PRELIMINARY GEOTECHNICAL REPORT

Wildwood Commerce Park Expansion
Abandoned Mine Impact Assessment
Carroll County, Virginia

Schnabel Reference # 25160017.000
April 11, 2025

Schnabel ENGINEERING
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April 11, 2025

Mr. Robbie Cornett
Senior Project Manager
Thompson & Litton, Inc.
100 Fifth Street
Suite 400
Bristol, Tennessee 37620

Subject: **Preliminary Geotechnical Engineering Report, Wildwood Commerce Park Expansion, Abandoned Mine Impact Assessment, Austinville, Carroll County, Virginia**

Dear Mr. Cornett:

SCHNABEL ENGINEERING, LLC is pleased to submit our preliminary geotechnical engineering report for this project. This study was performed in accordance with our proposal dated February 25, 2025 and the Agreement to Provide Professional Services dated March 17, 2025.

1.0 SCOPE OF SERVICES

The objective of this study is to provide a preliminary evaluation of the potential impact of existing mineworks on the proposed development. Our scope of services included:

- Site reconnaissance to observe existing abandoned mine features in the planned expansion area, including excavated mining pits, subsidence depressions, vertical shafts, and horizontal mine entrances.
- Desktop evaluation of available data to estimate the extent of mineworks beneath the expansion area.
- Initial assessment of the potential impact of existing mineworks on the proposed development, including preliminary recommendations for siting of structures and mitigation of existing mine features that may be necessary prior to site development and building construction.

2.0 PROJECT DESCRIPTION

We understand that Thompson & Litton (T&L) has been retained by the Blue Ridge Economic Development Authority (BREDA) to prepare a Master Plan for a 45-acre site development in the southeast portion of the Wildwood Commerce Park in the Austinville area of Carroll County, Virginia. As part of Master Plan preparation, T&L is interested in addressing the potential impacts of existing mine features on the development of the 45-acre pad. A Pad Plan provided by your office indicates development will include an approximately 3,300 ft extension of the existing park access road from its current termination to a new cul-de-sac at the southwest corner of the expansion. Two large stormwater management ponds will be constructed to service the new pad, with a 3.5-acre pond at the south end and a 2.6-acre pond at the north end. About 1.1 million cubic yards of cut and 930,000 cubic yards of fill will be required to grade the pad. Cut and fill depths of up to about 40 ft are expected to achieve proposed grades.

3.0 PREVIOUS SUBSURFACE EXPLORATIONS BY OTHERS

Draper Aden Associates (DAA) performed a geotechnical engineering study of the Wildwood Commerce Park site in 2012. The study identified site stratigraphy comprised of residual soils generally consisting of elastic silt (MH), sandy silt (ML), and silty sand (SM) overlying weathered rock derived from metasedimentary rocks of the Ashe Formation. The western part of the site is crossed by a relatively narrow, northeast/southwest trending belt of sulfide deposits known as the Gossan Lead. The sulfide deposits in the Gossan Lead were historically mined, typically for copper, iron, lead and some other minerals.

The DAA study included a geophysical exploration of a portion of the site where they had identified some abandoned mine features, including suspected mine tailings piles, trenches shafts and entrances. This geophysical survey was performed in the northwest corner of the site where DAA identified approximately 13 suspicious features at the ground surface. DAA performed six electrical resistivity transects to explore the subsurface for underground mine excavations. The DAA resistivity profiles suggested that there are underground mine workings, some of which have likely caved in, and some which may remain partially or completely open and air-filled. The length of the area explored by DAA was limited to about 400 ft in a NE-SW alignment. From the geophysical data, DAA interpreted the depth of the mines generally in the range of 30 to 60 ft.

DAA drilled six test borings in the western part of the site in the vicinity of the Gossan Lead. Three of the borings were terminated at depths of 30 to 50 ft without encountering refusal on rock. Three of the borings encountered refusal at depths of 31 to 44 ft. The deep residual soil profile suggests that the old mine works were likely excavated in soil or disintegrated rock materials.

