The Stroubles Creek Watershed: History of Development and Chronicles of Research

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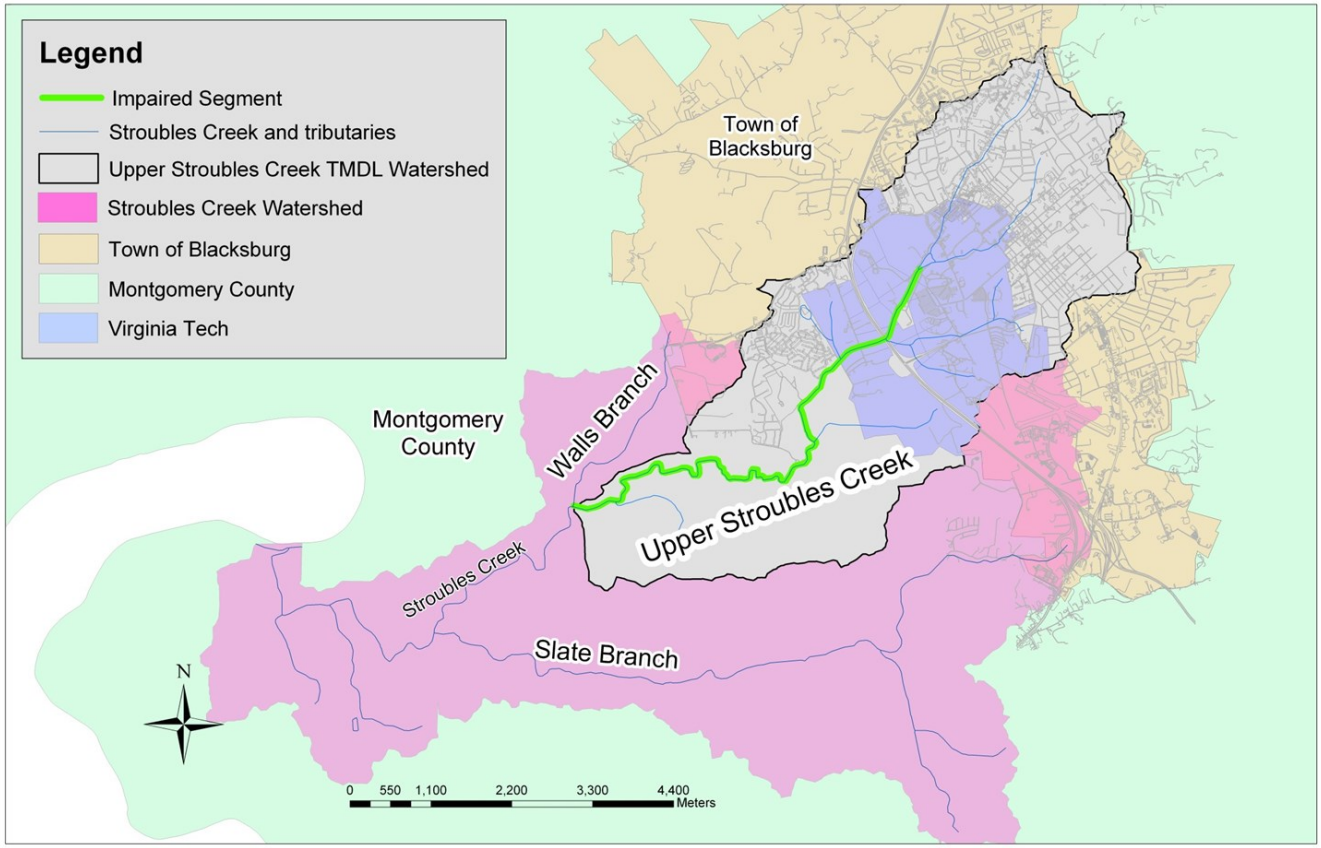
The Story of Blacksburg and its First Watershed



Stroubles Creek Watershed Initiative

The Stroubles Creek Watershed Initiative was launched in 1999. The major goal of the Initiative was:

1. Provide research, educational, and service-learning opportunities to Virginia Tech students.

2. Compile historic information on watershed development and water quality of the creek.

This presentation will provide an overview of watershed research and management (1914 – present), and the history of the watershed development.

Contents of Presentation

- History of the Stroubles Creek Settlement
- Original Creek and Sources of Community Water
- Land Use Changes and Urbanization
- Early Research on Stroubles Creek
- Some Milestones
  - VT Duck Pond Condition
  - Watershed Monitoring and TMDL Program
  - Drinking Water Supplies and Sanitation

History of the Stroubles Creek Settlement

1740 - Stroubles Creek was first settled by the Draper's Meadow Community

1798 - The land became the Town of Blacksburg – a sixteen block 38- acre square grid

1851 - The Town's Methodist community opened the Preston and Olin Institute

1860 - Population of Blacksburg was 460 people.

