APPENDIX 11

A-11. MILE BRANCH

A-11.1 Watershed Description

Mile Branch is in the central portion of the Upper Kanawha watershed, as shown in Figure A-11-1, and drains approximately 0.87 square mile (554 acres). Figure A-11-2 shows the land use distribution in the watershed. The dominant land use is forest, which covers 95.74 percent of the watershed. All other individual land cover types account for less than two percent of the total watershed area.

There is one impaired stream, Mile Branch, in the watershed. Figure A-11-3 shows the impaired segment and the pollutants for which it is impaired.

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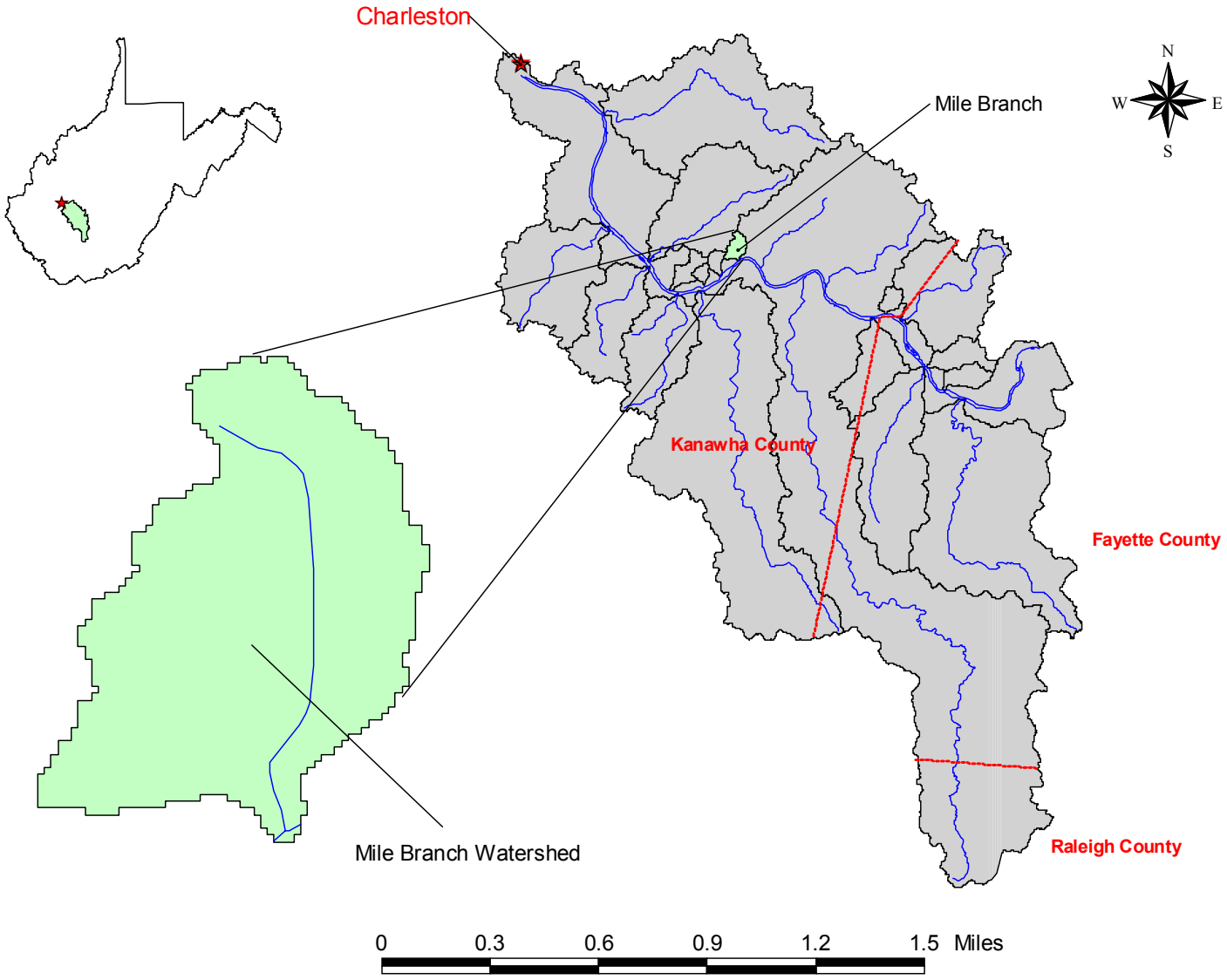


