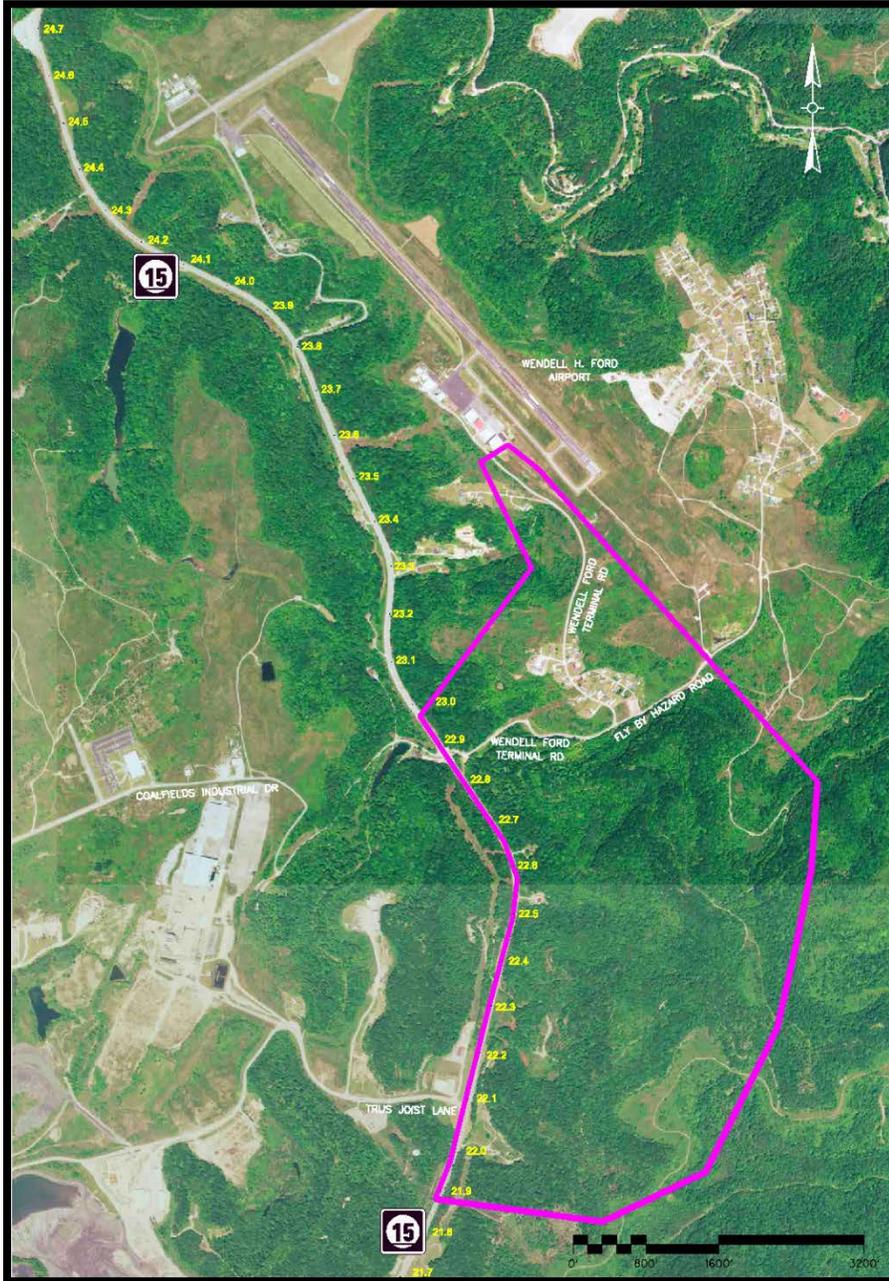




Appendix D

Geotechnical Overview Report P-003-2018

American Engineers (March 2018)



GEOTECHNICAL OVERVIEW REPORT P-003-2018

Wendell H. Ford
Airport Access Road

Perry County, KY

March 2018



August 9, 2018

Gary W. Sharpe, PE, PLS
Project Manager
Palmer Engineering
Engineering Planning
400 Shoppers Drive
Winchester, KY 40392

Re: Geotechnical Overview Report
Wendell H. Ford Airport Access Road
Perry County, Kentucky
AEI Project No. 217-360

Dear Mr. Sharpe:

American Engineers, Inc. Field Services Center is pleased to submit this geotechnical overview that details the results of our site and mapping reconnaissance at the above referenced site.

The attached report describes the site conditions and near-surface geology and also details potential design recommendations for the proposed project. The Appendices to the report contains several maps of the study area, including geologic, landslide, mine portals, mined out areas and well maps.

We appreciate the opportunity to be of service to you on this project and hope to provide further support on this and other projects in the future. Please contact us if you have any questions regarding this report.

Respectfully,
AMERICAN ENGINEERS, INC.

A handwritten signature in blue ink that reads "Brad High".

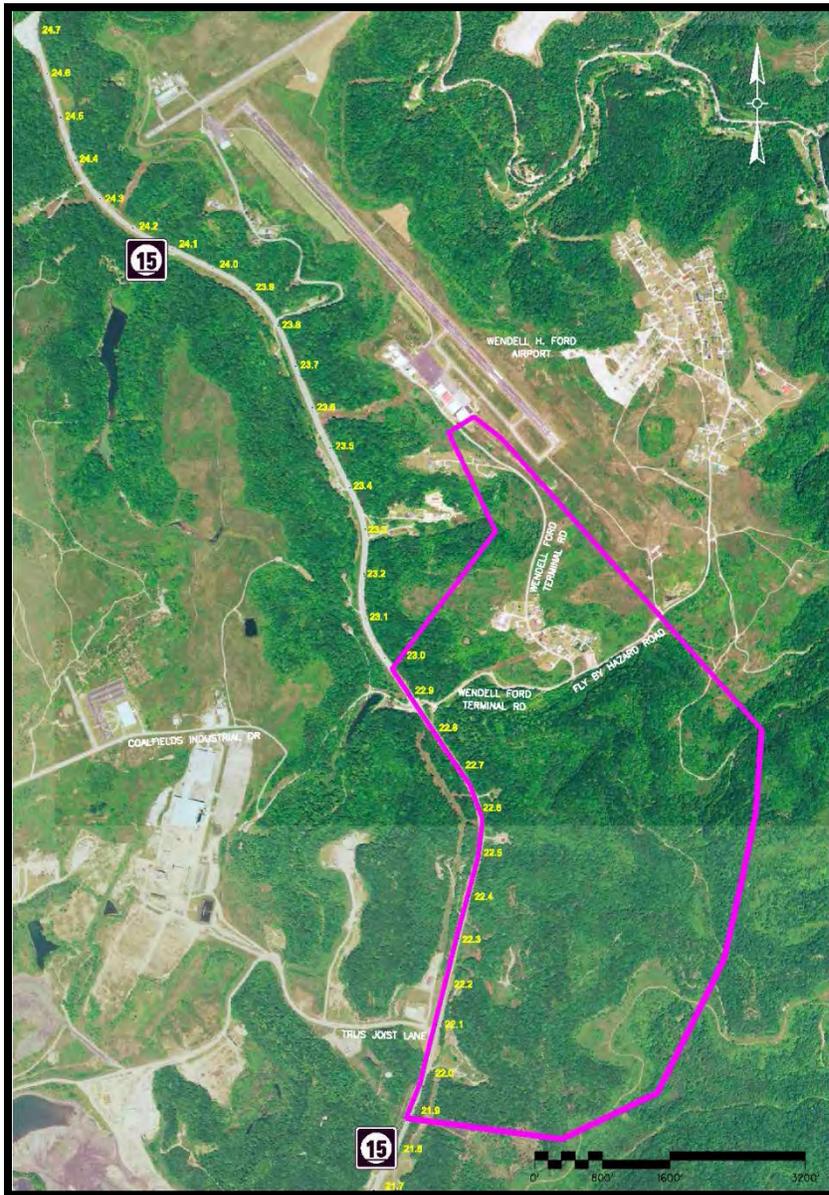
Brad High, PG, PMP
Senior Project Geologist