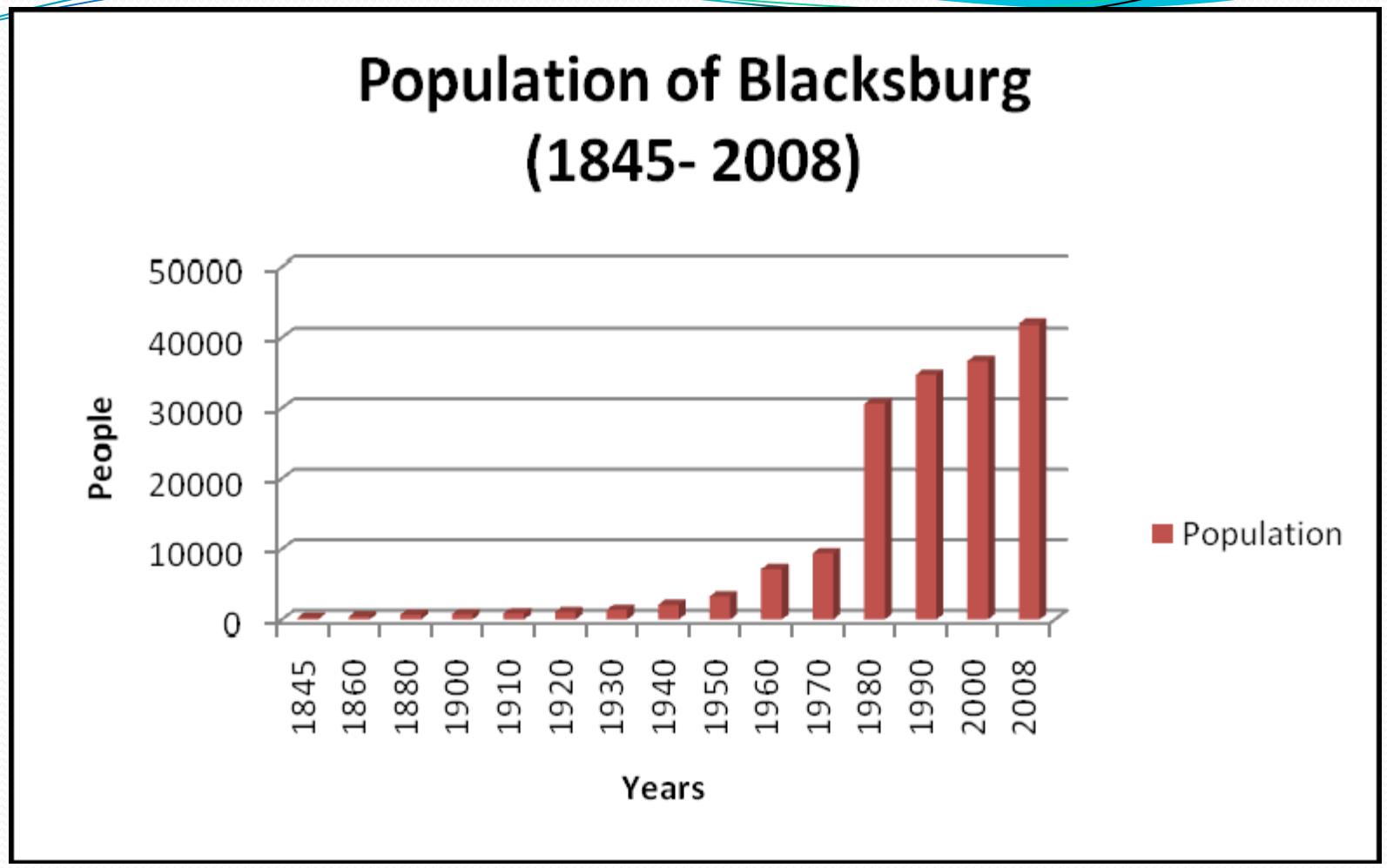
1872 - The Preston and Olin Institute in Blacksburg was purchased by the Virginia General Assembly and turned into the Virginia Agricultural and Mechanical College

1896 - The college's name was changed to the Virginia Agricultural and Mechanical College and Polytechnic Institute (later VPI & SU)

Original Creek and Sources of Community Water

1864 Surveyed Map of Upper Stroubles Creek

Source: Virginia Tech Newman Library Archives

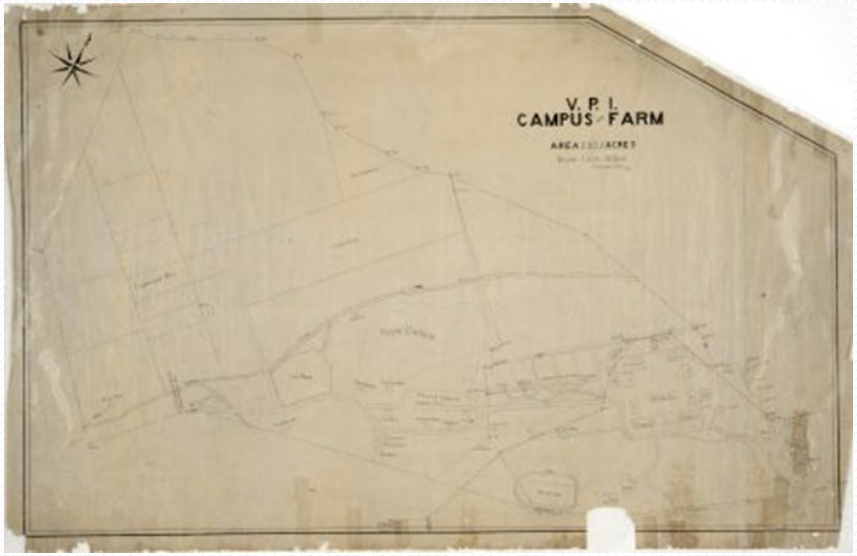


From 1950 to 1960, the population increased from 3,358 to 7,070 (110.5%) From 1960 to 1980 population increased from 7,070 to 30,638 (333%). From 1980 to present 14% to 15% population increase.

(Source: Blacksburg Partnership 2008)

