

EXTRACTIVE/ENERGETIC:

The Adaptive Reuse of Minescapes as Landscapes of Renewable Energy in the Anthracite Coal Mining Region of Northeastern Pennsylvania



# The Anthracite Coal Mining Region of Northeastern Pennsylvania: A History of Externalities

Throughout the nineteenth and twentieth centuries, the anthracite coal mining region of northeastern Pennsylvania experienced a drastic rise and fall in production and employment. This resulted in some worker strikes, labor conflicts, environmental degradation, and debates about the future of Pennsylvania as a landscape of energy.



## 250,000,000 BC - 400,000,000 BC Formation of Anthracite Coal

The birth of anthracite occurred during the Carboniferous Geological Period. At that time, most of Pennsylvania was a flat, low-lying plain covered with swamping swamps thick with tall trees and wide spreading ferns. Years of subsidence and geologic uplifting raised anthracite from rotting plant material.



100,000

80,000

60,000

40,000

20,000

**AVERAGE POPULATION OF RESIDENTS IN ANTHRACITE COAL MINING REGION TOWNS**

1860

## 1869 Pennsylvania Department of Mines is Established

The Ansonia Mine Disaster occurs, killing 188 men and boys killed during a fire at the mine. This is the largest mine disaster to ever occur in the anthracite mining region. This nation's first stringent mine safety laws were developed as a result of this event.

1870

## 1870 Avondale Mine Disaster Initiates Mining Legislation

The Avondale Mine Disaster occurs, killing 188 men and boys killed during a fire at the mine. This is the largest mine disaster to ever occur in the anthracite mining region. This nation's first stringent mine safety laws were developed as a result of this event.

1880

## Late 1800s The Anthracite Region Introduces the Electric Locomotive

The anthracite region played an important role in the development of the electric railway industry. The first three electric street cars in America were installed in the anthracite towns between 1887 and 1891.

1890

## 1890 First United Mine Workers of America Strike

United Mine Workers of America (UMWA) miners union strikes a coal to it's 9000 members. Within one week, 125,000 hard-coal coal miners were off their jobs and 90% of coal mine production ceased.

1900

## 1902 The United Mine Workers of America form "The Great Strike"

In 1902, the United Mine Workers - 140,000 strong - began the "Great Strike," which lasted for nine months and was finally settled with the assistance of President Theodore Roosevelt.

With the settlement of the Great Strike, production of Anthracite moved forward at a pace never before seen in coal mining. Industrial led home heating demand for clean coal increased monthly.

After 1900, silk weaving establishments opened. The anthracite silk industry grew to nearly 200 companies by 1910, employing more than 20,000 women and 5,000 children. By 1914, Pennsylvania surpassed New Jersey as the leading silk producing state in the nation. In time the Region processed more than 75% of the raw silk used in America.

## 1890s Immigrants Create "Patch Towns"

Many ethnic groups chased the demand of coal mining including the Welsh, English, German, Irish, Polish, Russian and Swiss. John Mitchell, president of the United Mine Workers Association, recalls "The coal you dig is not Slavish coal or Polish coal, or Irish coal, it's coal."

## Late 1800s The United Mine Workers of America Established

Bill Mitchell, co-founder of the Atlas Coal Company and Scotts Run Mine, gains the trust and support of the various disgruntled coal miners by organizing into what will become the UMWA (United Mine Workers of America).

## 1775 Anthracite Mining Starts in Northeastern Pennsylvania

Anthracite mining starts in Scranton, Pottsville, and Luzerne County. The first recorded anthracite coal shipment to Lehigh Coal Mining Company, sends anthracite out 14 per wagon in 1821.

## Mining Legislation

Concerns over the environmental impacts of coal mining resulted in passage of some of Pennsylvania's very first environmental laws. Regulation of the mining industry began in earnest in 1913 with the passage of Act 375 prohibiting the discharge of anthracite coal, cinders or refuse into streams.

## 1872 General Mining Act of 1872

Codified the informal system of acquiring and protecting mining claims on public land.



## Pre-1930s Employment in Underground Mines

Until the 1830s mining provided the primary basis of employment in scores of settlements that had been built around a deep mine. Yet this changed drastically with the periods of increased production, such as when employment dropped from 139,431 to 121,245 from 1811-1922.

## 1937 The Clean Streams Law

Passed largely to protect streams from pollution, it was amended in 1945 to prohibit acid mine drainage and again in 1965 to define acid mine drainage as an industrial waste, requiring all mines to treat their drainage to specified standards.

## 1945 The Surface Mining Conservation and Reclamation Act (SMCRA)

The Surface Mining Conservation and Reclamation Act (SMCRA) was a more comprehensive attempt to regulate surface coal mining. Both the Clean Streams Law and the Surface Mining Conservation and Reclamation Act were passed in 1977.

## 1920s Technological Advances and the Rise of the Automobile

Technological advances allowed for coal breakers to become safer and more efficient places to work, while the rise of the automobile accounted for consumers turning to oil as an energy source. Mechanized systems within the breaker buildings start to replace the need for miner workers in every step of the coal cleaning and burning process.

## 1920s "Breaker Boys" Outlawed

The practice of employing children in coal breakers largely ended by 1920 because of the efforts of the National Child Labor Committee, sociologist and photographer Lewis Hine, and the National Consumers League, who educated the public about the practice and succeeded in passing child labor laws.

## 1920 Anthracite Supplies Majority of Home Energy Needs

In 1920 anthracite coal supplied more than 96 percent of the home heating needs of the area north and east of the Pennsylvania anthracite fields. However, as competition from the petroleum and natural gas increased, anthracite's share of the market declined rapidly.

## 1910 Fatality Count Reaches 13,000

The historical total fatality count in anthracite mines tops 13,000 men, women and children.

## 1914 Coal Mining Employment Peaks

Employment at anthracite mines reaches a maximum of 180,000 workers.

## 1917 Anthracite Coal Production Peaks at Over 100 million Tons

Employment at anthracite mines reaches a maximum of 180,000 workers.

## 1914-1918 The Coal Industry During WWI

Employment at anthracite mines reaches a maximum of 180,000 workers. Coal production rose to meet wartime energy demands, and smoke abatement concerns decreased. During the severe weather of 1917-1918, coal rations were limited and created the most acute fuel shortage in U.S. history.

## 1930s The Great Depression Strikes the Coal Mining Industry

With stringent laws in place and state mine inspectors, the number of fatalities per million tons of coal drops to 6.5.

## 1933 New Deal Brings Hope to Miners and UMWA

Pro-labor legislation through the New Deal sparks the resurgence of the United Mine Workers Association, becoming the nation's largest union. John L. Lewis leads the charge in improving miners' lives and changing the course of the American labor movement.

## 1935 Lewis Launches Congress of Industrial Organizations

John L. Lewis splits from the American Federation of Labor (A.F. of L.) and launches the Congress of Industrial Organizations (CIO), with the United Mine Workers Association at its core. The move effectively increases the occurrence of strikes amongst non-union workers.

## 1949 Strikes Lead to Lessen Public Support for Coal

John L. Lewis becomes an unfavorable public figure due to the ongoing coal mine worker strikes, which causes the U.S. energy market to turn to oil.

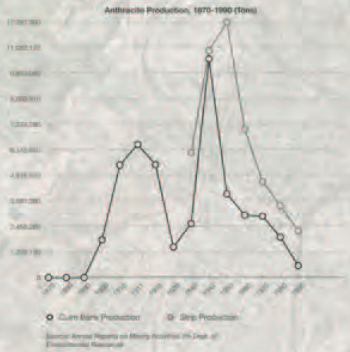
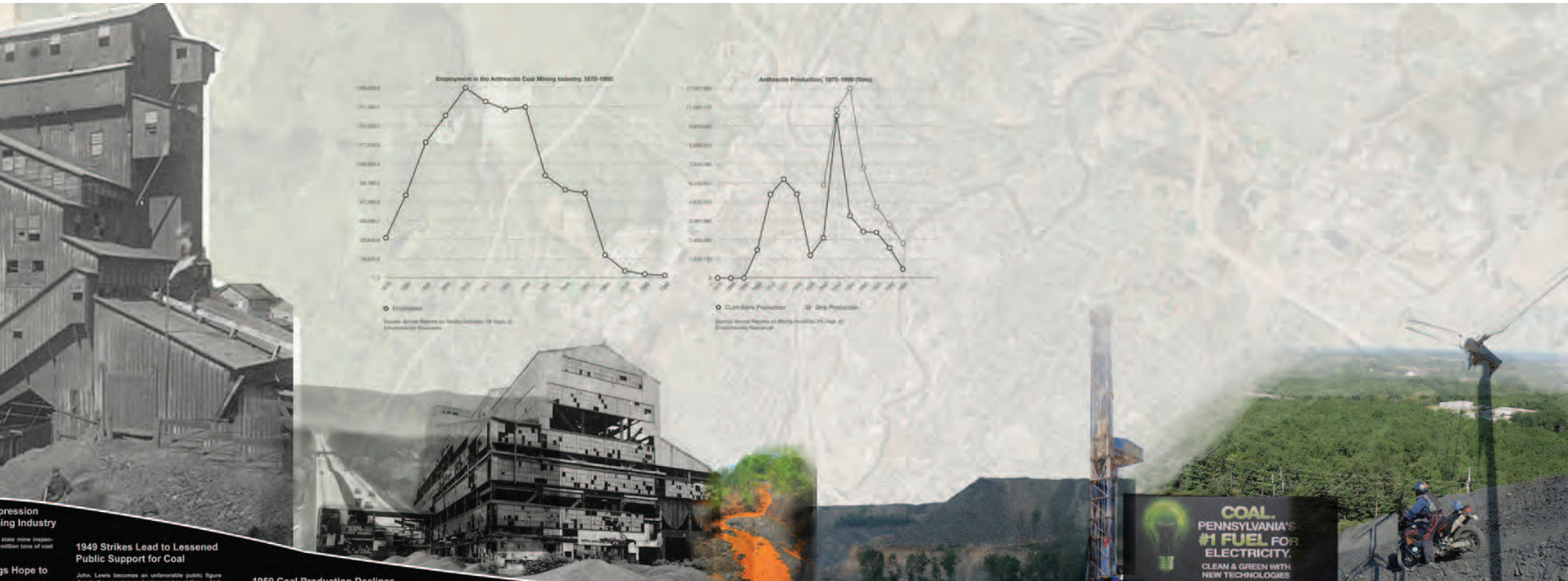
## 1955 Coal Energy Use Soars While Oil and Gas Use Soars

With natural gas and fuel oil becoming more available and technologies modernizing, coal burn away from its solid form made extraction, transportation and production more difficult than other sources. The rise of the automobile accelerated development. With no major domestic anthracite largely disassembled as a major industry, leaving the anthracite counties of Pennsylvania economically devastated.

1939-1940  
With all the war effort, the anthracite industry was in a state of decline. The industry was largely disassembled as a major industry, leaving the anthracite counties of Pennsylvania economically devastated.

# TIMELAPSE IN LEGISLATION

# THE ANTHRACITE REGION OF NORTHEASTERN PENNSYLVANIA: A HISTORY OF EXTERNALITIES



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**1955 Coal Energy Use Nose-Dives While Oil and Gas Use Soars**

With natural gas and fuel oil becoming more available, and technologies modernizing, coal turns away from being coal. Its solid form makes extraction, transportation and production more difficult than other energy sources. The rise of the automobile boosted its use. With no major domestic market, anthracite largely disappeared as a major industry, leaving the anthracite counties of Pennsylvania economically devastated.

**1950 Coal Production Declines**

Anthracite coal mine production steadily declines from its peak of 100 million tons in 1913 to 46 million tons in 1950. Thirty five percent of the coal being mined comes from surface facilities or the reprocessing of coking banks. The facility rate drops to 1.86 facilities per million tons of coal mined.

**1959 Knox Mine Disaster**

Knox mine coal disaster - Fort Griffith, PA (near Pottsville). The 100-year-old Knox Mine for Rhakia through the "new working, perforating" Rocking the stability of the pre-existing underground mine in the "unstable" area. Although production of coal was constant through the area since its peak in 1913, it was largely referred to as the event which ended deep coal mining in the northeast anthracite field of Pennsylvania.

**1969 Mine Safety and Health Administration Created**

The Federal 1969 Coal Mine Health and Safety Act is passed by Congress and an agency, now known as the Mine Safety and Health Administration (MSHA) is created.

**1970 Coal Production Continues to Decline**

Anthracite coal mine production continues to steadily fall to 9.2 million tons. There are 0.43 facilities per million tons of coal mined.

**1971 Surface Mining Act Addresses Acid Mine Drainage**

The Surface Mining Conservation and Reclamation Act of 1971 required that "the approval shall be granted [for a permit] unless the plan provides for a practicable method of avoiding acid mine drainage - or other stream pollution." This requirement changed the driving need for the development of technology to predict mine water quality and an understanding of methods to prevent mine drainage pollution.

**1976 Surface Mining Overtakes Deep Underground Mining**

Anthracite deep production continues to shift from deep, inland, to surface, mines and the new recycling of coking banks and off-gases. Research and development is continuing. These plants are designed to turn back acid mine refuse/water.

**1987 Continued Job Losses**

Production of anthracite coal drops to 5.2 million tons, of which only 515,000 tons come from the 98 deep mines in the region which employ 626 deep miners. Deep anthracite coal mining accounts for only 11.8% of coal product.

**1987 Facilities reach 31,088**

The total recorded number of individuals that have died at mining operations over the years since anthracite mining has occurred reaches 31,088.

**1990 Deconstruction of the Anthracite Coal Industry**

By 1990 total employment of anthracite coal mines had declined to 2,228. There were 248 mines operating, of which 82 were deep mines, 101 were strip mines, and 65 were bank mines. In addition, there were 70 breakers and washers plants. Pennsylvania declines by providing only 2 percent of the nation's minerals.

**1990s Corporate Reorganization**

Production of the companies in 1990 varied from about 100 tons to a maximum of 220, 370 by the Valley Highland Coal Company of West Virginia. Because the companies were small, there were only many failures but also many reorganizations every year. Most companies are now the resources for modernizing operations.

**2003 Marcellus Shale Gas Discovered in Pennsylvania**

Appalachia, LLC drilled a Marcellus well in Washington County, Pennsylvania and found a promising flow of natural gas (2). They experimented with horizontal drilling and hydraulic fracturing methods that work in the Barnett Shale of Texas.

**2005-2007 Marcellus Shale Gas Drill Sites Multiply**

The first Marcellus gas production from the well in Washington County began in 2005. Between then and the end of 2007 more than 375 gas wells with suspected Marcellus intent had been permitted in Pennsylvania.

**2010 Energy Debates Become the Main Driver in Pennsylvania Politics**

Debates concerning the coal, natural gas and renewable energy industries take the forefront of the political stage in Pennsylvania. The environmental, economic, political and social externalities of these industries continue to determine the fate of the "Rust Belt" of the anthracite coal mining region of Pennsylvania.

**2006 MINER Act**

Congress passed the Mine Improvement and New Emergency Response Act (MINER Act). The MINER Act amended the Mine Act to require mine-specific emergency response plans in underground coal mines, added new regulations regarding mine rescue teams and sealing of abandoned



**1939-45 World War II Era**

World War II sparks the anthracite coal industry's temporary renaissance. From 1939 to 1945 both armaments and production fell almost 50%. Within a few weeks the light of the breakers and the workers' demands for coal production were way to some companies with less direct control over the local community.

**1945 The Surface Mining Conservation and Reclamation Act**

The Surface Mining Conservation and Reclamation Act (SMCRA) was a more comprehensive attempt to regulate surface coal mining. Both the Clean Streams Law and the Surface Mining Conservation

**1968 Anthracite Coal Mining Act**

Passed in 1965 to establish a program to prevent pollution from anthracite mining. In 1968 the Streamlined Mine Subsidence and Land Conservation Act was passed to protect structures from the effects of deep mining subsidence.

**1968 Anthracite Coal Mining Act**

In 1968 a \$500 million bond issue was passed, in part to finance the reclamation of abandoned mined lands through a new Operation Scariff and to purchase land for conservation and recreation purposes. The Coal Refuse Disposal Control Act was passed in that same

**1979 Bureau of Deep Mine Safety Created**

DMP's Bureau of Deep Mine Safety was officially created in the former Department of Environmental Resources in 1979, having been in existence in various forms as part of predecessor agencies back to 1963 in the Department of Mines. Its primary pur-

**1992 SMGRA Amended**

In 1992 the Surface Mining Conservation and Reclamation Act was amended to better protect water supplies and provide incentives for re-mining previously abandoned areas.

**1994 Mine Subsidence and Land Conservation Act Amended**

The Mine Subsidence and Land Conservation Act was amended in 1994 to better protect water supplies affected by deep coal mining and to revise the procedures for repairing or replacing buildings damaged by mine subsidence. Legislation was also

**2006 MINER Act**

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**30,905 Anthracite Coal Mining Deaths from 1870-1993**

**THE ANTHRACITE REGION OF NORTHEASTERN PENNSYLVANIA: A HISTORY OF EXTERNALITIES**



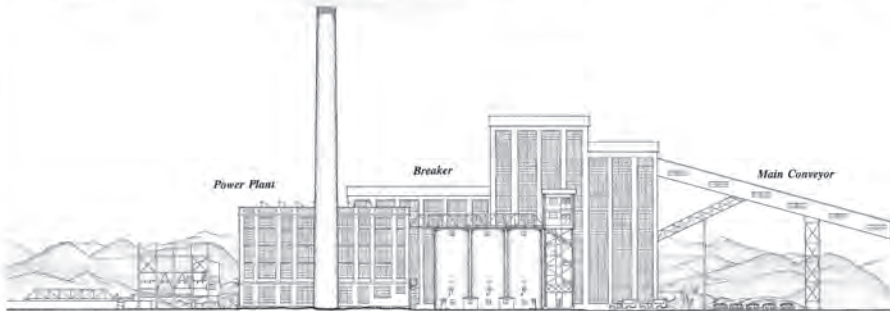
THIS SITE: HUBER BREAKER, ASHLEY PENNSYLVANIA



THIS SITE: HUBER BREAKER, ASHLEY PENNSYLVANIA

# Huber Breaker

ASHLEY, PENNSYLVANIA



MAIN STREET ELEVATION 1939

Anthracite coal, when mined, comes in a variety of sizes and mixed with various impurities. As a result, it is processed before shipping to market. The processing is done in a plant known as a "breaker", a complex series of mechanical devices which break, wash, and size coal for shipping.

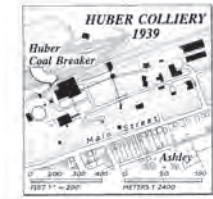
In the 1930's, confronted by changing markets, anthracite coal companies erected breakers with new designs to break uniform, high grade coal for most market conditions. One of these breakers, the Huber Breaker, was erected by the Glen Alden Coal Company in Ashley, Luzerne County, Pennsylvania. It began operation on February 1, 1939.

The Huber Breaker could process 2,000 tons of anthracite daily. It featured a large crane, hoists which separated coal from rock. The main conveyor was 450 feet long and delivered coal to the top floor. An aerial tramway carried refuse from the plant. Refuse coal was taken by rail south to Atlantic coast markets. All coal processed at the Huber Breaker was shipped with a blue ink-stained stamp and marked as "Blue Coal".

As the market for anthracite coal diminished and the nature of anthracite mining changed from underground to open-pit operations, the Huber Breaker was placed out. Glen Alden sold its coal producing subsidiary, Blue Coal Corporation, in 1966. The Huber Breaker was sold to Lucky Strike Coal Company in 1975 and Blue Coal



REGIONAL MAP



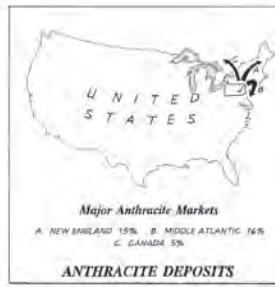
SITE PLAN

Company declared bankruptcy in 1976. The breaker ceased operation shortly thereafter.

The Huber Coal Breaker Recovery Project is part of the Historic American Engineering Record, a program to document America's historic engineering, engineering and transportation resources. As part of the National Park Service, U.S. Department of the Interior, the HAER program is administered by the Historic American Buildings Survey, Historic American Engineering Record Division, HARIS/HAER, Dr. Robert J. Kaebler, Chief. The Huber Coal Breaker Recovery Project has been completed in 1991 by HAER under the general direction of Eric DeLany, Chief and Principal Architect, HAER, and the Delaware and Lehigh Navigation State National Heritage Commission, William Reynolds, Chairman. Pennsylvania participation was provided through the High Moore Historical Park and Museum, Inc. Assistance was provided by Anne Barlow and the Ashley Breaker Preservation Society. Blue Coal Corporation opened to corporate archives to the HAER team.

