Remediation of Pyritic Rock Interstate-99 Highway Project Centre County, Pennsylvania

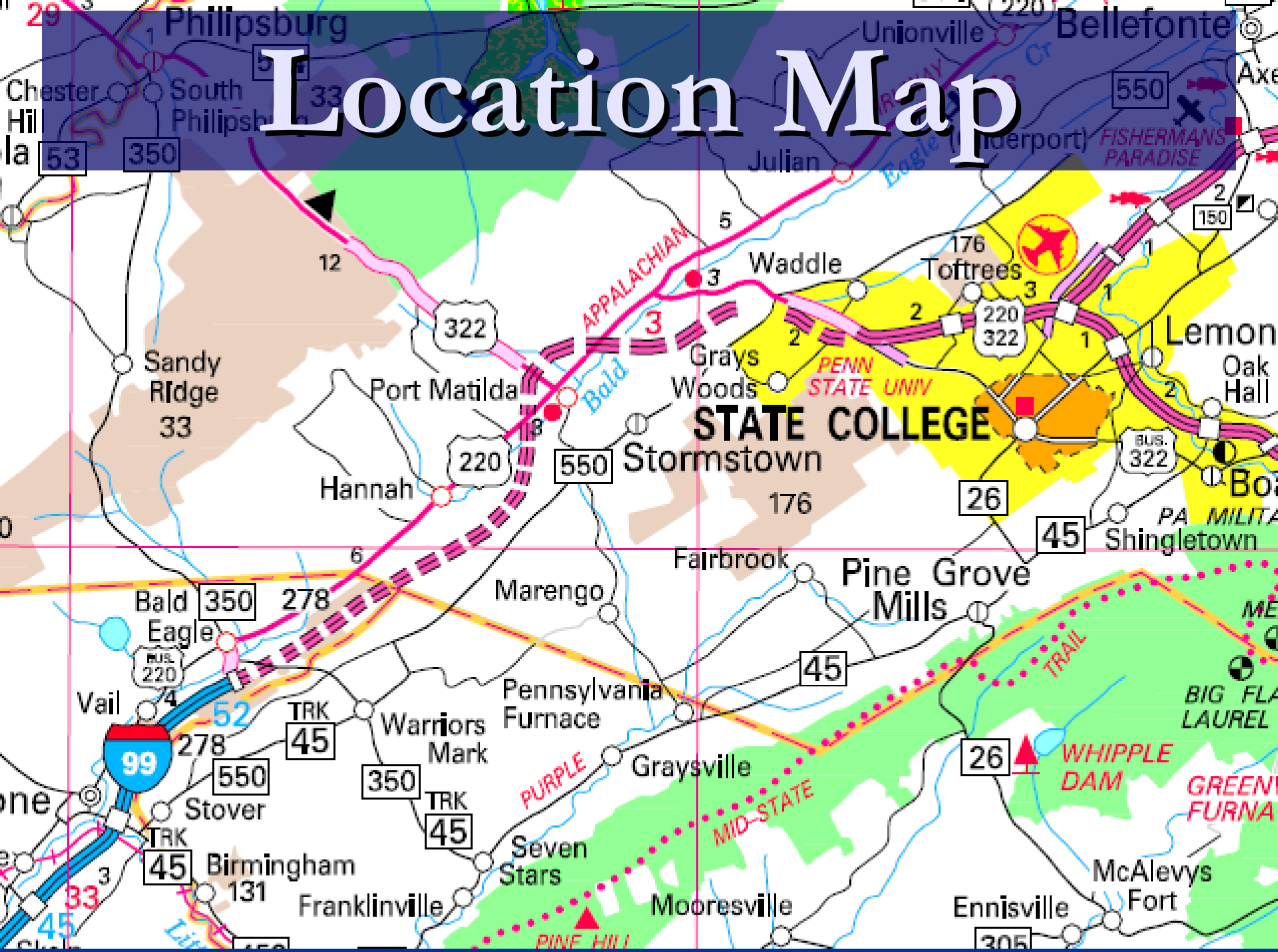
CETCO®
CONTRACTING SERVICES

Agenda

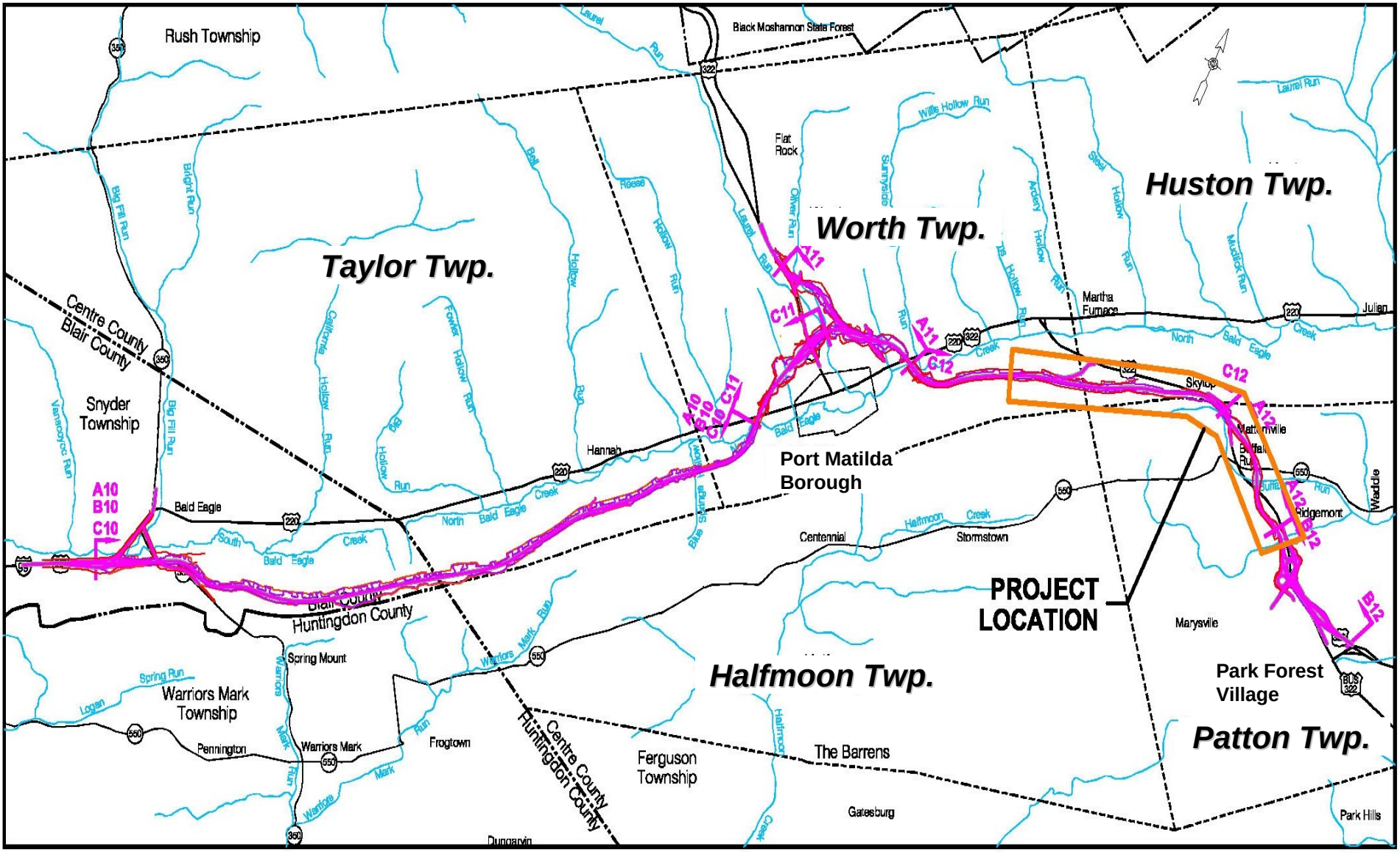
- History and Background
- Interim Treatment
- Immoveable Material
- Moveable Material
- Summary