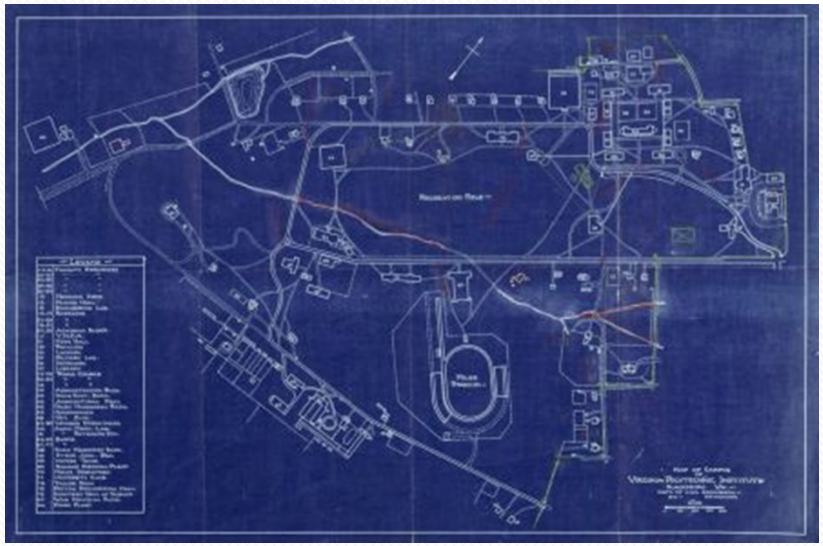
Early VT Campus Surveys

1908



1911

1931



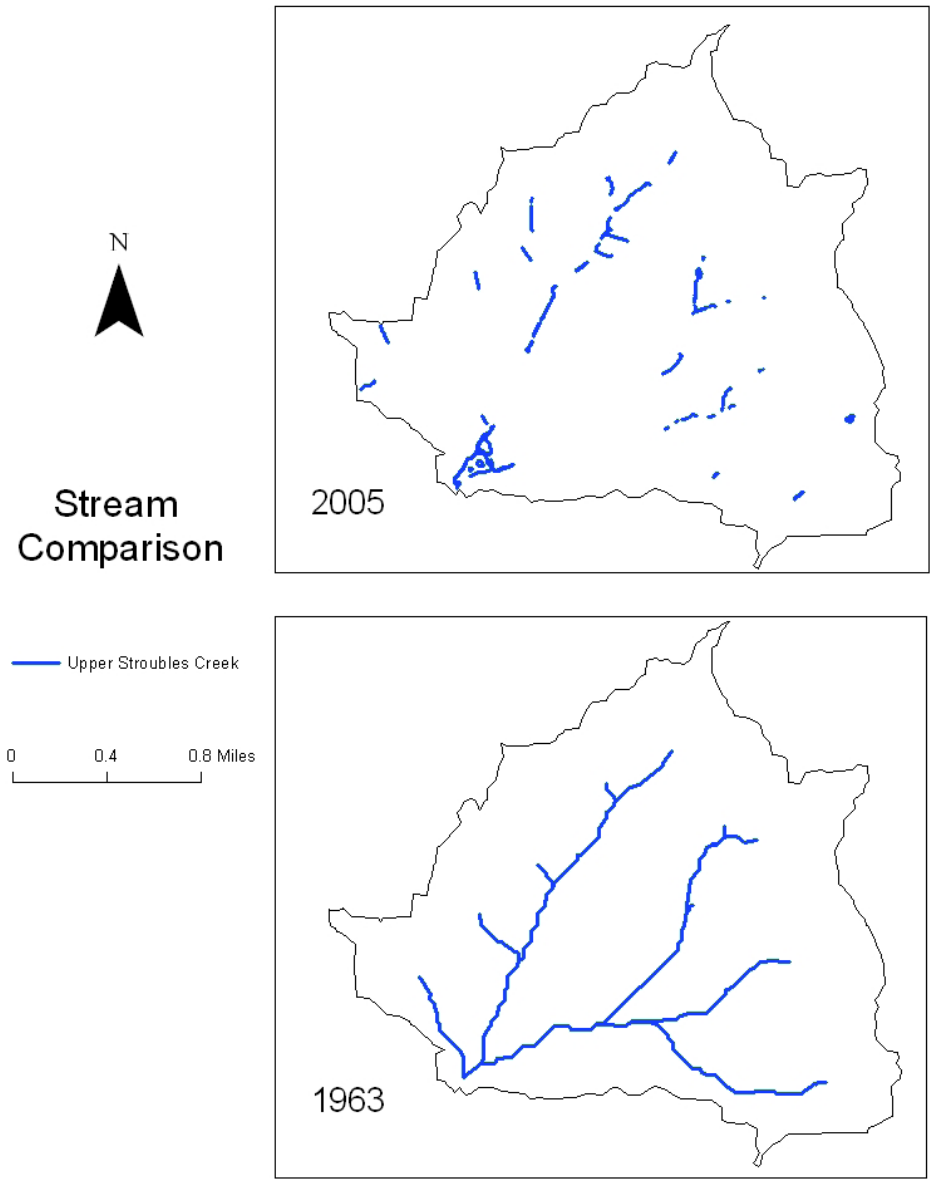
Source: Virginia Tech Newman Library Archives

Construction of Drillfield and Duck Pond 1937

1937 Aerial Photo of Drillfield and Duck Pond (Source: Jim Campbell 2009)

Dam below the Duck Pond (Source: Parece 2010)

Three natural springs – **Town, Keister-Evans and Spout**, constitute the headwaters of Stroubles Creek.



Source: Town of Blacksburg 2007

Early Drinking Water Source

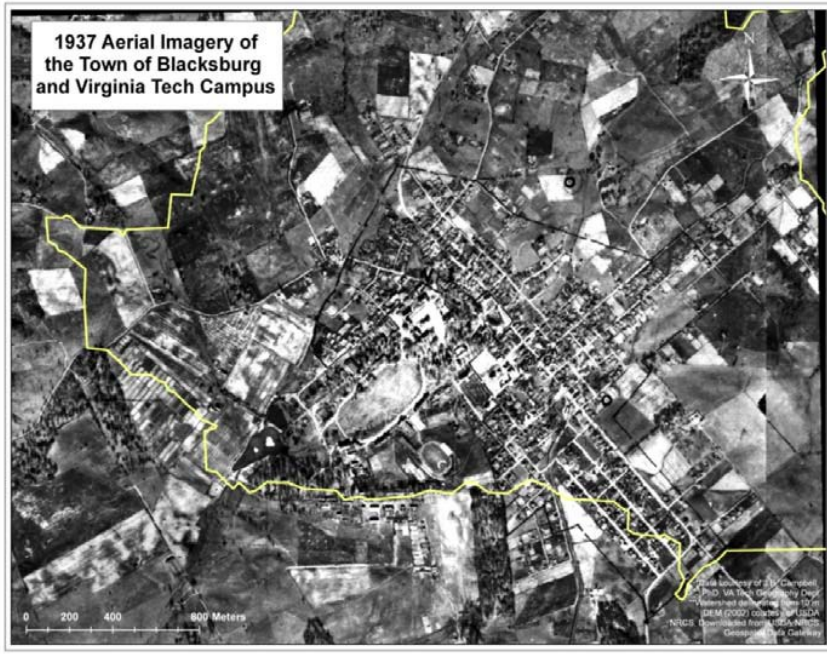
Until 1950 three natural springs – **Town, Keister-Evans and Spout** (headwaters of the Stroubles Creek) were major drinking water source for Blacksburg residents.