A handwritten signature in blue ink that reads "Dennis Mitchell".

Dennis Mitchell, PE, PMP
Director of Geotechnical Services

Wendell H. Ford Airport Access Road Geotechnical Overview Report Perry County, KY

1	PROJECT DESCRIPTION	2
2	SITE GEOLOGY	3
3	TOPOGRAPHY AND DRAINAGE	7
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Wendell H. Ford Airport Access Road Geotechnical Overview Report Perry County, KY

1 PROJECT DESCRIPTION

The purpose of this study is to provide an alignment for improved access to the Wendell H. Ford Airport in Perry County. Currently, the primary access to the airport is from KY 15 (MP 22.9) via the Wendell Ford Terminal Drive, which is a county road. Wendell Ford Terminal Road is a narrow winding roadway with steep grades leading to the airport. Lane widths vary from 10 feet to 11 feet and there is little to no shoulder. During the field review it was noted that signs of subgrade distress are apparent in several areas. The existing pavement shows signs of cracking, spalling and potholes in a few areas. A previously repaired landslide exists near the roadway entrance from KY 15. Existing grades are on the order of 16 to 20 percent. Slope failures and other maintenance concerns also are prevalent along the alignment for the Wendell Ford Terminal Road. Airport officials have indicated that the grades and roadway geometry are such that fuel trucks cannot deliver full loads of fuel to the airport during the winter months. An older access road also can be used to access the airport but has narrower lanes and steeper grades. In addition, there is a housing development along the Wendell Ford Terminal Road near the top of the road that all traffic must pass through to get to the airport. Another housing development is also accessed from the Wendell Ford Terminal Road using Fly By Hazard Road. Any improvements to Wendell Ford Terminal Road or any new access road to the airport will need to avoid affecting these housing developments.

Currently, District 10 has studied two potential alignments. Each proposed alignment would start opposite the intersection of Trus Joist Lane and KY 15. The first alignment would run roughly parallel to KY 15 and tie in with Fly By Hazard Road near the intersection with Wendell Ford Terminal Road near an existing residential area. This proposed alignment would terminate at this point and utilize the existing Wendell Ford Terminal Road to access the airport. The second

alignment would also roughly parallel KY 15 but it appears it would lie at a higher elevation along the ridgeline. This proposed alignment would tie into the existing Wendell Ford Terminal Road near the airport and avoid existing residential areas.

The airport has plans to extend Runway 14 – 32 by 1,000 feet to increase the runway length to 6,500 feet. Extending the runway length by 1,000 feet will allow the airport to better serve corporate jets and small air cargo planes. Extending the runway length to 10,000 feet has been discussed but is considered highly unlikely.

Approximate coordinates for the northwestern extent of the study area at the airport are 37.379487, -83.256652; and 37.370477, -83.244714 for the southeastern portion of the study area.

The geotechnical overview was conducted in relative accordance with Section 801 of the Kentucky Transportation Cabinet Geotechnical Manual. The purpose of this overview is to identify potential geotechnical concerns and provide anticipated typical parameters for design throughout the defined study area as a precursor to a more thorough geotechnical field investigation.

The study was conducted during January, February and March 2018 and included field reconnaissance and geologic research of available geologic and topographic quadrangle maps, Soil Survey of Leslie and Perry Counties, Kentucky, as well as multiple resources available from the Kentucky Geological Survey and the United States Geological Survey. Past reports from geotechnical investigations for roadways and structures in and near the area of the Overview were also reviewed.

2 SITE GEOLOGY

Available geologic mapping (*Geologic Map of the Haddix Quadrangle, Eastern Kentucky, USGS, 1965, Geologic Map of the Noble Quadrangle, Eastern Kentucky, USGS, 1974, Geology of the Hazard North Quadrangle, Kentucky, USGS 1964 and Geology of the Krypton Quadrangle,*

Kentucky, USGS 1965 and the Kentucky Geological Survey Geologic Map Information Service online) shows the immediate ground surface within the study area to be underlain by Quaternary-aged alluvium deposits and lower and middle Pennsylvanian bedrock of the Breathitt Formation. More recently, the Breathitt Formation has been further differentiated into the Princess, Four Corners and Hyden Formations, listed in descending order of lithology. The bedrock of these formations is commonly associated with deposition of both marine and nonmarine environments and consists of a variable sequence of sandstone, shale, siltstone, limestone, coal and underclay. This sequence of deposition is commonly referred to as a cyclothem.

Sandstone of these formations is commonly light to medium gray in color, fine to medium grained, thick to very thick bedded and commonly crossbedded. Shale and siltstone in the area are typically light to very dark gray or black in color, occasionally calcareous or carbonaceous and commonly interbedded with sandstone in areas. Limestone occurs sporadically and is typically only several inches to a few feet thick where encountered. Alluvium exists within floodplains along stream valleys within the study area. The alluvium consists of a heterogenous mixture of silt, sand, clay and gravel. Pyritic shale was not readily identified in review of geologic mapping; however, pyrite may be present in some of the carbonaceous shale or coal in the study area.

Regional dip in the study area was reviewed based on subsurface topographic contours drawn on the top of the Fire Clay coal rider bed on the Haddix 7.5-minute geologic quadrangle map and indicates a dip of about 35 feet per mile, or about 0.7 percent to the northwest.