HISTORY and BACKGROUND

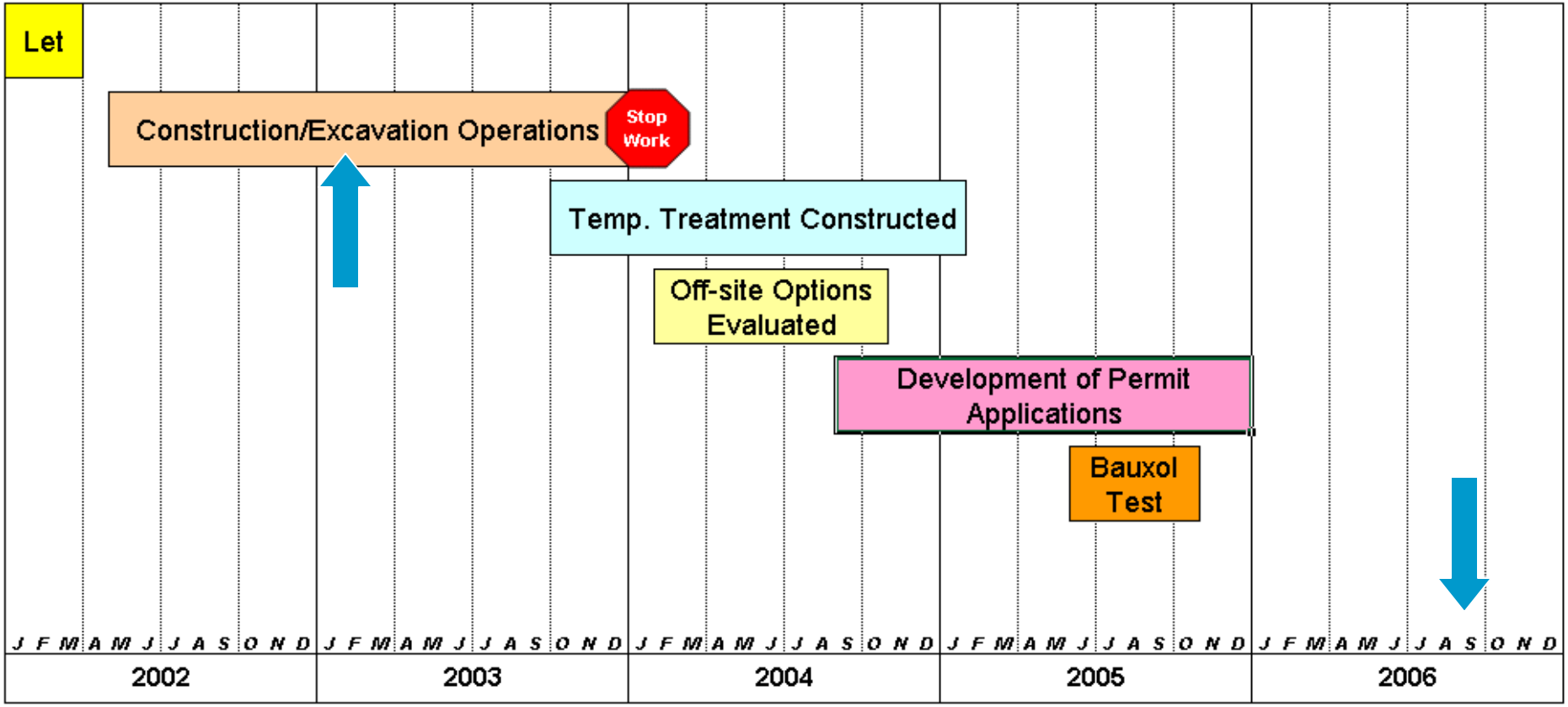
Location Map



Location Map



Sequence of Events



Public Information

- Partners' Meetings (over 40 bi-weekly meetings)
- Web site
- Newsletter
- Public meetings

I-99/S.R. 6220 Construction Project
Blair and Centre Counties
Bald Eagle to State College

NEWSLETTER

News About I-99 Construction from Bald Eagle to State College

Number 3 **June 2005**

The purpose of this edition of the Newsletter is to provide detailed information regarding the Acid Rock Drainage (ARD) situation being experienced within Construction Sections A12 and C12 in Patton Township. This edition of the newsletter was prepared with assistance and input from the Pennsylvania Department of Environmental Protection (PA DEP) Northcentral Regional Office.

Overview of Project

The I-99/S.R. 6220 Project extends from the Village of Bald Eagle (I-99) in Blair County to the Mount Nittany Expressway (U.S. 322) in Centre County, just west of State College. The improvements involve the construction of a new four-lane limited access highway that includes four interchanges and approximately 18 miles of roadway.

PENNDOT divided the project area into three design sections: Sections 10, 11, and 12. Section 10 extends from the existing I-99 in Blair County to the North Bald Eagle Creek crossing, south of Port Matilda. Section 11 extends from Section 10 to the North Bald Eagle Creek crossing, north of Port Matilda. This section of roadway will provide a direct high-speed connection from U.S. 322 (west of Port Matilda) to I-99 northbound. Section 12 extends from Section 11 to the Mount Nittany Expressway, west of State College. This design section includes construction sections A12 and C12, the areas of ARD concern.

Acid Rock Drainage (ARD)

ARD is acidic water run-off that contains elevated concentrations of contaminants including heavy metals and sulfates. The acidity is caused by the reaction of sulfide minerals (commonly pyrite, pyrrhotite) with oxygen and water. The acid dissolves and leaches minerals from the rock, further increasing the potential to degrade water quality in nearby streams if left untreated. Sulfide minerals were exposed during the construction of Section A12 when large volumes of ground were excavated. This material was initially neutralized with limekiln dust. Some was used as fill for the roadway, and the rest was stockpiled as waste material within Sections A12 and C12. Runoff from the sites was monitored. Early monitoring results from the Spring of 2003 indicated that the material was contained and there were no signs of ARD. In mid-September, the pH readings of runoff from the sites started to fall, indicating that the runoff was becoming acidic. More rigorous chemistry testing was started during and after storm events, at this time.

In October and November of 2003, PENNDOT coordinated with PA DEP to address the ARD occurring at the waste sites and the need to protect streams, particularly Buffalo Run, from receiving acidic runoff.

Within the I-99 Sections A12 and C12, there are eleven areas that have been identified as containing pyritic rock: Trumbull Batch Plant, Bifurcation/Buttress Area (includes a small Cut-Face area), Skytop Waste Area, Siebert Waste Area, 3042 Fill Area, Crushed ARD Rock Pile, Cut-Face Area, Arbogast Waste Area, Structure 317 Fill Area, Sellers Lane Area, and Rock on Arbogast. These sites are depicted in the figure provided with this newsletter. Currently it is estimated that 600,000 to 1,000,000 cubic yards of pyritic-laden material exists. The *ARD Monitoring and Remediation Plan* (May 2004) was developed by PENNDOT to implement monitoring and remediation (corrective) measures for acidic water discharges from these areas.