4.0 DESKTOP RESEARCH

4.1 Mine Database(s)

The USGS Mineral Resources Data System identifies a former mine on the subject site. The Sarah Ellen Mine, also known as the Vaughn Mine, reportedly operated between 1856 and 1859, primarily to extract copper ore. A report by R.O. Currey (1859) noted that the mine had 304.9 M (1,000 ft) of levels and 53.3 M (175 ft) of shafts.

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The Virginia Division of Minerals and Resources field checked the site in 1987 and noted the following: *Much of the area has been clear-cut, but not bulldozed. Small pits, cross-cut trenches, and possible collapsed shafts are visible from the collapsed portal trenches, and possible collapsed shafts are visible from the collapsed portal location almost up to the interstate. Interstate 77 cuts through the original extent of the Sarah Ellen workings, cutting them into smaller segments and probably destroying some.*

Schnabel reviewed imagery obtained from the Virginia LiDAR Inventory web map to identify suspected abandoned mine features on the site. From the LiDAR mapping, Schnabel identified 27 features on the site that we suspected were mine pits, trenches or subsidence features. Schnabel arbitrarily numbered these features Nos. 1 through 27, starting at the southwest corner near Interstate I-77 and progressing northeastward. The mine features are shown on the LiDAR hill shade image on Figure 1, Feature Location Plan.

5.0 SITE RECONNAISSANCE

Schnabel personnel performed a site reconnaissance on March 25, 2025 to observe the suspected abandoned mine features noted on the LiDAR mapping. The site is forested, and many of the mine features are surrounded by rhododendron thickets. Schnabel observed, measured and photographed each of the 27 features. We documented an additional feature located between Features 12 and 13, and named it Feature 13A. Photographs and brief descriptions are presented on the Mine Feature Documentation sheets in Appendix A. Our descriptions include the approximate width and depth of the features and some narrative of specific observations. The mine features are in a relatively narrow band trending southwest to northeast. The width of the band is on the order of 120 ft. The observed features include what appear to be both horizontal and vertical mine entries.

6.0 PRELIMINARY RECOMMENDATIONS

We based our preliminary geotechnical engineering analysis on the information developed from our desktop study and site visit, along with proposed site grading plans. Thompson & Litton provided us the Master Plan, Sheet No. Ex.2 dated 2/12/25, showing proposed pad grading. The proposed grading of a 45-acre pad will disturb approximately 80 acres and require over 1 million cubic yards of earthwork. The mine features and the proposed grading contours are shown on Figure 2, Proposed Site Grading Plan. The western side of the site, where the historic mining occurred, will be cut down significantly to grade the pad. Table 1 below summarizes the mine features, existing ground elevations, proposed elevations based on the Master Plan, and the amount of cut or fill proposed at the feature locations. The existing ground surface elevations were estimated from available topographic mapping, and should be considered an approximate average elevation of the area around the feature and not any particular point within the feature.

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Table 1: Wildwood Commerce Park - Abandoned Mine Features

Feature	Approx. Exist. GS EL	Approx. Proposed EL	Delta (-cut) (+fill)	Feature	Approx. Exist. GS EL	Approx. Proposed EL	Delta (-cut) (+fill)
1	2653	2652	-1	14	2654	2625	-29
2	2654	2636	-18	15	2634	2627	-7
3	2656	2637	-19	16	2649	2626	-23
4	2662	2632	-30	17	2641	2626	-15
5	2668	2640	-28	18	2636	2625	-11
6	2659	2627	-32	19	2652	2626	-26
7	2668	2636	-32	20	2646	2625	-21
8	2659	2627	-32	21	2639	2624	-15
9	2663	2627	-36	22	2624	2622	-2
10	2663	2627	-36	23	2624	2620	-4
11	2663	2627	-36	24	2610	2595	-15
12	2671	2629	-42	25	2606	2586	-20
13	2661	2627	-34	26	2590	2570	-20
13A	2671	2629	-42	27	2558	2566	8

