U.S. Department of Transportation
Federal Highway Administration

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RESOURCE CENTER

Replacement of Rt. 33 Bridges in Active Sinkhole Environment

Stockertown, Pennsylvania

What's Going On…

Bridges are located in a highly active sinkhole area that became a real concern in the fall of 2000

There are three limestone quarries in the vicinity of the structures. The closest (Hercules) is currently drawing the water table down approximately 200 feet and pumping rates are on the order of 50 to 55 million gallons per day

Land development and relocation of Bushkill Creek for construction of the Route 33 Bridges are contributing to existing problems

SR 2017 Bridge - Closed in October 2000

Railroad Bridge with lost wingwall

State Rt. 33 North Bridge - Closed January 24, 2004

Geologic Conditions

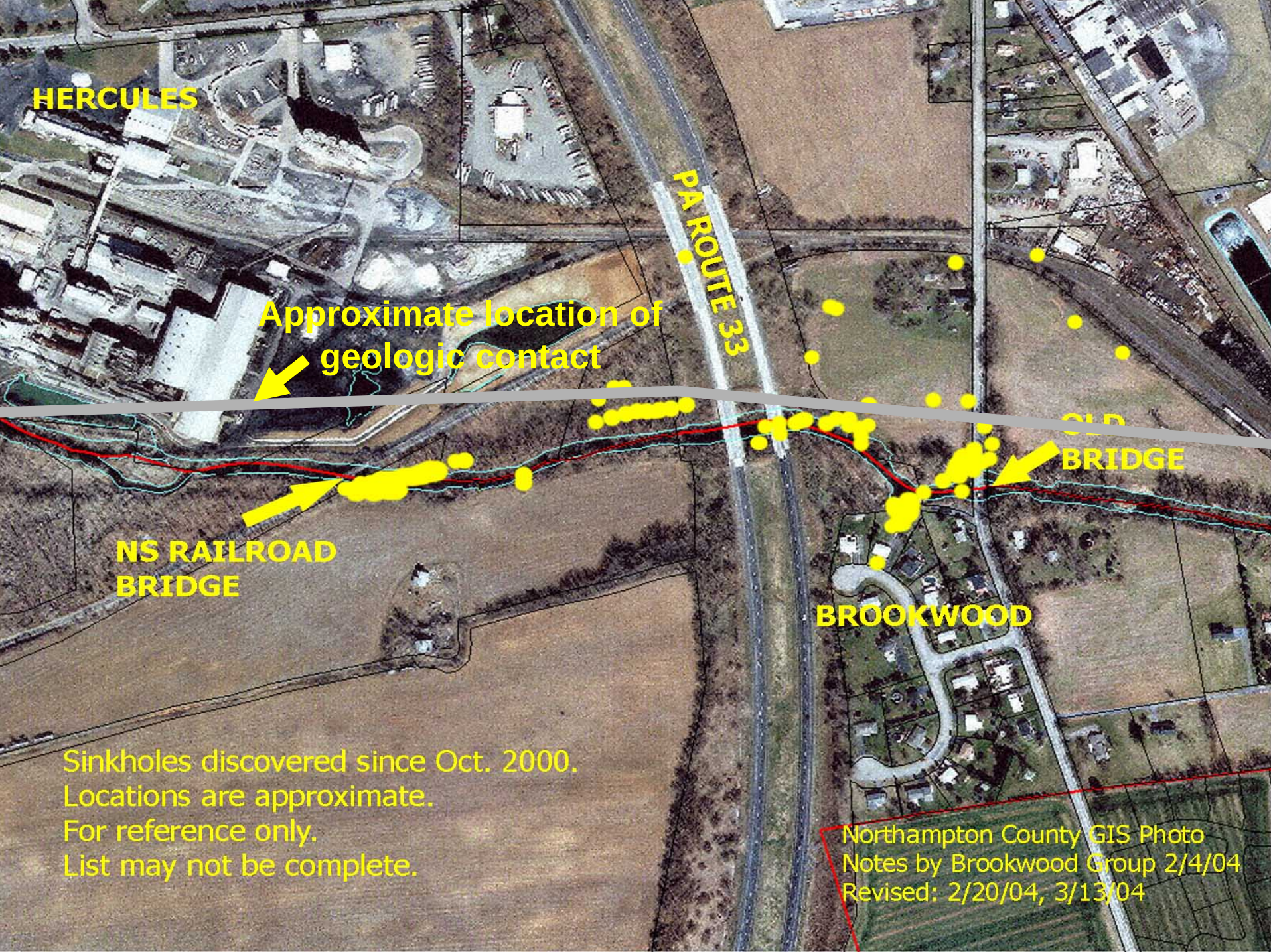
Bushkill Creek and the Route 33 Bridges sit at the geologic contact of the Epler (south) and Jacksonburg (north) Formations