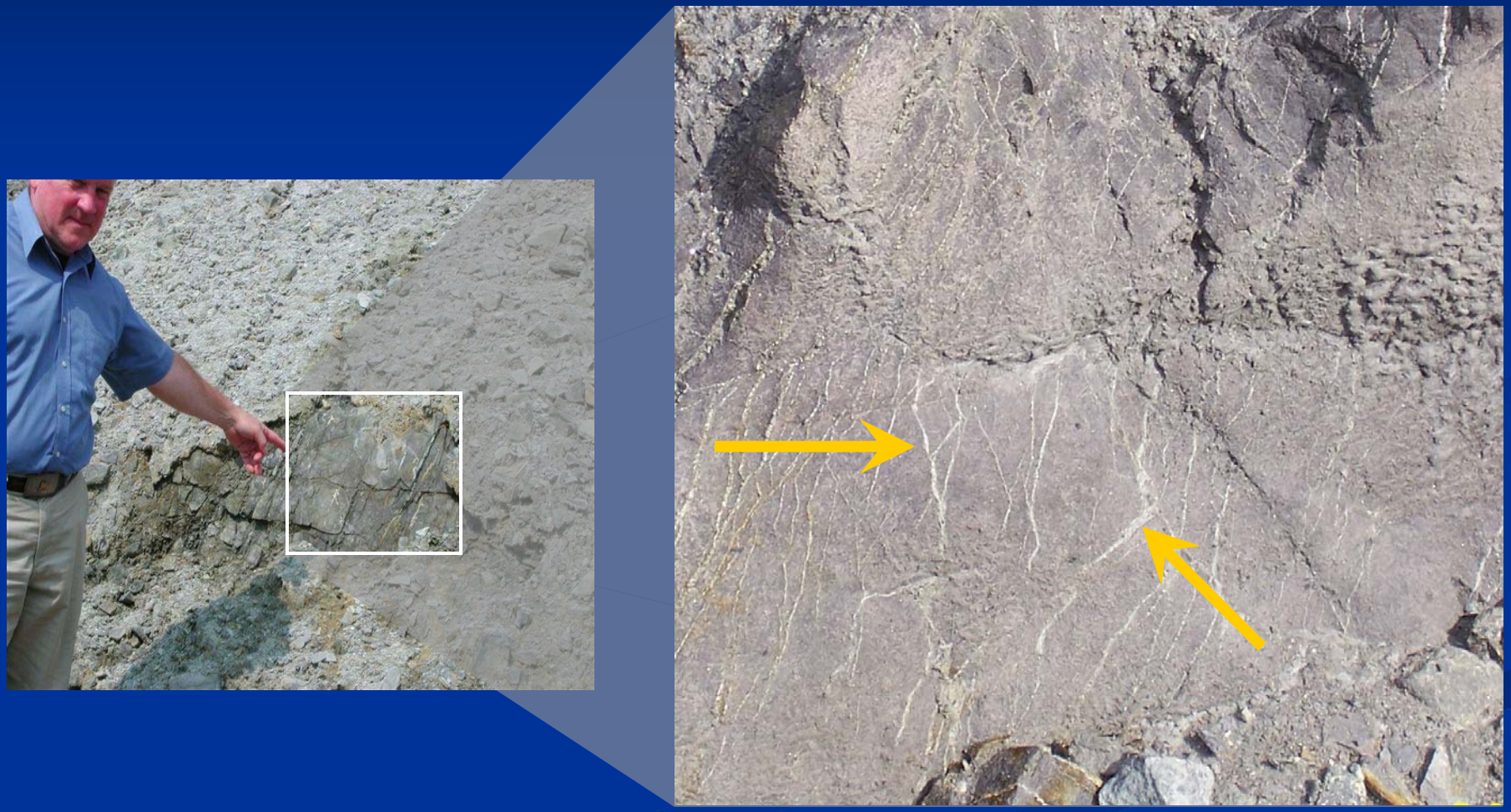
Monitoring Efforts

The *ARD Monitoring Plan* includes water quality monitoring for both surface and ground water resources within the vicinity of the areas of concern. This effort includes the following:

- 104 residential water supplies are sampled either bi-weekly, monthly, quarterly, or semi-annually.
- 89 groundwater monitoring wells have been installed and are sampled monthly or quarterly.

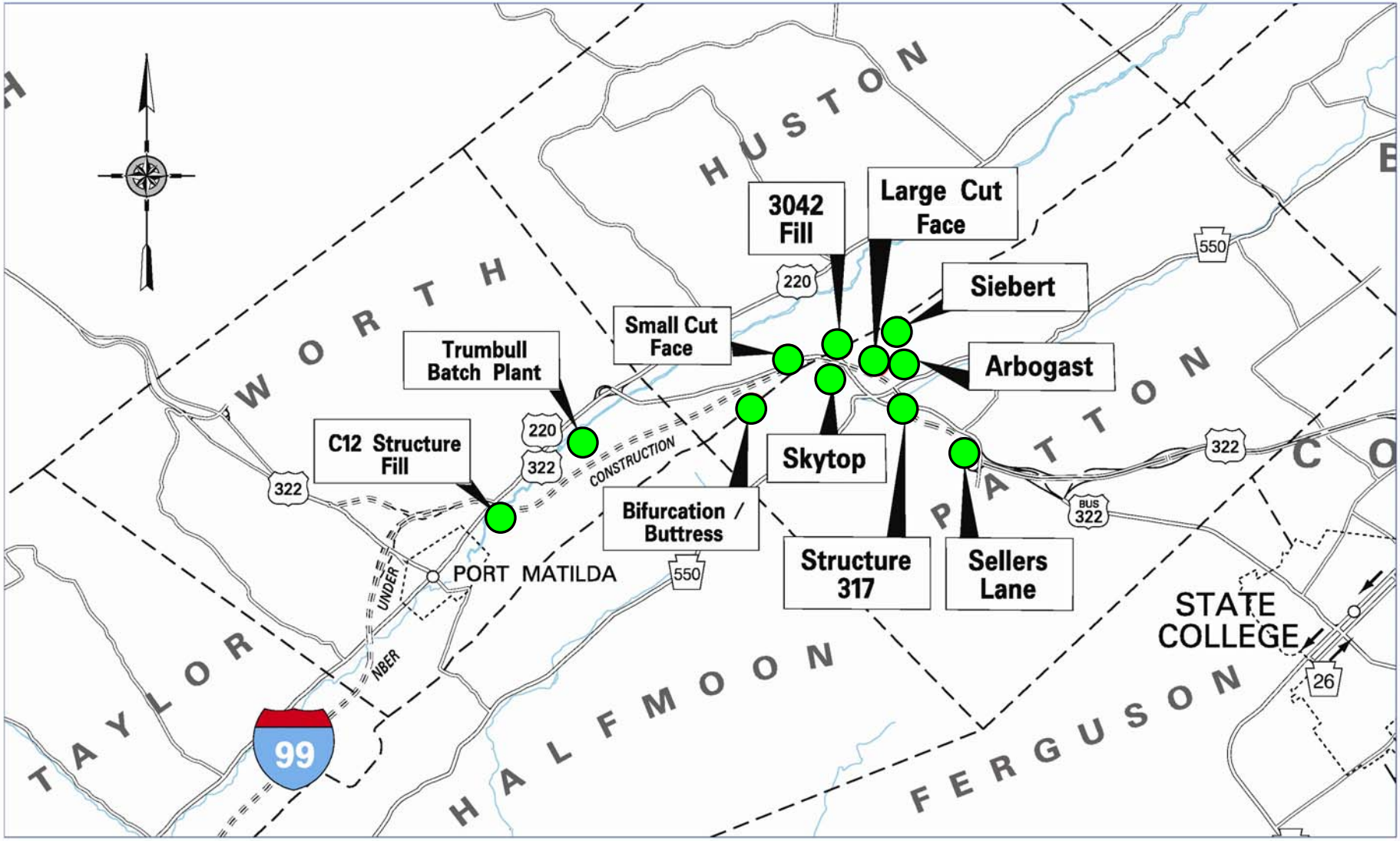
Oxidized Cap Rock
Sulfide veins in Bald Eagle Sandstone
Bald Eagle Fm.
Reedsville Fm.

Pyritic Veins in Bald Eagle Sandstone At Large Cut Face

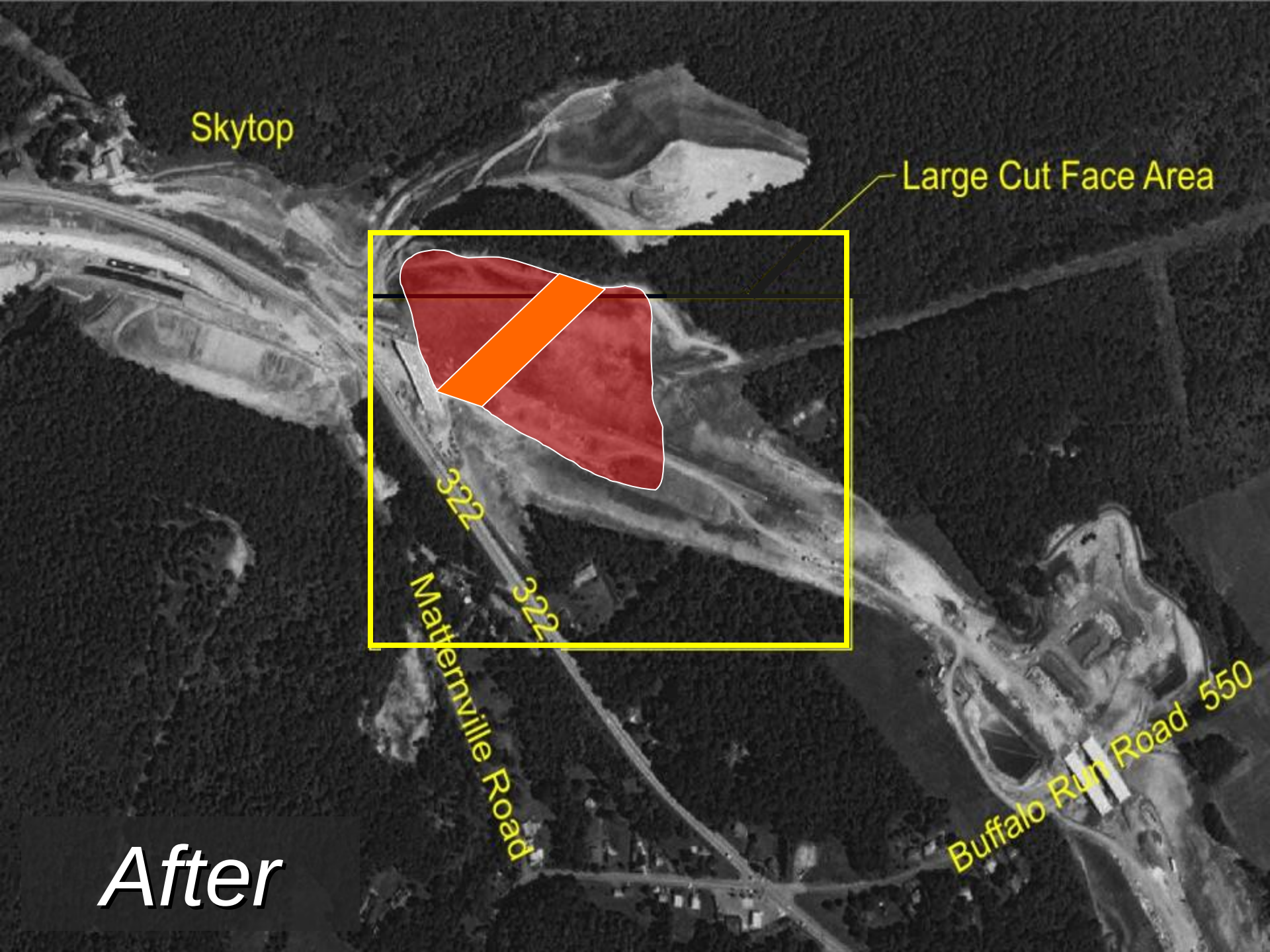


Pyrite Veins

Locations of Pyritic Material as a Result of Project



Large Cut Face Area
Skytop
322
Mattenville
Buffalo Run Road 550
Before


Skytop
Large Cut Face Area
322
322
Matternville Road
Buffalo Run Road 550
After

331'
200'
122'