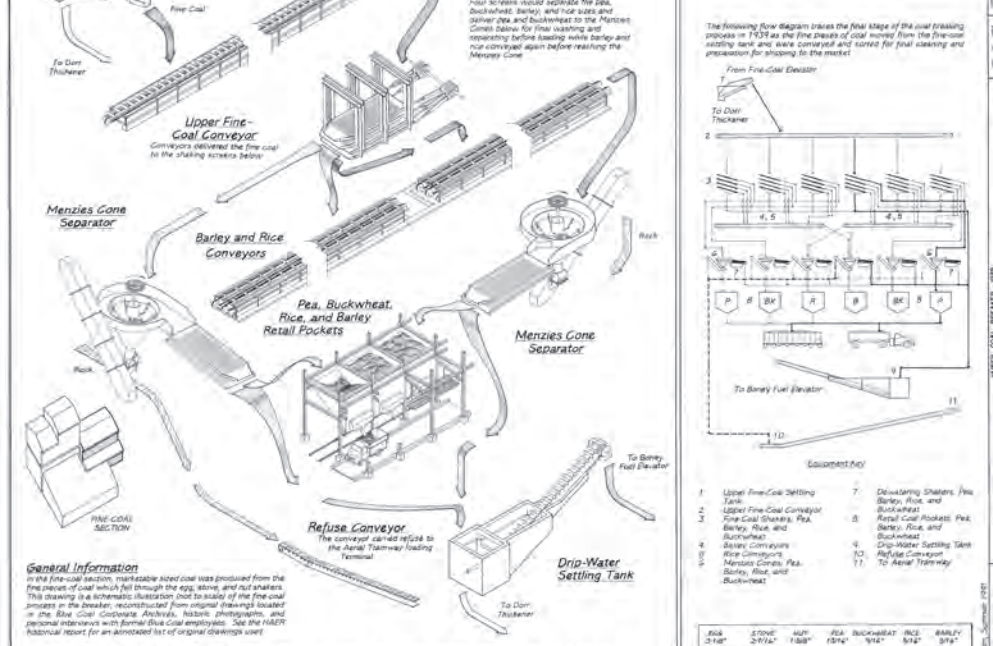
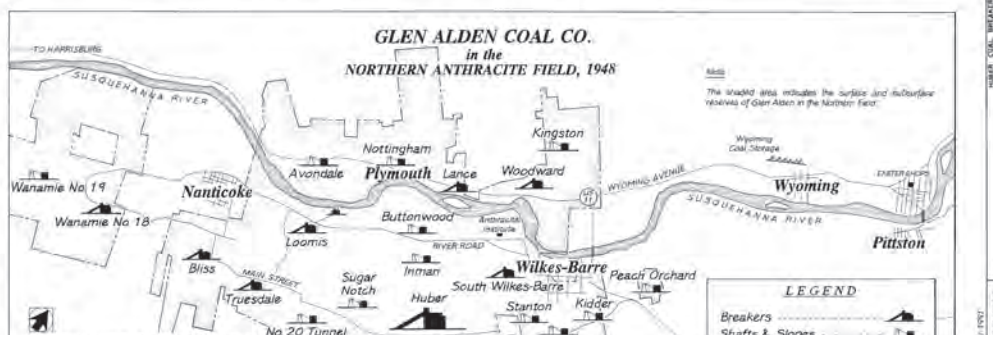
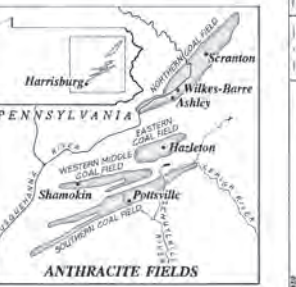
The field work and measured drawings were prepared under the management of Robert Jackson. The team consisted of: Supervisor Craig N. Stang, Albert and Michael Thomas, Architectural Technicians Nicole Duran and Lander Sailer, (SC0201), Shannon Porter A. Johnson, Photographers, Susan Elliot and George Hawker, archival assistance by Matthew Ashton, Tamara Jacob, and assistant Pauline Robinson.

# ANTHRACITE DOMAIN



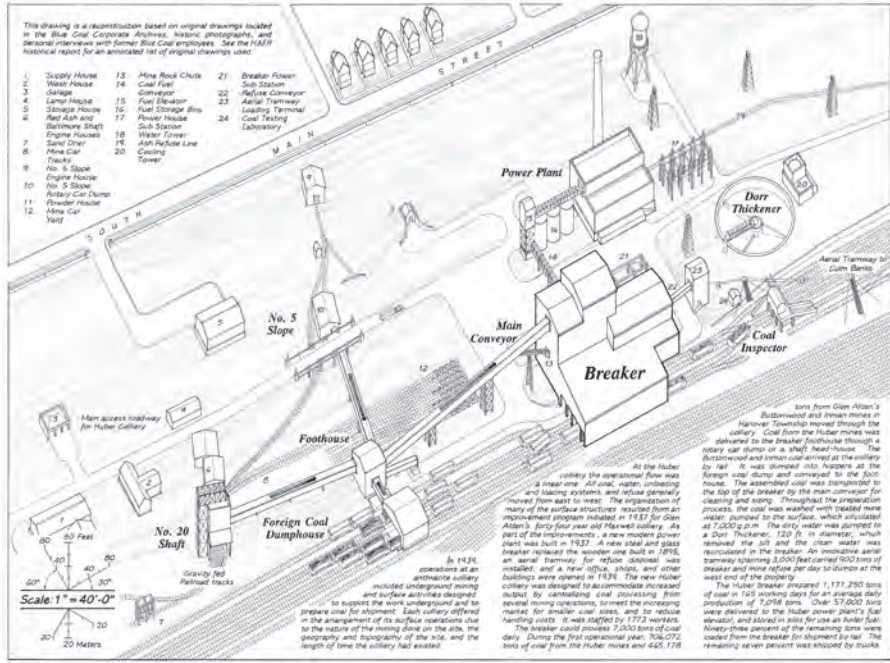
Anthracite coal is found in a 484 square mile area in Northeastern Pennsylvania. The deposits are divided geographically into four separate fields: the Northern, the Eastern Middle, Western Middle, and Southern. The Northern field is a crescent shaped basin extending 170 miles from Forest City in Lackawanna County to Scranton in Luzerne County. Its widest point is five miles in near Wilkes-Barre which is located at the center of the southern half of the field. Ashley, the site of the Huber Breaker, is approximately two miles southwest of Wilkes-Barre.

Ninety-nine percent of the anthracite coal mined comes from Northeastern Pennsylvania representing approximately 10% of total coal production in the United States. Anthracite production grew slowly at first, but expanded rapidly in the late 19th century. The slow rise of anthracite is attributed to a lack of adequate transportation systems. Gradually, first, with the development of canal systems, such as the Delaware and Lehigh Navigation System, and eventually, with the development of railroads, access to markets beyond production sites in 50 mile zones in 1891 and reaching its peak of 100 mi-



# FINE-COAL PROCESS 1939

# HUBER COLLIERY OPERATIONS 1939



# SITE ANALYSIS

This drawing is a reconstruction based on original drawings located in the Blue Coal Corporation Archives, historical photographs, and personal interviews with former Blue Coal employees. See the HAER historical report for an annotated list of original drawings used.

At the Huber colliery the operational flow was a clear one. All coal, water, conveying and loading systems, and refuse generally moved from east to west. The organization of many of the surface structures resulted from an improvement program initiated in 1917 for Glen Alden's forty-four year old Harwood colliery. As part of the improvements, a new modern power plant was built in 1927. A new steel and glass breaker replaced the wooden one built in 1876, an aerial tramway for refuse disposal was installed, and a new office, shop, and other buildings were erected in 1928. The new Huber colliery was designed to accommodate increased output by centralizing coal processing from several mining operations, to meet the increasing market for marketable coal sizes, and to reduce handling costs. It was staffed by 1773 workers. The breaker could produce 7,000 tons of coal daily. During the first operational year, 1939/42, tons of coal from the Huber mines and 445,178

ton tons in 1917 with the Harwood plant accounting for almost 500 million tons. Anthracite became the chief home heating fuel in the great cities areas of Pennsylvania, New York and New Jersey; it fueled the "American Industrial Revolution" and, as transportation systems improved, markets became more widespread to include New England and Canada.

In the years following 1917, anthracite production fell as a result of competition with gas and oil. By 1938 only 51 million tons were produced. Responding to market conditions, Glen Alden, the largest producer in the northern field, chose to consolidate its coal processing operations by building the Huber Breaker in Ashley, Pennsylvania. The plant was constructed by Glen Alden's many underground mining operations and to major industrial outlets it continued to deliver as a central processing plant until the nature of mining changed from underground to surface striping in 1966, striping operations produced 55% of the anthracite mined. By the 1950's, the Delaware and Lehigh Navigation System, and eventually, with the development of railroads, access to markets beyond production sites in 50 mile zones in 1891 and reaching its peak of 100 mi-

Four screens would separate the size, dust, white, heavy, and top size and separate the pea and buckwheat to the Market Cone bins for final washing and reprocessing before being washed and top size again before reaching the Market Cone.

The following flow diagram traces the final stages of the coal breaking process in 1939 as the fine stream of coal moves from the final washing tank and were conveyed and sorted for final cleaning and preparation for shipping to the market.

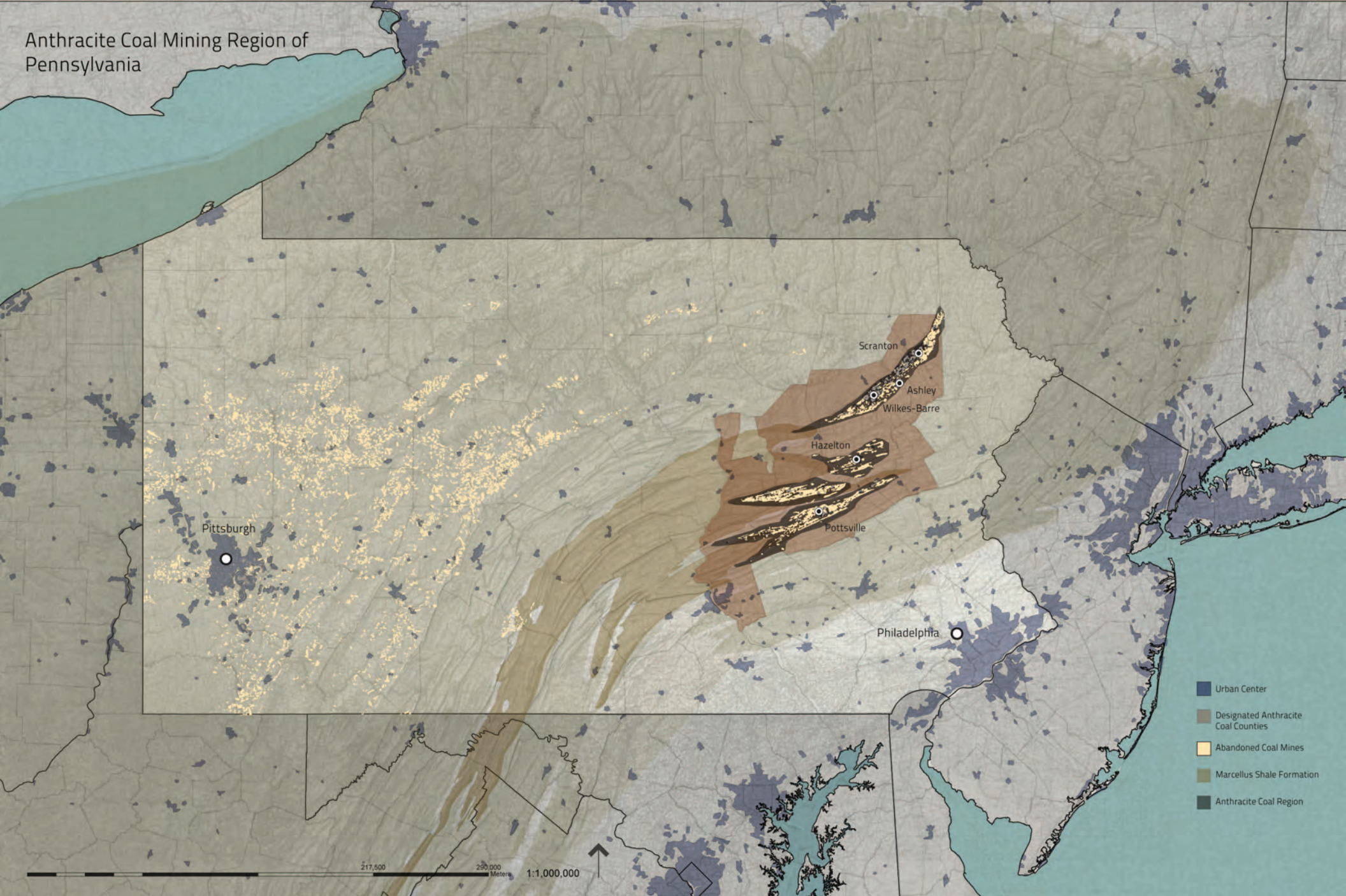
Equipment Key:

1. Upper Fine-Coal Chilling Tank
2. Upper Fine-Coal Conveyor
3. Fine-Coal Shakers, Pea, Barley, Rice and Buckwheat
4. Barley Conveyors
5. Rice Conveyors
6. Menzie's Cones, Pea, Barley, Rice, and Buckwheat
7. De-watering Shakers, Pea, Barley, Rice, and Buckwheat
8. Refuse Coal Pockets, Pea, Barley, Rice, and Buckwheat
9. Dip-Water Settling Tank
10. Refuse Conveyor
11. To Aerial Tramway

Marketable Coal Sizes:

8 1/2" STONE  
4" STONE  
3" STONE  
2" STONE  
1 1/2" STONE  
1" STONE  
3/4" STONE  
3/8" STONE  
1/4" STONE  
1/8" STONE  
DUST

# Anthracite Coal Mining Region of Pennsylvania



## INTRODUCTION



A photograph of a river with a concrete bridge in the background. The water is turbulent and has a reddish-brown hue. A person in a white shirt and brown pants is kneeling on a rock in the foreground, looking at the water. The text 'ENVIRONMENTAL EXTERNALITIES' is overlaid in the center.

# ENVIRONMENTAL EXTERNALITIES

# Patch Town Adjacencies

Anthracite Coal Mining Region of  
Northeastern Pennsylvania



Susquehanna River

Regional Underground Mine Network

Acid Mine Drainage Stream

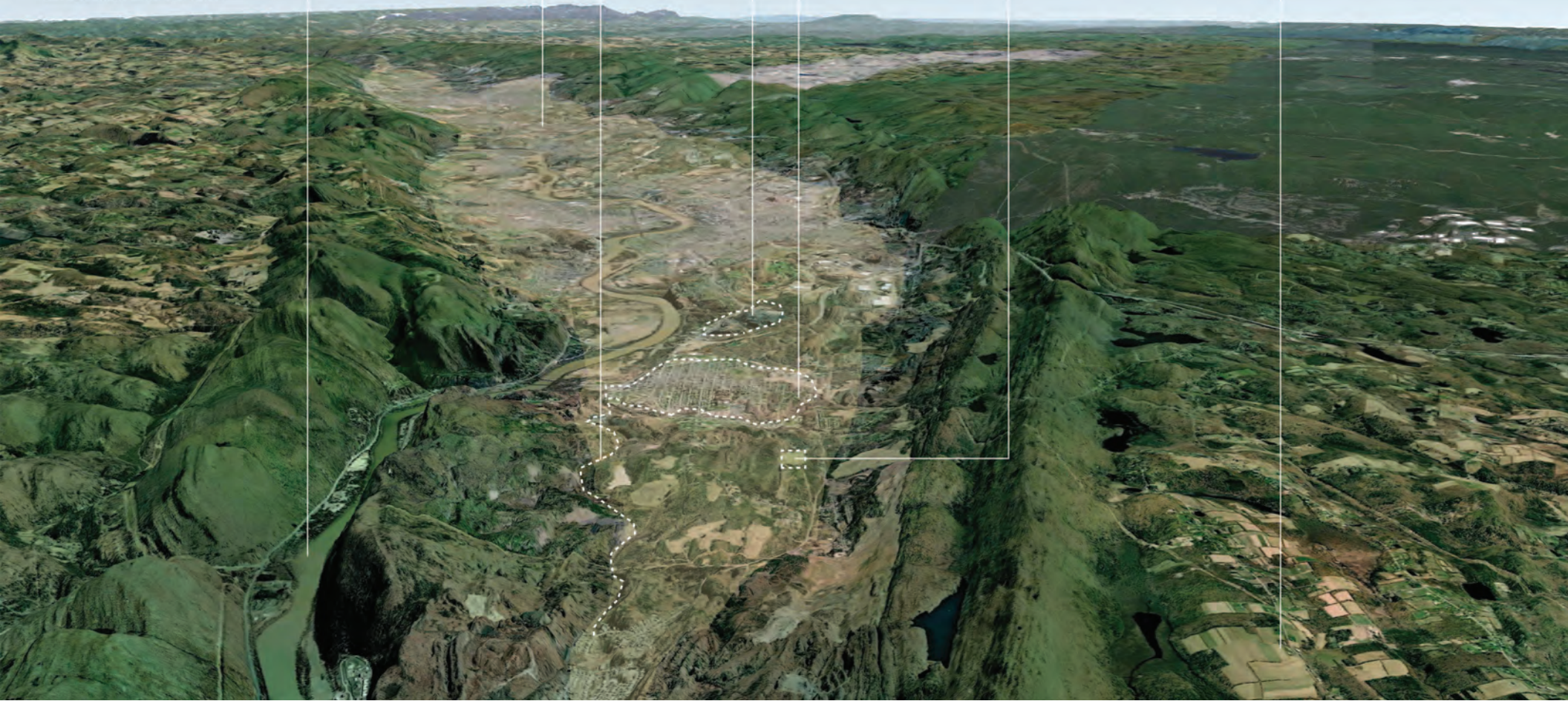


Surface Mining Site

"Patch Town"  
Ashley, Pennsylvania  
Population: 2,900

Reclaimed Mine Site

Agricultural Land



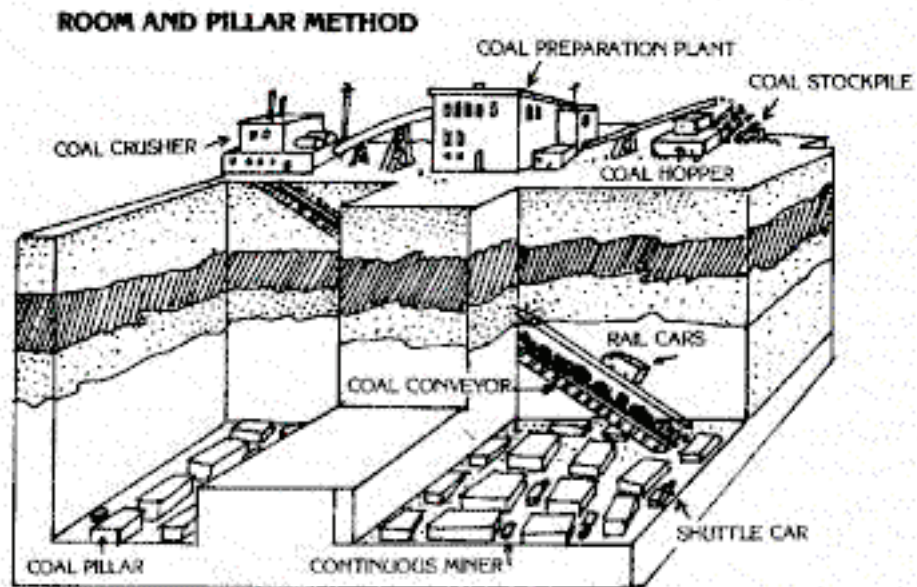
## **Minescapes:**

Landscapes which exhibit 4 different conditions resulting from mining practices.