Landslides are common in the study area and commonly occur along oversteepened artificial cuts and embankments as well as oversteepened natural slopes. Several were noted on KGS landslide mapping along KY 15, 2246 and 1067. A landslide location map is included in the Appendix and identifies landslide areas derived from aerial photography, areas susceptible to debris flows as well as individual slides inventoried in KGS landslide inventory data.

At least 30 geotechnical reports exist in the KGS Geotechnical Database for Perry County from past investigations and reviews where landslides have occurred. While the available landslide reports review focus on remediation, causes listed include side casting of material on existing slopes, placement of mine spoil as fill, slope toe erosion from streams, past mining activity and porous bedrock. In almost every case where a cause was determined, movement of groundwater and saturation of the embankment materials was a driving force.

In addition, the underclays and shales in the area are relatively impermeable, and water tends to migrate along the surface of these materials. As the water gradually saturates these materials, the amount of resisting force to movement is lowered in relation to overburden pressures and the force of gravity (driving forces). If the driving forces exceed the resisting forces, movement of the underclays and shales will occur, usually along with any overlying strata.

Coal beds within the project area are commonly underlain by moderate plasticity underclay layers, with relatively low permeability. The low permeability of the underclay inhibits movement of groundwater, while the coal is typically more permeable. As a result, when a mode of entry to a coal seam is available, water often travels along the seam to an exit point. Coal beds can often behave as aquifers and commonly discharge water at a downdip location. This discharge can undermine areas in cut slopes, especially when encountering nondurable underclays and shales.

The region, including the study area has been mined extensively for coal. The scope of work for the Overview indicates that this area is currently under an active coal mining permit. Available interactive mine maps were reviewed and the area was indicated to have been surface mined and underground by strip, auger and drift methods. Economic geologic descriptions on applicable quadrangle maps also indicate that scattered adits were also identified where mining was performed for local consumption, or “house coal”. A strong likelihood exists that others are

present in the study area which are not documented. Several coal beds noted to have been mined in the area include but are not limited to the Hazard No. 7 (approximate Elev. 1200), the Upper Knob and Lower Knob coal zones (approximate Elev. 1460), the Haddix (approximate Elev. 1000, Francis, Hindman (approximate Elev. 1300) and the Fire Clay. Three underground mines were identified within or very near the boundary of the study area and others are proximate to the site southeast of the airport. Any new roadway grades should avoid matching the dip angle of the underlying bedrock over long distances and should avoid any areas previously disturbed by mining. Links to stored underground maps are available at <http://minemaps.ky.gov/MineSearch.aspx>. Mining companies, State File Numbers, and mined seams are summarized in the table below.

Company	State File Number	Seam
Pugh Bros Coal Company	11960	Hazard No. 7
Indian Head Mining Company	0978-2A	Hazard No. 7
Indian Head Mining Company	09798-4	Hazard No. 7

Mine spoil will likely be encountered with any new construction in the area. While mine spoil is not indicated specifically on any available geologic mapping, almost the entire study area is indicated to lie within previously mined out areas. Construction in areas underlain by mine spoil is often problematic as subsidence is common and when exposed in side hill conditions mine spoil is prone to slipping.

A few water wells were noted from the KY Geologic Map Information Service proximate to the study area, however fall outside the current study area limits. Oil and gas well mapping was also reviewed and several were noted proximate to the area, however none were noted within the limits of the study area. It is possible, however that a few exist which are not noted on available mapping. A geologic map inclusive of the study area as well as a water wells and springs map is attached.

3 TOPOGRAPHY AND DRAINAGE

The study area lies within the mountainous Eastern Kentucky Coal Field Region in northern Perry County. Topography of the study area is characterized by nearly equal amounts of steeply sloping ridges with steep side slopes and moderately wide to narrow flood plains. Topographic relief throughout the study area ranges from a low of about 900 feet in the stream valleys to a high of about 1,400 feet or more along the ridges. Surface drainage within the study area trends toward several small localized creeks and ditches in a dendritic fashion and ultimately drains to the North Fork of the Kentucky River.

4 FIELD REVIEW

Field reviews were performed on February 9 and March 9, 2018. The condition of the existing roadways was reviewed along with roadway cuts and exposed rock faces within the study area and other areas proximate to the airport and access road. The study area was canvassed for any apparent geotechnical concerns and areas of interest were photographed.

Past mining activity and reclamation was apparent during the review and as evidenced from review of available mine mapping and general geologic mapping. Near the entrance to the airport a sign is posted for ICG Hazard, LLC and lists mining permit number 897-0591. During the field review, it was noted that signs of subgrade distress are apparent in several areas beneath the existing access roadway and in a few instances where no shoulder was present the edge of the roadway was being undermined by drainage within the ditches which are deep and relatively steep. The existing pavement shows signs of cracking, spalling and potholes in a few areas near the airport, however appeared to have been recently overlain on the main access road from KY 15 recently. A previously repaired landslide also exists near the roadway entrance from KY 15.

Existing rock cuts and open rock faces were reviewed along the existing access road near the intersections with Justin Avenue and Wendell H Ford Terminal Road. Other open cuts proximate

to the area were also reviewed near the proposed intersection with KY 15 across from Trus Joist Lane. The bedrock revealed in these cuts appeared to consist of relatively durable sandstones, e shale and coal. In general, these cuts were relatively vertical with intermediate benches noted in the higher cuts. It was noted that the shales were weathering at a more rapid pace than the sandstone, as a fair amount of talus had collected at the base of some of the cuts and had begun to undermine the more durable sandstones to variable degrees. Both overburden and intermediate benches will be necessary in any sizeable rock cuts.

5 GEOTECHNICAL CONSIDERATIONS

- Based on review or prior roadway reports in the area, a rock roadbed is anticipated for new construction. A design CBR for durable bedrock will likely range from 9 to 11.
- Soils which underlie the study area are anticipated to largely consist of clayey silts and silty and clayey sands with excessive moisture content.
- Any new alignment will likely encounter coal seams in any sizable cuts or other excavations. Any coal excavated from the project should be considered waste and shall not be utilized in the roadway.
- Any mine tunnels or horizontal auger openings in mined-out areas below grade should be properly investigated at the direction of the Engineer by rock coring, probing or other means to determine if adequate roof thickness exists between the top of the tunnel or opening and subgrade elevation. Planned roof collapse may be required if the roof thickness is not adequate and should be backfilled with durable broken stone from roadway excavation. Positive drainage of the tunnels or openings shall be provided through the use of pipe underdrains or other suitable drainage means.
- Any mine tunnels or horizontal auger openings in mined out areas which are exposed in cut slopes or under a proposed embankment shall be sealed at the direction of the Engineer. Pneumatic backstowing with durable stone will be required to fill any voids at

the direction of the Engineer. Positive drainage shall be provided through the use of pipe underdrains, surface ditches or other suitable drainage means.