Spout Spring - Clay & Wharton Streets

(Source: Parece 2009)

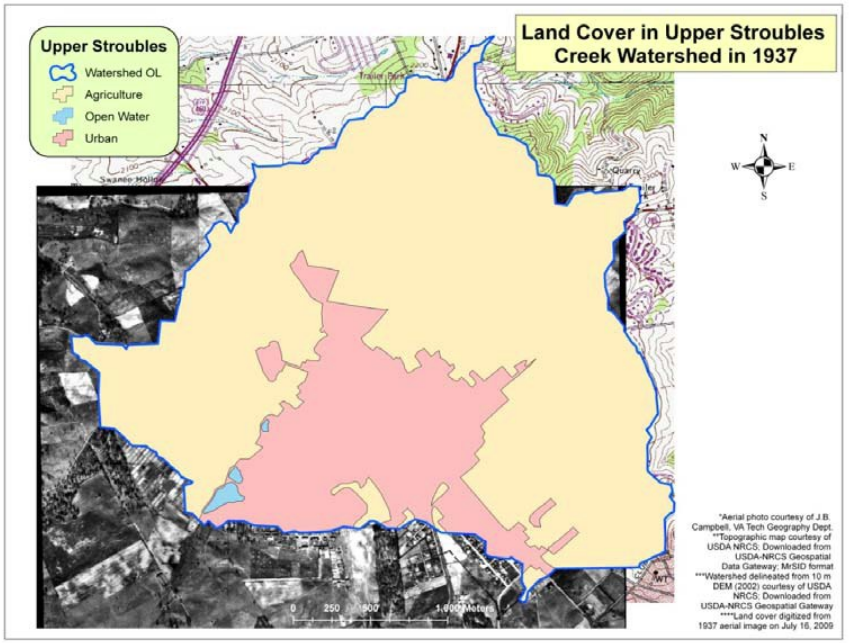
Spout Spring -Progress Street at Rescue Squad (culverted)

Land Use Changes and Urbanization
1937



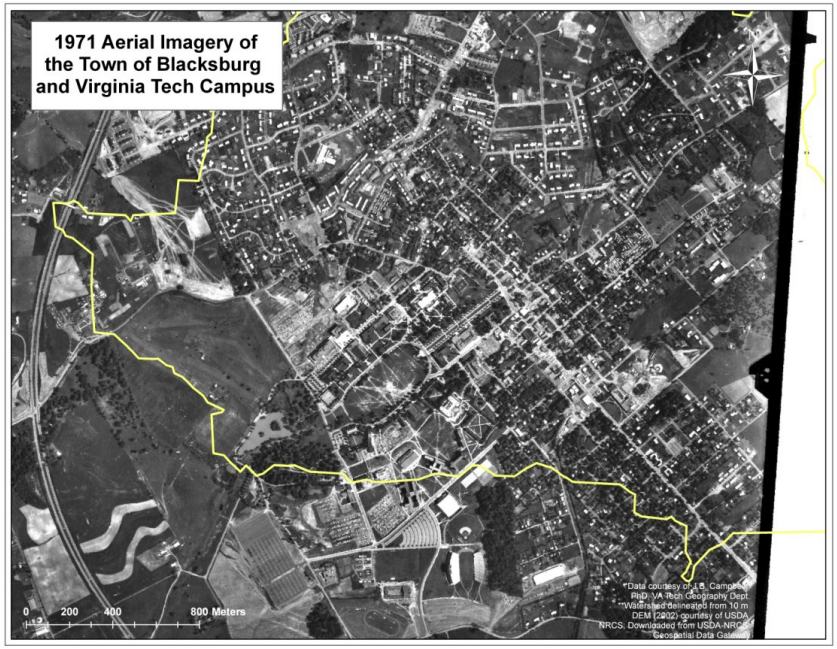
1937 aerial image of Blacksburg

(Source: Jim Campbell 2009)