Figure A-11-1. Location of the Mile Branch watershed

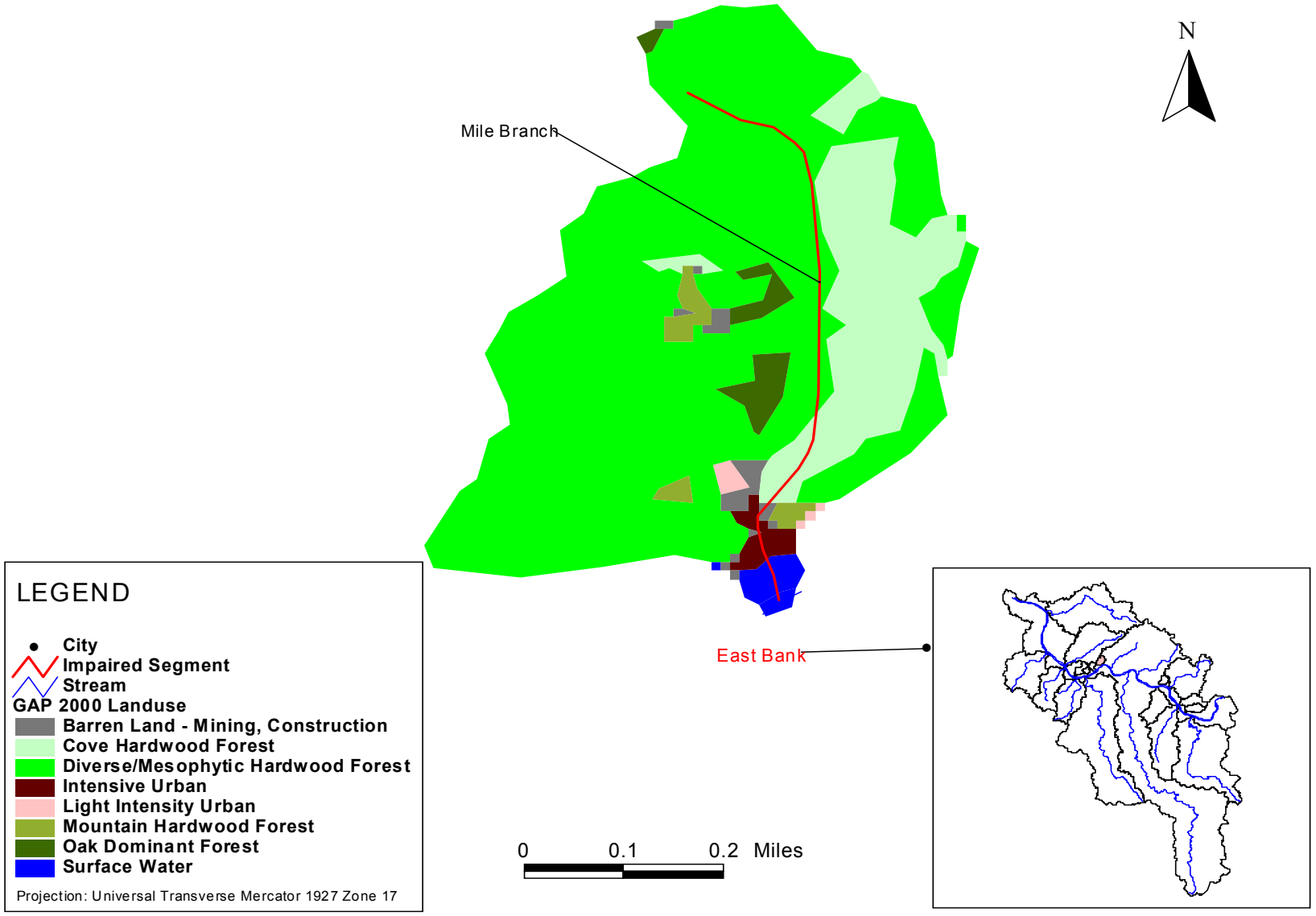
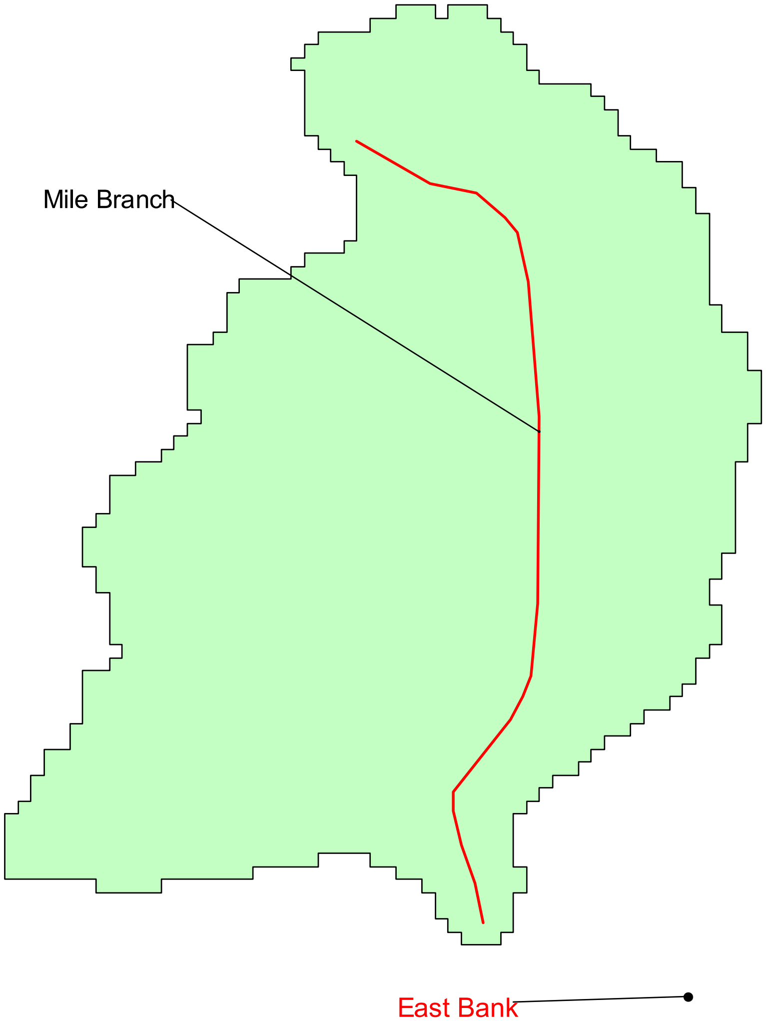


