APPENDIX 15

A-15. STATEN RUN

A-15.1 Watershed Description

Staten Run is in the eastern portion of the Upper Kanawha watershed, as shown in Figure A-15-1, and drains approximately 0.92 square mile (590 acres). Figure A-15-2 shows the land use distribution for the watershed. The dominant land use is forest, which covers 87.93 percent of the watershed. Other important land use types include urban/residential (5.02 percent) and barren/mining land (4.04 percent). All other individual land cover types account for less than 2 percent of the total watershed area.

One stream in the watershed, Staten Run, is impaired. Figure A-15-3 shows the impaired segment and the pollutants for which it is impaired.

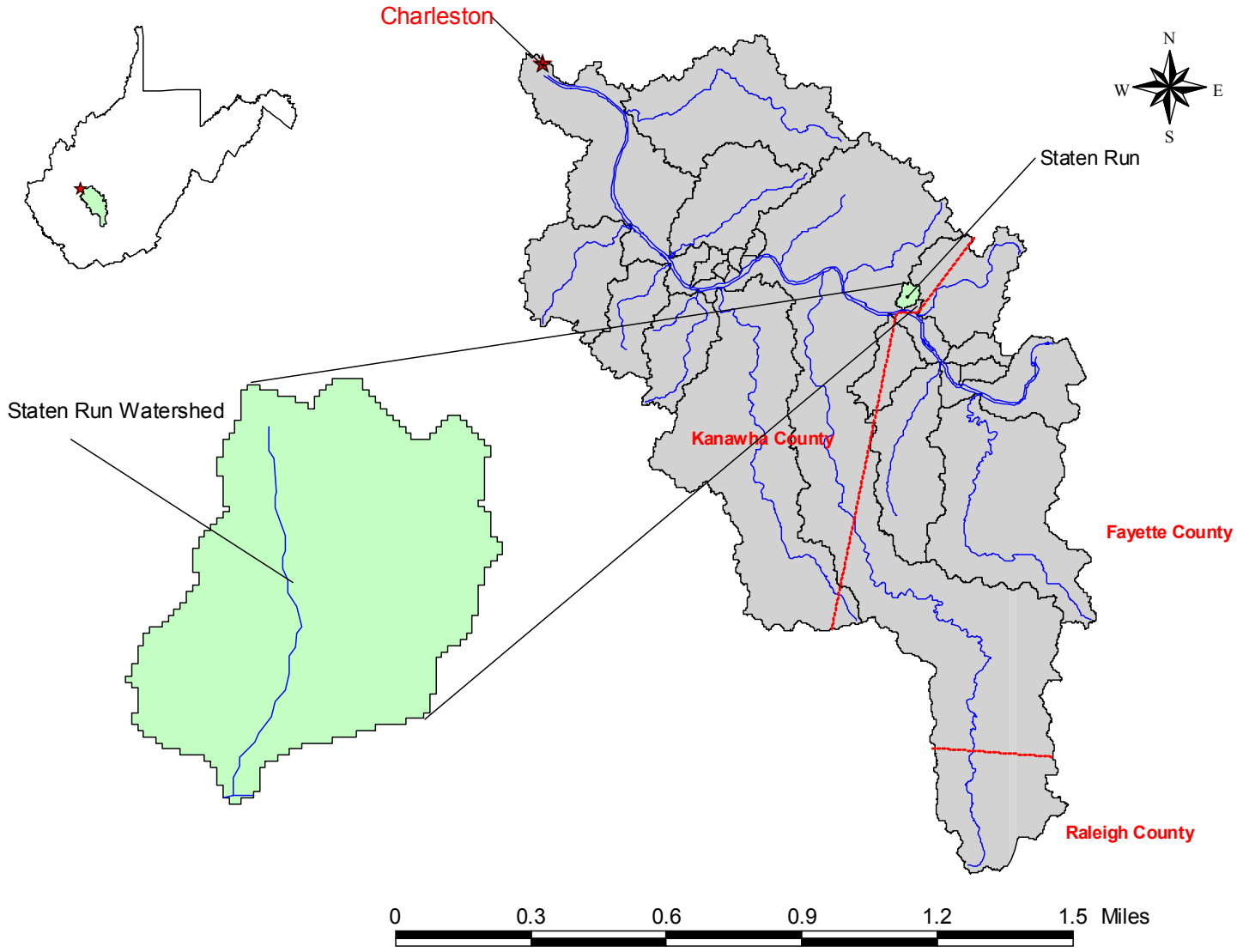


Figure A-15-1. Location of Staten Run watershed

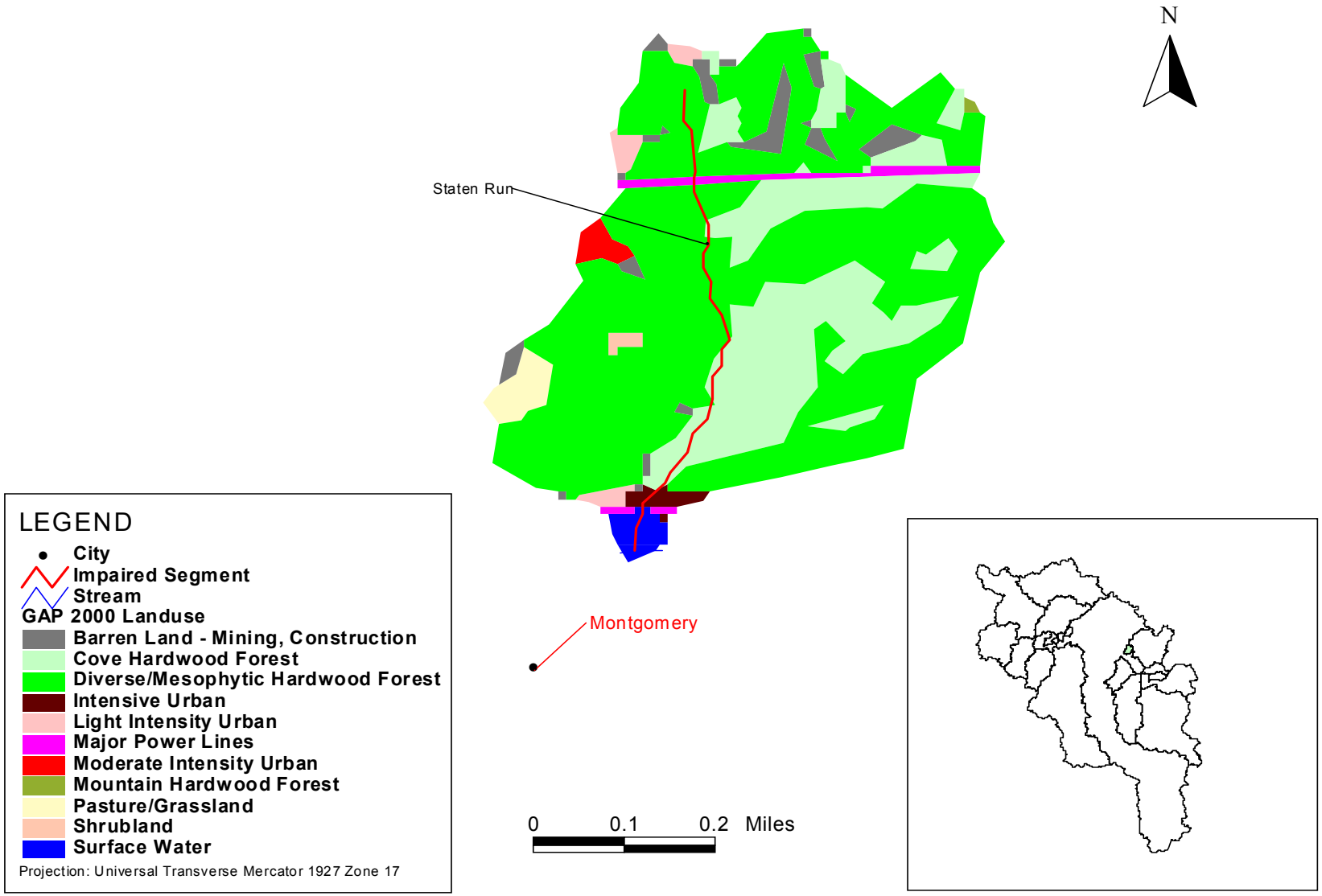
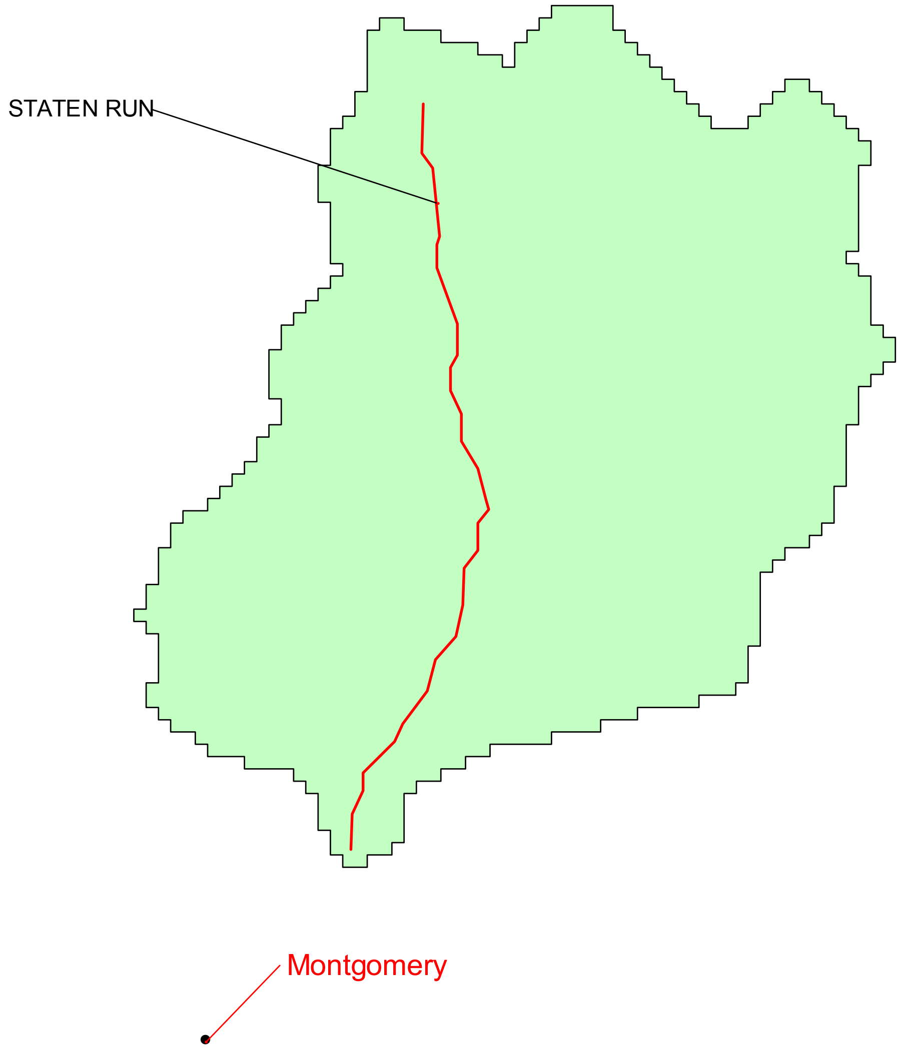