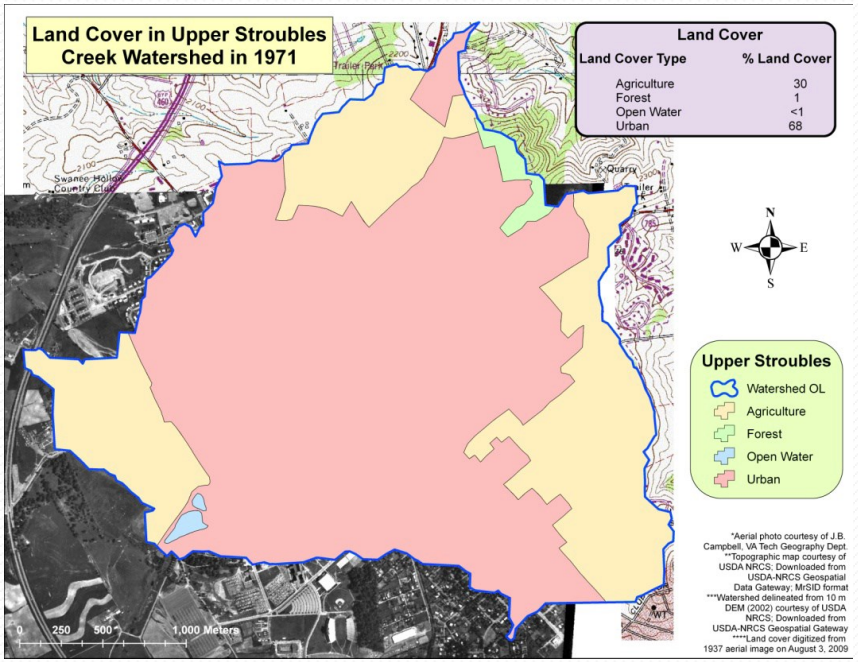
1937 land cover type

Land Use Changes and Urbanization 1971



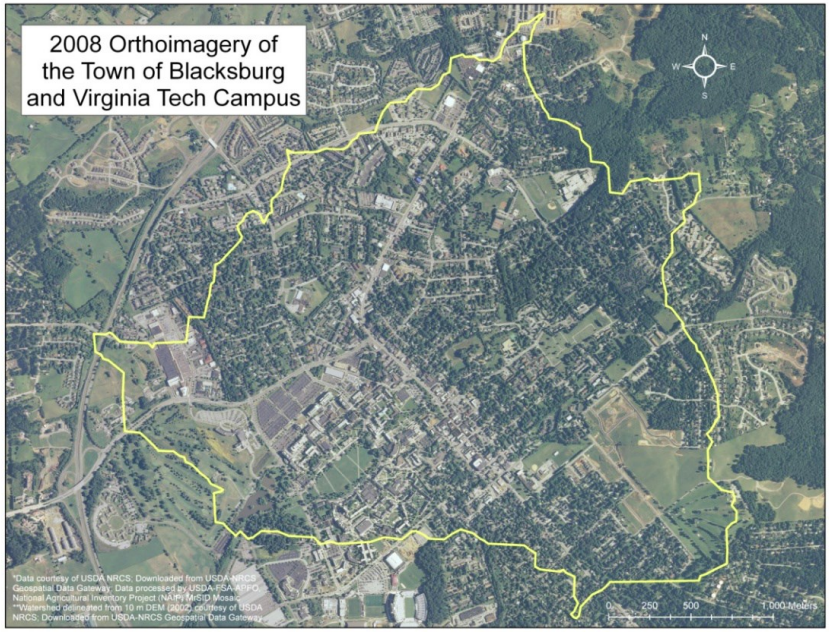
1971 aerial image of Blacksburg

(Source: Jim Campbell 2009)

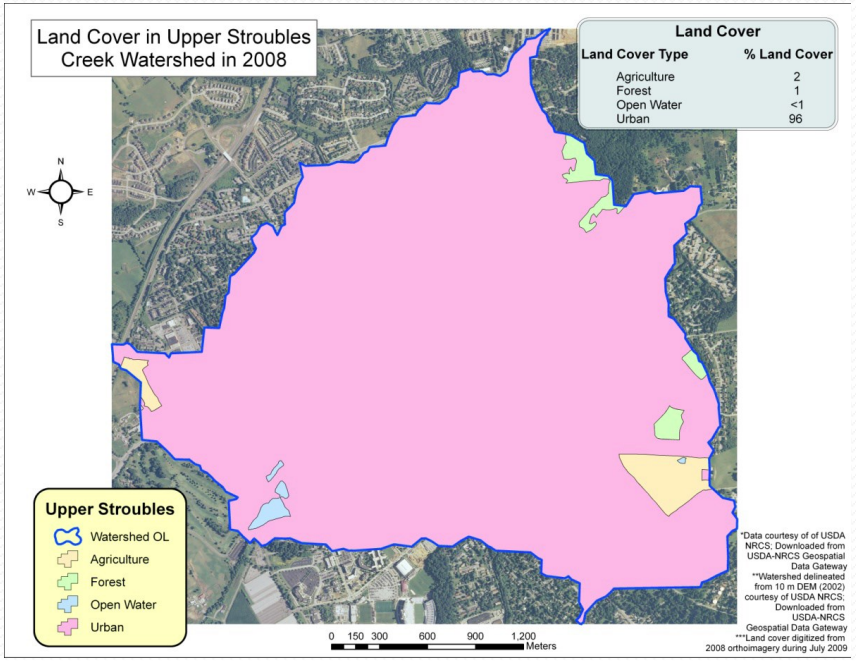


1971 land cover type

Land Use Changes and Urbanization 2008



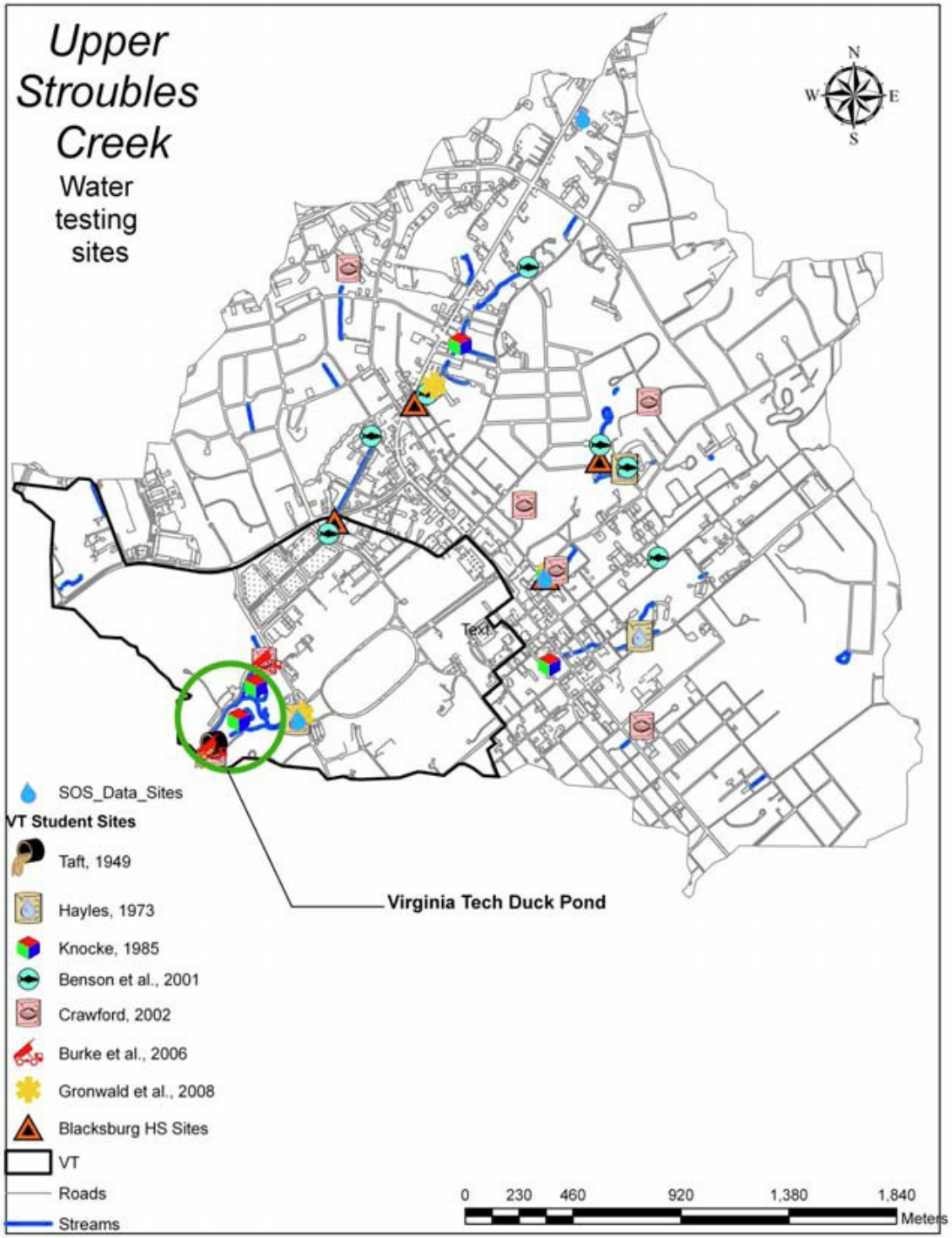
2008 aerial image of Blacksburg (Source: Jim Campbell 2009)



