE/DO), and thermal modification.
- In 1996, Pepperell Branch was listed on the 1996 §303(d) list for unknown toxicity, OE/DO, and nutrients.
- In 1998, EPA approved TMDLs for OE/DO and delisted for unknown toxicity and thermal modification.
- As a result of fecal coliform data collected by ADEM from 2004 through 2009, placed it on Alabama's 2010 §303(d) list in 2010 for pathogens (fecal coliform) from urban runoff and storm sewers.²⁰

Water Quality Impairment for Bacteria

Pathogen loadings are calculated as the product of concentration times flow times an appropriate conversion factor. The highest load reduction to the watershed is employed for the TMDL, the rationale being that if the watershed can meet pathogen criteria under the highest load conditions, it should be able to meet the criteria under any other conditions. The highest *E. coli* value measured from field data was the single sample value of 4839 colonies/100 mL at station PPLL-2 on June 21, 2010. Measured flow (i.e., the critical flow) on the same day was 2.88 cfs. The allowable concentration is equal to the water quality criterion minus a 10% measure of safety (MOS). The *E. coli* single sample summer water quality criterion is 487 colonies/100 mL for waterbodies classified as F&W. Incorporating a 10% MOS results in an allowable pathogen concentration of 438 colonies/100 mL. Shown in Table 5 below are the existing conditions and required load reduction for *E. coli* within the Pepperell Branch watershed.

For comparison purposes, the highest load reduction employing the geometric mean criterion was also calculated. That value was 78% as measured at station PPLL-2 from June 14 through June 28, 2010.

Table 6, below is a summary of the estimated existing load, allowable load, and percent reduction for the single sample criterion vs. the geometric mean criterion. Table 7 on the following page lists the TMDL defined as the maximum allowable *E. coli* loading under critical conditions (June-September) for Pepperell Branch. Using critical conditions for the TMDL development will ensure that water quality is maintained throughout the year.

Water quality data collected by ADEM from 2004 through 2009 was used to list Pepperell Branch on Alabama's 2010 §303(d) list. At the time of the listing, fecal coliform was the accepted pathogen indicator. Waters in which less than or equal to 10% of the samples collected over a five year period exceeded the single-sample maximum of 2000 colonies/100 mL were prepared by ADEM/Water Quality Branch. Geometric mean samples comprised of at least 5 samples collected over a thirty-day period that were reported less than or equal to 200 colonies/100 mL (June-September) or 1000 colonies/100 mL (October-May) were considered to comply with Alabama's water quality standard for fecal coliform bacteria. Waters in which greater than 10% of the samples exceeded the single-sample maximum criterion of 2000 colonies/100 mL or any geometric mean sample that exceeded the geometric mean criterion of 200 colonies/100 mL (June-September) or 1000 colonies/100 mL (October-May) were considered impaired and subsequently listed for pathogens (fecal coliform) on Alabama's §303(d) list. It should be noted that ADEM adopted *E. coli* as the new water quality criterion for freshwater in Alabama that became

effective on September 19, 2010. The ADEM fecal data was collected on Pepperell Branch near US Highway 29. Of 35 samples collected, six exceeded the single sample maximum fecal criterion of 2,000 colonies/100 mL.

Table 6: 2010 *E. coli* Loads and Required Reduction by Source

	Existing Load (colonies/day)	Allowable Load (colonies/day)	Required Reduction (colonies/day)	% Reduction
Nonpoint Source Load Single Sample	3.41 x 10 ¹¹	3.09 x 10 ¹⁰	3.10 x 10 ¹¹	91%
Nonpoint Source Load Geometric Mean	3.76 x 10 ¹⁰	8.41 x 10 ⁹	2.92 x 10 ¹⁰	78%
Point Source Load ^a	NA	NA	NA	0%

a. This does not include loads associated with the MS4 Phase II Area.

Table 7: 2010 *E. coli* TMDL for Pepperell Branch with percent reductions by ADEM

TMDL ^e	Margin of Safety (MOS)	Waste Load Allocation (WLA) ^a			Load Allocation (LA)	
		WWTP ^b	MS4 ^c	Leaking Collection Systems ^d		
(cols/day)	(cols/day)	(cols/day)	(% reduction)	(cols/day)	(cols/day)	(% reduction)
3.43 x10 ¹⁰	3.45 x10 ⁹	NA	91	0	3.09 x10 ¹⁰	91%

a. There are no CAFOs in the Pepperell Branch watershed. Future CAFOs will be assigned a waste load allocation (WLA) of zero.