\*As identified in the northeastern Pennsylvania anthracite coal region

# Minescape Type 1:

Deep Underground Mine (aka "Room and Pillar")





ENVIRONMENTAL DEEP UNDERGROUND MINE MAPS



Source: Underground Miner's Website



ENVIRONMENTAL DEEP UNDERGROUND MINE



Source: Underground Miner's Website



ENVIRONMENTAL DEEP UNDERGROUND MINE

# SUBSIDENCE



Source: Underground Miner's Website



Source: Underground Miner's Website

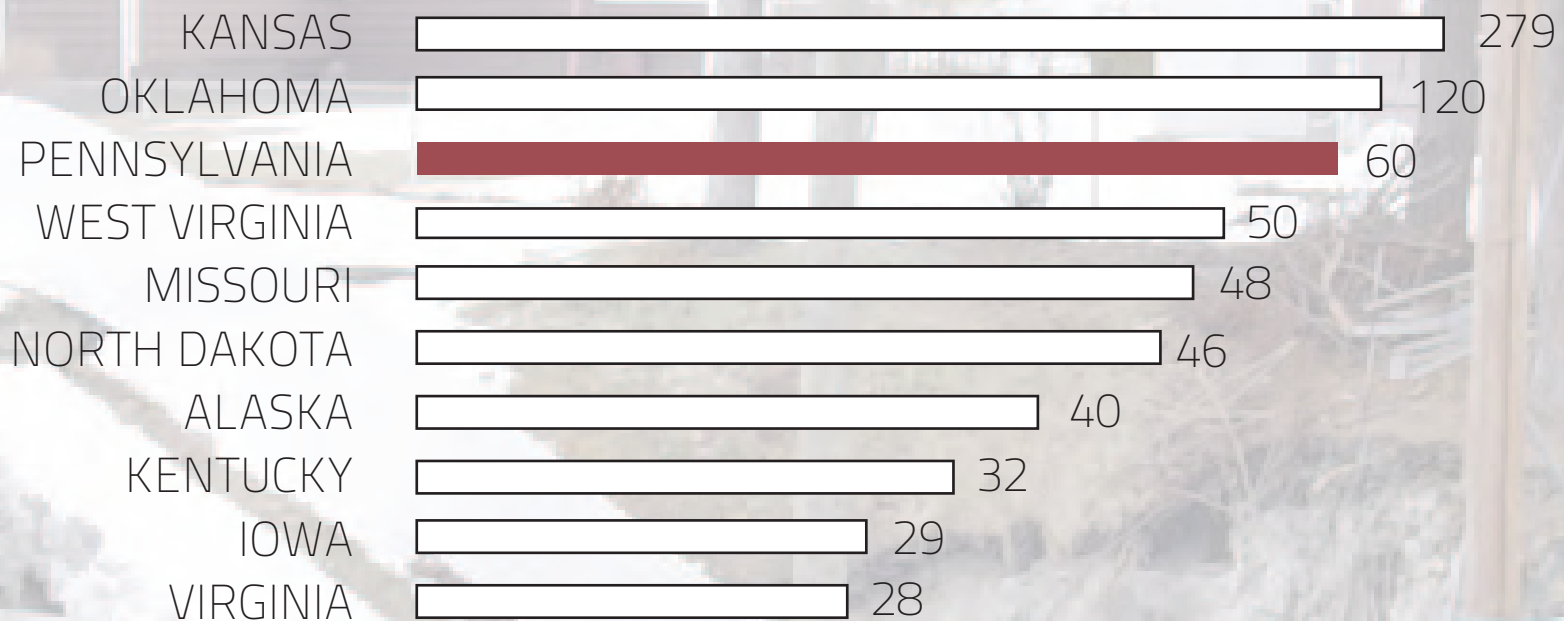
# ACID MINE DRAINAGE



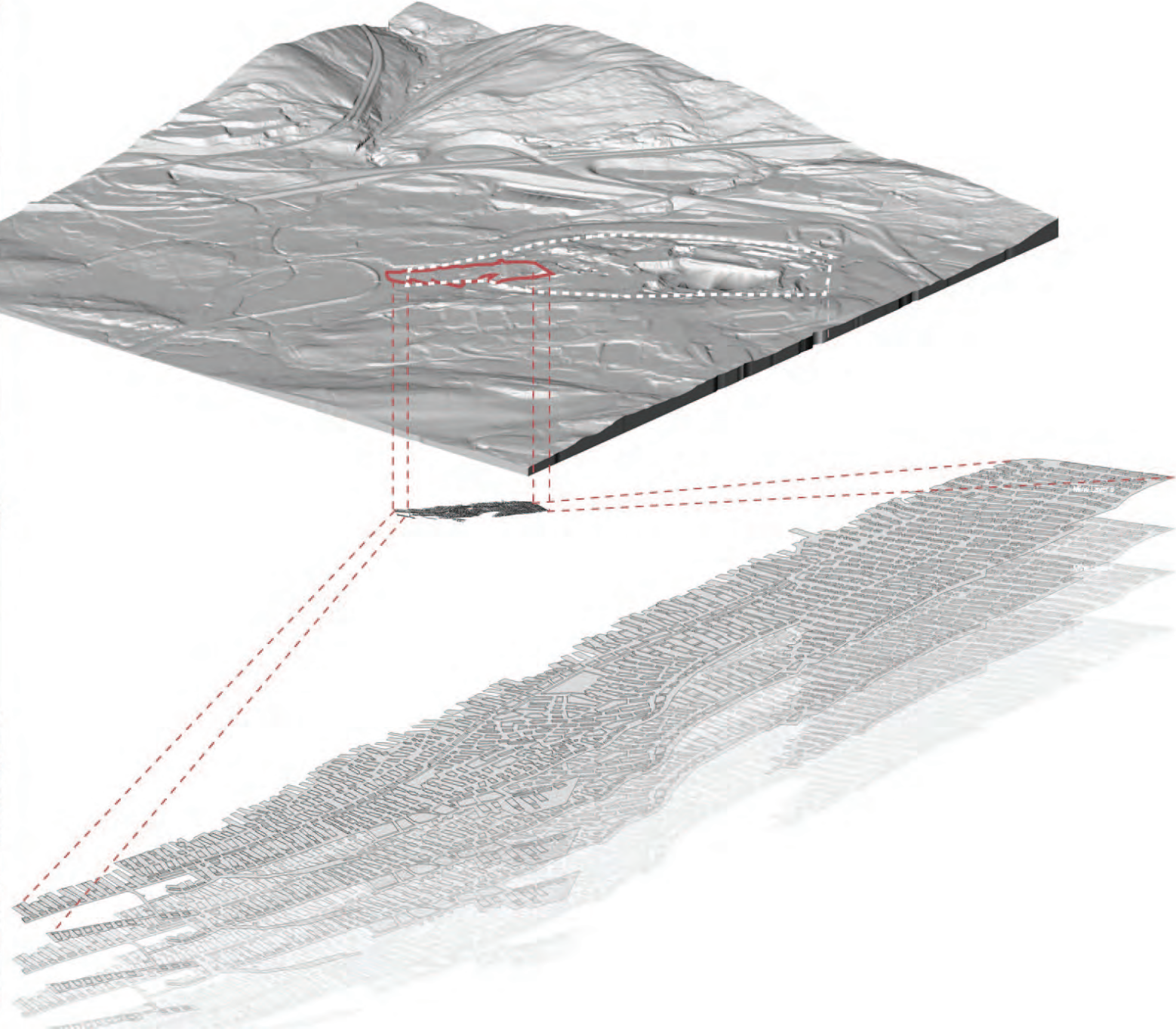
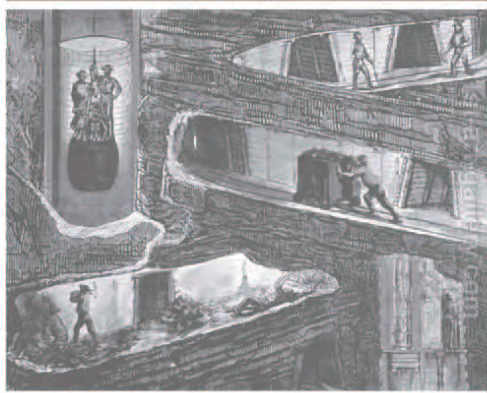
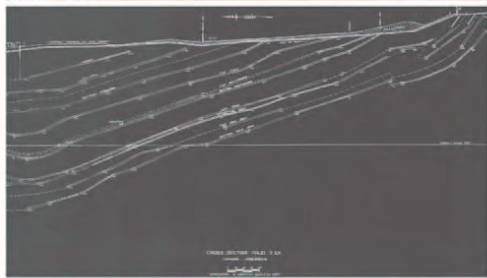
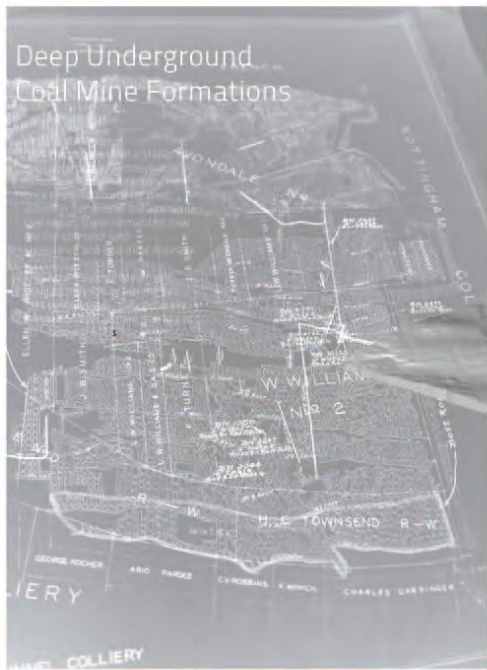
ENVIRONMENTAL SUBSIDENCE AND ACID MINE DRAINAGE



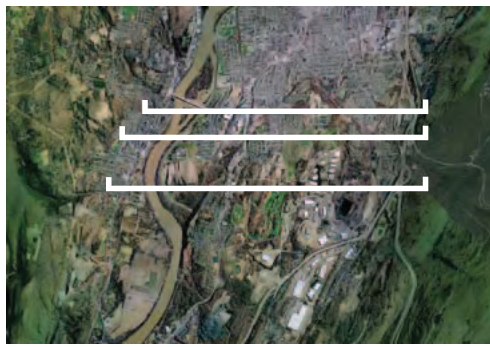
Number of years needed to fix abandoned mine hazards with the current level of federal funding, for selected states



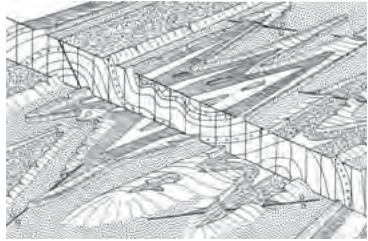
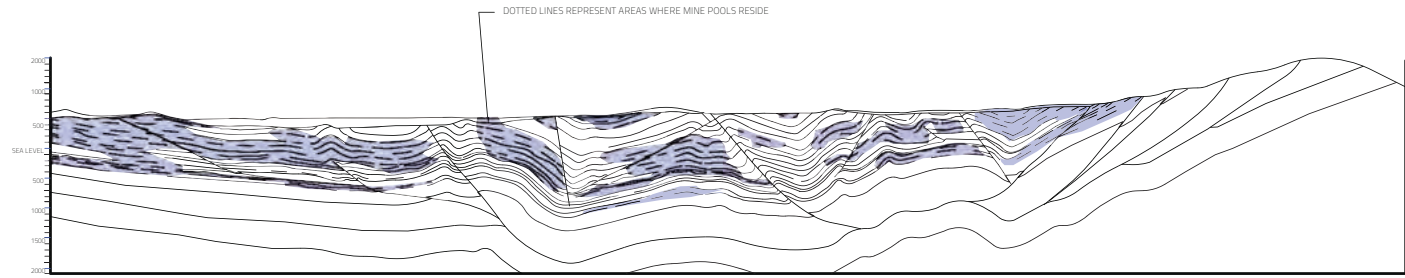
Source: Department of the Interior, Office of Surface Mining, Reclamation and Enforcement



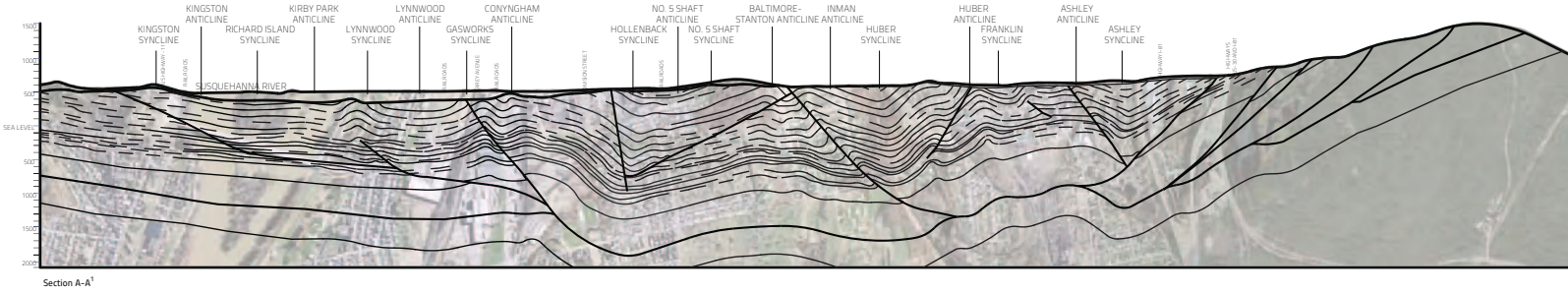
ENVIRONMENTAL UNDERGROUND MINE NETWORK AT HUBER BREAKER SITE



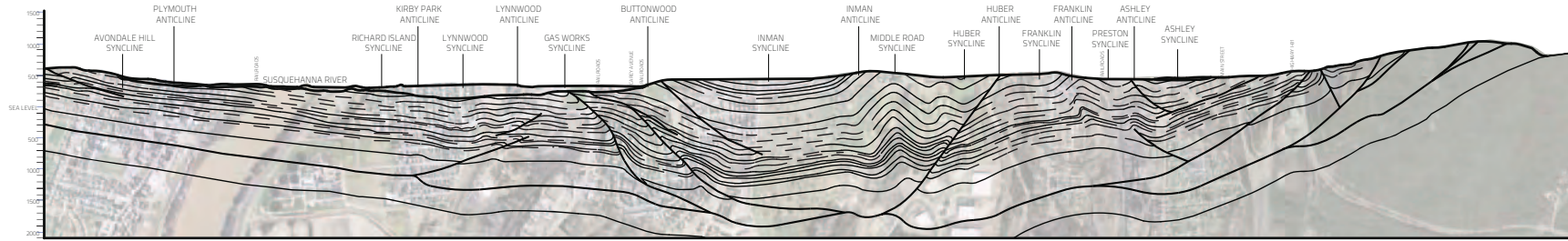
KEY PLAN OF THE TOWNS OF ASHLEY AND WILKES-BARRE PENNSYLVANIA



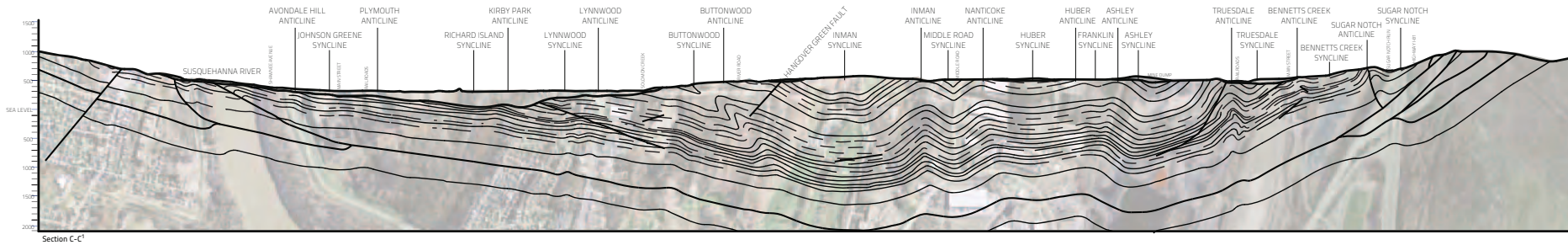
ANTICLINES AND SYNCLINES OF THE ANTHRACITE COAL REGION



Section A-A'



Section B-B'

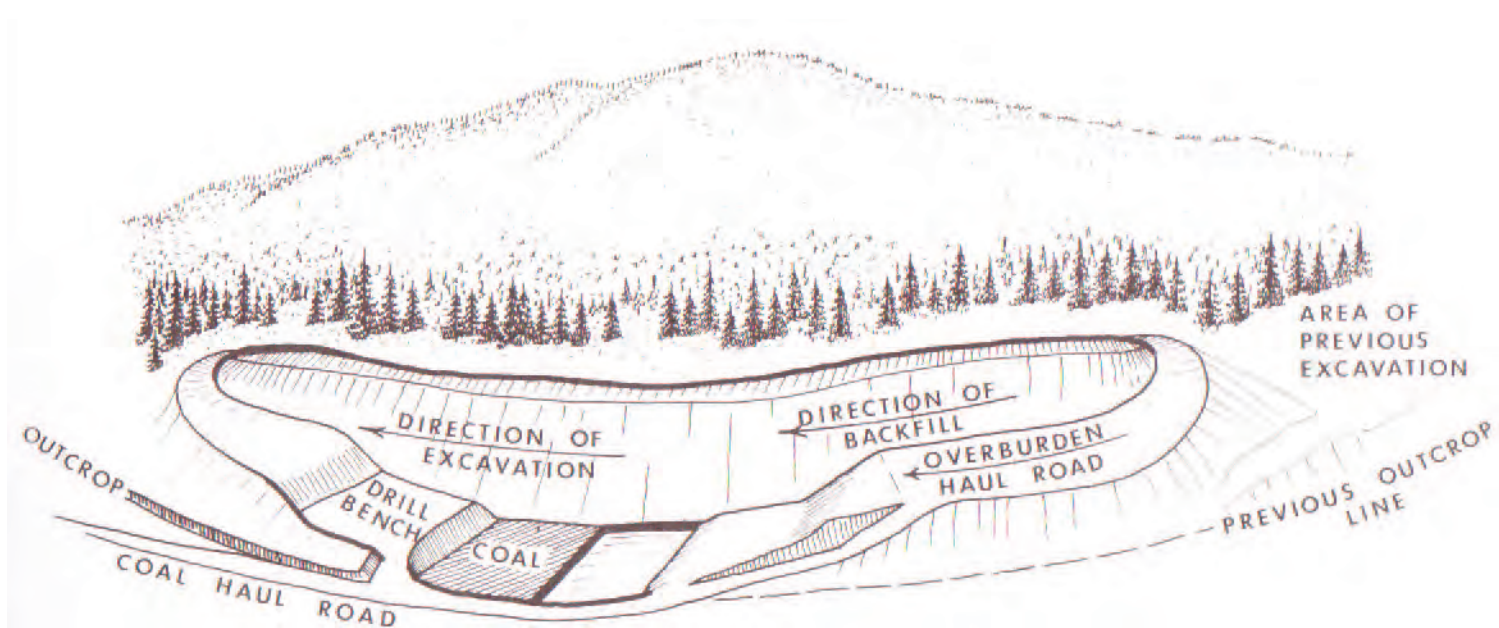


Section C-C'

# ENVIRONMENTAL GEOLOGIC SECTIONS OF COAL SEAMS, ANTICLINES & SYNCLINES, AND UNDERGROUND MINE POOLS

## Minescape Type 2:

Open Pit Mine (aka "Surface Mine")





ENVIRONMENTAL OPEN PIT MINE



5 = Average number of coal mine workers employed per mine in 2011

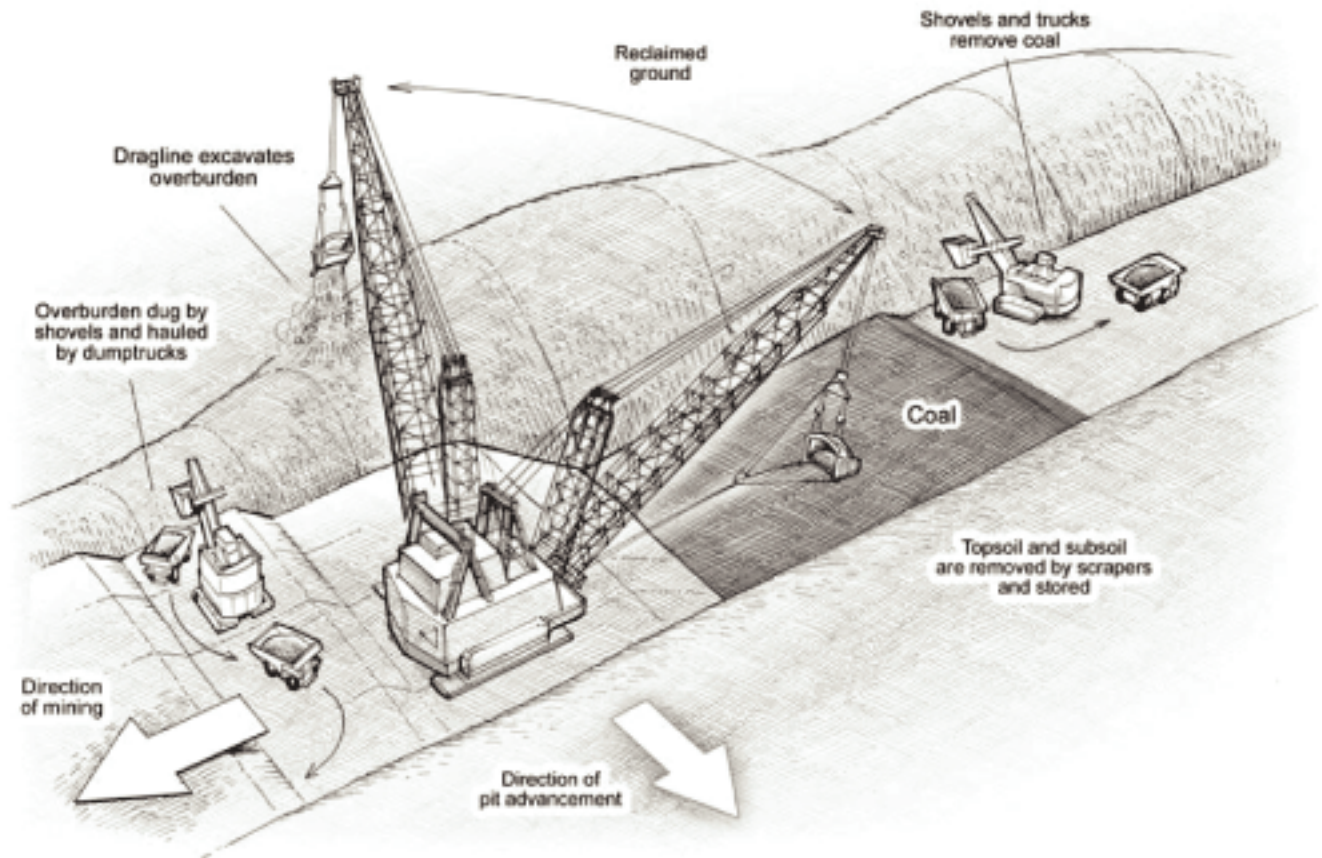


600 = Number of coal mine workers employed per mine in 1900



# Minescape Type 3:

## Reclaimed Mine





Reclaimed open pit mine sites near Pottsville, PA

ENVIRONMENTAL RECLAIMED MINE





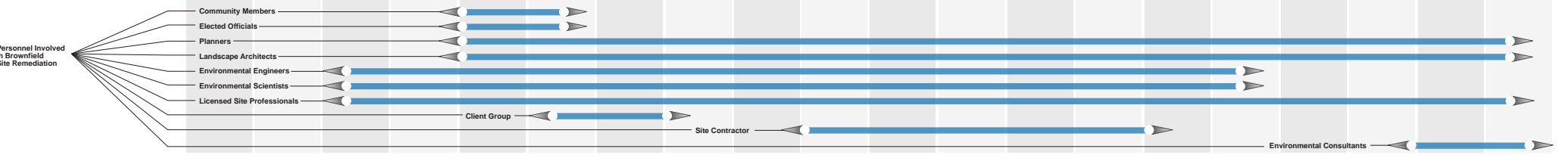
WalMart adjacent to coal mine site in Pottsville, PA as part of Acres for America Program