ARD

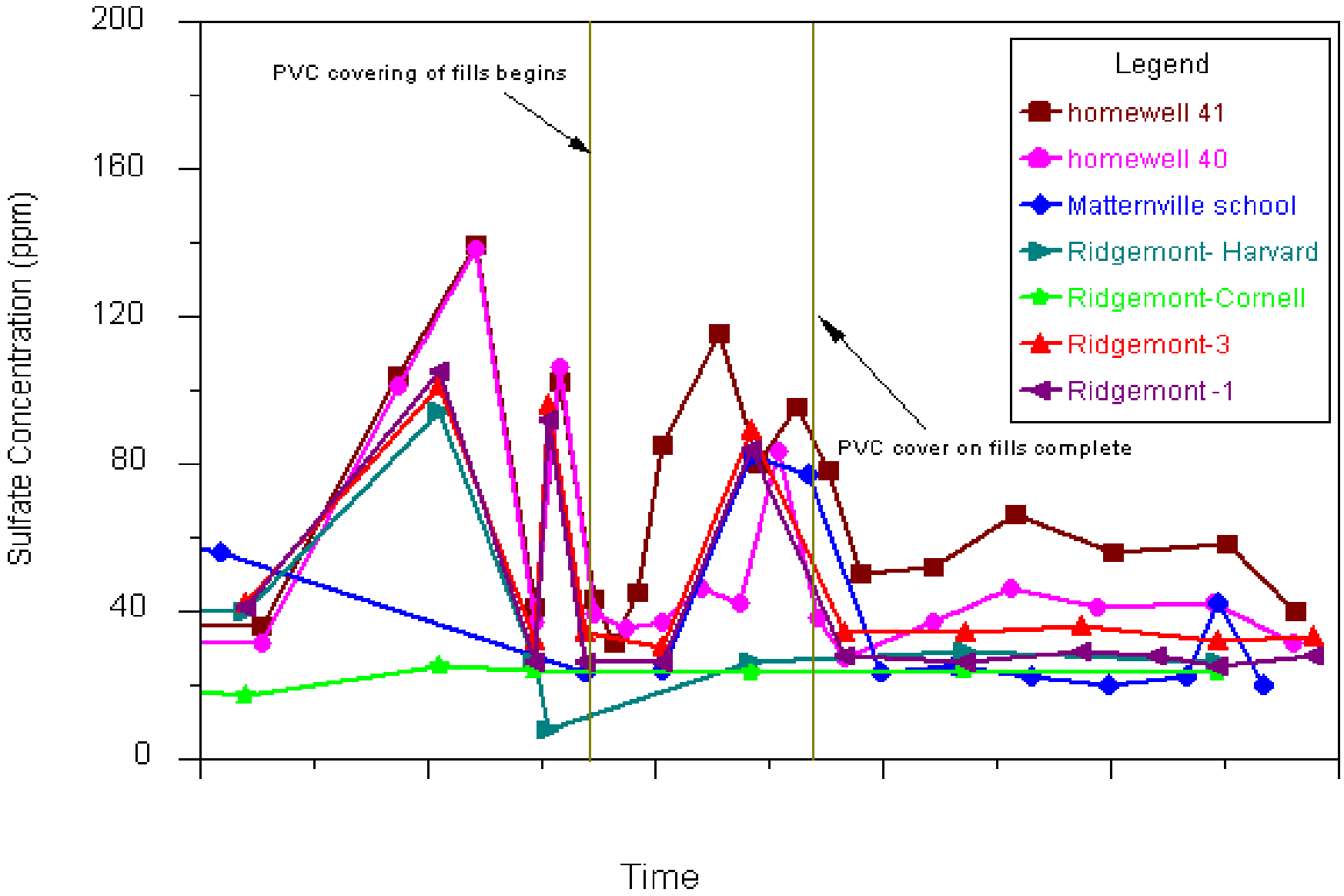
Residential Water Monitoring

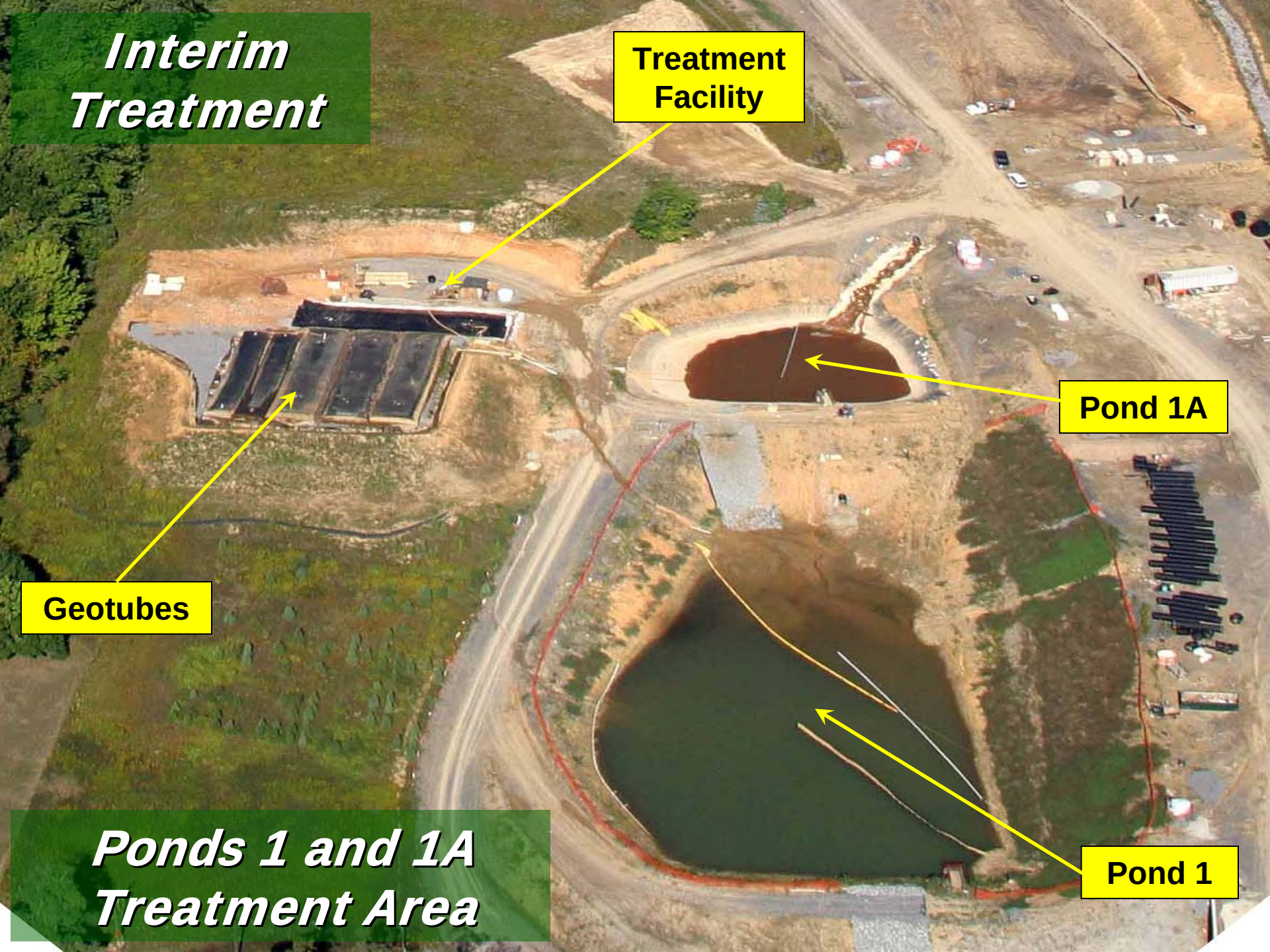
- Residential groundwater monitoring – 2003
- Monthly and quarterly monitoring
- Currently providing bottled water to nine residences
- Continue to monitor 103 residential supplies
- Overall evaluated 178 residences, three businesses, and one school