Figure A-11-2. Land use distribution in the Mile Branch watershed



Stream	Aluminum	Iron	Manganese	pH	Biological	Fecal Coliforms
Mile Branch	X	X			X	X

Figure A-11-3. The impaired waterbody in the Mile Branch watershed

A-11.2 Pre-TMDL Monitoring

Before establishing Total Maximum Daily Loads (TMDLs), WVDEP conducted monitoring in each of the impaired streams in the Upper Kanawha watershed to better characterize water quality and to refine impairment listings. Monthly samples were taken at 339 stations throughout the Upper Kanawha watershed from July 1, 2001, through June 30, 2002. The locations of the pre-TMDL monitoring sites in the Mile Branch watershed are shown in Figure A-11-4. Monitoring suites at each site were based on the types of impairments observed for in each stream. Streams impaired by metals and low pH were sampled monthly and analyzed for a suite of parameters (e.g., total iron, dissolved iron, total aluminum, dissolved aluminum, total manganese, total suspended solids, pH, sulfate, and specific conductance). Monthly samples from streams impaired by fecal coliform bacteria were analyzed for this parameter, pH, and specific conductance. Appropriate monitoring suites were also selected for streams with multiple impairments. For example, if a stream was impaired by metals and fecal coliform bacteria, the samples were analyzed for total iron, dissolved iron, total aluminum, dissolved aluminum, total manganese, total suspended solids, pH, sulfate, specific conductance, and fecal coliform bacteria. In addition, benthic macroinvertebrate assessments were performed at specific locations on the biologically impaired streams during the pre-TMDL monitoring period. When conditions allowed, instantaneous flow measurements were also taken at the pre-TMDL sampling locations.