Figure A-15-2. Land use distribution in the Staten Run watershed



Stream	Aluminum	Iron	Manganese	pH	Biological
Staten Run		X			X

Figure A-15-3. The impaired waterbody in the Staten Run watershed

A-15.2 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 Staten Run watershed are shown in Figure A-15-4. Monitoring suites at each site were based on the types of impairments observed 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.

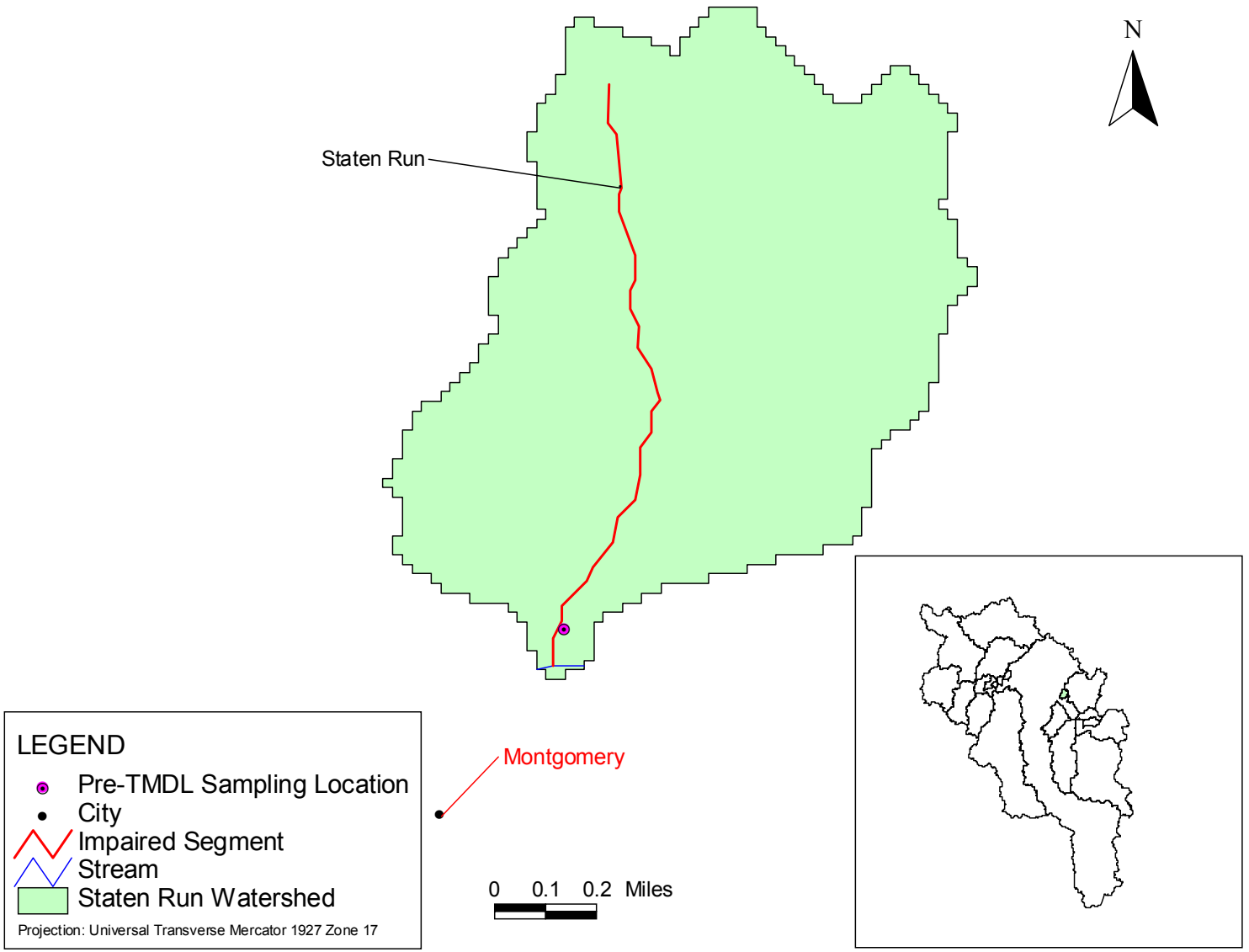


Figure A-15-4. Pre-TMDL monitoring stations in the Staten Run watershed

A-15.3 Metals Sources

This section identifies and examines the potential sources of metals in the Staten Run 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 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-15.3.1 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. Only mining-related point sources exist in the Staten Run watershed.

Permitted Non-mining Metals Point Sources

There are no non-mining NPDES permits in the Staten Run watershed.