Epler Formation characterized by pinnacled limestone and dolomite. Jacksonville Formation characterized by silty limestone that does not exhibit karst features

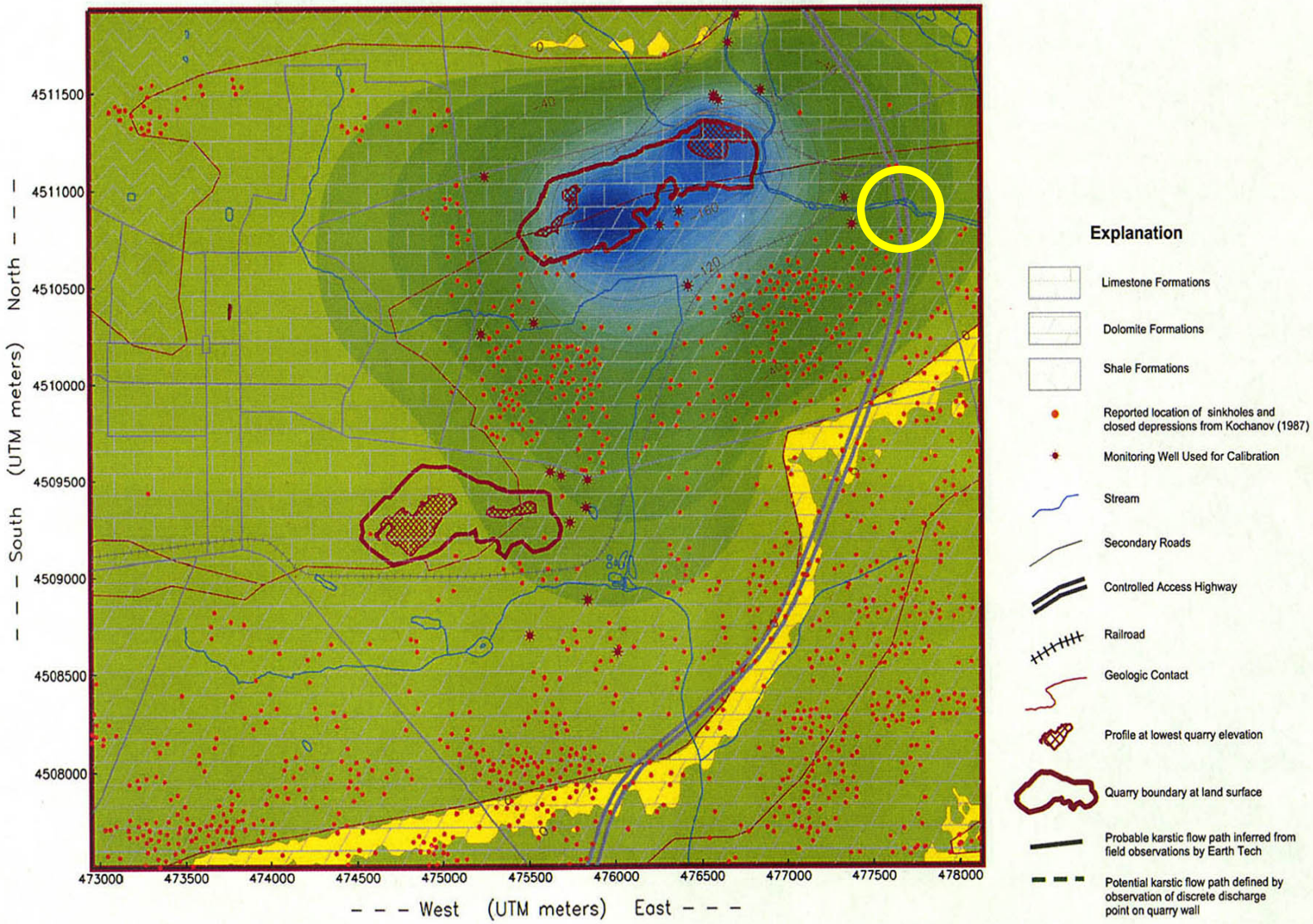
The Formations are intensely folded and faulted with numerous joints and fractures