- Any coal encountered at or within 4 feet of planned grade shall be removed to a depth of 4 feet below planned grade. The Contractor shall not perform additional undercutting to recover coal unless prior approval of the Engineer has been obtained. Any such undercutting at or near grade for recovery of coal shall be backfilled with sandstone or other approved durable rock in 2 foot lifts and positive drainage shall be maintained.
- Wet areas could require stabilization for embankment construction. Likewise, subgrade soils under any existing pavements could be very wet and might require stabilization if pavements are removed.
- A working platform may be required in wet/ soft foundation soils.
- Any new bridges will likely be designed for a non-yielding foundation utilizing H-piles and/or spread footings bearing on bedrock or approved granular material.
- Adequate drainage will be of primary concern with any new design or new construction since the soils in the area are anticipated to be silty in nature. Positive drainage should be promoted at all times during construction. Mitigation of surface runoff should be performed by silt checks, silt traps, sediment basins and lined ditches where appropriate and directed toward permanent drainage structures as soon as possible.
- New roadway embankments or cut slopes for new construction will likely be required for any alignment chosen within the study area. Any embankments constructed at 2H:1V or flatter will likely provide an acceptable factor of safety for embankments. Soil cuts in the residual soils and mine spoils can be problematic due to softening of the clays upon exposure in the cuts. Soil cut slopes should not be steeper than 2H:1V.

- Pyritic shales were not specifically indicated by mapping to exist within the study area. However, carbonaceous black shale may be present especially near coal seams which may contain pyrite. If encountered during any further geotechnical investigation, any design for widening, realignment, etc. should avoid these shales to minimize the potential for acidic runoff from surface drainage which may encounter this formation in open cuts or if utilized as embankment material. If encountered during construction, special treatment may be required to minimize the potential for acidic runoff if this bedrock is exposed. Placement of such pyrite bearing shales within embankment would require encapsulation with clay or non-durable shale.
- Much of the study area appears to have been mined previously based on review of available geologic and mine mapping as well as field observations. Underground mine maps and geologic maps reviewed during research indicates seams that lie within and near the study area including the Hazard No. 7 and Hindman coal seams have been mined in the past. Underground workings beneath the study area were indicated to have been mined near Elevations from 1166 to 1188. Surface mining and auger mining was also indicated to have occurred within and near the study area. Any new construction will likely encounter mine spoil along portions of any new alignment in the study area and may encounter or could overlie underground workings. While many factors would determine whether any future mining would be feasible (value of coal deposits, technology, fuel costs, etc) it is estimated that because of existing development and past mining activity that the most likely areas for future mining potential would lie within the southern half of the study area.
- No oil or gas wells were identified through review of online mapping or during field review of the study area, however several were noted proximate to the study area. Any oil or gas wells identified prior to or during construction should be closed in accordance with Section 708 of the current edition of the Standard Specifications for Road and Bridge Construction.

- No monitoring wells or other water wells were indicated to lie within the study area upon review of online mapping, however it is possible a few exist within the study area. Any water wells, cisterns, manholes or catch basins not incorporated into any new design and identified prior to or during construction should be closed in accordance with Section 708 of the current edition of the Standard Specifications for Road and Bridge Construction.
- A list of previously completed Geotechnical Investigations proximate to the study area is included below. These reports can be accessed through the KYTC Geotechnical Branch Database.

List of Projects & Reports

Project ID	Project Type	Project Description
R-020-2000	Roadway	Relocated KY 15
R-007-1980	Roadway	Hazard-Booneville Road (KY 28)
R-033-1978	Roadway	Hazard-Watergap Road (KY 80)
RA-008-2015	Roadway Addendum	KY 15 Reconstruction (Morton Blvd to Bonnyman)
L-004-1995	Landslide	KY 476, Milepost 18.7
S-140-2013	Wall	KY 15 Retaining Wall
S-207-2014	Wall	KY 15 Retaining Wall
S-017-2012	State Bridge	KY 476 over Troublesome Creek
S-066-2001	Bridge	Buckhorn Creek Road over Troublesome Creek
LA-001-2016	Landslide Memo	KY 1278 Approximate Milepost 2.35

6 SUMMARY

Much of the entire study area has been mined previously. Challenges to construction of any new alignment would likely be derived from previous mine activity including construction within mine spoil materials and potential subsidence due to previous underground mining activity or areas that were not reclaimed properly after surface mining. Two mine portals are indicated to lie within the study area and a third is very close to the boundary of the study area. During the field review, the area near the Wendell H. Ford Terminal Road intersection with Fly By Hazard Road

was reviewed for one of the portals. Several indicators were observed which indicated previous mining activity, however an actual portal was not observed and may have been sealed off or collapsed. There is a high probability that the proposed alignment nearest to KY 15 will terminate near the suspected portal. Extensive review of available mining records should be conducted along with settlement analyses to determine the potential for settlement in reclaimed areas. Since the area is prone to landslides, contains significant relief and has been previously mined, measures to increase factors of safety will likely be required for construction of any significant embankments. Some of these measures include construction with flatter than typical slopes, zoning of embankment materials, avoidance of past mines, especially underground mines and adits; promotion of surface and subsurface drainage, promotion of vegetation growth and construction of retaining walls may be required. Actual recommendations for slope geometries and means of stabilization would follow a thorough geotechnical investigation. Several landslides were previously identified proximate to the study area. The alignment near the airport will also be bound to a large degree by terrain and residential development near the airport.