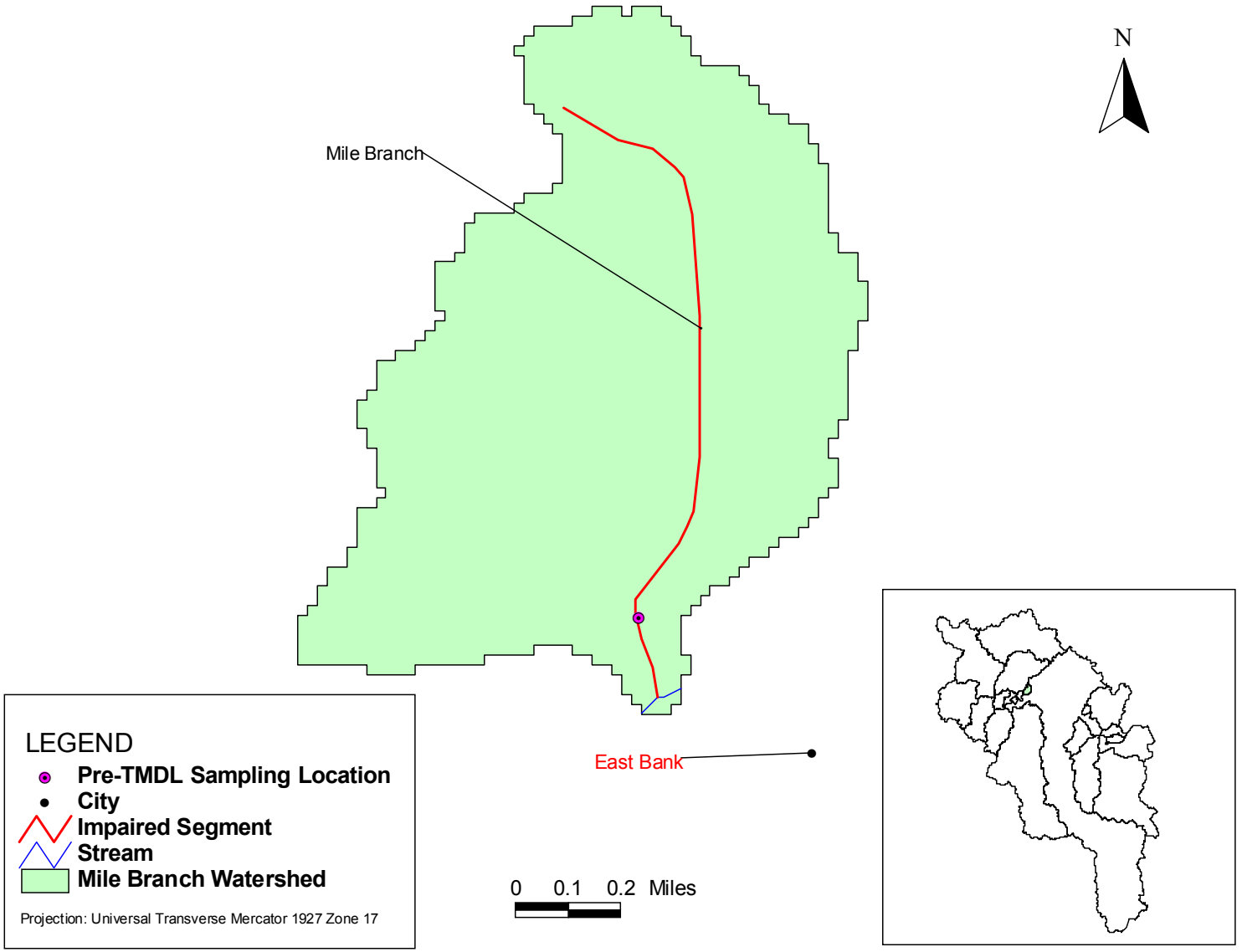


Figure A-11-4. The pre-TMDL monitoring station in the Mile Branch watershed

A-11.3 Metals and pH Sources

This section identifies and examines the potential sources of aluminum and iron in the Mile Branch watershed. Sources can be classified as either point sources (specific sources subject to a permit) or nonpoint sources (diffuse sources). Metals and pH point sources are classified by mining- and non-mining-related permits. Metals and pH nonpoint sources are diffuse, non-permitted sources such as abandoned or forfeited mine sites.

Pollution sources were identified using statewide geographic information system (GIS) coverages of point and nonpoint sources, and through field reconnaissance. As part of the TMDL process, WVDEP documented pollution sources in detail by collecting Global Positioning System data and water quality samples for laboratory analysis. WVDEP personnel recorded physical descriptions of the pollutant sources: the number of outfalls, the source of the outfalls, and the general condition of the stream in the vicinity of the outfalls. These records were compiled and electronically plotted on maps using GIS software. This information was used in conjunction with additional data to characterize pollutant sources.