2008 land cover type

Early Water Research on Stroubles Creek

- "A Study of the Self- Purification of Stroubles Creek" **(Sutton, Jr. 1914).** In 1914 Lee Edward Sutton, Jr., completed his Bachelor of Science degree with his thesis in Bacteriology on Stroubles Creek's ability to purify itself.
  - His report linked stream pollution to horse waste, privies, pastures, cultivated fields, coal- mining activities and the Virginia Tech septic tank, all of which drained into the stream.
- "To Determine the Rate and Degree of Recovery of Stroubles Creek after Diversion of Poorly Treated Sewage, Blacksburg, Virginia" **(Taft 1949)** Walter D. Taft, Jr. completed his Master of Science in Sanitary Engineering with research on the chemical parameters of Stroubles Creek.
  - In July of 1948, a new sewage treatment plant was implemented in Blacksburg preventing raw sewage from being discharged directly into the stream. During the summer months (June 22 to August 31, 1948), Taft studied 3 sites below the duck pond dam, 100 feet, 500 feet and one mile).


Upper Stroubles Creek
Water testing sites
N
W
E
S
Text
Virginia Tech Duck Pond
SOS_Data_Sites
VT Student Sites
Taft, 1949
Hayles, 1973
Knocke, 1985
Benson et al., 2001
Crawford, 2002
Burke et al., 2006
Gronwald et al., 2008
Blacksburg HS Sites
VT
Roads
Streams
0 230 460 920 1,380 1,840
Meters