Photograph Number	Approximate Latitude	Approximate Longitude
1	37.381587	-83.259568
2	37.381276	-83.259224
3	37.378568	-83.255818
4	37.374382	-83.254845
5	37.371886	-83.252078
6	37.360403	-83.261391
7	37.375634	-83.247457
8	37.370754	-83.258926
9	37.360457	-83.260787

10	37.370777	-83.258551
11	37.370661	-83.248238
12	37.371449	-83.252963
13	37.371117	-83.253722

Site Photographs



Figure 1 Approach to FBO



Figure 2 Hollow area in front of FBO



Figure 3 Pavement distress near airport



Figure 4 Approach to residential area



Figure 5 Open rock face along current access road



Figure 6 Rock Cut on Trus Joist Lane near KY 15



Figure 7 Reclaimed area near airport



Figure 8 Remediated landslide area



Figure 9 Trus Joist Lane approach to KY 15



Figure 10 Permit Information Sign



Figure 11 Mined out area east of study area

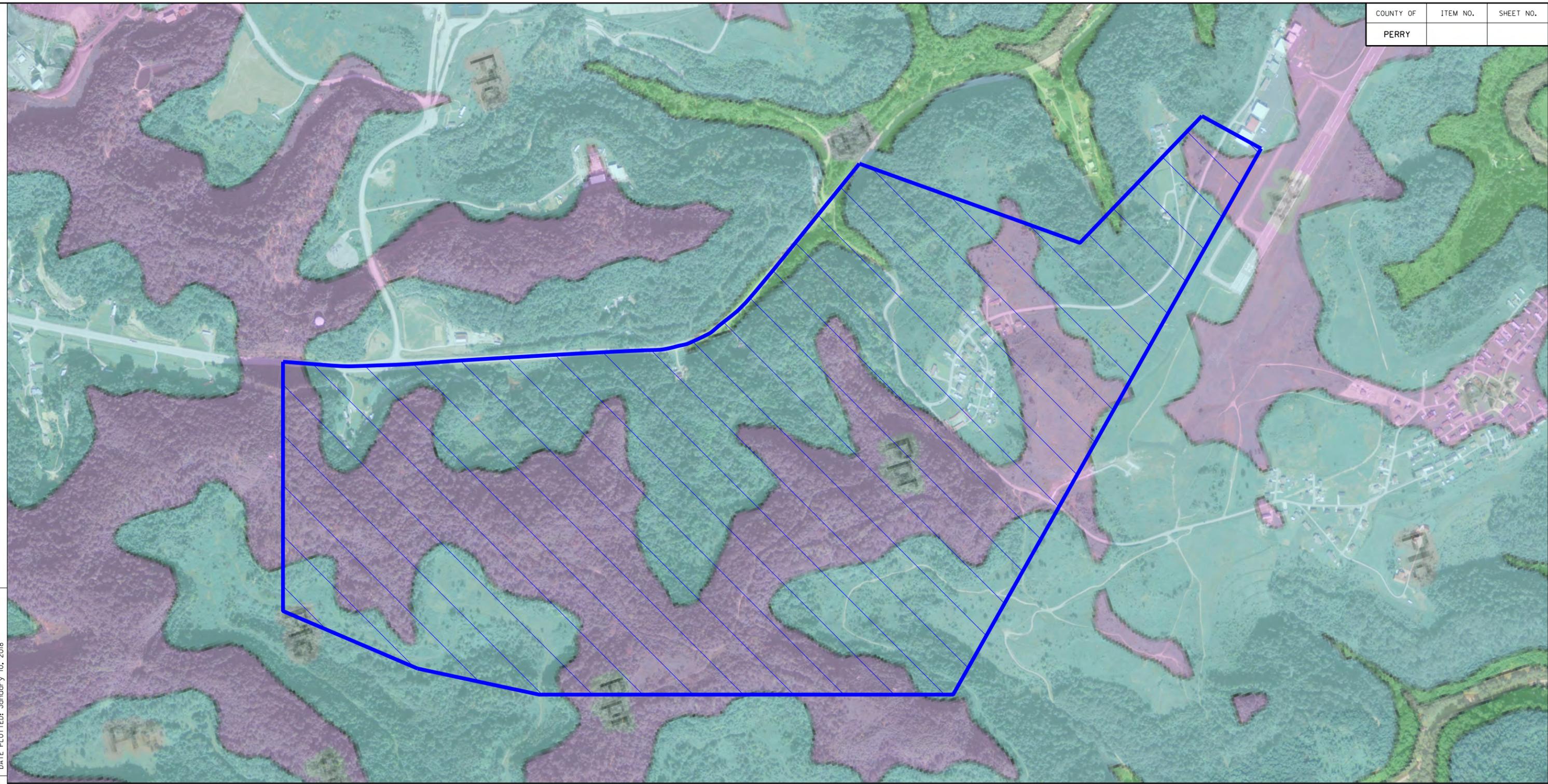


Figure 12 Debris observed near map indicated mine portal



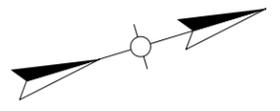
Figure 13 Abandoned pipe near map indicated mine portal

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LEGEND

- | | |
|---|---|
|  Ppr Princess Formation
(Middle Pennsylvanian-Middle Pennsylvanian) |  Qal Alluvium
(Quaternary-Quaternary) |
|  Ph Hyden Formation
(Middle Pennsylvanian-Middle Pennsylvanian) |  Pfc Four Corners Formation
(Middle Pennsylvanian-Middle Pennsylvanian) |
|  Approximate Study Area | |