INTERIM TREATMENTS

Temporary Tarps

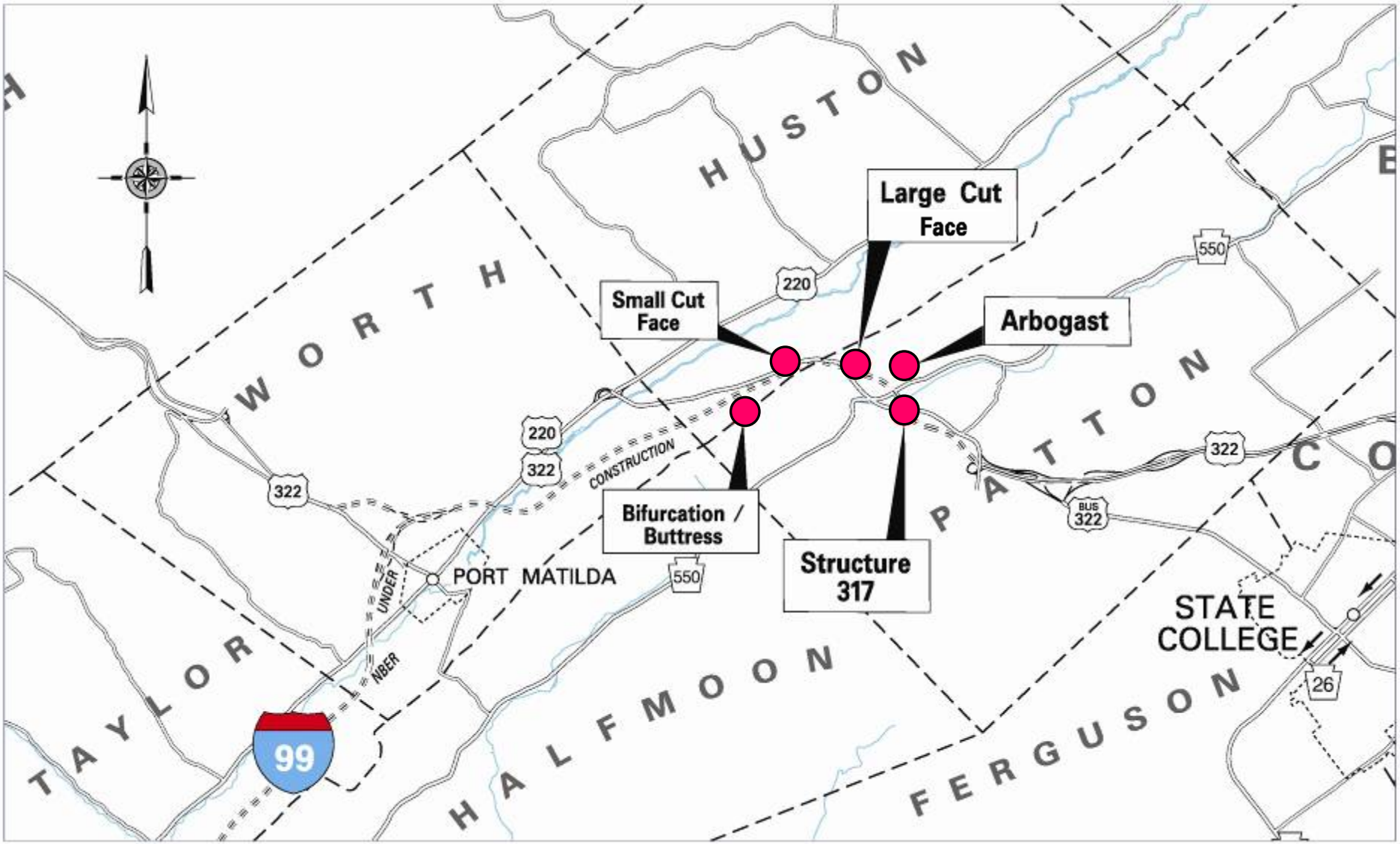
Sulfate Levels in Select Residential Wells Downgradient of 317 Fill




Interim Treatment
Treatment Facility
Pond 1A
Geotubes
Pond 1
Ponds 1 and 1A Treatment Area