Some Milestones

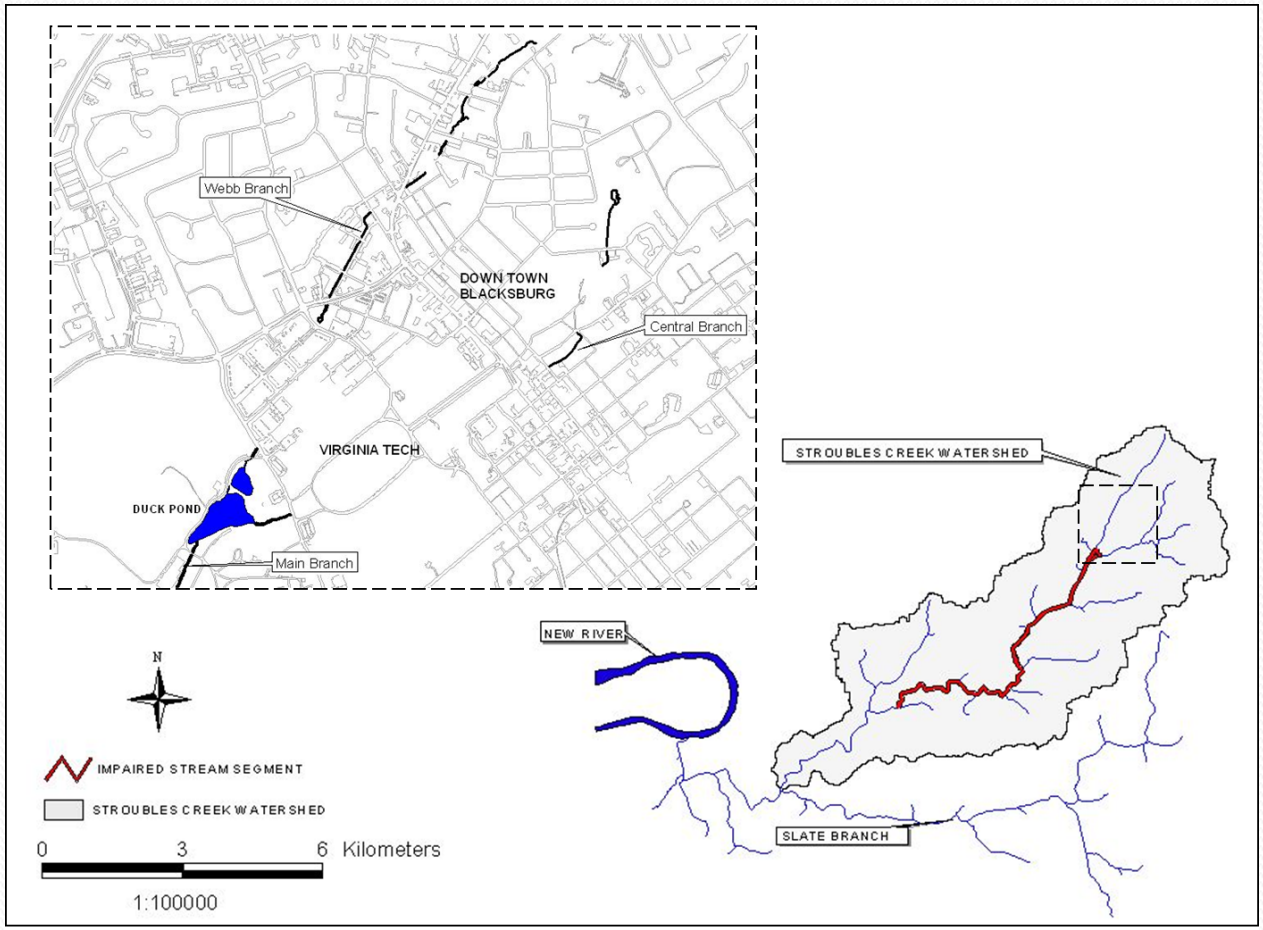


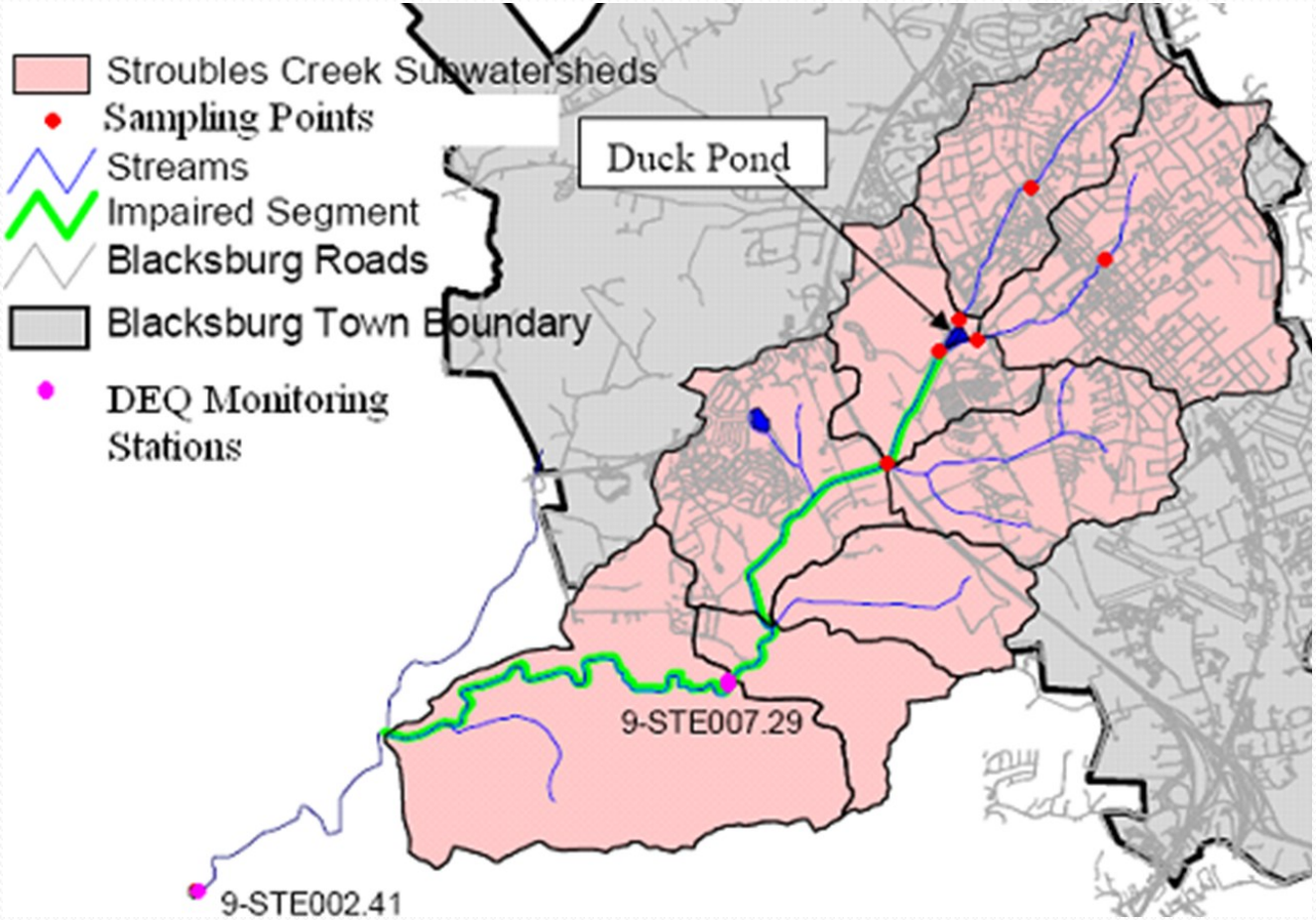
Figure 1. Stroubles Creek Watershed Map

Virginia Tech Duck Pond

(Source: Parece 2010)

- From 1970 to 1978, chemical waste generated in Virginia Tech's Davidson Hall's chemistry labs directly discharged into the Pond
- Dredging in 1950, 1960, 1986, [my 2007 observation]
- December 15, 2006, 50 to 80 gallons of fuel oil was released into the stream from a 275 gallon above-ground storage tank spill at a local Hardware Store.
- At present, stormwater runoff from TOB and VT continue to create major sedimentation problems in the Duck Pond and bacteria level is high

DEQ Monitoring Program



In the **early 1970s,** when the **Clean Water Act** was passed, the Virginia Department of Environmental Quality (DEQ) began monitoring the stream

Stroubles Monitoring and TMDL Program

- In 1996 and 1998, the DEQ classified lower Stroubles Creek, which extends 4.5 miles downstream of the Duck Pond as benthically impaired.
- In 2002, the stream was included in the total maximum daily load (TMDL) list of impaired waters (303d list).
- A TMDL study of the impaired segment was completed in 2003 which identified sediment as the major cause of benthic impairment.
- In 2006, a TMDL implementation plan (IP) for the Stroubles Creek was completed.

Drinking Water Supplies and Sanitation

- Before World War II, and several years after the war, the Town of Blacksburg depended on natural springs for its water supplies.

- In 1950, a special Act of the legislature created the Blacksburg-Christiansburg-VPI Water Authority, and the Authority was chartered by the State Corporation Commission on September 15, 1956. The New River became the source for water supplies.