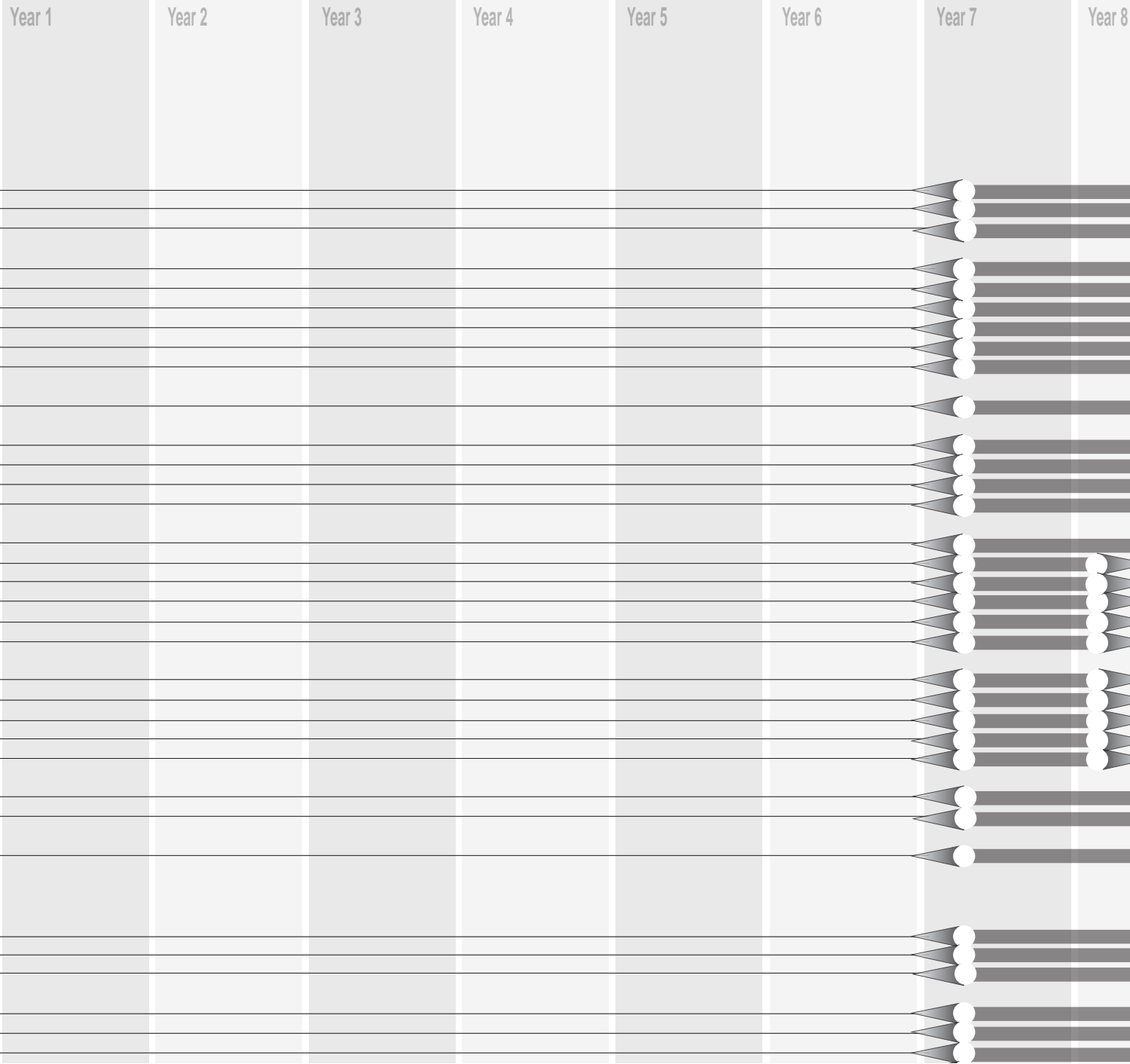


Former mine site, now a soccer field in Ashley, Pennsylvania

ENVIRONMENTAL RECLAIMED MINE

Year 1 Year 2 Year 3 Year 4 Year 5 Year 6 Year 7 Year 8 Year 9 Year 10 Year 11 Year 12 Year 13 Year 14 Year 15 Year 16 Year 17 Year 18 Year 19 Year 20





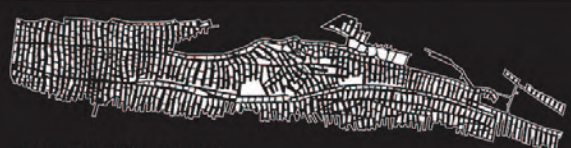
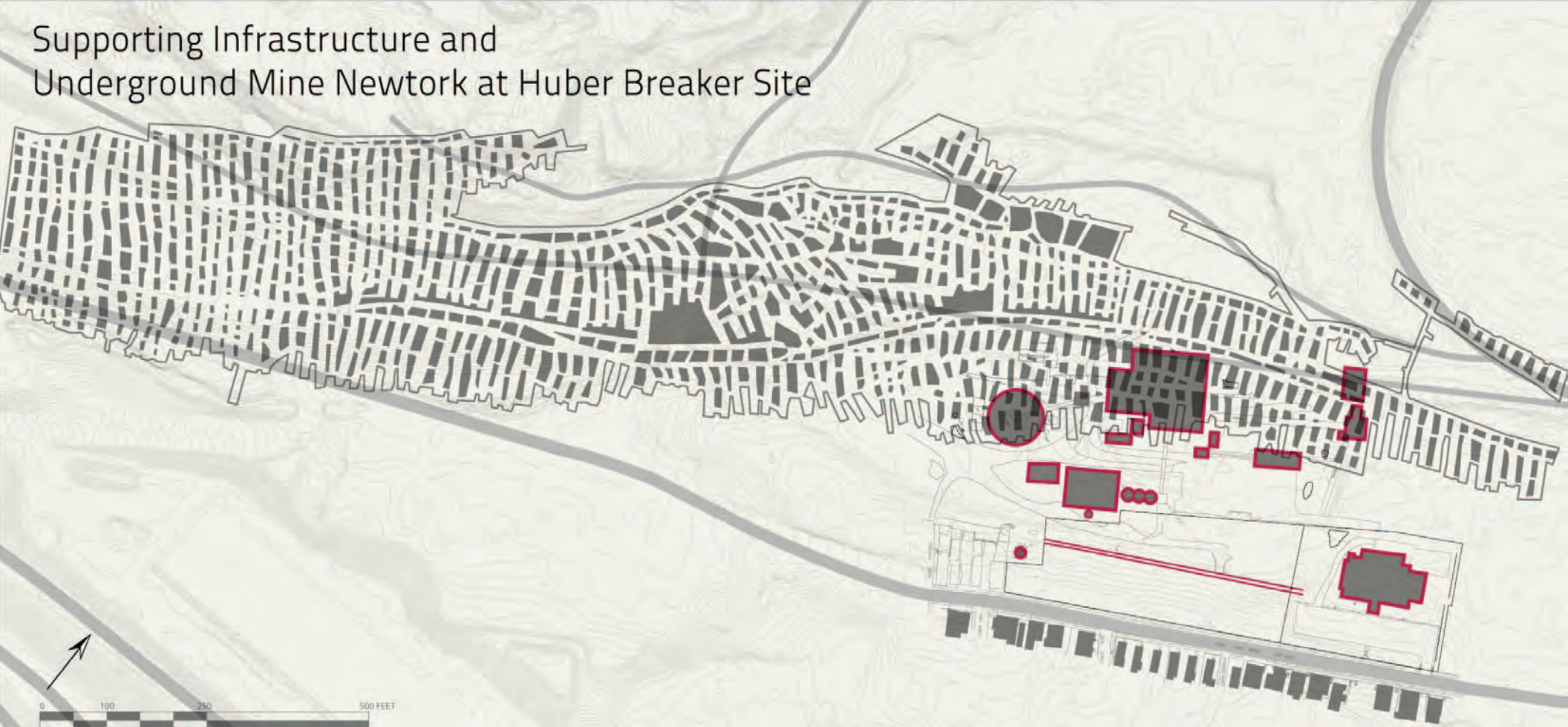
**ENVIRONMENTAL**

# Minescape Type 4:

## Supporting Infrastructure



# Supporting Infrastructure and Underground Mine Network at Huber Breaker Site



## Underground Mine Network

Above is a plan of a mine network underneath the Huber Breaker site which starts at 70' below surface grade. There are five levels of mines still intact, however each level is filled with water and

slurry. The white in the above plan are the coal pillars still standing, and the black indicates the "rooms" where coal was extracted.



## Huber Breaker

Opened in 1939, is now the last standing colliery breaker in the northern anthracite coal region.



## Power House



## Retail Coal Pocket



## Foreign Coal Dump



## Storage Tanks



## Smoke Stacks and Coal Silos



## EPCAMR Office



## Sewer Easement



# ENVIRONMENTAL



# POLITICAL EXTERNALITIES

Concerns over the environmental impacts of coal mining resulted in passage of some of Pennsylvania's very first environmental laws. Regulation of the mining impacts began in earnest in 1913 with the passage of Act 375 prohibiting the discharge of anthracite coal, culm or refuse into streams.

## 1872 The General Mining Act of 1872

Codified the informal system of acquiring and protecting mining claims on public land.

## 1937 The Clean Streams Law

Attempt to regulate surface coal mining. Formed the basis of modern environmental regulations covering surface coal mining operations.

## 1945 The Surface Mining Conservation and Reclamation Act

Largely protects streams from pollution. It was amended in 1945 to include acid mine drainage and again in 1965 to define acid mine drainage as an industrial waste, requiring all mines to treat their drainage to specified standards.

## 1968 Anthracite Coal Mining Act

In 1968 a \$500 million bond issue was passed, in part, to finance the reclamation of abandoned mined lands through a new Operation Scarlift and to purchase land for conservation and recreation purposes. The Coal Refuse Disposal Control Act was passed in that same year to help control pollution from coal refuse piles.

## 1979 Borough of Deep Mine Safety Created

DEP's Bureau of Deep Mine Safety was officially created in the former Department of Environmental Resources in 1979, having been in existence in various forms as part of predecessor agencies back to 1903 in the Department of Mines. Its primary purpose is to improve safety conditions in mines through training and setting safety requirements. The Bureau also investigates mine accidents and conducts mine rescue operations.

## 1980 CERCLA (Superfund) Act Created

The Comprehensive Environmental Response, Compensation and Recovery Act created a tax on chemical and petroleum industries, established requirements concerning closed and abandoned hazardous waste sites. The act also provided liability for persons responsible for releases of hazardous waste sites.

## 1992 SMCRA Amended

In 1992 the Surface Mining Conservation and Reclamation Act was amended to better protect water supplies and provide incentives for remaining previously abandoned areas.

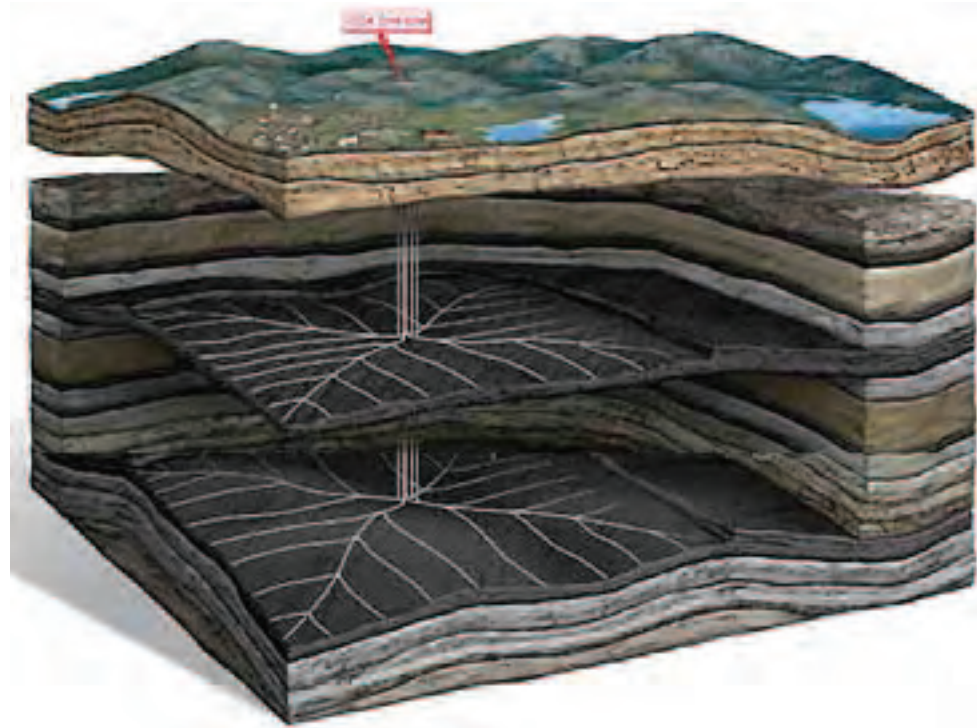
## 1994 Mine Subsidence and Land Conservation Act Amended

The Mine Subsidence and Land Conservation Act was amended in 1994 to better protect water supplies affected by deep coal mining and to revise the procedures for repairing or replacing buildings damaged by mine subsidence. Legislation was also passed to encourage the siting of coal refuse disposal areas on lands previously affected by mining (Act 114).

# Mineral vs. Surface Rights

“Mineral Rights” entitle a person or organization to explore and produce the rocks, minerals, oil and gas found at or below the surface of a tract of land. The owner of mineral rights can sell, lease, gift or bequest them to others individually or entirely. For example, it is possible to sell or lease rights to all mineral commodities beneath a property and retain rights to the surface. It is also possible to sell the rights to a specific rock unit (such as the Pittsburgh Coal Seam) or sell the rights to a specific mineral commodity (such as limestone). In the United States and a few other countries, ownership of mineral resources was originally granted to the individuals or organizations that owned the surface. These property owners had both “surface rights” and “mineral rights”. This complete private ownership is known as a “fee simple estate”.

Fee simple is the most basic type of ownership. The owner controls the surface, the subsurface and the air above a property. The owner also has the freedom to sell, lease, gift or bequest these rights individually or entirely to others.

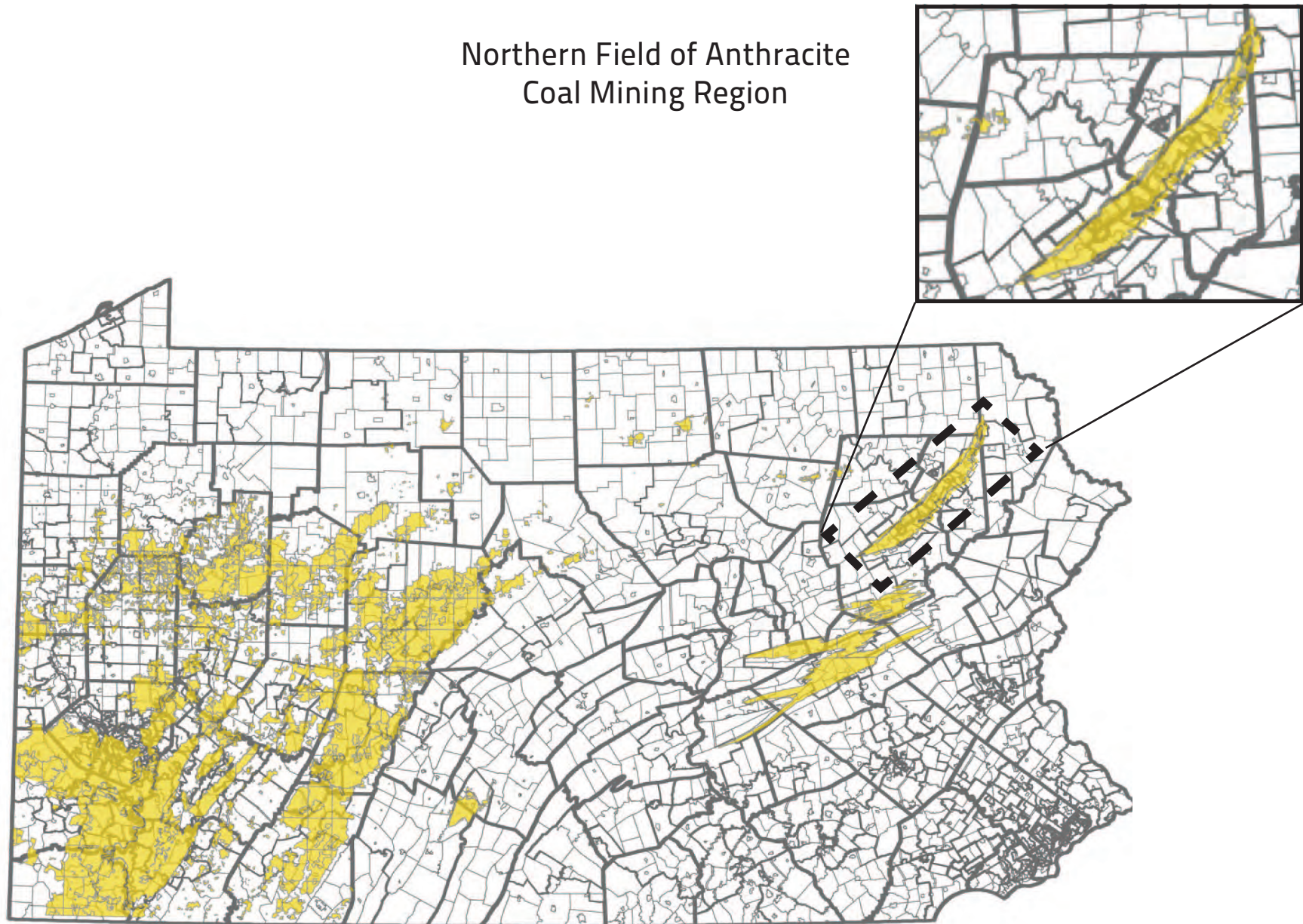


Source: Rock Creek Energy LLC Website

The General Mining Act of **1872**  
**ESTABLISHED SURFACE AND MINERAL**  
**RIGHTS REGULATIONS THAT ARE STILL**  
**TODAY'S STANDARD**



# Northern Field of Anthracite Coal Mining Region

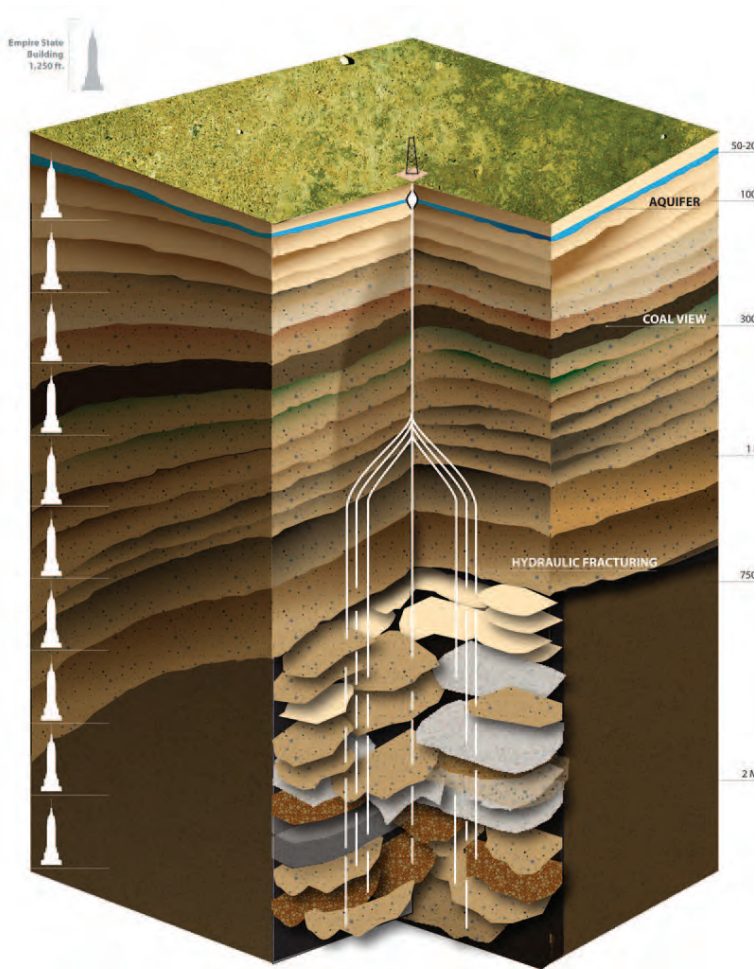


**POLITICAL**

COAL FORMATIONS AND POLITICAL BOUNDARIES IN PENNSYLVANIA:  
COUNTIES, MUNICIPALITIES, TOWNSHIPS, BOROUGHS AND CONGRESSIONAL DISTRICTS

### Going Deep:

WELL STIMULATION TECHNOLOGY DEPLOYED THOUSANDS OF FEET BELOW THE WATER TABLE.