IMMOVEABLE MATERIAL

Immoveable Material

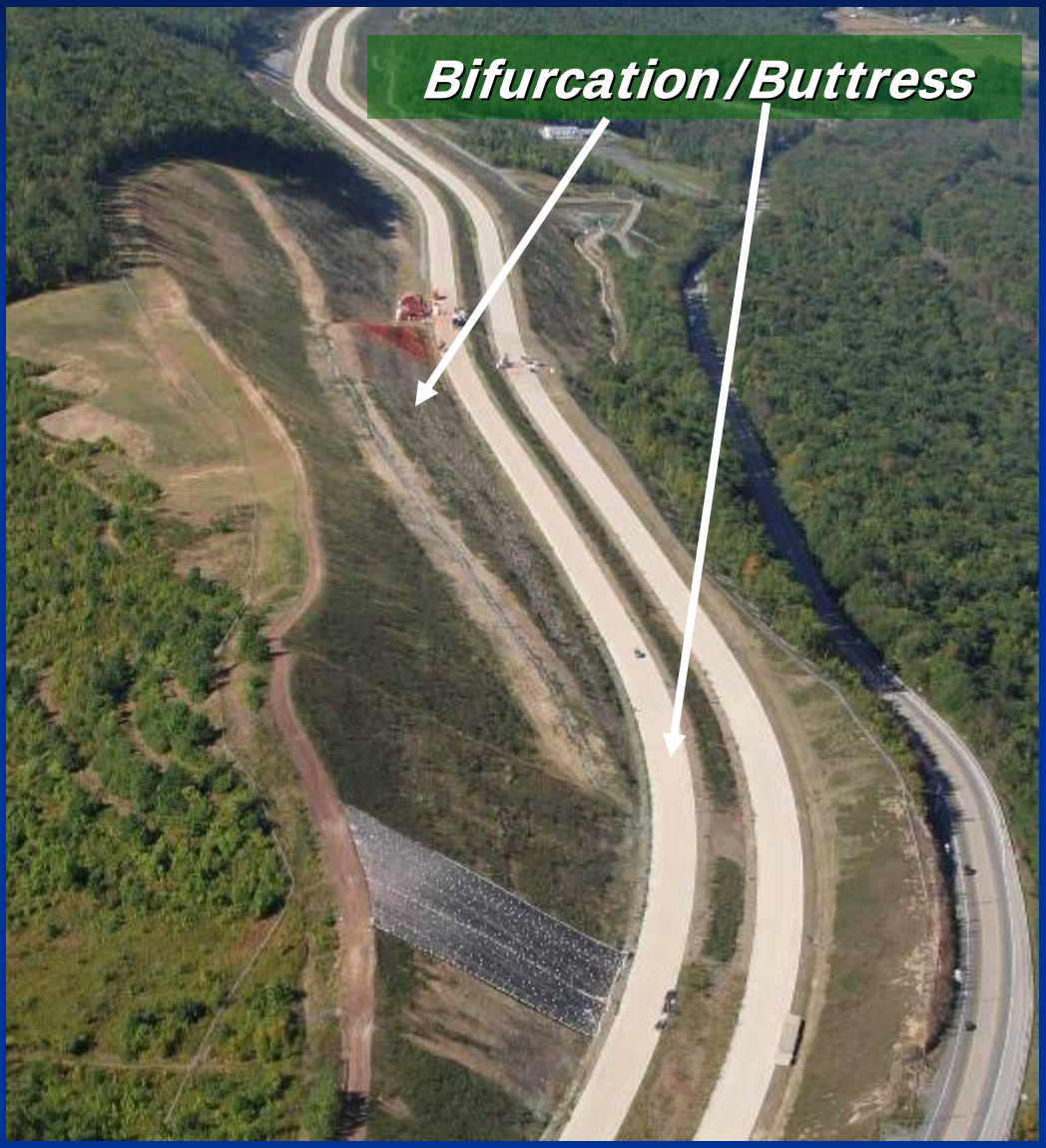


Immoveable Material

Large Cut Face

Small Cut Face

Immoveable Material

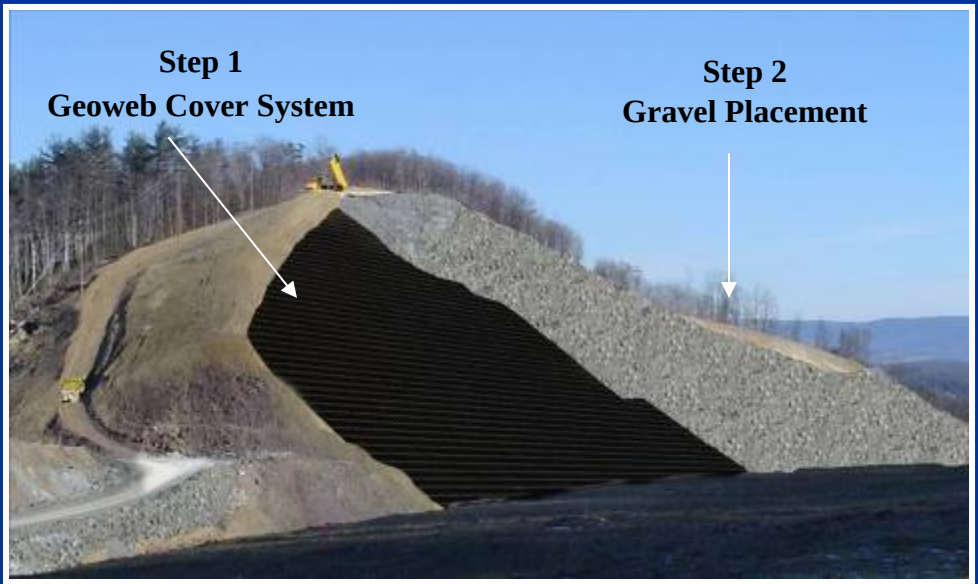


Immovable Options

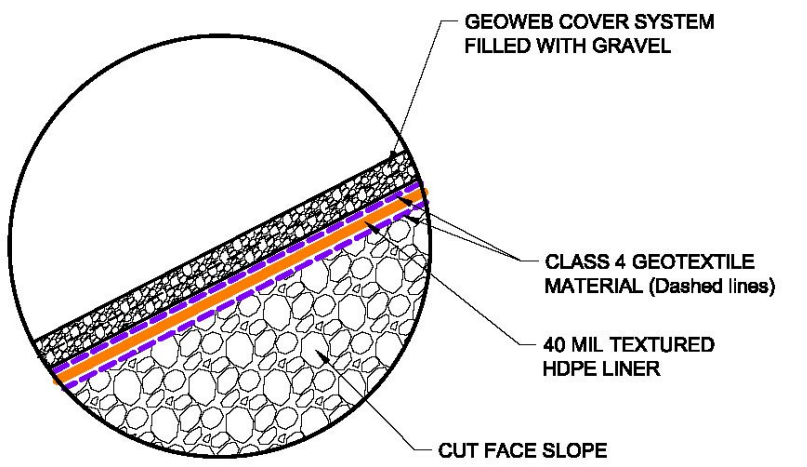
PADOT evaluated multiple options for immovable materials

Design/Build
Remediation Plan – Immoveable Material

- Covered by geoweb material filled with limestone, leachate will be collected, tested, and treated as necessary



GEOWEB COVER SYSTEM PLACED ON STEEP SLOPE CONDITION



Design Considerations

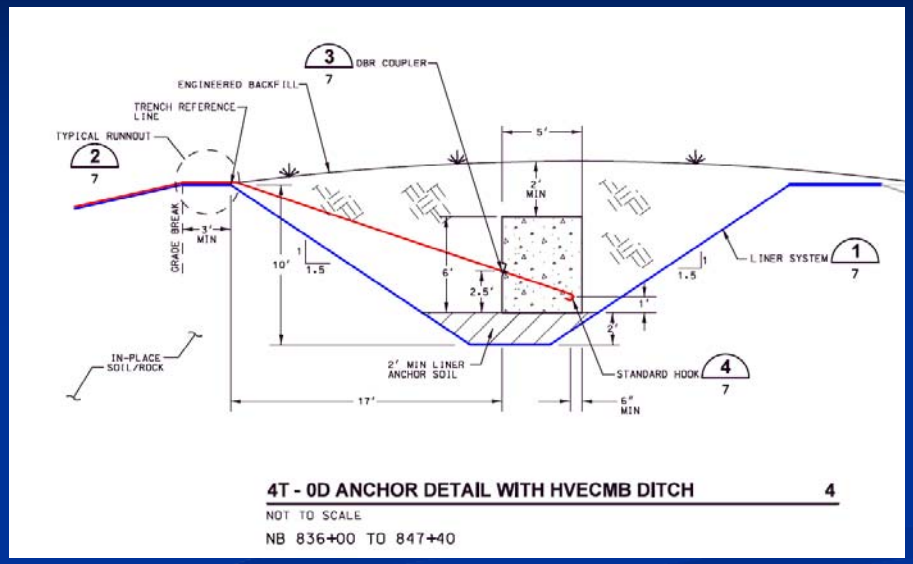
- 8 slopes of various lengths and inclinations
- No penetrations through the liner system
- Matrix developed based on slope length and inclinations (2T - 8T)
- Anchor designs varied based on access to each slope