Permitted Mining Metals Point Sources

WVDEP's *HPU* GIS coverage was used to determine the locations of the mining permits; subsequent detailed permit information was obtained from WVDEP's *ERIS* database system. Fourteen mining-related NPDES outlets were found in the watershed (Figure A-15-5). The permits related to these outlets are listed in the Technical Report. The list identifies the responsible party and the total number of outlets that discharge into the Staten Run watershed. The Technical Report also contains detailed information regarding NPDES/Article 3 permit relationships, specific data for each permitted outlet, and permit limits for each mining-related NPDES outlet.

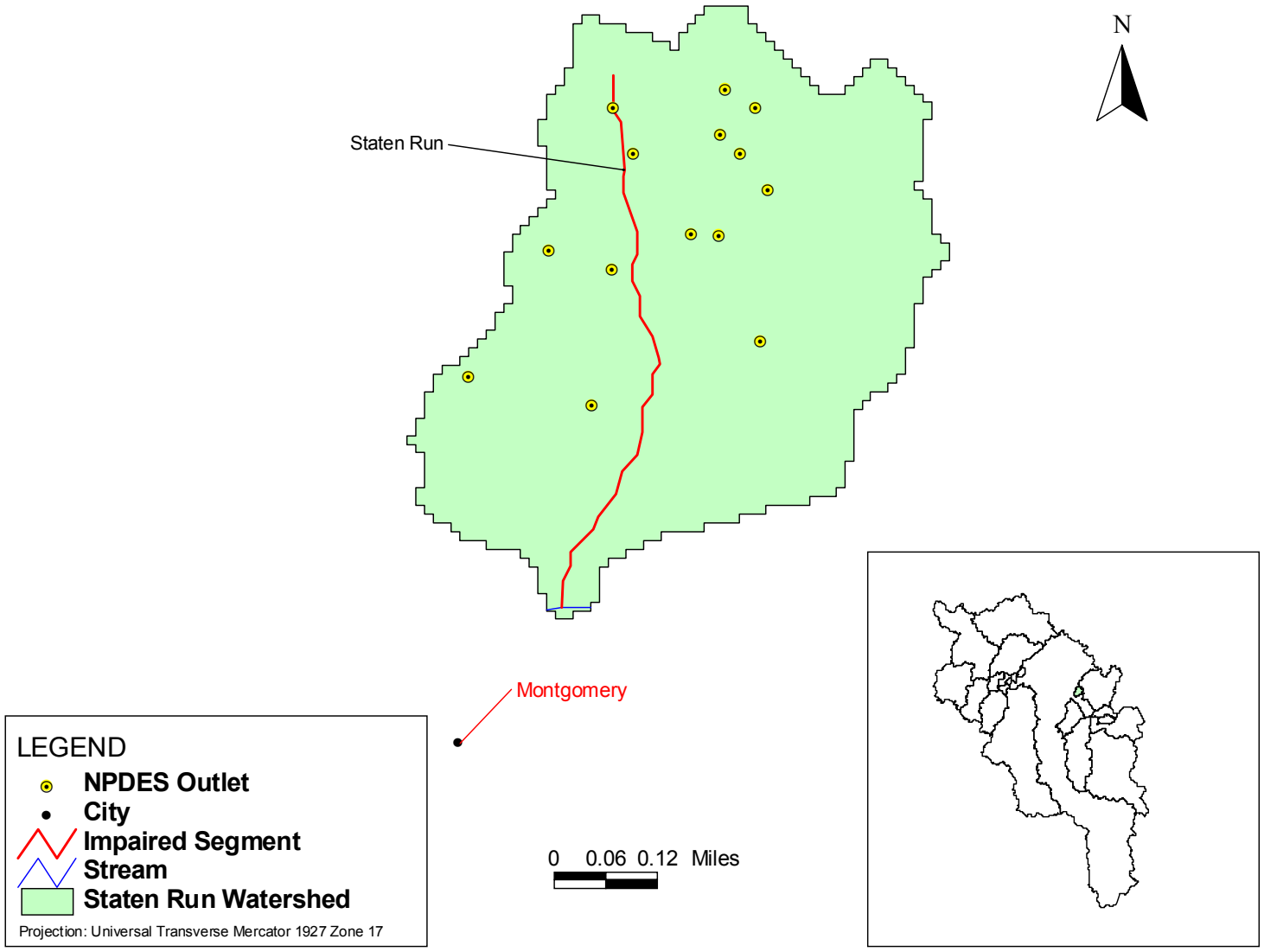


Figure A-15-5. NPDES outlets in the Staten Run watershed

A-15.3.2 Metals Nonpoint Source Inventory

In addition to point sources, 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