Source: Energy In Depth Website



Source: Carbon Tax Center Website



Source: Swarthmore College Environmental Studies Website Article "Natural Gas Drilling in the Marcellus Shale"



SOCIAL  
EXTERNALITIES

Clean Goal: Dirty Joke



SOCIAL



# ECONOMIC EXTERNALITIES

# Wilkes-Barre, PA

demographics

POPULATION  
INCOME

40,964  
\$27,406

POVERTY: 2009

23.8%

UNEMPLOYMENT: 2011

10.3%

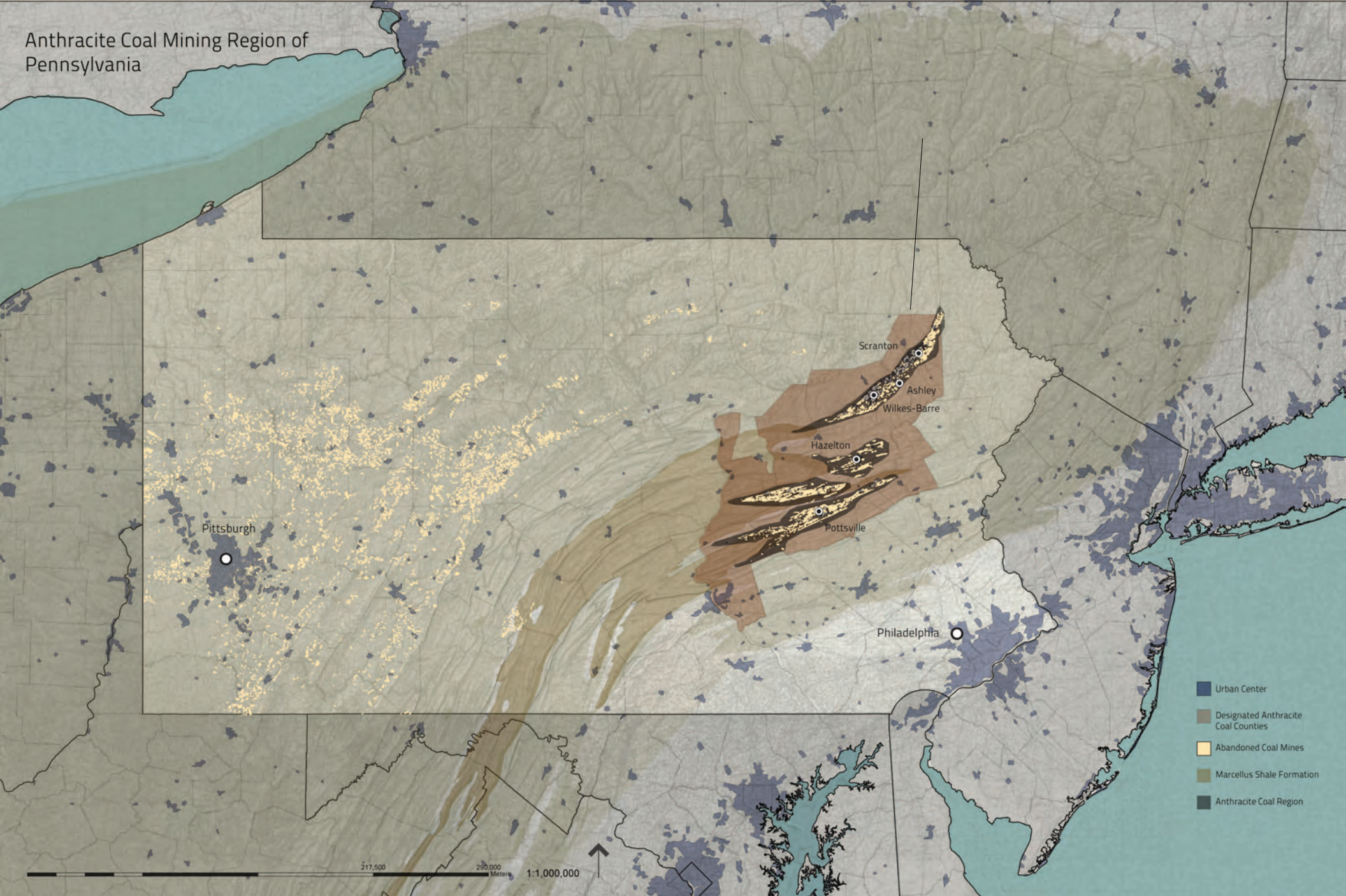
## ENERGY

UTILITY GAS 76%  
ELECTICITY 13%  
FUEL OIL, KEROSENE 8%  
BOTTLED, TANK, LP GAS 1%  
COAL 1%

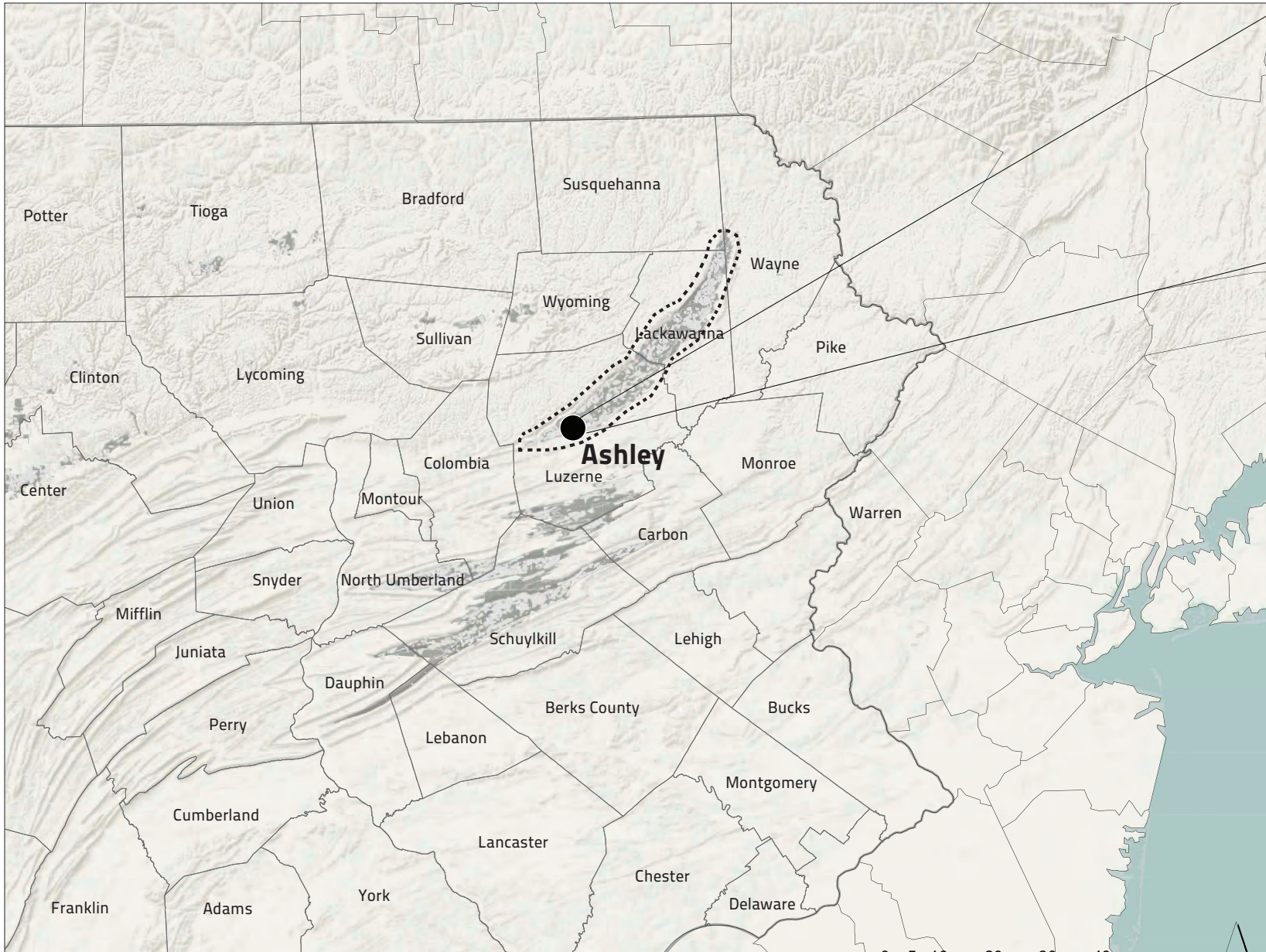
## EDUCATION

HIGH SCHOOL 76.8%  
BACHELOR'S DEGREE 12.8%  
GRADUATE OR  
PROFESSIONAL DEGREE 4.7%

# Anthracite Coal Mining Region of Pennsylvania

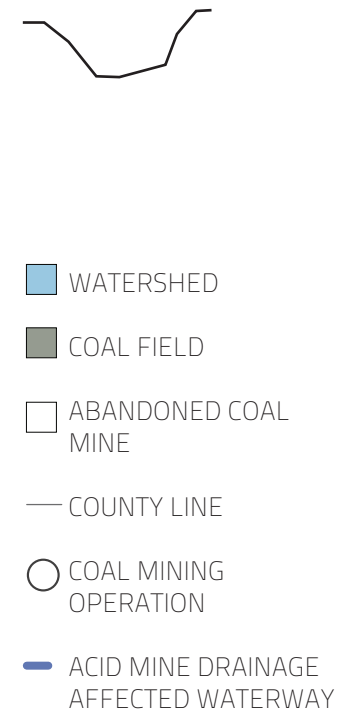
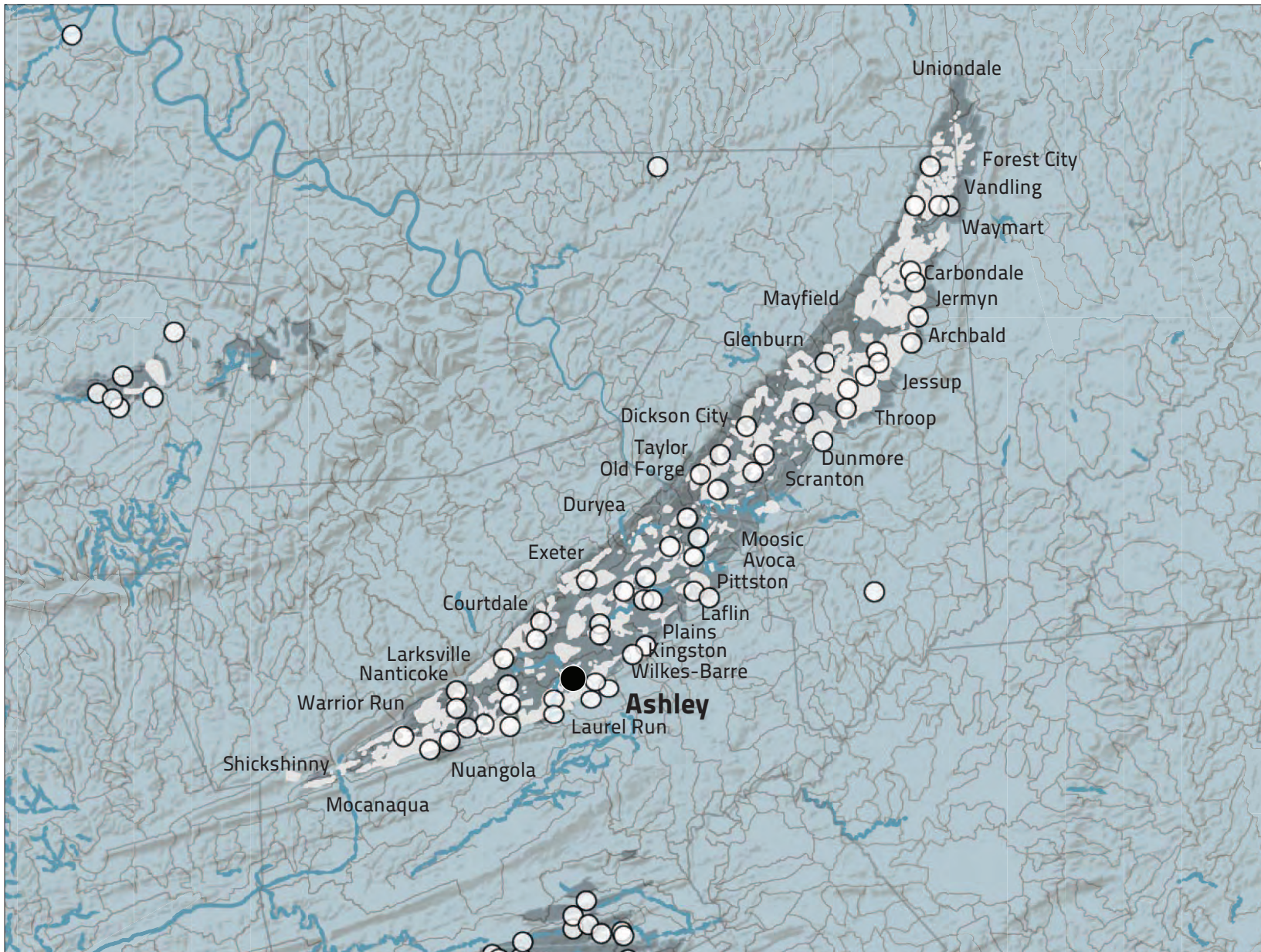