Tendons

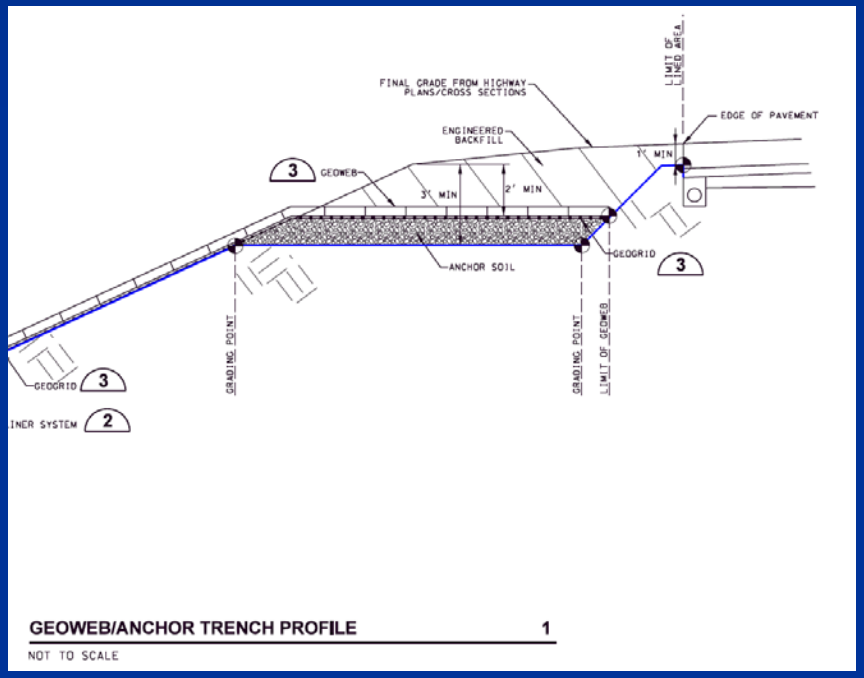
Stop Sleeve and Washer Detail

Crimping Equipment

Deadman Anchor Block

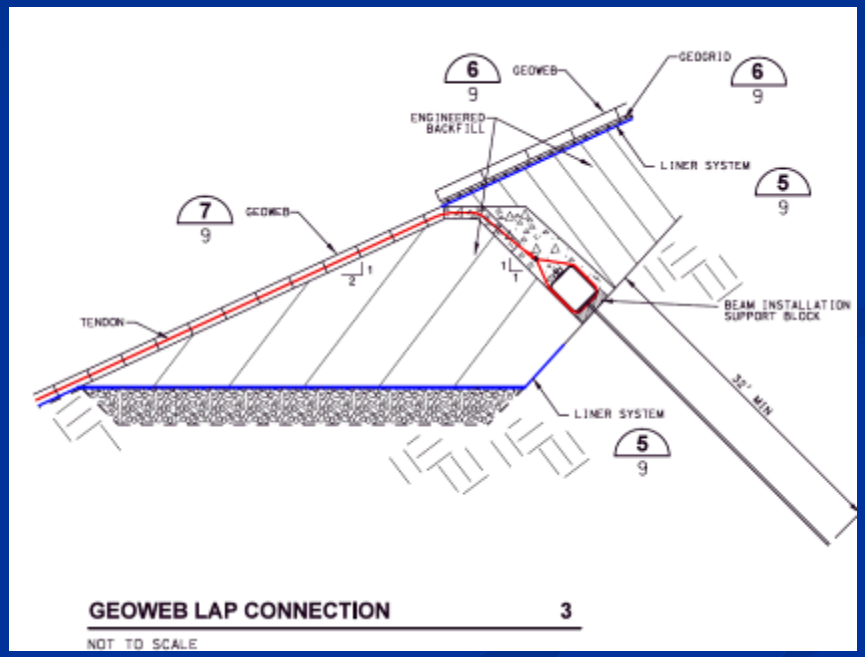


Runout Anchor Trench



Small Cut Face

Soil Anchors



Soil Anchors

Large Buttress Slope

Termination and Stops

Stone Infill

Large Buttress Completed

Median

Soil Filled

Small Cut and Large Buttress

317 Fill

Large Cut Face

High Wall and Low Wall

Safety Training

High Wall

1H:1V 400’ long

High Wall

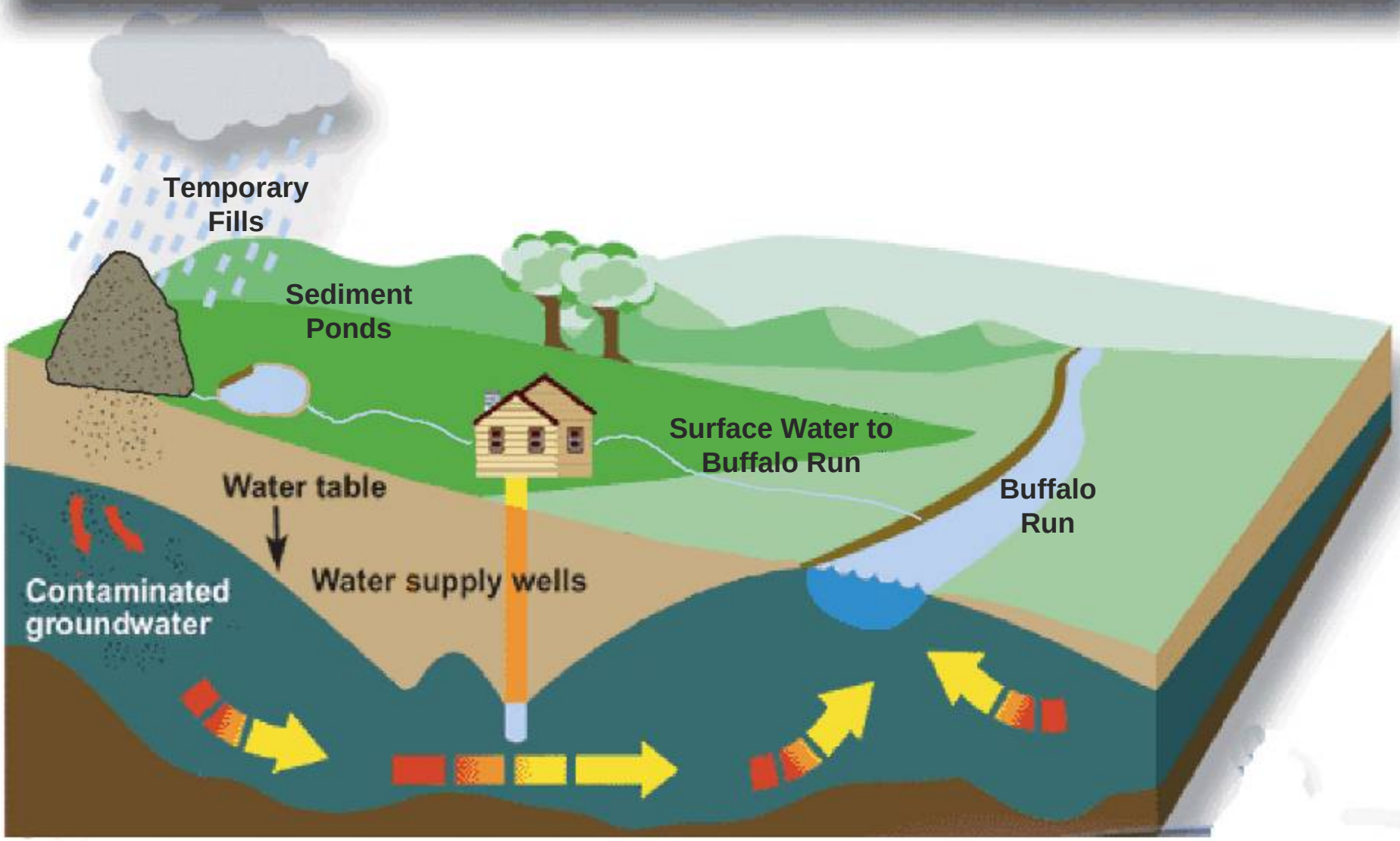
High Wall

MOVEABLE MATERIAL

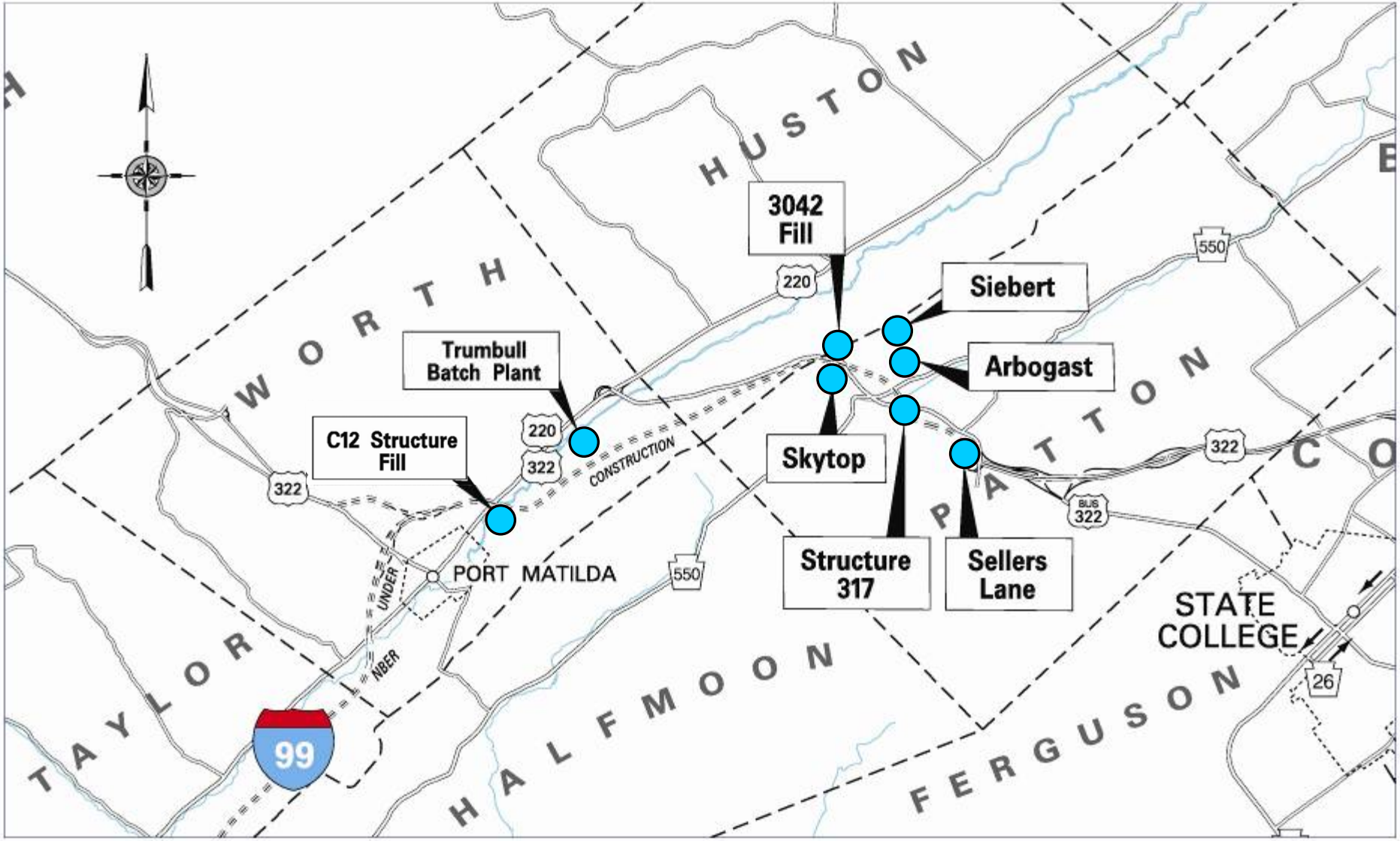
Why Must It Be Moved?