Based on scientific knowledge of sediment/metal interactions and knowledge of West Virginia's soils, it is reasonable to conclude that sediments contain high levels of aluminum and iron, and, to a lesser extent, manganese. Control of sediment-producing sources may be necessary to meet water quality criteria for dissolved aluminum, total iron, and total manganese during critical high flow conditions.

A-11.3.1 Metals Point Source Inventory

As described in the main report, the National Pollutant Discharge Elimination System (NPDES) program, established under Clean Water Act sections 318, 402, and 405, requires permits for the discharge of pollutants from point sources. Metals and pH point sources can be classified into two major categories: permitted non-mining point sources and permitted mining point sources. There are no permitted point sources in the Mile Branch watershed.

A-11.3.2 Metals Nonpoint Source Inventory

Nonpoint sources contribute to metals-related water quality impairments in the watershed. Nonpoint sources are diffuse, non-permitted sources. Abandoned mines can create acid mine drainage, which contributes low pH and high metals concentrations to surface and subsurface waters; therefore, abandoned mine lands can be a significant non-permitted source of metals and pH impairment. Facilities that were subject to the Surface Mining Control and Reclamation Act of 1977 and forfeited their bonds or abandoned operations can be a significant mining-related non-permitted source. Non-mining land disturbance activities can also be a nonpoint source of metals, causing metals to enter waterbodies as a component of sediment. Examples of such land disturbance activities are agriculture, forestry, oil and gas wells, and the construction and use of roads.

Abandoned Mine Lands and Bond Forfeiture Sites
There are no abandoned mine lands or bond forfeiture sites in the Mile Branch watershed.

Land Disturbance Activities

Land disturbance resulting from agriculture, forestry, oil and gas operations, and the construction and use of roads can contribute metals to streams. The areas related to these activities and the number of sites in the Mile Branch watershed are discussed below.

Agriculture

Based on the GAP 2000 land use coverage, there are no agricultural areas in the Mile Branch watershed.

Forestry

There are no active logging operations in the Mile Branch watershed.

Oil and Gas Wells

There are six active oil and gas wells in the Mile Branch watershed, the locations of which are shown in Figure A-11-5. Based on the survey by WVDEP's Office of Oil and Gas, it is estimated that 0.96 acre (0.17 percent) of the Mile Branch watershed is disturbed by the active well sites (including areas associated with access roads).