## SITE ANALYSIS



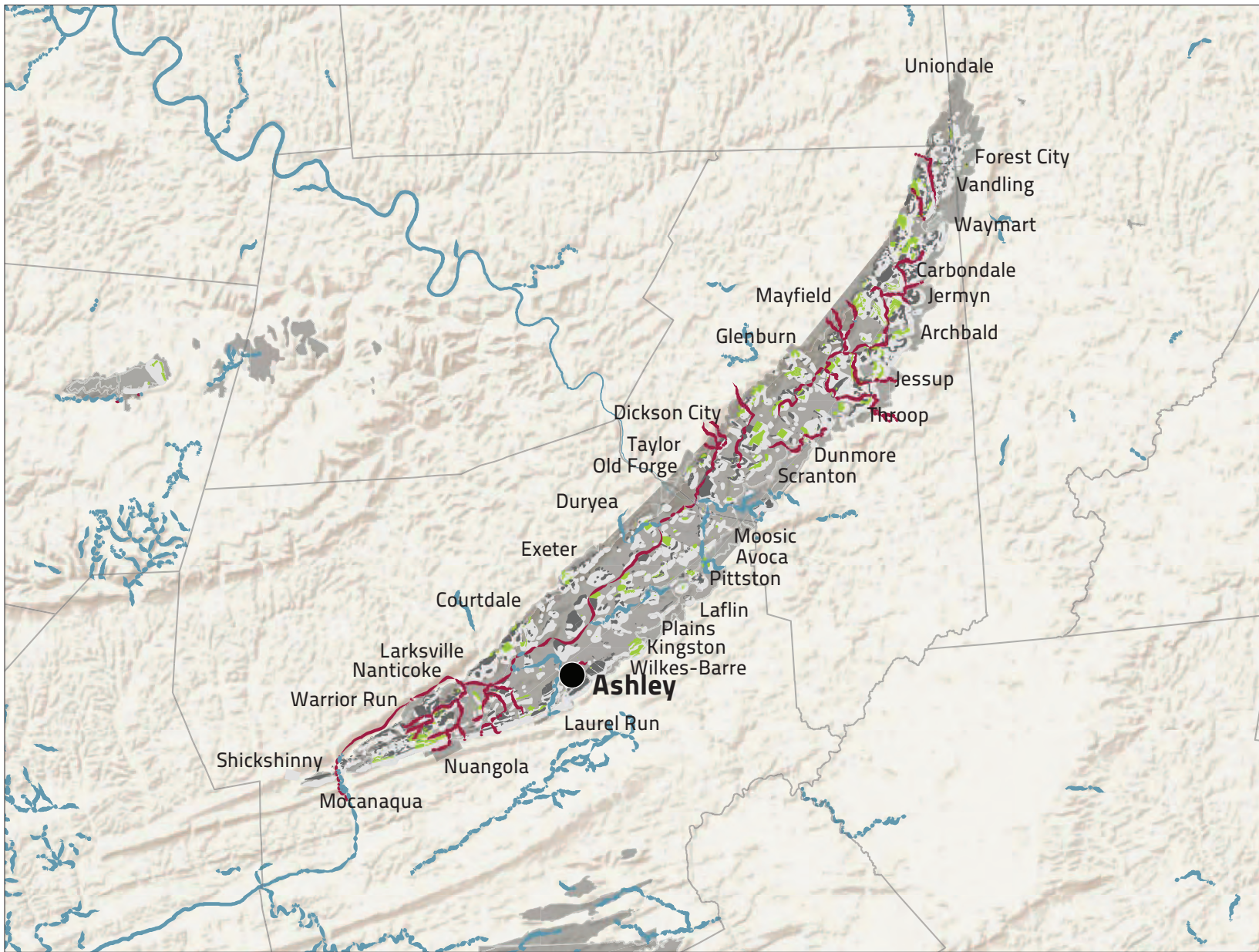
**SITE ANALYSIS** COAL FIELDS AND COUNTIES IN THE ANTHRACITE REGION





**SITE ANALYSIS**

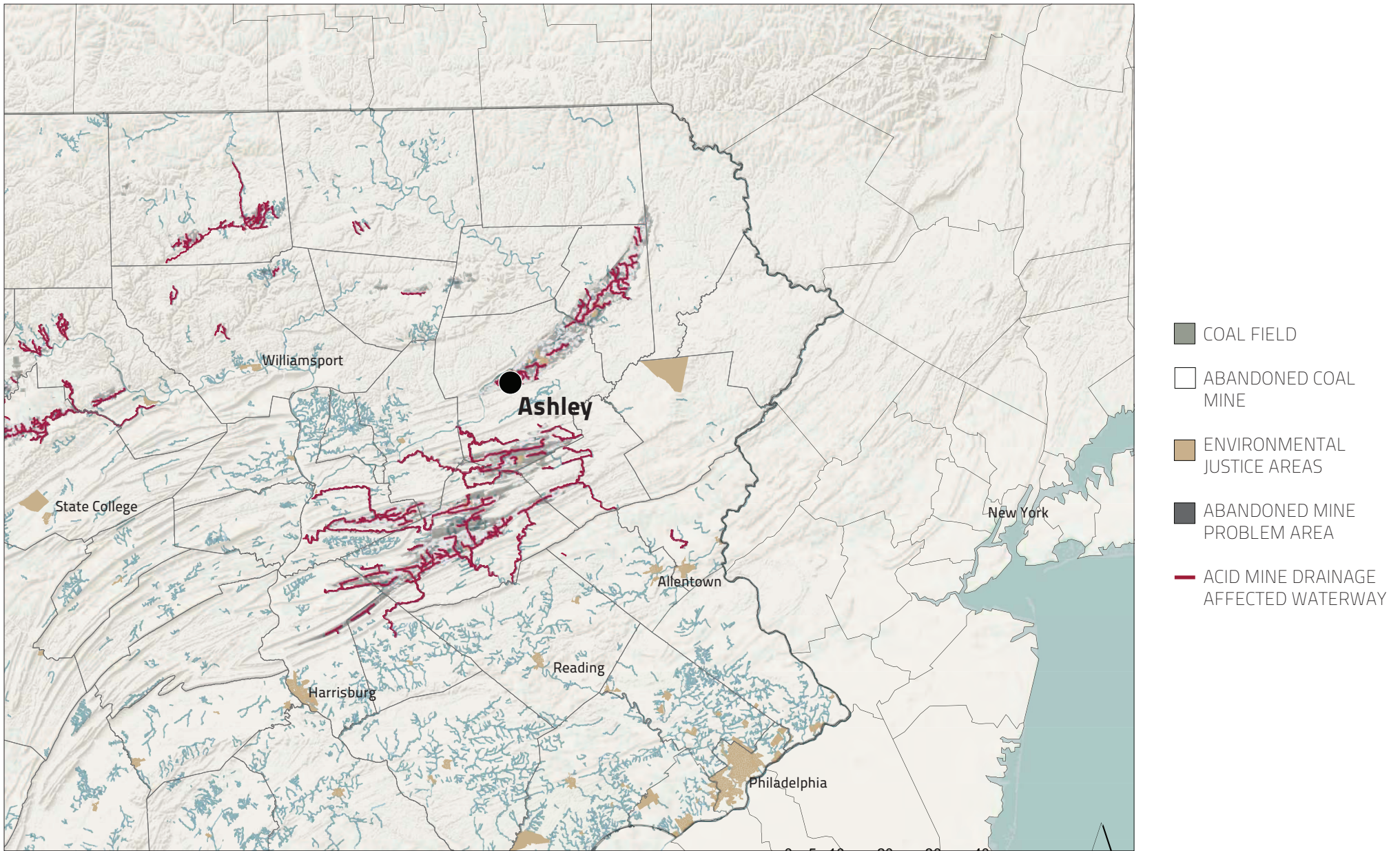
WATERSHEDS AND MINING AREAS IN THE NORTHERN ANTHRACITE COAL FIELD



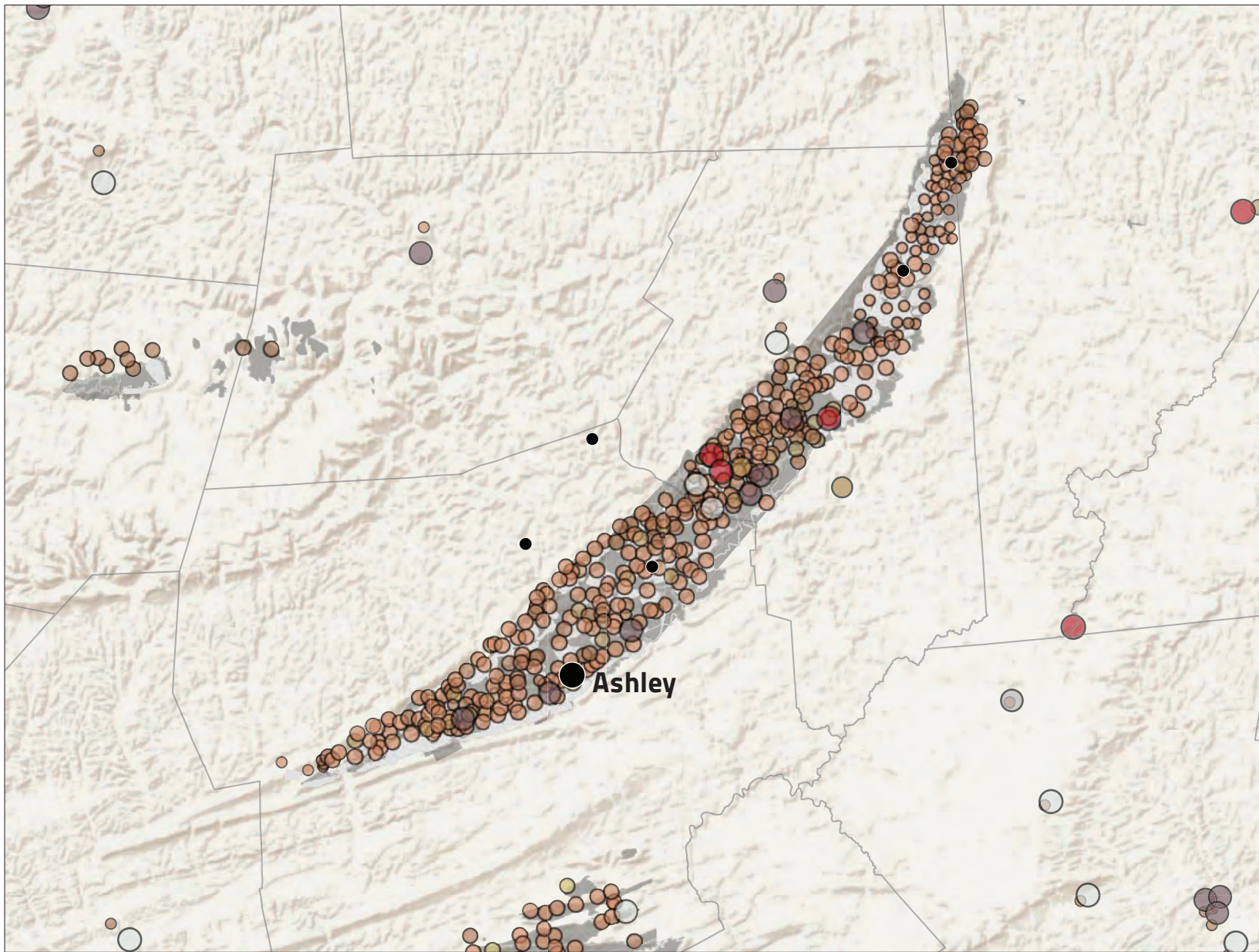
- COAL FIELD
- ABANDONED COAL MINE
- RECLAIMED MINE
- ABANDONED MINE PROBLEM AREA
- ACID MINE DRAINAGE AFFECTED WATERWAY

**SITE ANALYSIS**

ABANDONED MINE LANDS, ACID MINE DRAINAGE AND RECLAIMED MINE SITES IN THE NORTHERN ANTHRACITE COAL FIELD



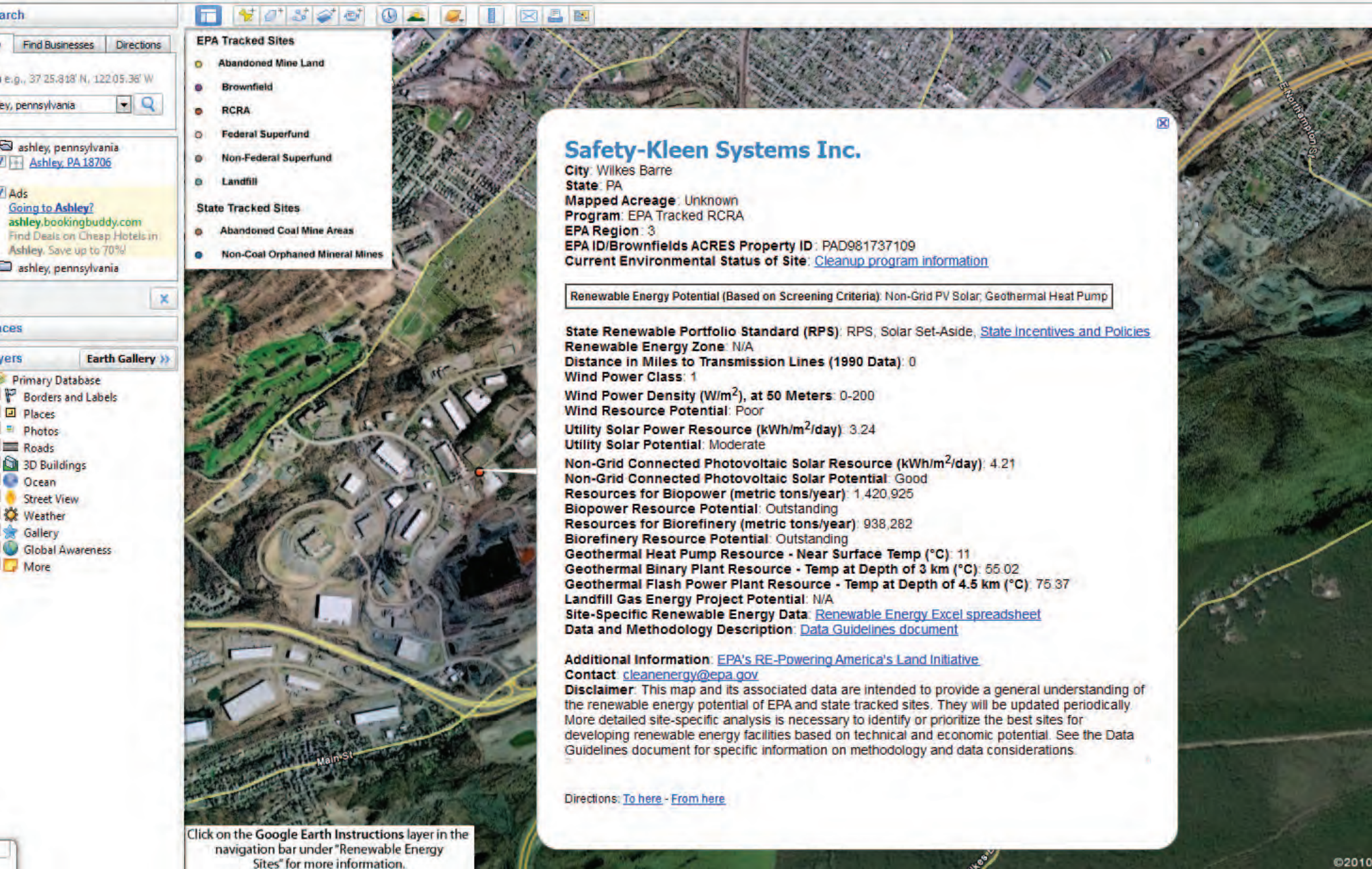
**SITE ANALYSIS** COAL FIELDS AND ACID MINE DRAINAGE IN THE ANTHRACITE REGION



- COAL FIELD
- ABANDONED COAL MINE
- MAJOR HIGHWAY

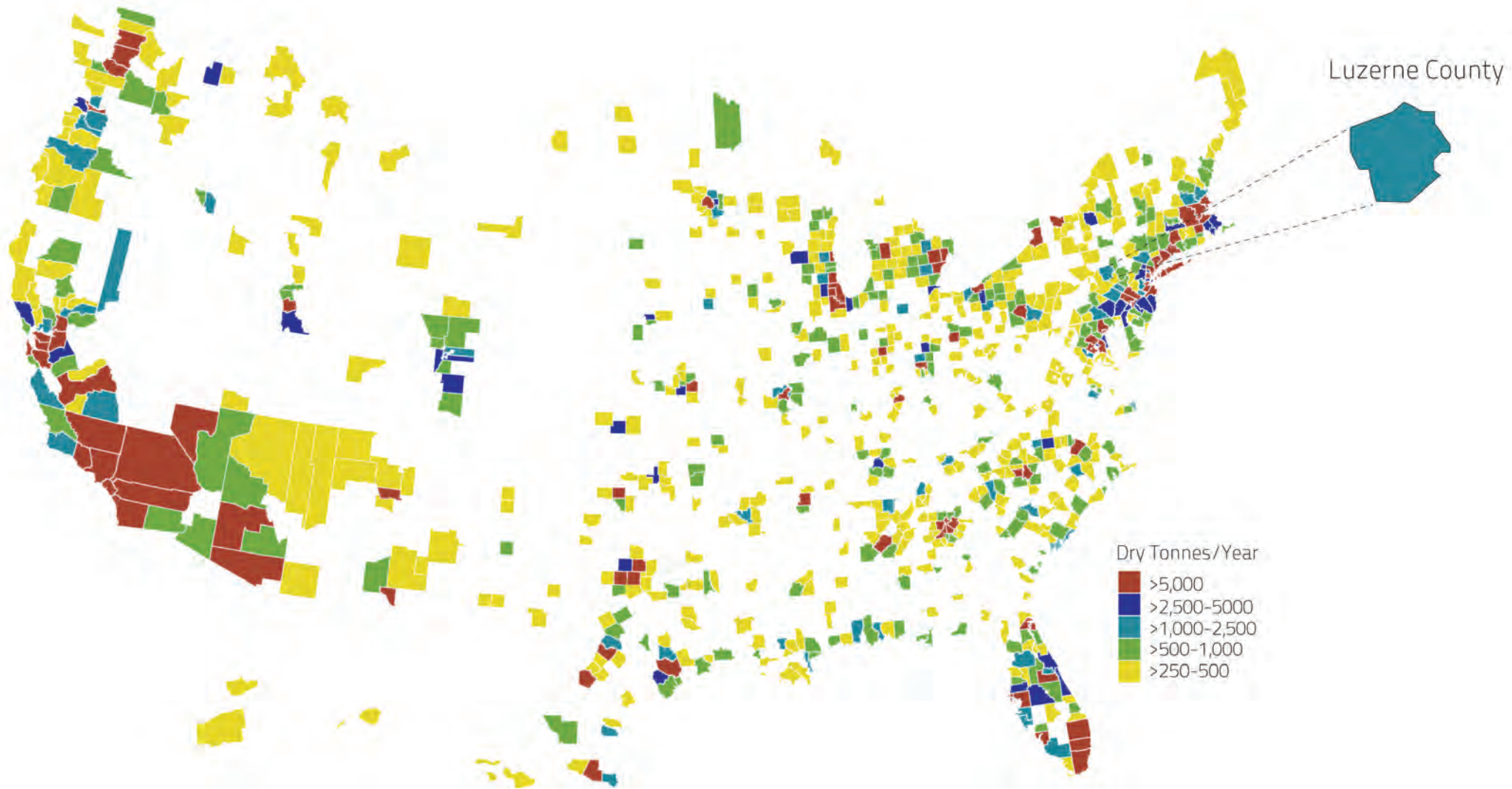
## SITE ANALYSIS

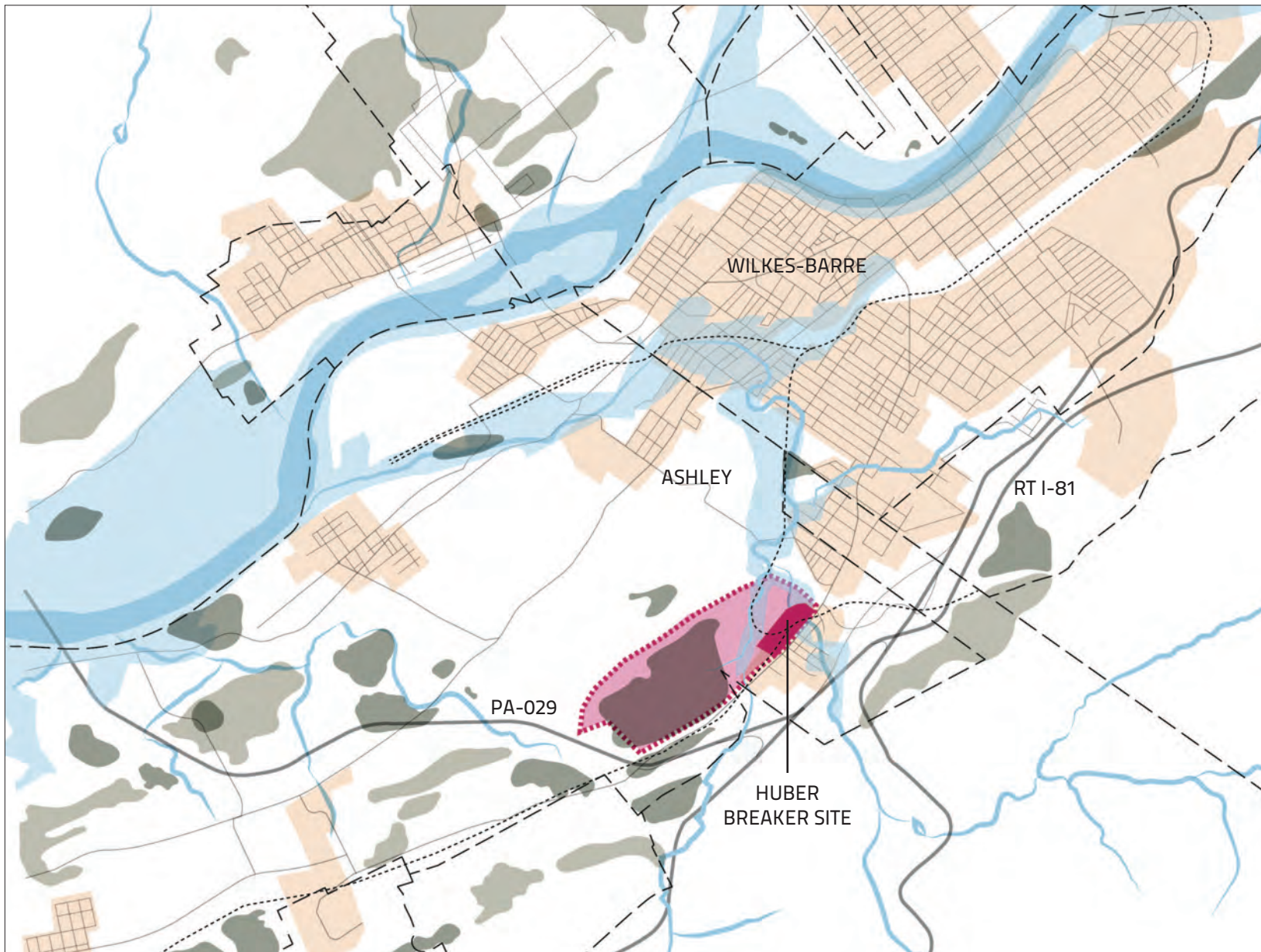
RENEWABLE ENERGY POTENTIAL, BROWNFIELD AND SUPERFUND SITES  
IN THE NORTHERN ANHRACITE COAL FIELD



# Biomass Resources of the United States by County: Methane Emissions from Domestic Wastewater Treatment

\*Source: National Renewable Energy Laboratory





- "PATCH TOWN" EXTENTS
- RIVERS AND STREAMS
- FLOOD PLAIN
- MINE DUMP AREA
- OPEN PIT MINE AREA
- RAILROAD
- POLITICAL BOUNDARY



SITE ANALYSIS ASHLEY, PENNSYLVANIA AERIAL: 1992





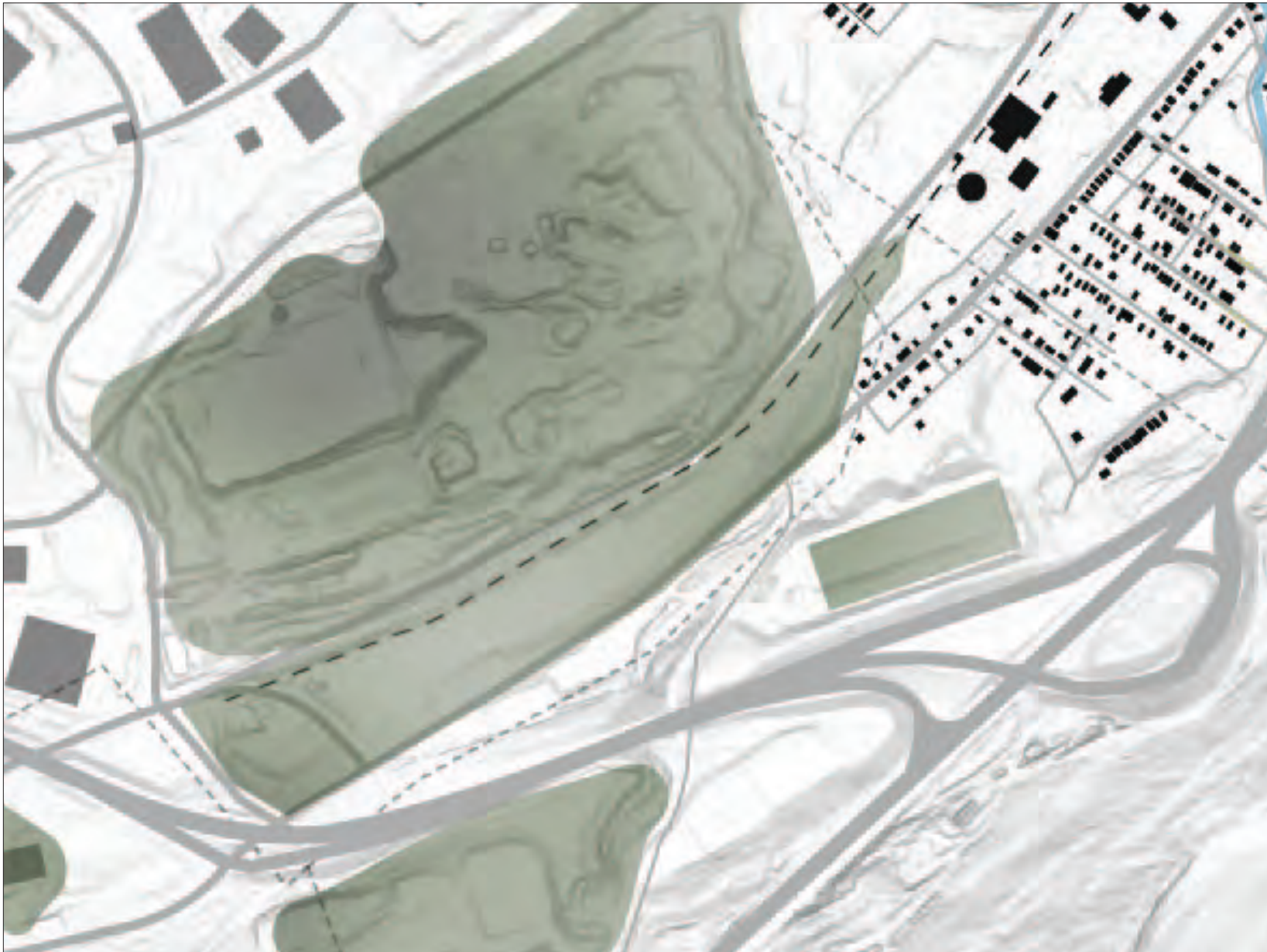
SITE ANALYSIS ASHLEY, PENNSYLVANIA AERIAL: 1999



SITE ANALYSIS ASHLEY, PENNSYLVANIA AERIAL: 2005



SITE ANALYSIS ASHLEY, PENNSYLVANIA AERIAL: 2010



- MINE DUMP AREA
- POLITICAL BOUNDARY

**SITE ANALYSIS** ASHLEY, PENNSYLVANIA AERIAL: MINE DUMP AREAS

# Design Intervention:

## ADAPTIVE REUSE OF MINESCAPES

Use Huber Breaker Site as testing ground for energetic landscape prototypes infused with remediation...

...thus spawning a new chapter in energy landscapes for the anthracite coal region.