Weathering of the Epler Formation has produced deeply developed karst topography

Rock encountered during subsurface explorations consisted of highly voided limestone and dolomite with soil filled seams


HERCULES
PA ROUTE 33
Approximate location of geologic contact
BRIDGE
NS RAILROAD BRIDGE
BROOKWOOD
Sinkholes discovered since Oct. 2000.
Locations are approximate.
For reference only.
List may not be complete.
Northampton County GIS Photo
Notes by Brookwood Group 2/4/04
Revised: 2/20/04, 3/13/04

Predicted Zone of Influence: Hercules Only



Current Status

PennDOT is conducting an extensive subsurface exploration program consisting of:

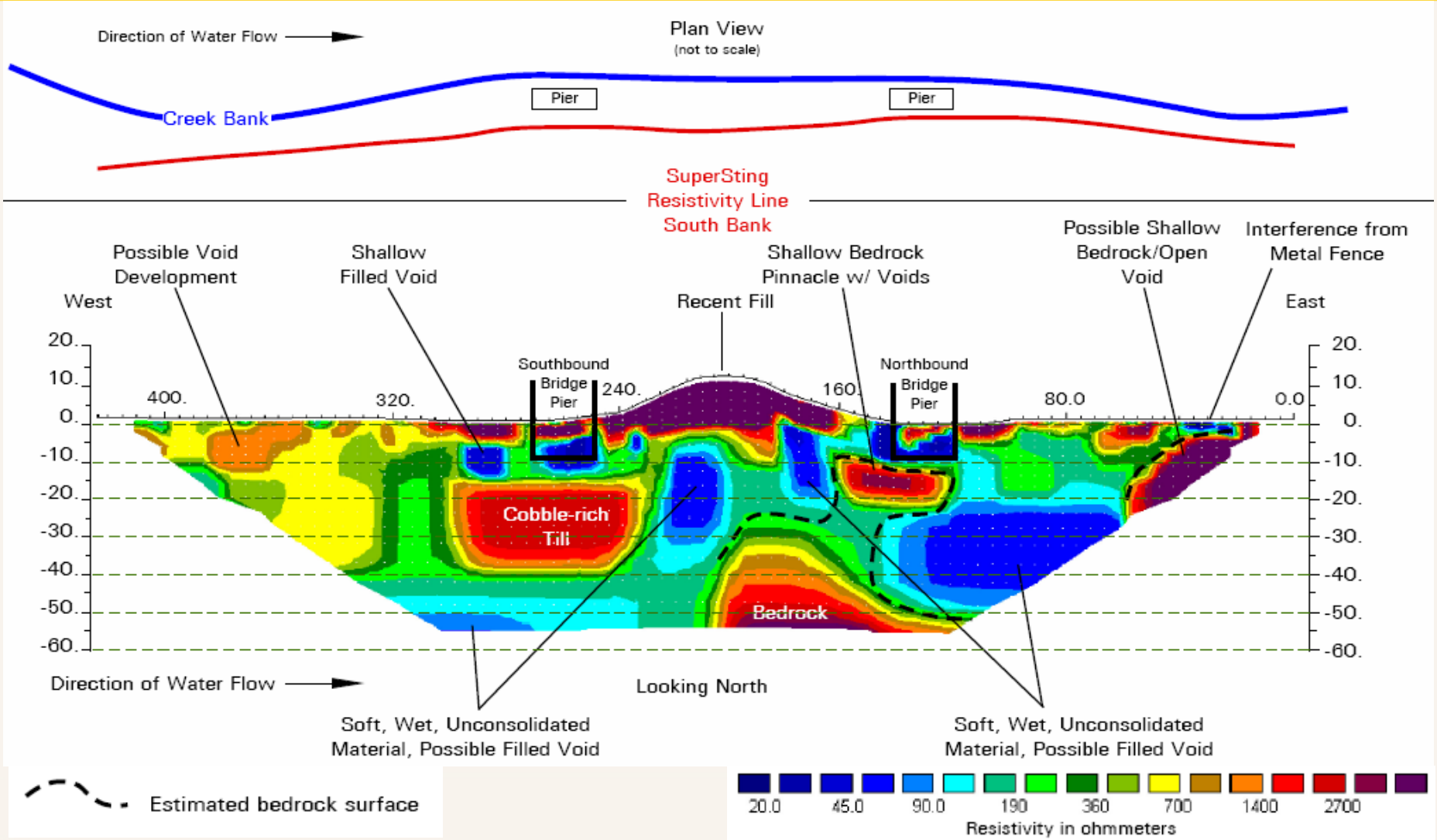
- Extensive boring program to depths in excess of 500 ft.
- Cross-hole and surface electrical resistivity
- Self potential
- Temperature logging of creek and groundwater
- Sentinel wells
- Tracer tests (sinkholes to borings to quarry)