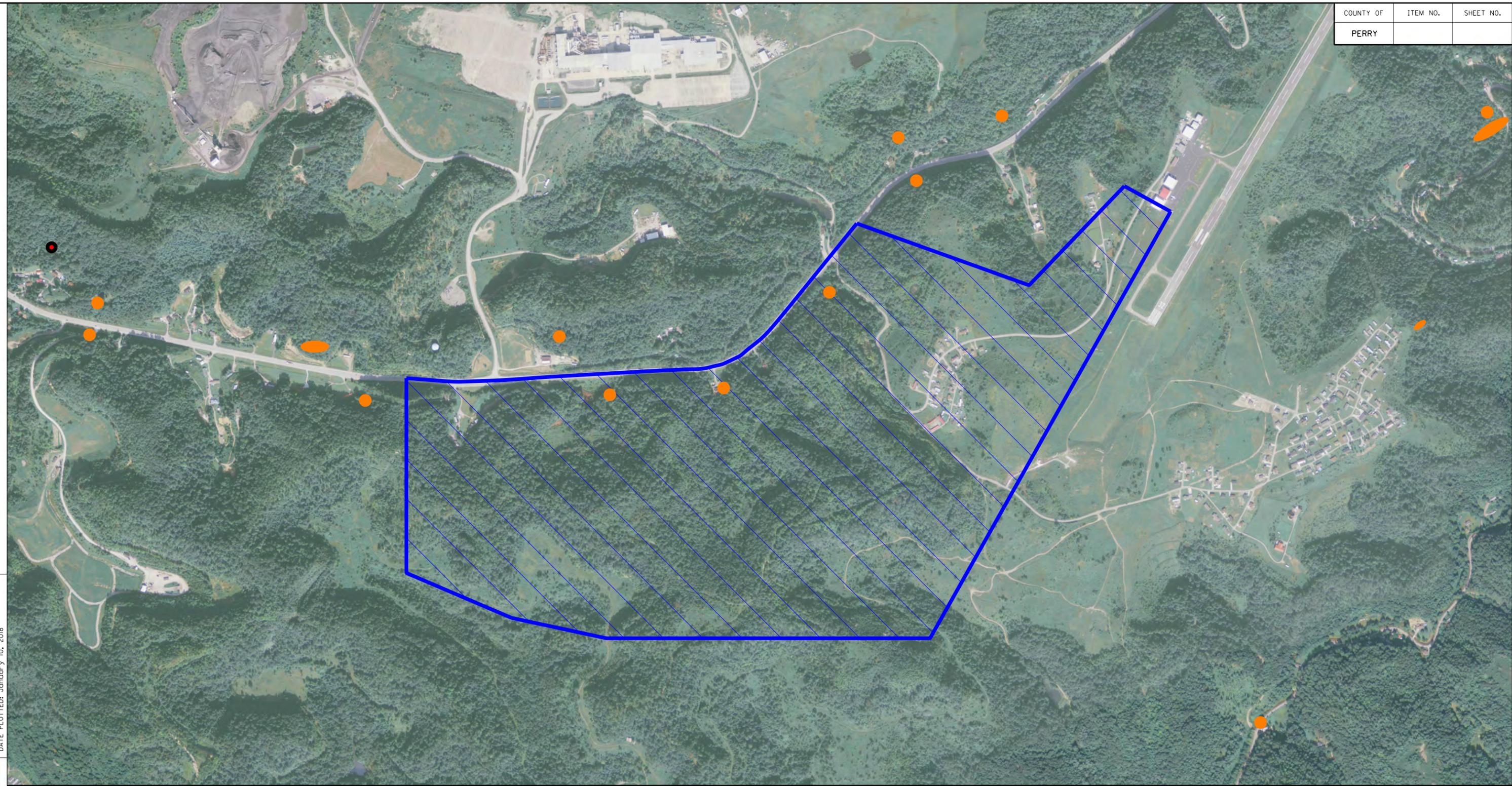


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 1" = 400' VERTICAL

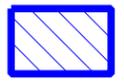
WENDELL H. FORD AIRPORT ACCESS ROAD
 GEOTECHNICAL OVERVIEW
 GEOLOGIC MAP

COUNTY OF	ITEM NO.	SHEET NO.
PERRY		

MicroStation v8.11.9.459 E-SHEET NAME: USER: jchiladdress DATE PLOTTED: January 10, 2018 FILE NAME: F:\GEO TECH SUPPORT\KYTC\217-360 WENDELL H. FORD AIRPORT ACCESS ROAD\REPORT\WENDELL H LANDSLIDES.DGN



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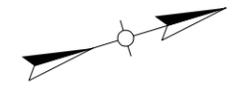
Approximate Study Area



KGS Landslide Inventory Data



Landslide Areas Derived From Aerial Photography

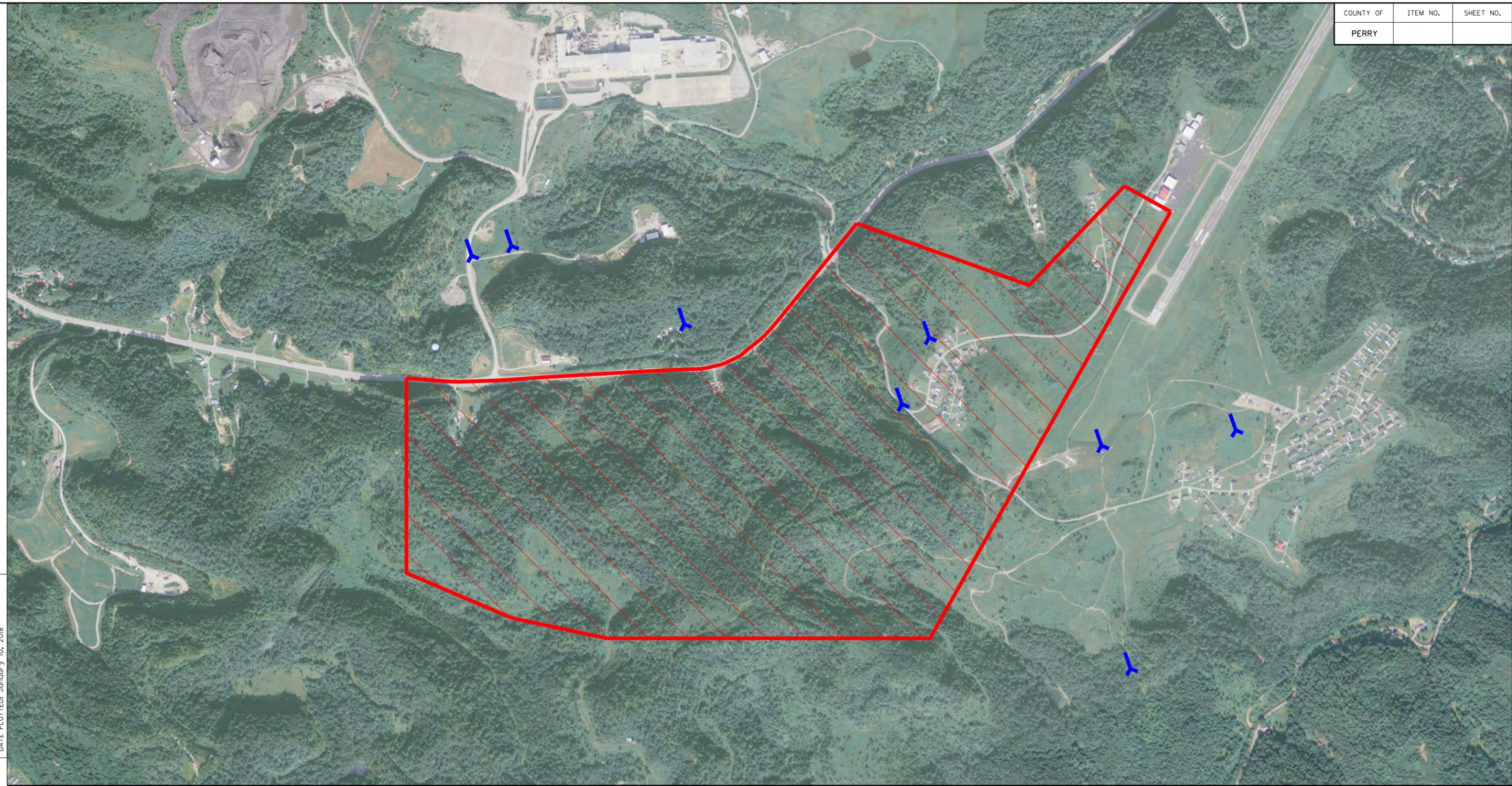


SCALE: 1" = 500' HORIZONTAL
1" = 500' VERTICAL

WENDELL H. FORD AIRPORT ACCESS ROAD
GEO TECHNICAL OVERVIEW
LANDSLIDE DATA MAP

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PERRY		

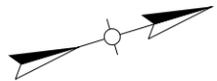
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LEGEND