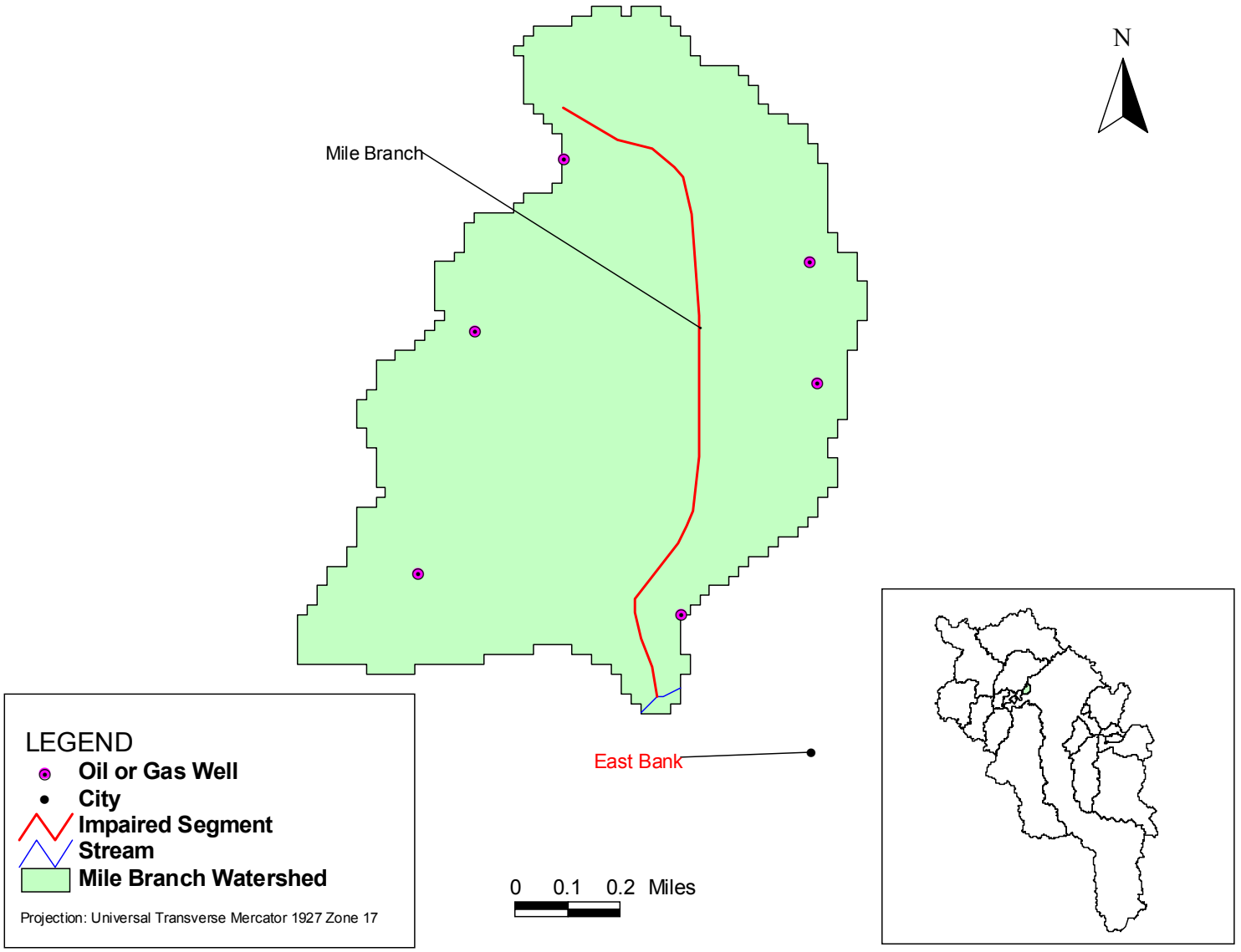


Figure A-11-5. Oil and gas wells in the Mile Branch watershed

Roads

The length and area of paved roads were calculated using the Census 2000 TIGER/Line files roads coverage for West Virginia. Information on unpaved roads from TIGER was supplemented by digitizing any unpaved roads on topographic maps that were not included in the TIGER shapefile. Table A-11-1 summarizes the length, area, and percentage of total watershed area for both paved and unpaved roads in the Mile Branch watershed.

Table A-11-1. Road miles by type in the Mile Branch watershed

Road Type	Road Distance (miles)	Road Area (acres)	Road Area as Percentage of Watershed
Total paved	0.62	1.44	0.26%
Total unpaved	6.53	9.66	1.74%

A-11.4 Fecal Coliform Bacteria Sources

This section identifies and examines the potential sources of fecal coliform bacteria in the Mile Branch watershed. Sources can be classified as either point (permitted) or nonpoint (non-permitted) sources. Point sources of fecal coliform bacteria are classified by several different types of sewage permits and the point source discharges regulated therein. Nonpoint sources are diffuse, non-permitted sources.

A-11.4.1 Fecal Coliform Bacteria Point Sources

Permitted sources of fecal coliform bacteria that experience effluent overflows or that do not comply with permit limits can cause occasional high loadings of fecal coliform bacteria in receiving streams. There are no permitted sources of fecal coliform bacteria in the Mile Branch watershed.

A-11.4.2 Nonpoint (Non-permitted) Fecal Coliform Bacteria Sources

Pollutant source tracking by WVDEP personnel identified scattered areas of high population density without access to public sewers in the Mile Branch watershed. Human sources of fecal coliform bacteria from these areas include undisinfected sewage discharges from failing septic systems, and possible direct discharges of undisinfected sewage from residences (straight pipes). The West Virginia Bureau for Public Health estimates septic tank failure rates in this area to be 70 percent in the first 10 years (WV Bureau for Public Health 2003). An analysis of census data from the 1990 Census combined with WVDEP source-tracking information yielded an estimate of 22 people living in unsewered homes in the Mile Branch watershed. Figure A-11-6 shows the estimated distribution of the unsewered population in the watershed.