Assesment of stream lining

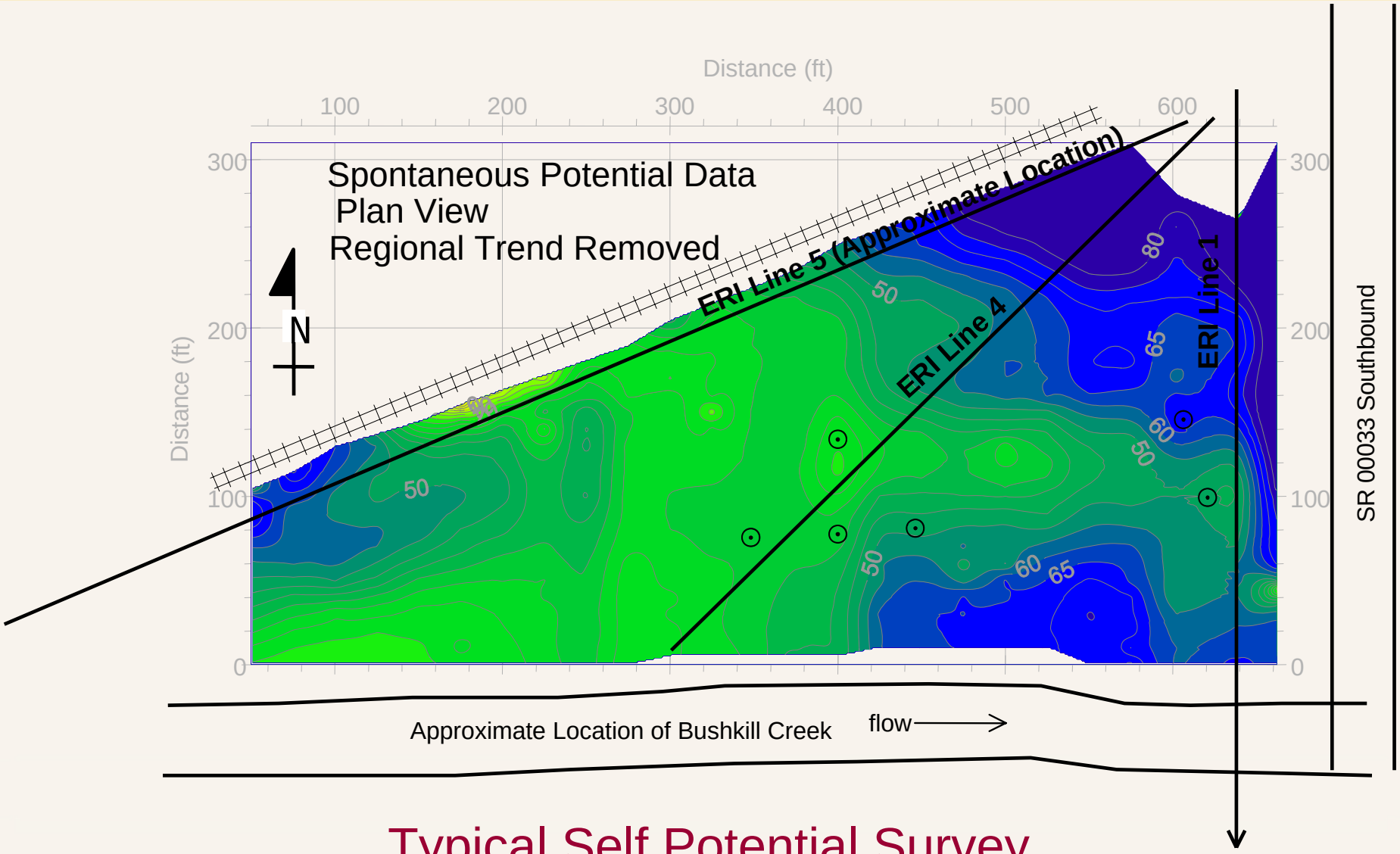
Remediation plans for existing Route 33 Structures