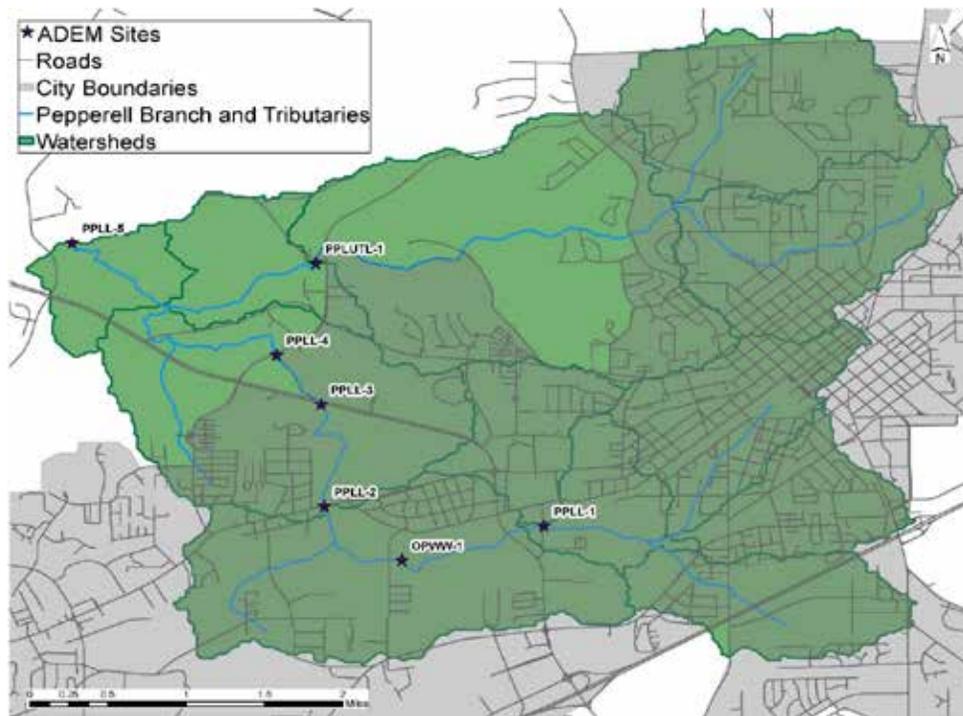
b. WLAs for WWTPs expressed as *E. coli* loads (colonies/day). Future WWTPs must meet instream water quality criteria at the point of discharge as specified in their NPDES permits.

c. Applies to all regulated MS4s located in the Pepperell Branch watershed, both current and future.

d. The objective for leaking collection systems is a WLA of zero. It is recognized, however, that a WLA of 0 colonies/day may not be practical. For these sources, the WLA is interpreted to mean a reduction in *E. coli* loading to the maximum extent practicable, consistent with the requirement that these sources not contribute to a violation of the water quality criteria for *E. coli*.

e. TMDL was established using the single sample criterion of 487 colonies/100ml.

Figure 11: ADEM Historical Sampling Sites in Pepperell Branch Watershed.



Reach Characteristics at Trend Station PPLL-2

Pepperell Branch at U.S. Highway 14/ Pepperell Parkway (32.6347/-85.4254; PPLL-2) was monitored June 2010 to assess the biological integrity of the site and to document impairment from siltation. Pepperell Branch was also monitored upstream of at PPLL-5. A macroinvertebrate survey and habitat assessment were conducted to verify impairment to aquatic communities. Monthly water chemistry samples were collected to identify the causes of impairment.

Figure 12: Pepperell Branch. Source: Creeklane Trails of Opelika.



2010 Physical Characteristics Assessment by ADEM

During ADEM's 2010 macroinvertebrate assessment, general observations and habitat assessments were completed. By comparing reference reaches in the same ecoregion, the assessments gave an indication of the physical condition of the site and the quality and availability of habitat. Pepperell Branch at PPLL-2, is a sand bottom stream in the Tallapoosa River watershed. Overall habitat quality was categorized as *sub-optimal*.

General observations and a habitat assessment were completed during the macroinvertebrate assessment of Pepperell Branch upstream of Saughatchee Creek behind Opelika Westside WWTP in Lee County (32.66030/-85.44870). Pepperell Branch at PPLL-5 is a sandy-bottomed, mostly-shaded stream reach. In comparison with reference reaches in the same ecoregion, overall habitat quality was categorized as *marginal*.

Benthic macroinvertebrate communities were sampled using ADEM's Intensive Wadeable Multi-habitat Bioassessment methodology (WMB-I). The WMB-I uses measures of taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each metric is scored on a 100-point scale. The final score is an average of the score for each metric. The macroinvertebrate community was rated *poor* (Table 4) due to *very poor* ratings in # EPT and % Dominant Taxa and *very poor* rankings in % plecoptera.

Table 8: Habitat Assessment Results from 2010 by ADEM.