Based on the identification of a number of abandoned mining activities in the Staten Run watershed, abandoned mine lands are a significant non-permitted source of metals and pH impairment. WVDEP's Office of Abandoned Mine Lands identified locations of abandoned mine lands in the Staten Run watershed. In addition, source-tracking efforts by WVDEP's Division of Water and Waste Management identified and characterized nine abandoned mine sources (discharges, seeps, portals, culverts, refuse piles, diversion ditches, and ponds). The locations of abandoned mine lands are shown in Figure A-15-6. There are no bond forfeiture sites in the Staten Run watershed.

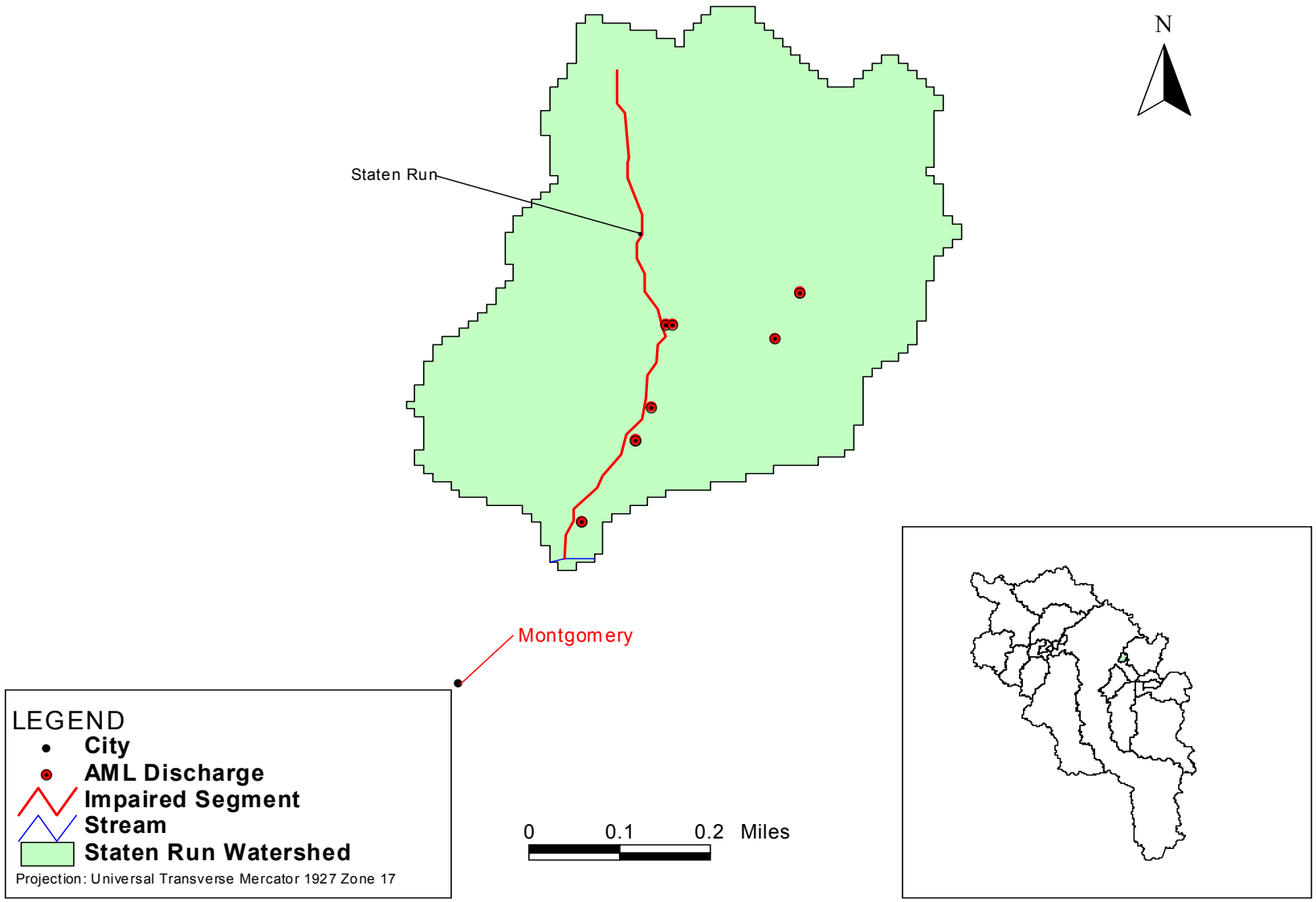


Figure A-15-6. Abandoned mine lands in the Staten Run watershed

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 Staten Run watershed are discussed below.

Agriculture
Based on the GAP 2000 land use coverage, agricultural areas cover 10.0 acres (1.70 percent) of the Staten Run watershed.

Forestry
There are no active logging operations in the Staten Run watershed.

Oil and Gas Wells
There are eight active oil and gas wells in the Staten Run watershed, the locations of which are shown in Figure A-15-7. Based on the survey by WVDEP's Office of Oil and Gas, it is estimated that 1.28 acres (0.22 percent) of the Staten Run watershed are disturbed by the active well sites (including areas associated with access roads).