Address externalities through program dictated by remediation status:

### **Environmental**

-Site and design energy prototypes based on cyclical energy of former coal mine sites through geothermal and biomass

### **Political/Legislative**

-Private companies purchasing mine lands  
-Develop private interest groups that work with local government to spearhead legislation

### **Economic**

-Provide funding for renewables researchers through federal/state grants  
-Provide "green jobs" for those working at prototypes at Research and Development

### **Social**

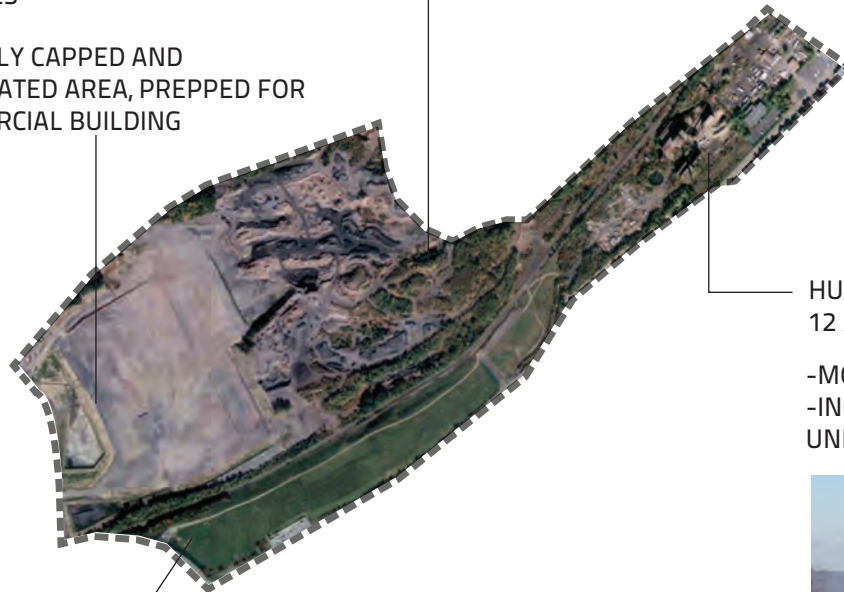
-Industrial heritage tour as educational tool



CULM PILES SET IN FLOOD PLAIN,  
FILLED WITH ACID MINE DRAINAGE

FORMER MINE DUMP SITE  
75 ACRES

RECENTLY CAPPED AND  
REMIATED AREA, PREPPED FOR  
COMMERCIAL BUILDING



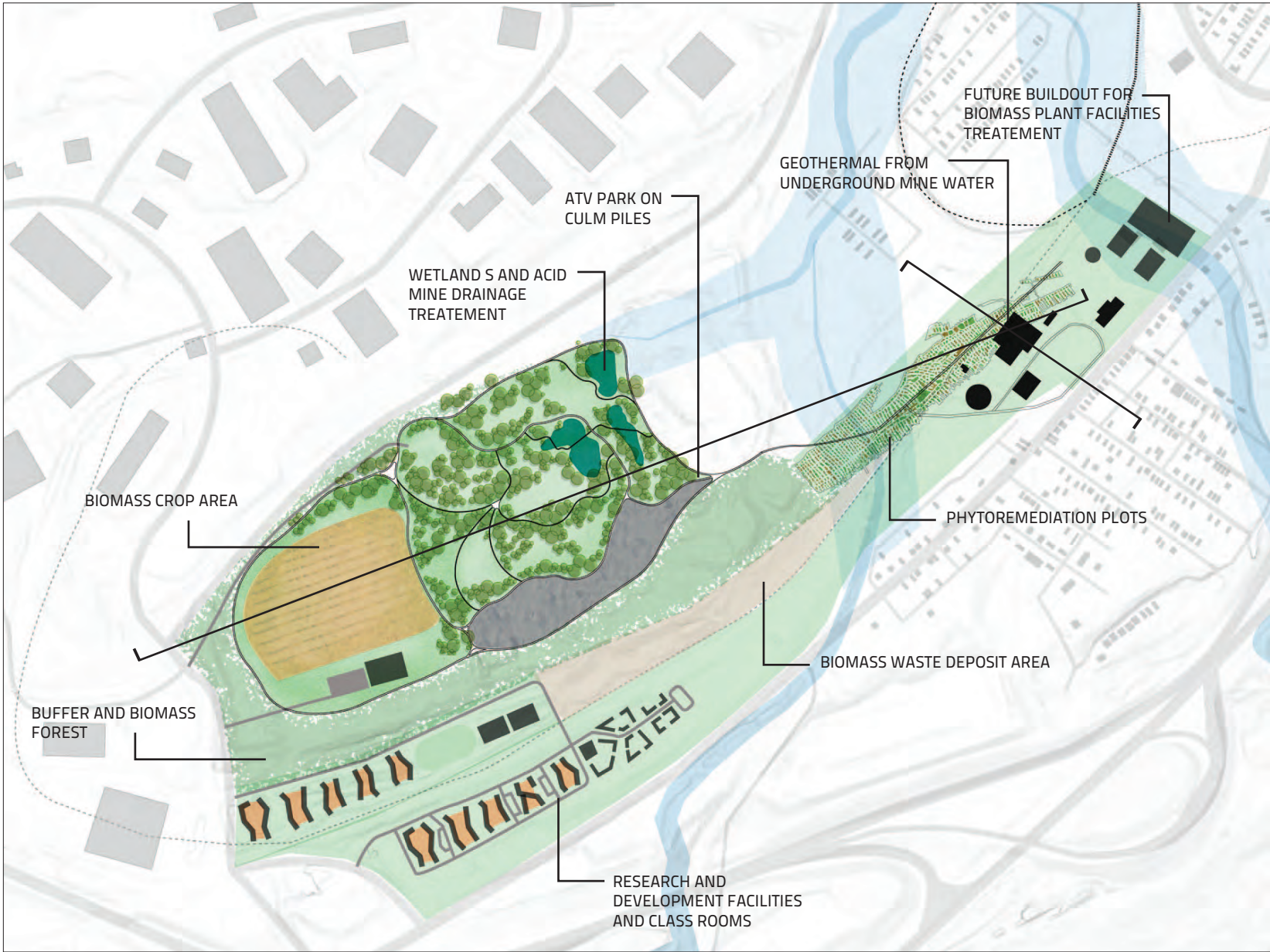
HUBER BREAKER SITE  
12 ACRES

- MOST TOXIC
- INCLUDES HUBER BREAKER AND  
UNDERGROUND MINE NETWORK

DEVELOPABLE SITE 1  
17 ACRES

- RECENTLY REMEDIATED  
THROUGH CAPPING USING COAL  
REFUSE MATERIAL
- PREPPED FOR BUILDINGS



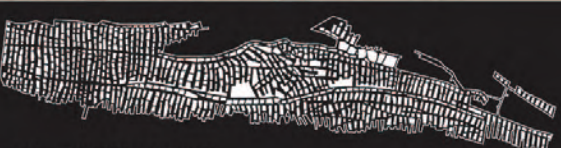
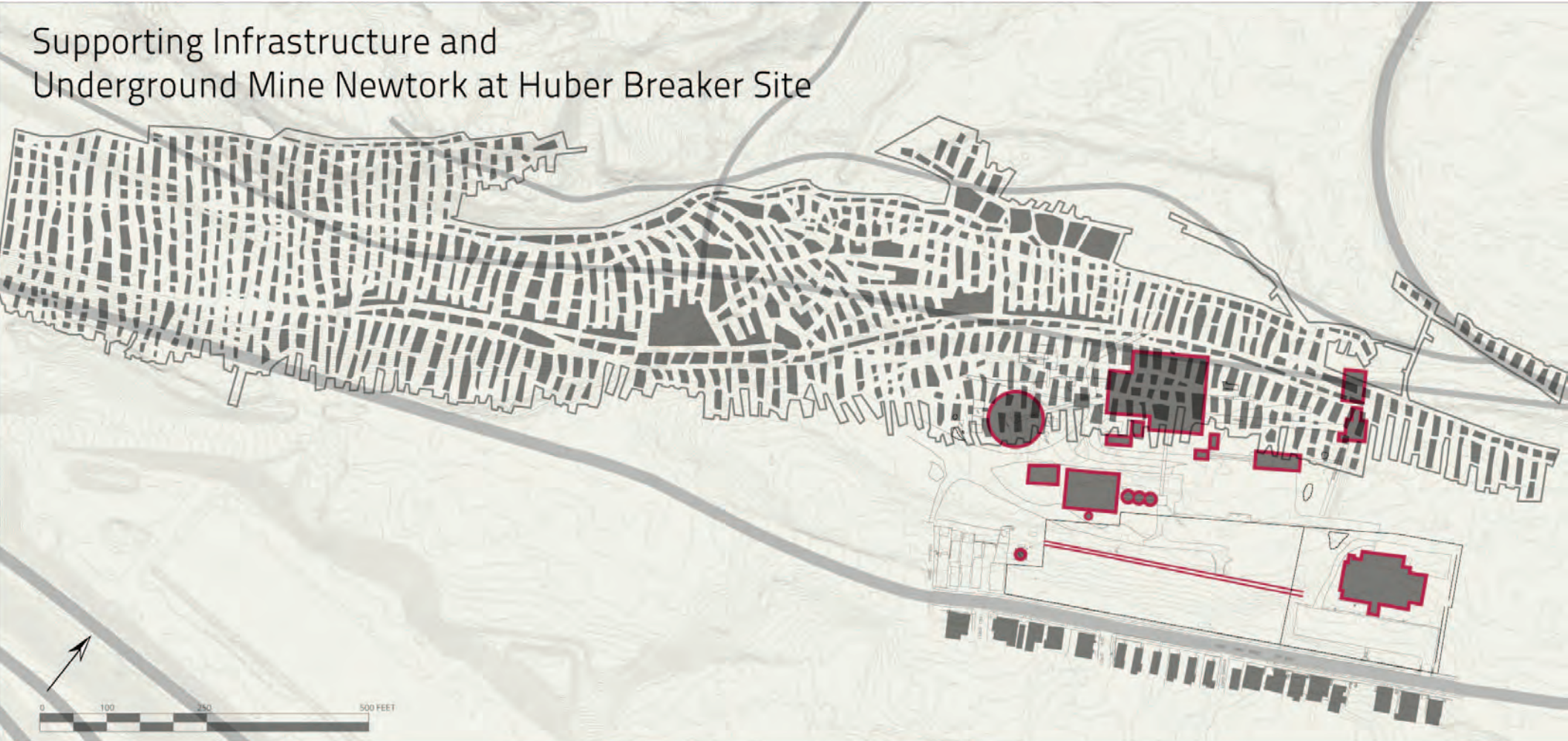


PROPOSAL

SITE PLAN



# Supporting Infrastructure and Underground Mine Network at Huber Breaker Site



## Underground Mine Network

Above is a plan of a mine network underneath the Huber Breaker site which starts at 70' below surface grade. There are five levels of mines still intact, however each level is filled with water and



slurry. The white in the above plan are the coal pillars still standing, and the black indicates the "rooms" where coal was extracted.



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Opened in 1939, is now the last standing colliery breaker in the northern anthracite coal region.



## Power House



## Retail Coal Pocket



## Foreign Coal Dump



## Storage Tanks



## Smoke Stacks and Coal Silos



## EPCAMR Office

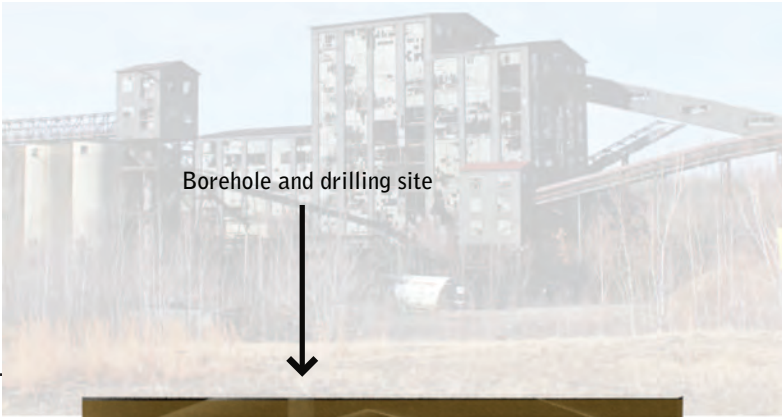


## Sewer Easement



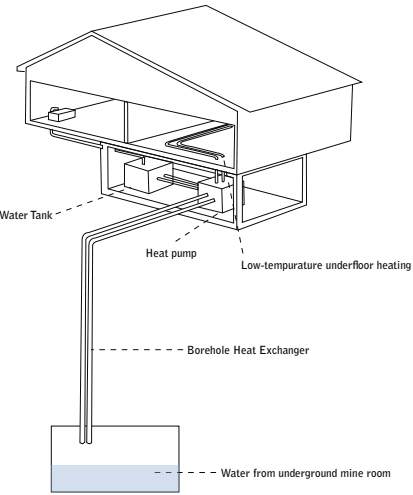
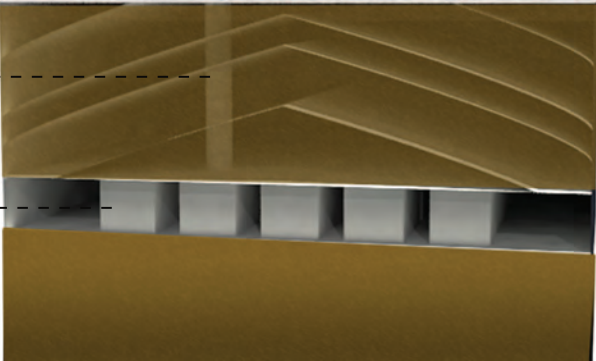
## PROPOSAL

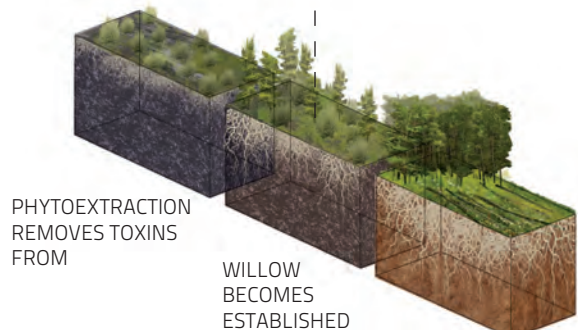
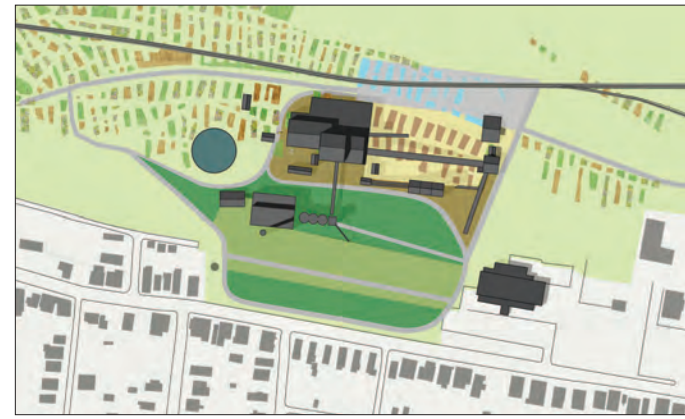
REPURPOSE BUILDINGS AT HUBER BREAKER SITE FOR BIOMASS