Habitat Assessment	% Maximum Score	Rating
Instream Habitat Quality	87	Optimal > 70
Sediment Deposition	53	Marginal (41-58)
Sinuosity	88	Optimal > 84
Bank and Vegetative Stability	35	Marginal (35-59)
Riparian Buffer	51	Marginal (50-69)
Habitat Assessment Score	145	
% Maximum Score	60	Sub-optimal (59-70)

Table 9: Macroinvertebrate Assessment from 2010 by ADEM

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures			
# EPT genera	3	12	Very Poor (≤ 18)
Taxonomic composition measures			
% Non-insect taxa	9	80.9	Fair (61.9-92.7)
% Plecoptera	0	0	Very Poor (≤ 1.85)
% Dominant taxa	45	12.4	Very Poor (≤ 23.4)
Functional composition measures			
% Predators	13	43.8	Fair (30.2-45.2)
Tolerance measures			
Beck's community tolerance index	0	0	Very Poor (≤ 10.5)
% Nutrient-tolerant organisms	55	25.8	Poor (25.4-50.8)
WMB-I Assessment Score	-	25	Poor (19-37)

Table 10: Results of the Macroinvertebrate Bioassessment Conducted by ADEM in Pepperell Branch at PPLL-2
June 22, 2010.

	Parameter	N	Min	Max	Med	Avg	SD	E
Physical								
	Temperature (°C)	20	16.2	27.0	24.5	23.6	2.9	
	Turbidity (NTU)	20	3.0	35.0	6.7	11.7	9.9	
	Total Dissolved Solids (mg/L)	8	70.0	114.0	98.0	96.0	15.8	
J	Total Suspended Solids (mg/L)	8	< 1.0	31.0	4.5	7.0	9.1	
	Specific Conductance (µmhos)	20	115.5	201.0	183.8	175.2	24.0	
	Alkalinity (mg/L)	8	27.0	70.6	63.7	57.3	14.8	
	Stream Flow (cfs)	20	0.1	4.5	2.0	2.1	1.4	
Chemical								
	Dissolved Oxygen (mg/L)	20	1.3*	8.6	5.8	5.7	1.6	3
	pH (su)	20	6.3	7.6	7.1	7.0	0.4	
	Ammonia Nitrogen (mg/L)	8	< 0.021	0.369	0.010	0.061	0.126	
	Nitrate + Nitrite Nitrogen (mg/L)	8	0.156	0.528	0.274	0.320	0.149	
	Total Kjeldahl Nitrogen (mg/L)	8	0.194	0.886	0.388	0.447	0.223	
	Total Nitrogen (mg/L)	8	0.448	1.314	0.661	0.767	0.329	
J	Dissolved Reactive Phosphorus (mg/L)	8	0.005	0.037	0.014	0.015	0.010	
	Total Phosphorus (mg/L)	8	0.018	0.094	0.030	0.038	0.025	
J	CBOD-5 (mg/L)	8	< 2.0	< 2.0	1.0	1.0	1.0	
	Chlorides (mg/L)	8	4.2	11.9	9.5	8.8	2.6	
Biological								
	Chlorophyll a (ug/L)	8	< 0.27	1.60	1.07	0.96	0.50	
J	E. coli (col/100mL)	19	31	4839	261	792	1210	

* F&W use class criteria violated
E = # of samples that exceeded criteria
J = estimate
N = # of samples

Figure 13: 2010 *E. coli* Loads and Required Reduction by Source.

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Point Source Load ^a	NA	NA	NA	0%

a. This does not include loads associated with the MS4 Phase II Area.

Table 11: *E. coli* TMDL in 2010 for Pepperell Branch

TMDLe	Margin of Safety (MOS)	Waste Load Allocation (WLA)a			Load Allocation (LA)	
		WWTPb	MS4sc	Leaking Collection Systemsd		
(cols/day)	(cols/day)	(cols/day)	(% reduction)	(cols/day)	(cols/day)	(% reduction)
3.43 x1010	3.45 x109	NA	91	0	3.09 x1010	91%

- a. There are no CAFOs in the Pepperell Branch watershed. Future CAFOs will be assigned a waste load allocation (WLA) of zero.
- b. WLAs for WWTPs expressed as *E. coli* loads (colonies/day). Future WWTPs must meet instream water quality criteria at the point of discharge as specified in their NPDES permits.
- c. Applies to all regulated MS4s located in the Pepperell Branch watershed, both current and future.
- d. The objective for leaking collection systems is a WLA of zero. It is recognized, however, that a WLA of 0 colonies/day may not be practical. For these sources, the WLA is interpreted to mean a reduction in *E. coli* loading to the maximum extent practicable, consistent with the requirement that these sources not contribute to a violation of the water quality criteria for *E. coli*.
- e. TMDL was established using the single sample criterion of 487 colonies/100ml.