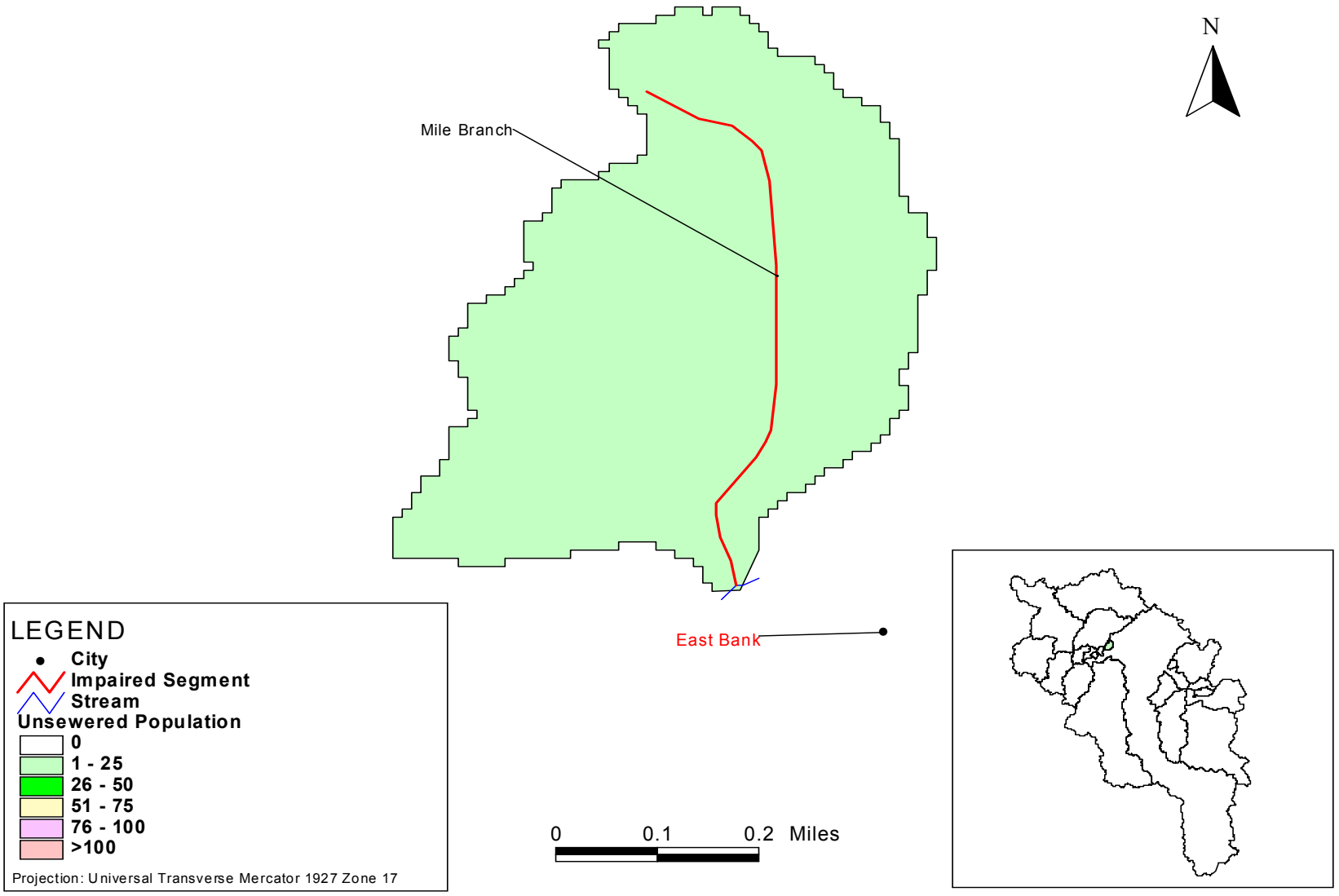


Figure A-11-6. Estimated unsewered population in the Mile Branch watershed

Stormwater runoff is another potential nonpoint source of fecal coliform bacteria in both residential/urban and rural areas. Runoff from residential areas can be a significant source, delivering bacteria present in litter and in the waste of pets and wildlife to the waterbody. Rural stormwater runoff can transport significant loads of bacteria from livestock pastures, livestock and poultry feeding facilities, and manure storage and application. In the Mile Branch watershed, there were isolated instances of dogs confined near the stream. Cattle, horses, and other agricultural livestock were not found in the area.