Piping for mine water transport

Underground Mine Area

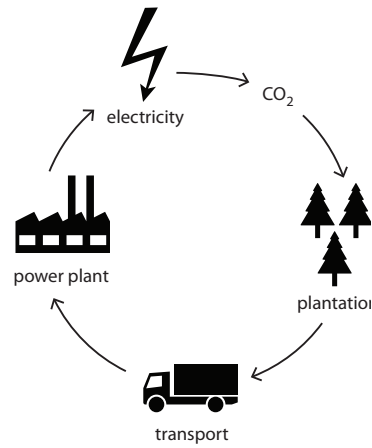




PHYTOEXTRACTION  
REMOVES TOXINS  
FROM

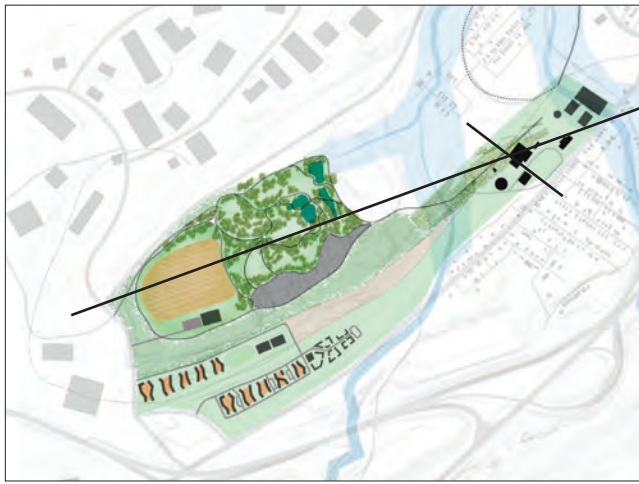
WILLOW  
BECOMES  
ESTABLISHED

MATURE  
WILLOW IS FELLED  
FOR CONVERSION TO  
BIOMASS ENERGY

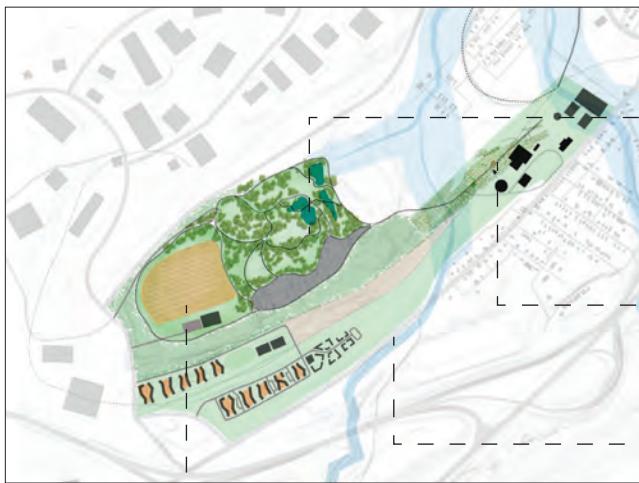


PROPOSAL

PHYTOREMEDIATION PLOTS CONVERTED TO BIOMASS



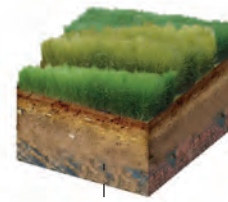
POLITICAL



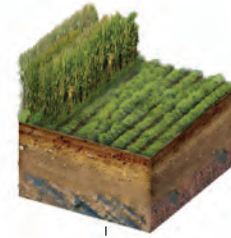
BIOMASS AS PHYTO



BIOMASS AS GRASSLAND



BIOMASS AS CROP

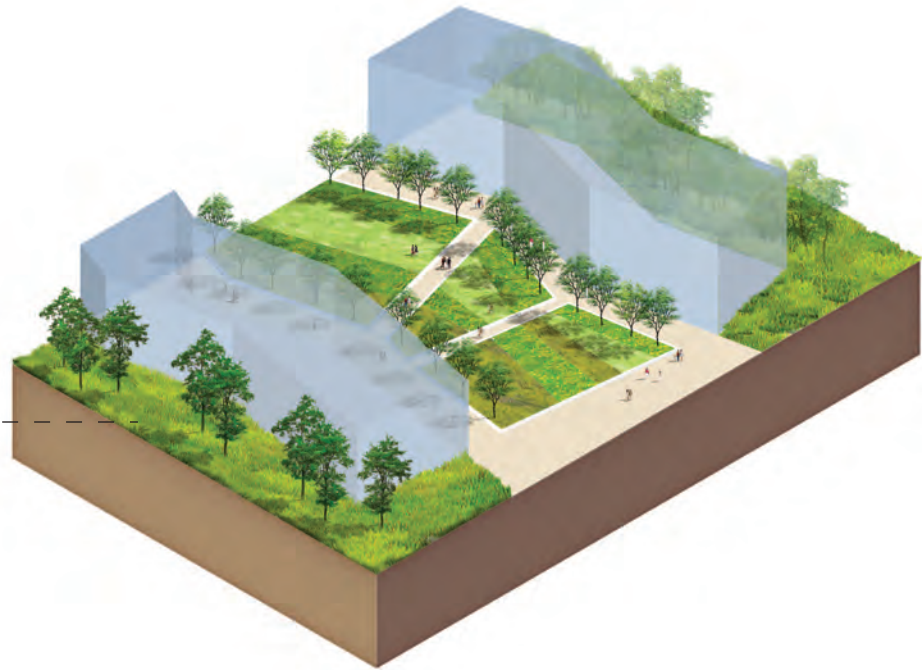


BIOMASS AS WETLAND



PROPOSAL

BIOMASS ZONES



PROPOSAL

RESEARCH AND DEVELOPMENT CENTER



PROPOSAL LUSATIA SEE 2010 PROJECT - LIGNITE MINING REGION OF LUSATIA, GERMANY

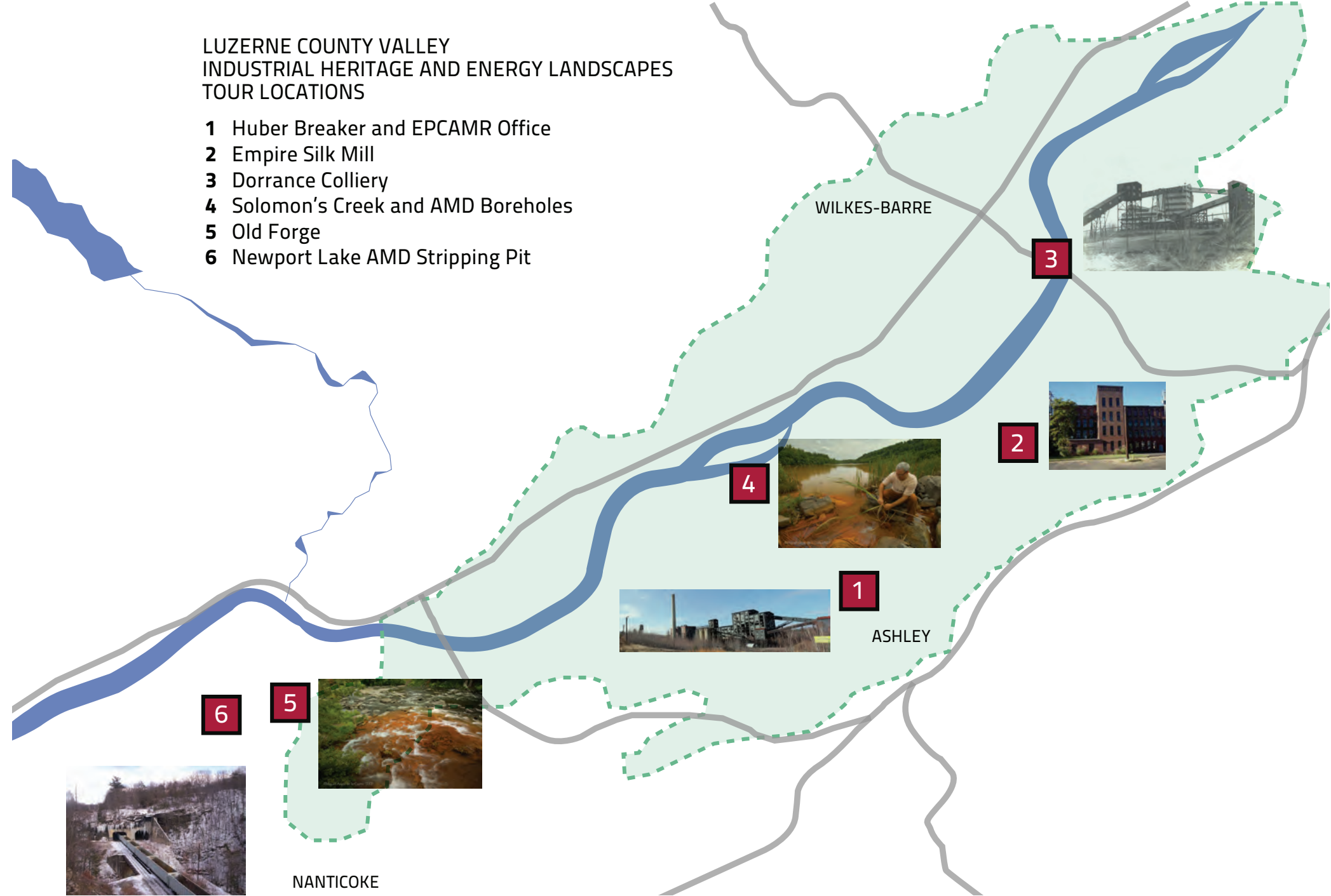


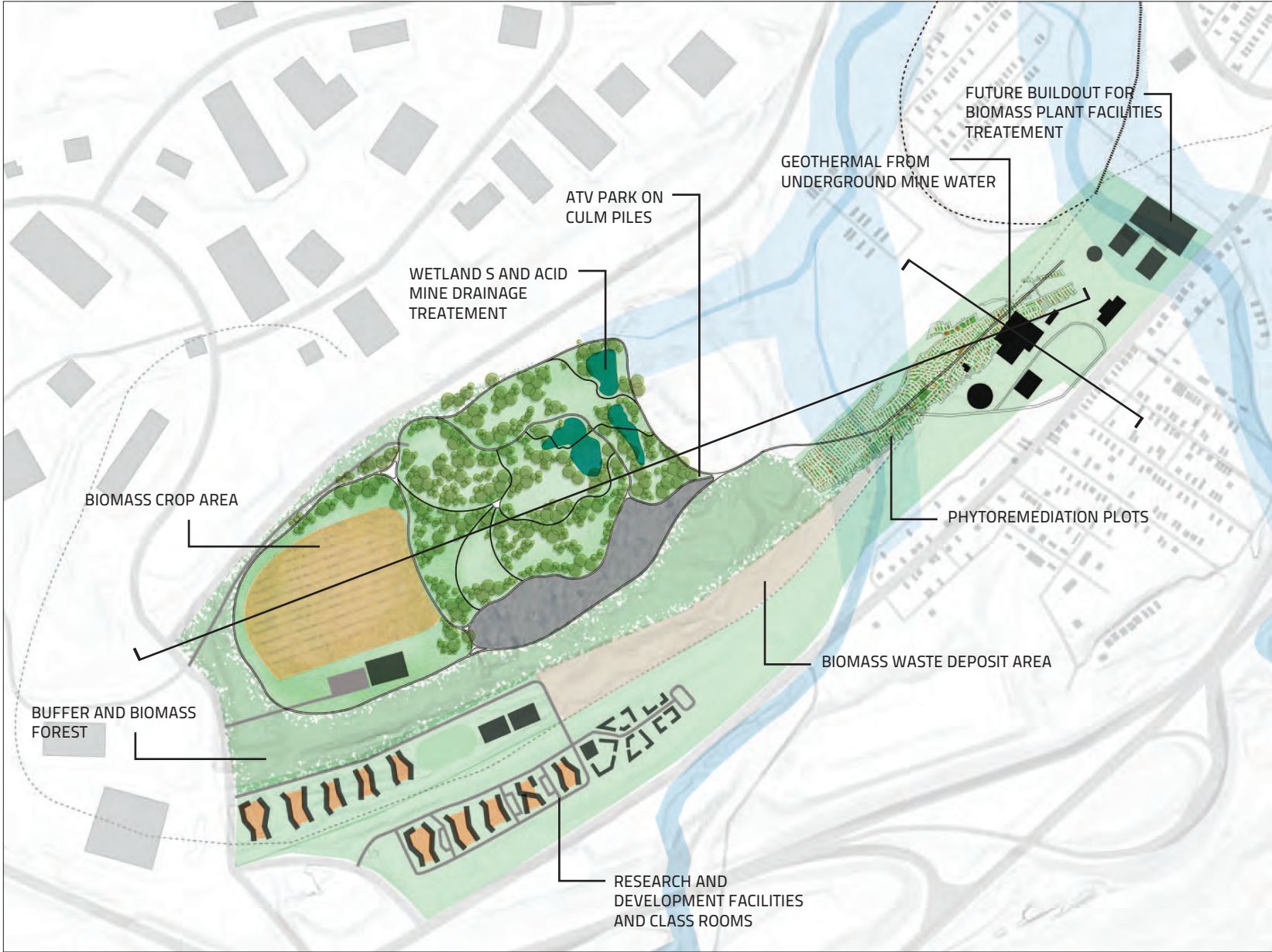
PROPOSAL LUSATIA SEE 2010 PROJECT - LIGNITE MINING REGION OF LUSATIA, GERMANY



LUZERNE COUNTY VALLEY  
INDUSTRIAL HERITAGE AND ENERGY LANDSCAPES  
TOUR LOCATIONS

- 1 Huber Breaker and EPCAMR Office
- 2 Empire Silk Mill
- 3 Dorrance Colliery
- 4 Solomon's Creek and AMD Boreholes
- 5 Old Forge
- 6 Newport Lake AMD Stripping Pit





PROPOSAL

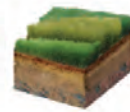


**BIOMASS PLANTING STRATEGIES**

BIOMASS AS PHYTOEXTRACTION



BIOMASS AS GRASSLANDS



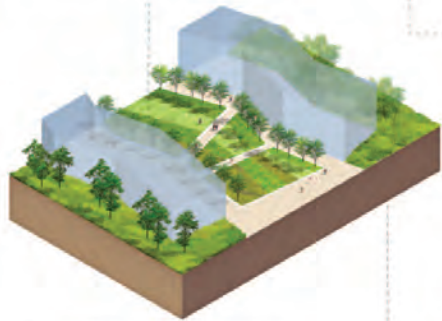
BIOMASS AS LEAF



BIOMASS AS ENGINEERED WETLAND



PHYTOEXTRACTION AT HUBER BREAKER SITE



RESEARCH AND DEVELOPMENT CENTER



HUBER BREAKER AS HERITAGE CENTER AND BIOMASS PLANT

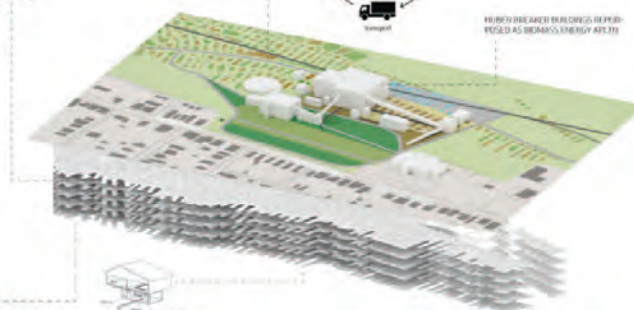


APU BURN WITH CLEAN COAL WASTE PILE



FLOPPING PLANT AT HUBER BREAKER SITE UNDERGROUND PILES AS FORM

HUBER BREAKER BUILDINGS REPURPOSED AS BIOMASS ENERGY ARTS



GEOTHERMAL HEAT EXCHANGE WITH WATER FROM UNDERGROUND MINES





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22nd – 31st  
july 2011

international  
summer school  
energy landscapes 3.0  
bauhaus dessau

Advisors: Charles Waldheim (Cambridge), Anuradha Mathur / Dilip da Cunha (Philadelphia and Bangalore), Stefan Tischer (Alghero), Theo Deutinger (Rotterdam) and Gunnar Hartmann (Dessau-Roßlau/Chur)

The objective of the summer school "Energy Landscapes 3.0" is to analyse potential network geographies and concepts in the post-fossil fuel era and their impacts on settlement structures in Europe. We will thereby explicitly refer to a chronicle of utopian thought on a large scale – visionary ideas for new Energy Landscapes promulgated decades ago by Herman Sörgel in 1928 with Atlantropa and Richard Buckminster Fuller in 1972 with World Game. The findings of these analyses should result in a development project for the design of new, "ideal" Energy Landscapes from the perspective of landscape architecture and urban development. — The interdisciplinary summer school is open for all students and post-graduate students of architecture, spatial planning, urban planning, art, design, environmental technology, the environmental sciences, the social sciences, philosophy etc. — apply now! [www.bauhaus-dessau.de/energylandscapes](http://www.bauhaus-dessau.de/energylandscapes)



# June 13th

## Ain Beni Mathar

### Plant Profile:

- Developed by the Office National de Electricite (ONE) and put out for bid:
  - Manufacturer: Abengoa (Spain)
  - Power Island: Alstom (France)
  - Solar Island: Solar Abengoa (Spain)
  - Civil Engineering: Arcobeton (Morocco)
- Global cost of 4.6 billion MAD (Dirham), funded by:
  - African Development Bank
  - Spanish Instituto de Credito Oficial
  - Global Fund for the Environment
  - Remainder provided by Office National de Electricite (ONE)
- Employs 50-60 people
- Total 100 with subcontracted work



% of renewable electrical energy in Europe

99% IS



the ecological footprint increased above the size of the planet  
black line highlighted!!!!!!











Vakiv

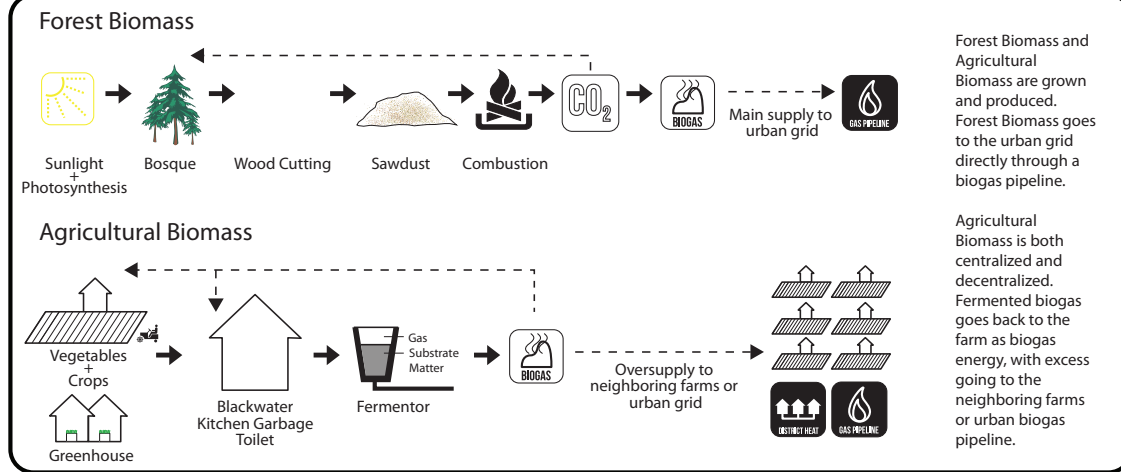
E EURO

FROM STRONG TO RESILIENT

# Fermentation Plant for Turning Biomass Into Biogas: Rural



## business concept

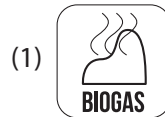


## consumption



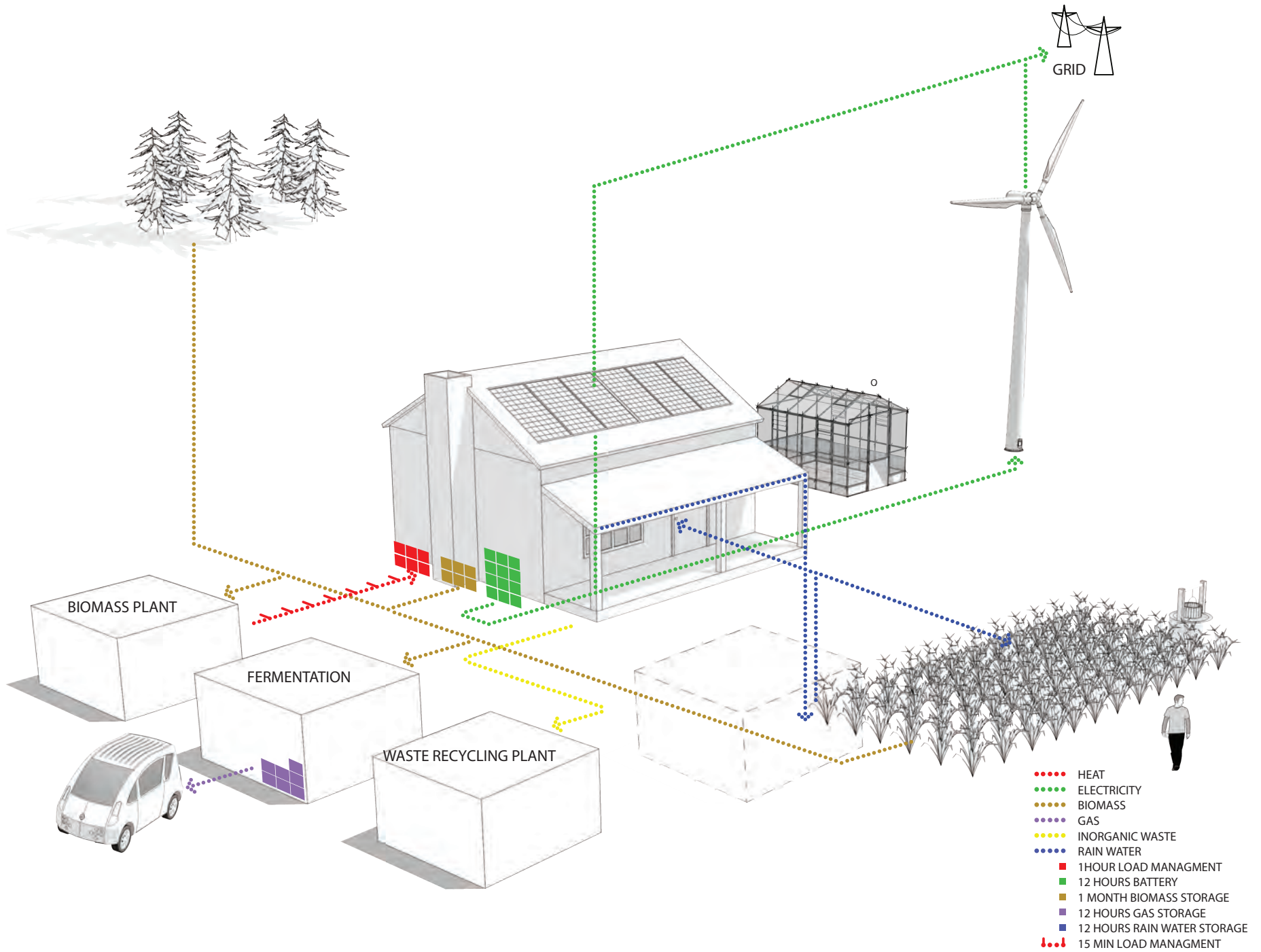
Forest or Agricultural Biomass

## production



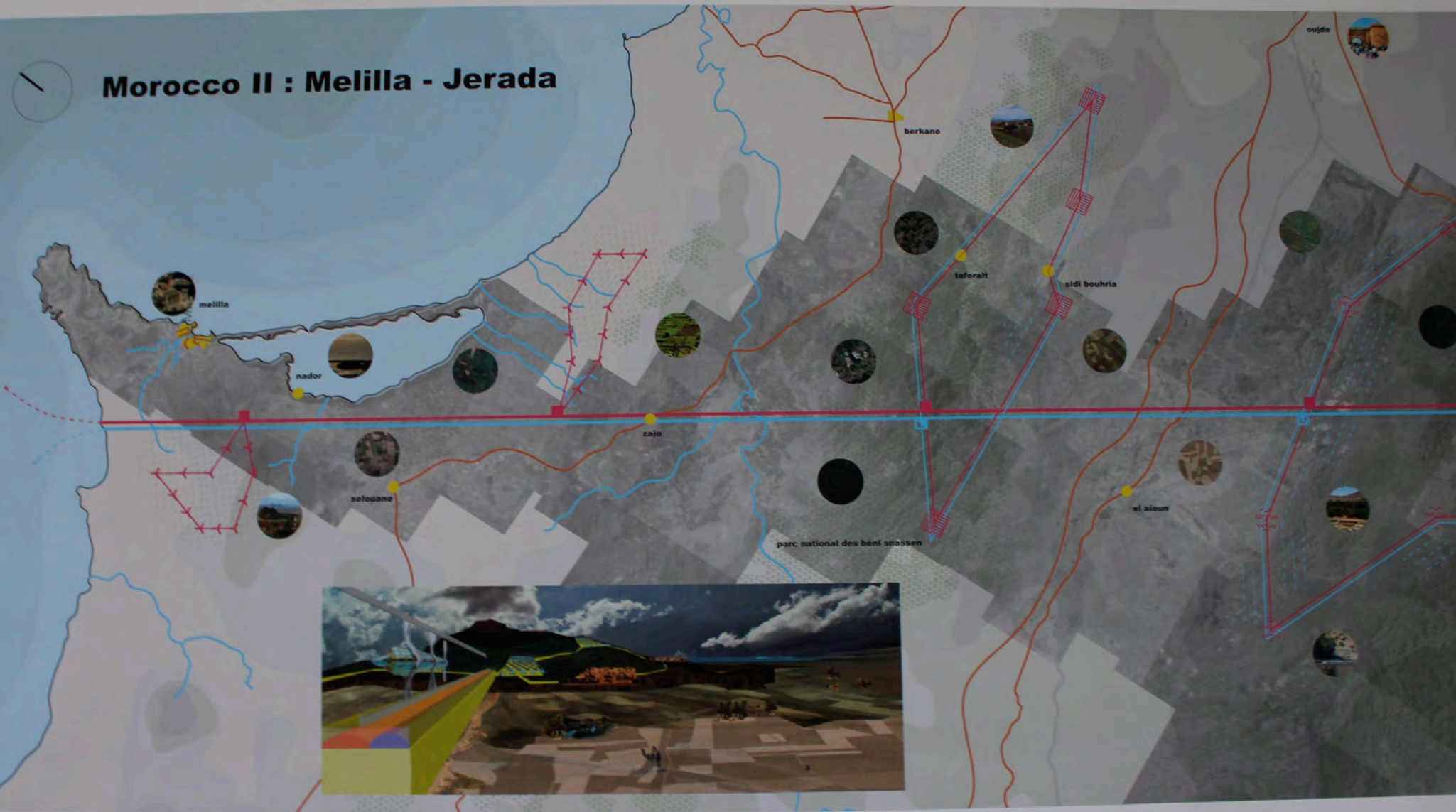
## storage







# Morocco II : Melilla - Jerada



## **Summary of Project Research and Design Observations:**

- Consider alternatives to energy production and consumption
- Consider the short- and long- term initiatives and funding for remediation, reclamation and design
- Consider the wide possibilities for research and development in the region with the partnership of local universities...
- Is it possible to change the Pennsylvania energy grid? Can energy landscapes of Pennsylvania become more localized and decentralized as a regional infrastructure?