 Approximate Study Area

 Mine Portal - Drift

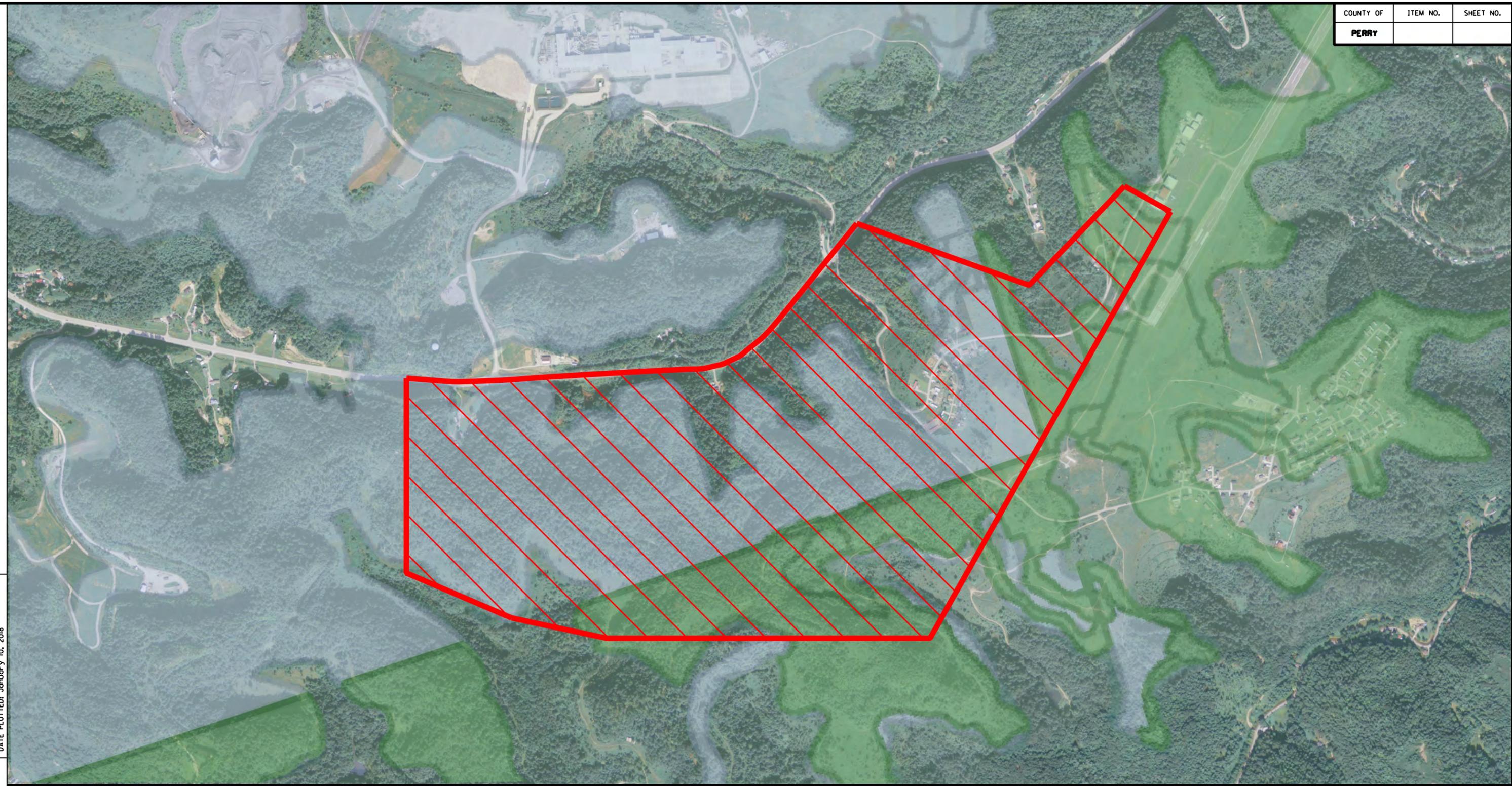


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1" = 500' VERTICAL

WENDELL H. FORD AIRPORT ACCESS ROAD
GEO TECHNICAL OVERVIEW
MINE PORTALS MAP

COUNTY OF	ITEM NO.	SHEET NO.
PERRY		

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LEGEND

- Ky Mined Out Areas**
- Mined Out Areas
 - Active
 - Inactive
 - Unknown



Approximate Study Area



SCALE: 1" = 500' HORIZONTAL
1" = 500' VERTICAL

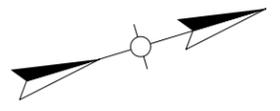
WENDELL H. FORD AIRPORT ACCESS ROAD
GEO TECHNICAL OVERVIEW
MINED AREAS MAP

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LEGEND

-  Approximate Study Area
-  Other Well
-  Domestic Well
-  Spring



SCALE: 1" = 400' HORIZONTAL
 1" = 400' VERTICAL

WENDELL H. FORD AIRPORT ACCESS ROAD
 GEOTECHNICAL OVERVIEW
 WELLS AND SPRINGS MAP

Mine
Headframe
File
Free-4
5 mine

RECEIVED
APR 21 1979

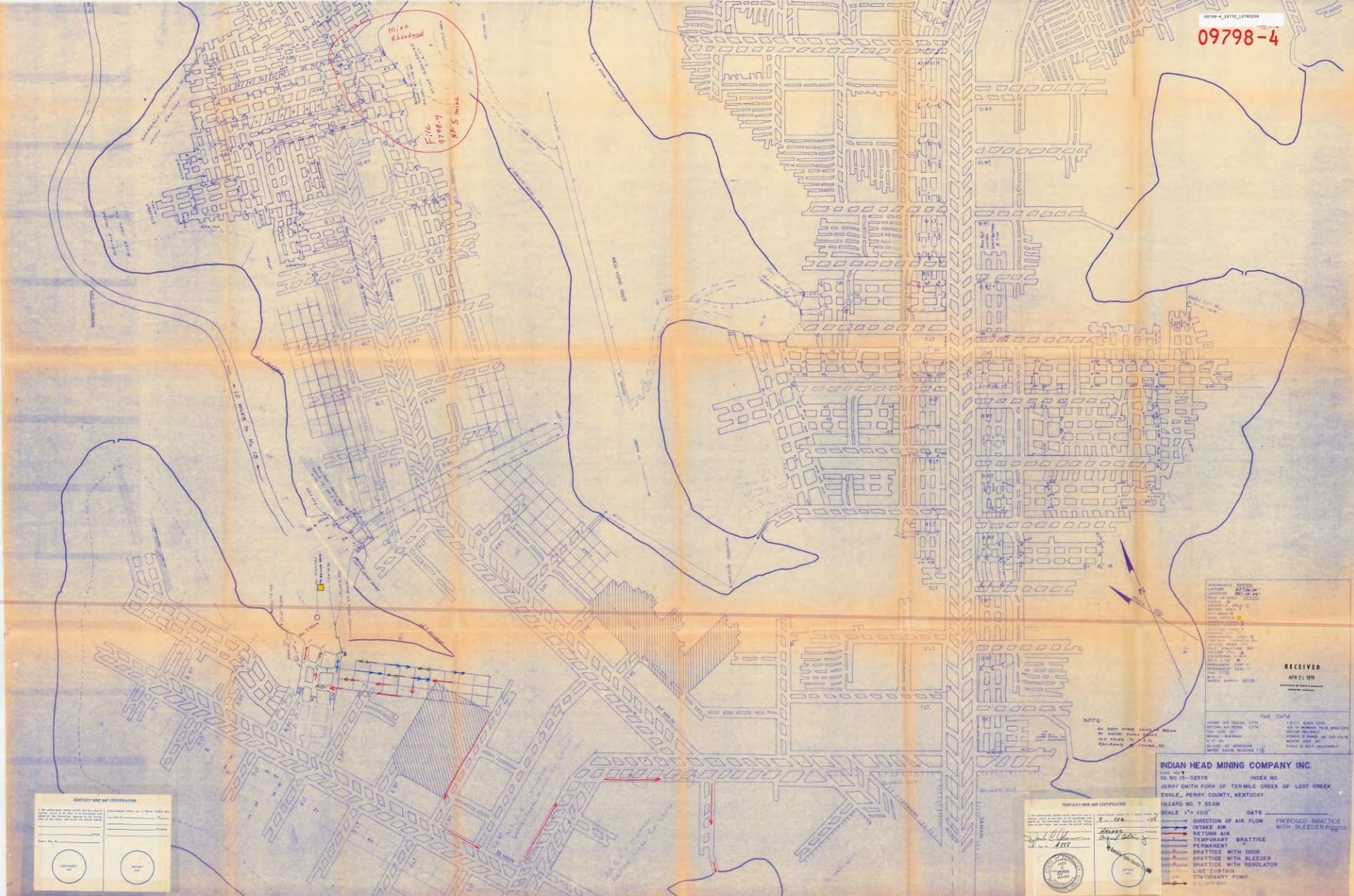
NOTE: DO NOT WALK UNDER
NO WATER PUMP HOUSE
WALK UNDER
RAILROAD IN WEST
KENTUCKY, KY.

INDIAN HEAD MINING COMPANY INC.
10 NO 15-02378 INDEX NO.
HENRY SIXTY-FORK OF TEN-MILE CREEK OF LOST CREEK
ENGLE, PERRY COUNTY, KENTUCKY
HAZARD NO. 7 BEAM

SCALE 1" = 100'
DATE
DIRECTION OF AIR FLOW
INTAKE AIR
RETURN AIR
TEMPORARY BRATTICE
PERMANENT BRATTICE WITH DOOR
BRATTICE WITH BLEEDER
BRATTICE WITH REGULATOR
LINE CURTAIN
STATIONARY PUMP
D.C. PIPEWAY

KENTUCKY MINE MAP CERTIFICATION
I, James Earl, M.S.E., M.E., P.E.,
of the State of Kentucky, do hereby certify that the
above map was prepared by me or under my direct