Given the small portion of total land area in the Upper Kanawha watershed that consists of residential and agricultural areas, and the low fecal accumulation rates for forested areas, stormwater runoff from these areas is not considered to be a significant nonpoint source of fecal coliform bacteria, except in localized areas.

A certain "natural background" contribution of fecal coliform bacteria can be attributed to deposition by wildlife in forested areas. Accumulation rates for fecal coliform bacteria in forested areas were developed using reference numbers from past TMDLs, incorporating wildlife estimates obtained from WVDEP's Division of Natural Resources. Although wildlife contributions of fecal coliform bacteria were considered in modeling, they were not found to be a significant source.

A-11.5 Stressors of the Biologically Impaired Stream

The Mile Branch watershed has one biologically impaired stream for which TMDLs have been developed. This stream is identified in Table A-11-2 along with the primary stressors of the stream's benthic communities and the TMDLs required to address the cause of biological impairment. A stressor identification process was used to evaluate and identify the primary stressors of impaired benthic communities.

Table A-11-2. Primary stressors of biologically impaired streams in the Mile Branch watershed

Stream	Primary Stressors	TMDLs Required
Mile Branch	Organic enrichment Metals toxicity (secondary; Al, Fe)	Fecal coliform bacteria Aluminum Iron

The iron and aluminum TMDLs presented in Tables A-11-4 and A-11-6 address the metals toxicity biological stressors, and the fecal coliform TMDL presented in Table A-11-8 is a surrogate for the organic enrichment biological stressor. Please refer to sections A-11.3 and A-11.4 for source information.

Note: Table number A-11-3 is omitted in this appendix for the purpose of maintaining uniformity of TMDL table numbers throughout the Upper Kanawha appendices.

A-11.6 TMDLs for the Mile Branch Watershed

A-11.6.1 TMDL Development

TMDLs and source allocations were developed for the impaired stream in the Mile Branch watershed. A top-down methodology was followed to develop these TMDLs and allocate loads to sources. Headwaters were analyzed first because they have a profound effect on downstream water quality. Loading contributions were reduced from applicable sources in the waterbody and TMDLs were developed. Refer to section 7.4 of the main report for a detailed description of allocation methodologies used in the development of the pollutant-specific TMDLs.

The TMDLs for iron, aluminum, and fecal coliform bacteria are shown in Tables A-11-4, A-11-6, and A-11-8. The TMDLs for iron and aluminum are presented as annual loads, in terms of pounds per year; the TMDL for fecal coliform bacteria is presented in terms of the number of colonies per year. All the TMDLs are presented as average annual loads because they were developed to meet TMDL endpoints under a range of conditions observed throughout the year.

A-11.6.2 TMDL Tables: Metals

Table A-11-4. Iron TMDL for the Mile Branch watershed

Major Watershed	Stream Code	Stream Name	Metal	Load Allocation (lb/yr)	Wasteload Allocation (lb/yr)	Margin of Safety (lb/yr)	TMDL (lb/yr)
MILE BRANCH	K-63	Mile Branch	Iron	668	NA	35	703

NA = not applicable.

Table A-11-5. Manganese TMDL for the Mile Branch watershed

Manganese impairments are not present in this watershed.

Table A-11-6. Aluminum TMDL for the Mile Branch watershed

Major Watershed	Stream Code	Stream Name	Metal	Load Allocation (lb/yr)	Wasteload Allocation (lb/yr)	Margin of Safety (lb/yr)	TMDL (lb/yr)
MILE BRANCH	K-63	Mile Branch	Aluminum	815	NA	43	858

NA = not applicable.

Table A-11-7. pH TMDLs for the Mile Branch watershed

There are no pH impairments in this watershed.

A-11.6.3 TMDL Tables: Fecal Coliform Bacteria

Table A-11-8. Fecal coliform bacteria TMDL for the Mile Branch watershed

Major Watershed	Stream Code	Stream Name	Parameter	Load Allocation (counts/yr)	Wasteload Allocation (counts/yr)	Margin of Safety (counts/yr)	TMDL (counts/yr)
MILE BRANCH	K-63	Mile Branch	Fecal coliform	1.09E+12	NA	5.75E+10	1.15E+12

NA = not applicable.

A-11.6.4 TMDL Tables: Sediment

Table A-11-9. Sediment TMDLs for the Mile Branch watershed

There are no sediment impairments in this watershed.