- Specially protected watersheds (Buffalo Run and Waddle Creek)
- Limestone/karst geology – potentially unstable base
- Cannot guarantee acceptable discharge into HQ streams

Potential Contamination from a Stockpile Site



Moveable Material



Moveable Material

Moveable Material

Mainline Cut

Options for Moveable Material

- Twenty-eight off-site locations evaluated
- Narrowed to two sites
- In-place treatment – Bauxsol

ERPA Site – Centre County

- Advantages
  - State-of-the-art design
  - Geology very favorable
  - No impact on wells
  - Minimum hauling
  - Minimal traffic impact
  - Uses lime dust
- Disadvantages
  - Greenfield site

Existing Site

During Construction

After Construction

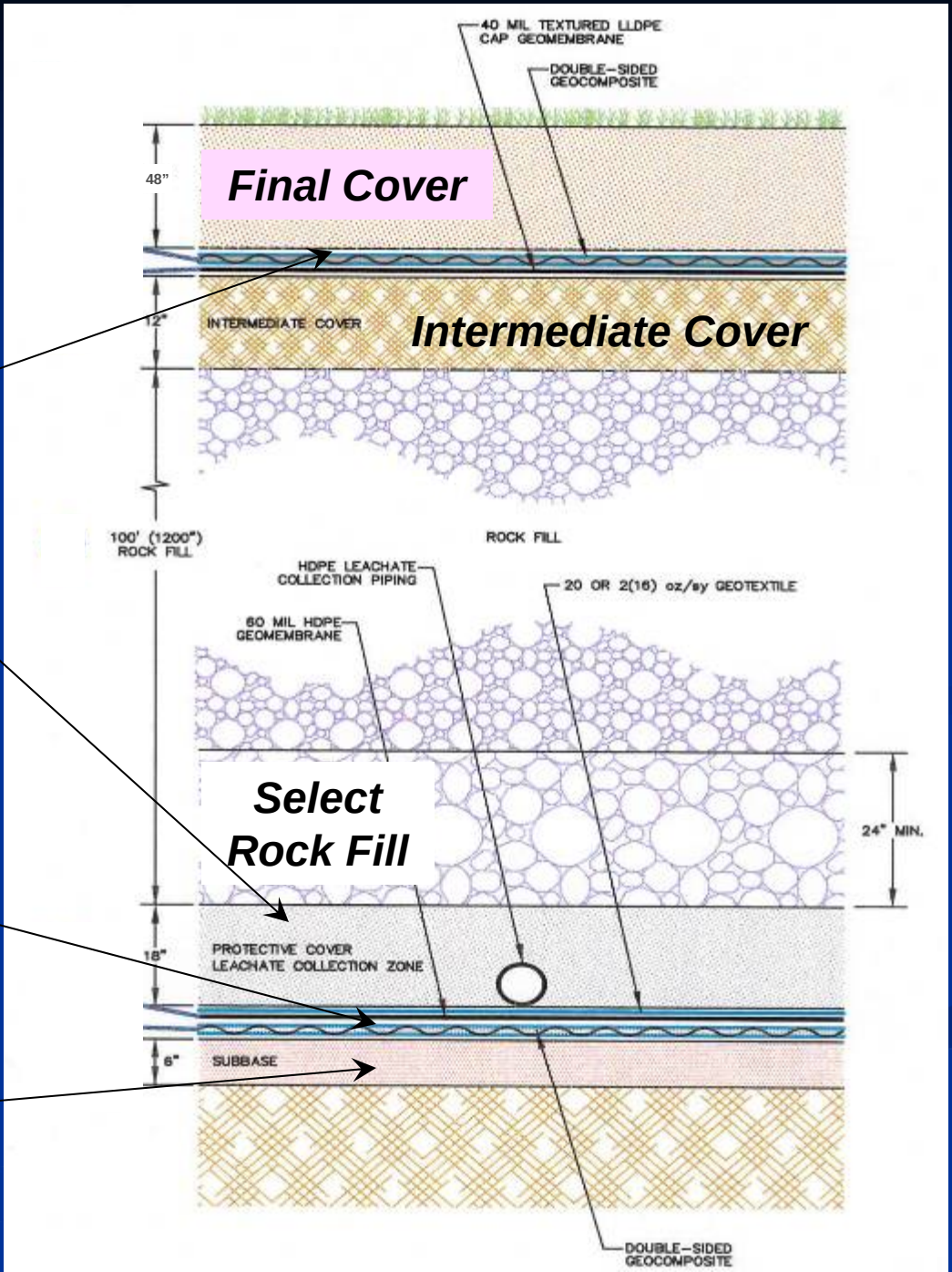
ERPA Details

Geocomposite/ 40milHDPE/ Geotextile

Protective Cover Leachate Collection Zone

60milHDPE/GCL/ Geocomposite

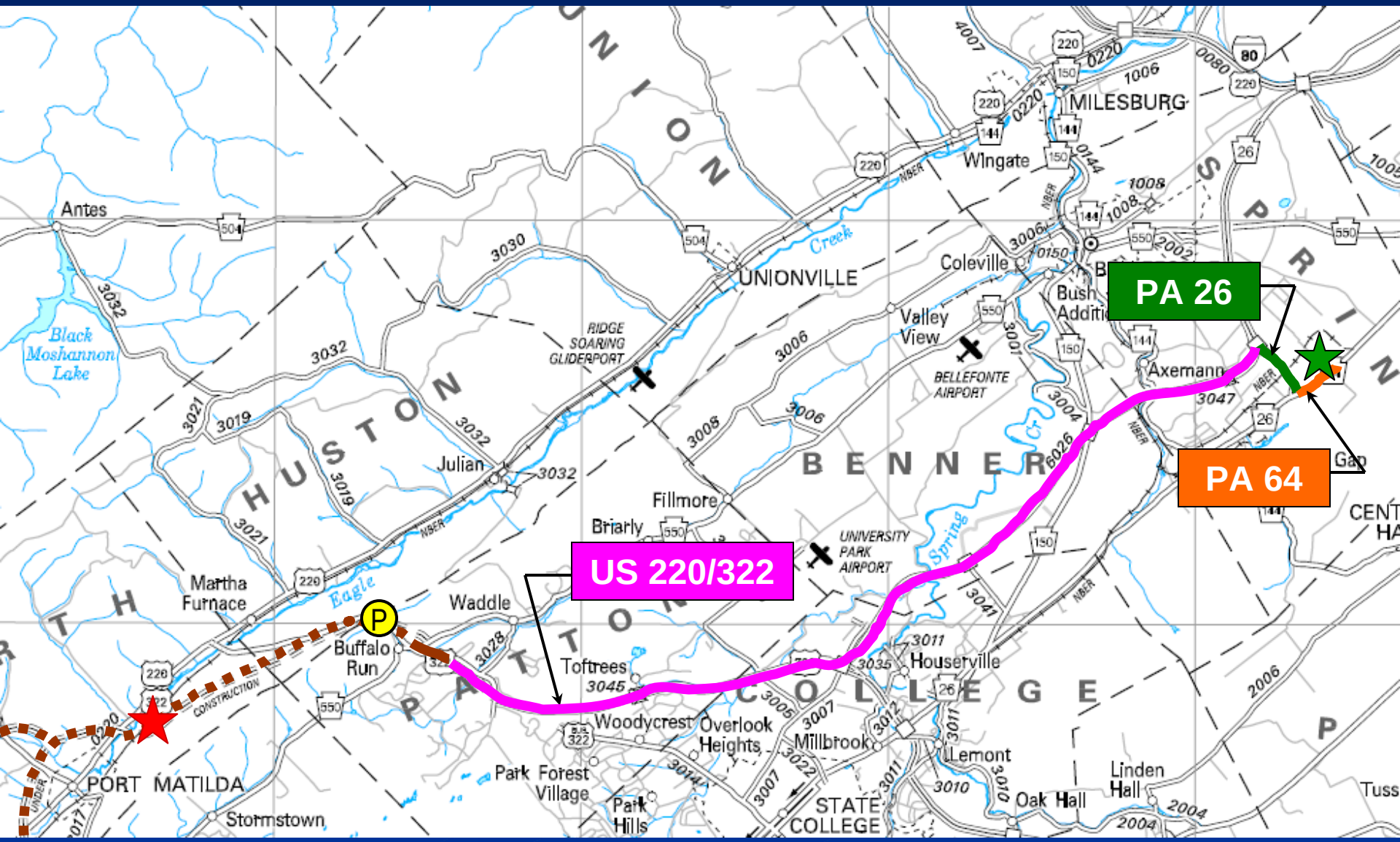
Subbase



Geosynthetic Installation

ERPA Construction

Transportation of Lime to ERPA



ERPA Construction

ERPA Closure

Summary

- Design/Build/Design
- Largest Geoweb project in USA
- Two year construction project
- 40 Acres of Geoweb/Geomembrane
- 25 Acre ERPA

THANK YOU