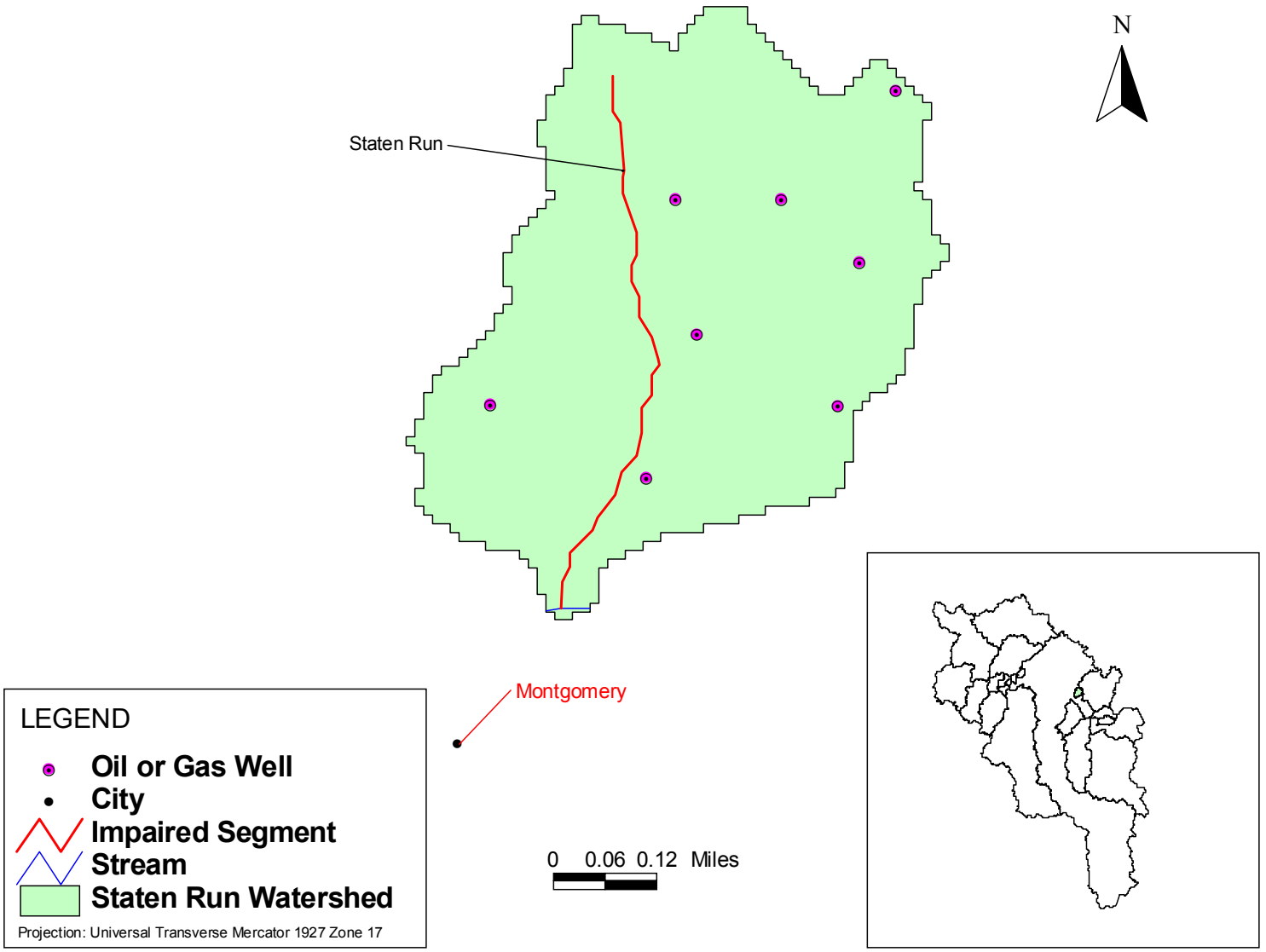


Figure A-15-7. Oil and gas wells in the Staten Run watershed

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-15-1 summarizes the length, area, and percentage of total watershed area for both paved and unpaved roads in the Staten Run watershed.

Table A-15-1. Road miles by type in the Staten Run watershed

Road Type	Road Distance (miles)	Road Area (acres)	Road Area as Percentage of Watershed
Total paved	0.29	0.86	0.15%
Total unpaved	4.72	6.92	1.17%

A-15.4 Fecal Coliform Bacteria Sources

There are no fecal coliform bacteria impairments in this watershed.

A-15.5 Stressors of the Biologically Impaired Stream

In the watershed, there is one biologically impaired stream for which a TMDL has been developed. The stream is identified in Table A-15-2 along with the primary stressor of the stream's benthic community and the TMDL required to address the impairment.

Table A-15-2. Primary stressor of the biologically impaired stream in the Staten Run watershed

Stream	Primary Stressors	TMDLs Required
Staten Run	Iron toxicity	Iron

The iron TMDL presented in Table A-15-4 addresses the iron toxicity biological stressor. Please refer to section A-15.3 for source information.

Note: Table number A-15-3 is skipped in this appendix for the purpose of maintaining uniformity of TMDL table numbers throughout the Upper Kanawha appendices.

A-15.6 TMDLs for the Staten Run watershed

A-15.6.1 TMDL Development