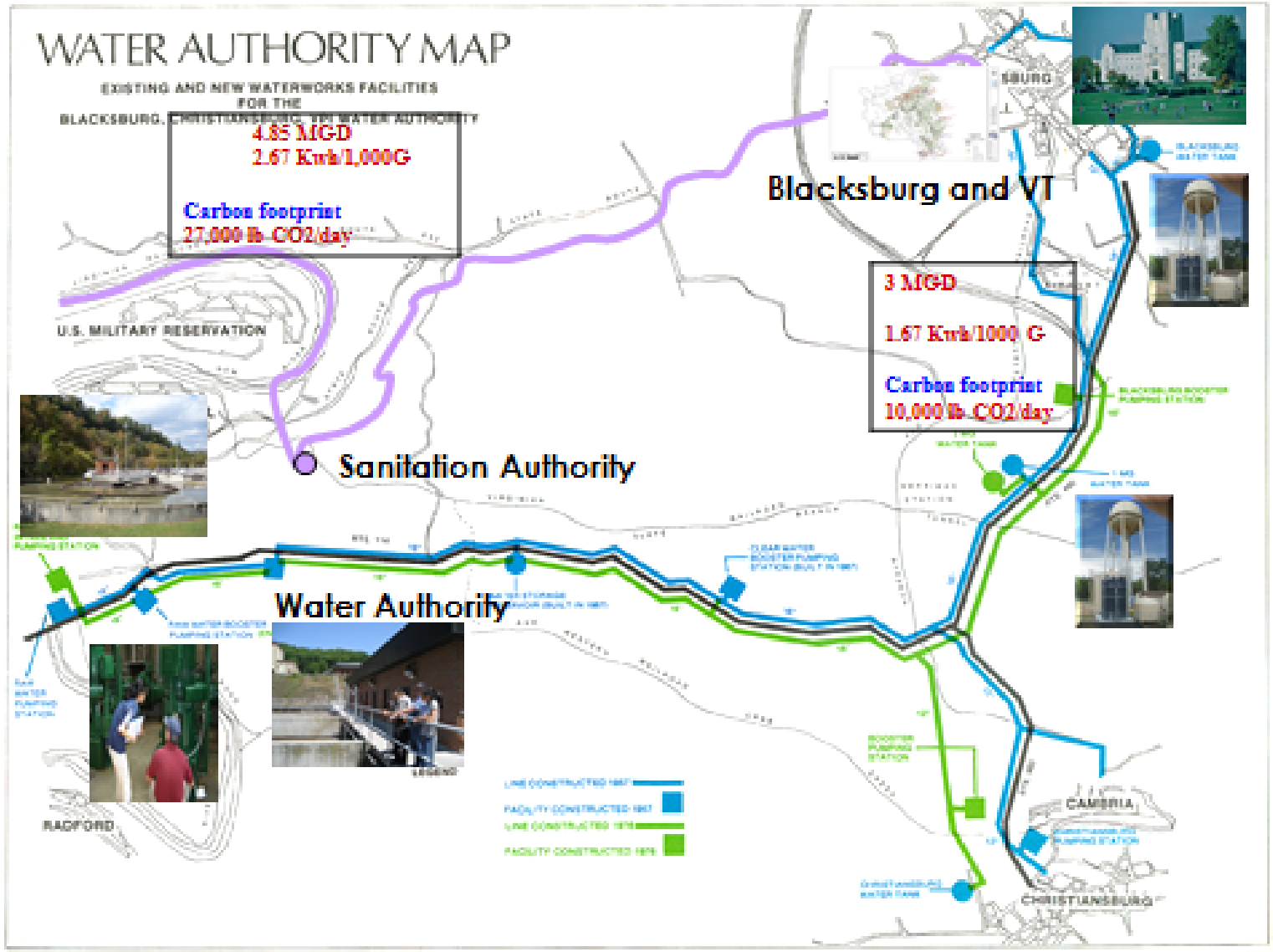
- The capacity of the existing water treatment plant is 12.5 million gallons per day (MGD), with a current average treatment volume of 7.5 MGD from which over 3.0 MGD is delivered to Blacksburg and Virginia Tech.

Drinking Water Supplies and Sanitation

- The original septic system located immediately downstream from the Duck Pond. In 1948 a new sewage treatment plant was constructed about 4.5 miles downstream from the Duck Pond.

- The second and current wastewater treatment facility went into operation in 1978 at a design capacity of 6.0 MGD average flow. The facility was expanded to 9.0 MGD average flow in 1996.

- Twenty-two wastewater discharge pumps are used to collect wastewater from the town neighborhoods and Virginia Tech in a central location below the Drillfield. Then wastewater is transported by gravity from Blacksburg to the Sanitation Authority for treatment. Treated wastewater is discharged into the New River.


WATER AUTHORITY MAP
EXISTING AND NEW WATERWORKS FACILITIES
FOR THE
4.85 MGD
2.67 Kwh/1,000G
Carbon footprint
27,000 lb CO2/day
Blacksburg and VT
3 MGD
1.67 Kwh/1000 G
Carbon footprint
10,000 lb CO2/day
U.S. MILITARY RESERVATION
Sanitation Authority
Water Authority
RADFORD
CAMBRIA
CHRISTIANSBURG

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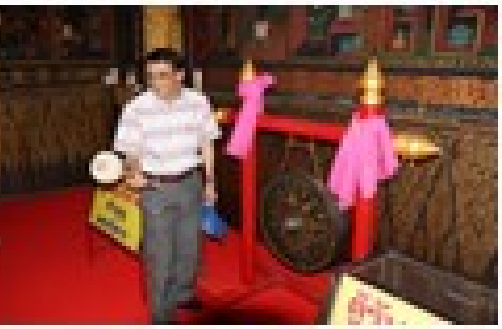
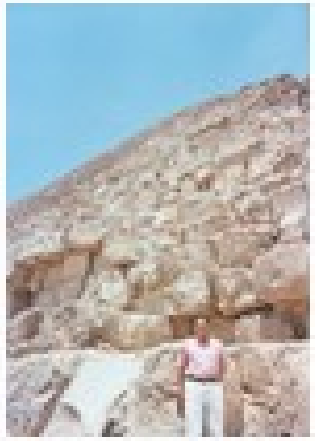


Ayuthaya, Thailand

Istanbul, Turkey

Beijing, China



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