supervision and that it is a true and correct
copy of the original map on file in my office.
JAMES EARL
M.S.E., M.E., P.E.
KENTUCKY DEPARTMENT OF REVENUE
DIVISION OF MINE SAFETY AND HEALTH

KENTUCKY MINE MAP CERTIFICATION
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copy of the original map on file in my office.
JAMES EARL
M.S.E., M.E., P.E.
KENTUCKY DEPARTMENT OF REVENUE
DIVISION OF MINE SAFETY AND HEALTH



NOTE: DID NOT OPERATE - FROM 1974 ANNUAL REPORT^{cfm}

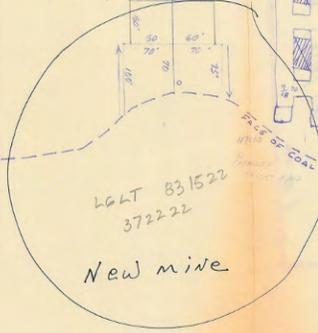
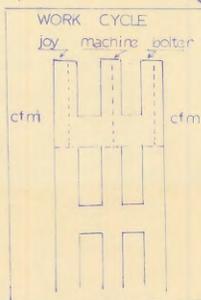
11960_1974L_19741023

11960

Fire Clay Top
15" Coal
10" RASH & KE
3" Coal
2" Fire Clay
5" Coal
1/2" Fire Clay
3" Coal
2" SORE
3/4" Coal
3/4" Fire Clay
15" Coal
COAL BOTTOM

District 831535
372230

JOHN NAPIER (FEE)



PUGH BROTHERS COAL CO.

(PONY B TRACK)

SUPT. LEWIS PUGH JR

EDGAR PUGH FOREMAN P.O. BOX 1076 HAZARD, KY PH 439 1493

NO 7 SEAM SCALE 1"=100'

LONG BRANCH OF ROCKHOUSE FORK PERRY CO. KY

MINE INDEX NO. _____ USBM NO. _____

- ▬ PERMANENT STOPPING
- ▬ STOPPING WITH HANDBOOK
- ▬ CHECK CURTAIN
- LINE CURTAIN
- INTAKE AIR
- RETURN AIR
- ESCAPE WAY

NOBLE QUAD LON 83°15' LAT 37°22'
INDEX NO 850

LONG BRANCH

NO. 3 MINE

NO. 4 MINE

KENTUCKY MINE MAP CERTIFICATION

I, the undersigned, hereby certify that this map is correct, above to the best of my knowledge and belief all the information required by the mining laws of this State, and covers the period ending

25 days of Oct. 1974

10-23-74
Howard L. Cook ENGR.

Eng'g. Reg. No. 2552

Perry Co. Kentucky
Phyllis G. Owsen

ENGINEER'S seal

NOTARY seal

ROCKHOUSE FORK

WORK ROOMS ON ADVANCE