A TMDL and source allocation were developed for the impaired stream in the Staten Run watershed. A top-down methodology was followed to develop the TMDL 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 a TMDL was 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 TMDL for iron is shown in Table A-15-4. The TMDL is presented as an annual load, in terms of pounds per year. It is presented as an average annual load because it was developed to meet the TMDL endpoint under a range of conditions observed throughout the year.

A-15.6.2 TMDL Tables: Metals

Table A-15-4. Iron TMDLs for the Staten Run watershed

Major Watershed	Stream Code	Stream Name	Metal	Load Allocation (lb/yr)	Wasteload Allocation (lb/yr)	Margin of Safety (lb/yr)	TMDL (lb/yr)
STATEN RUN	K-71	Staten Run	Iron	708	5,103	306	6,117

Table A-15-5. Manganese TMDLs for the Staten Run watershed

There are no manganese impairments in this watershed.

Table A-15-6. Aluminum TMDLs for the Staten Run watershed

There are no aluminum impairments in this watershed.

Table A-15-7. pH TMDLs for the Staten Run watershed

There are no pH impairments in this watershed.

A-15.6.3 TMDL Tables: Fecal Coliform Bacteria

Table A-15-8. Fecal coliform bacteria TMDLs for the Staten Run watershed

There are no fecal coliform impairments in this watershed.

A-15.6.4 TMDL Tables: Sediment

Table A-15-9. Sediment TMDLs for the Staten Run watershed

There are no sediment impairments in this watershed.