Continued monitoring of structures and surrounding area

Geophysical Exploration

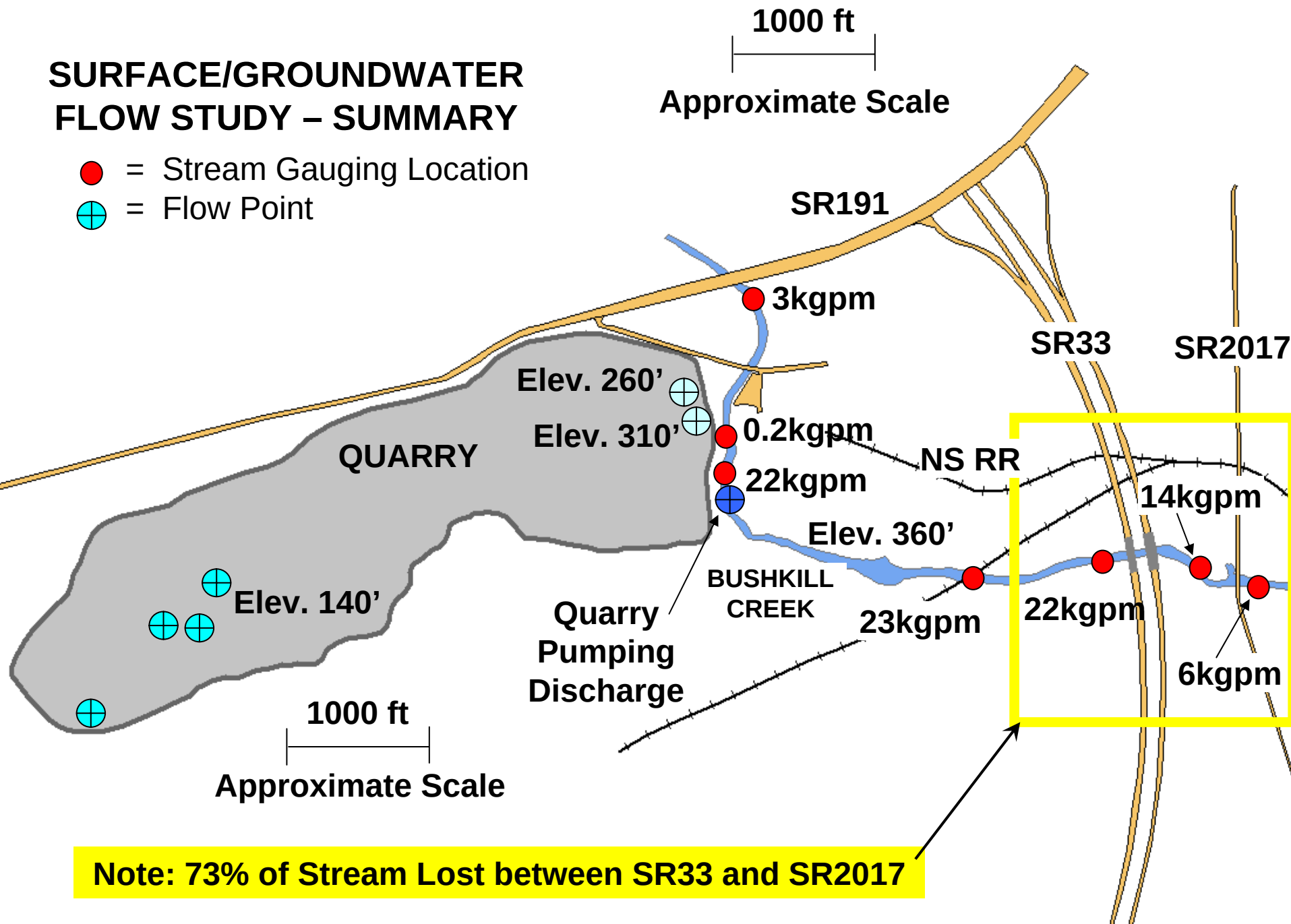


Typical Resistivity Imaging Survey



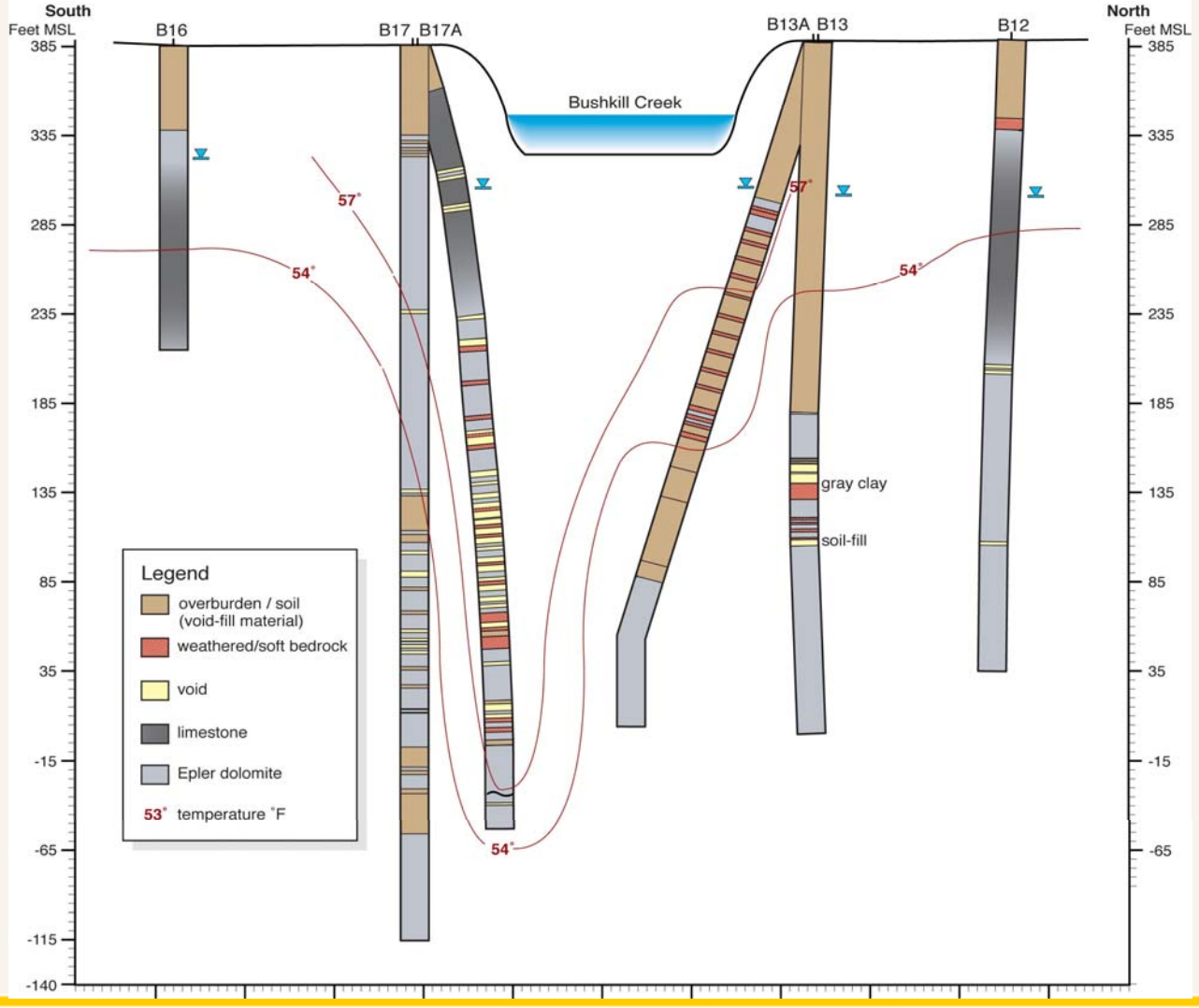
Typical Self Potential Survey

SURFACE/GROUNDWATER FLOW STUDY – SUMMARY



Note: 73% of Stream Lost between SR33 and SR2017

SR 33 - Typical Hydrogeologic Section



Where Are We Now?

Both Route 33 structures were replaced with emergency funds in 2004

Both structures have been structurally retrofitted to combat continued movement

Numerous alternatives for permanent remediation of the bridges and surrounding area are currently being evaluated

Coordination efforts with USACoE, DEP, Hercules Quarry, and the Brookwood Neighborhood Group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Thank You!

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