Relative to the estimated approximate existing ground surface elevations, all the features are in proposed cut areas, except for Feature 27 which is beneath the embankment of the proposed 2.5-acre pond at the northern end of the development. Within Feature 27 there is a horizontal mine adit of undetermined length, trending southward. Our personnel could see about 20-ft into the adit and noted that it is inclined downward. Features 24, 25 and 26 are also within the proposed pond area, although they are on the western side, where cut is required to grade the facility. Feature 24 is a vertical shaft that extends at least 57 feet deeper than the planned excavation grade for the pond. This shaft likely connects with other underground mine tunnels. There is significant potential for mine workings to be connected underground from Features 24 through 27, which raises concerns about potential pond leakage, settlement, hydraulic fracturing and blowout of the pond embankment/abutment. It is Schnabel's recommendation that the proposed pond be moved eastward to take it off the known mine features. Constructing the pond at its currently proposed location would require an extensive subsurface investigation and grouting program to mitigate the mine hazards.

Assuming the pond is moved to situate Feature 24 within a reconfigured site Pad, we recommend that Feature 24 feature be filled before site grading occurs. We anticipate that a suitable filling strategy would be a combination of VDOT No. 1 or No. 3 stone fill and flowable fill (Controlled Low Strength Material, or CLSM).

Feature 15 is in a large, disturbed area that appears to have a horizontal mine adit extending south/southwest that likely extends deeper than the proposed Pad cut grade. We recommend that the adit in Feature 15 be filled with flowable fill (CLSM) prior to commencement of site grading over the feature.

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Features 8 and 9 have been used for dumping of trash and debris, so the trash/debris will have to be removed and disposed of in an appropriate regulated landfill prior to initiation of site grading. After trash removal, the Geotechnical Engineer should be allowed to evaluate the characteristics of Features 8 and 9 to prior to site grading.

Features 1, 22 and 23 are located close to the proposed Pad cut/fill line, and the feature depths below the ground surface are greater than the anticipated depth of cut. Feature 22 is possibly a vertical shaft, with an apparent bottom about 9 ft below planned site cut grades. Feature 22 should be explored with an excavator to confirm the depth of the feature bottom, and then it should be filled with a mixture of CLSM and No.1 or No. 3 stone. Features 1 and 23 should also be explored using an excavator to characterize the features prior to site grading.

In the Pad Area, the planned deep cuts to grade the site may extend below some of the mine tunnels, but it is likely that some mines extend deeper than the planned excavation grades. The actual depths of the mines are unknown, but we lowered a tape 72 ft into Feature 24, and DAA geophysical data suggested anomalies extending to around 60 ft deep. After the site grading, we recommend that the locations of all the mine features identified in this report be re-established in the field via survey. We recommend that a program of ground improvement be implemented after completion of site grading over the band of mine features. We estimate that the band of ground improvement would be about 150 ft wide, extending from Feature 1 in the southwest corner of the site northeastward to Feature 27, a distance of roughly 2,200 feet. Based on the limited amount of soil data from the DAA geotechnical report, we anticipate that dynamic compaction may be an effective means of ground improvement. Dynamic compaction is often used to improve/compact old mine spoil fill. The process involves the repeated dropping of a heavy tamper from the boom of a crane to impact the ground. These impacts compact the soil and collapse near-surface voids. Practical improvement depths typically range from 15 to 20 ft. The technique is typically effective in compacting granular materials that are not saturated, which appear to be the conditions that were encountered at depth in the DAA borings.

Contractors working to develop the site should be made aware of the presence of shallow underground mine cavities that have the potential to collapse under equipment loads and vibrations. Contractors should plan their work accordingly to ensure safe construction operations.

7.0 LIMITATIONS

We based the analyses and preliminary recommendations submitted in this report on the information revealed by our desktop study and site reconnaissance. We attempted to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during subsequent studies and construction.

The recommended mine feature treatments and ground improvement strategies are not necessarily adequate for support of moderately to heavily loaded structures, or settlement sensitive structures. Any entity that develops this site should consider their specific building loads, locations and grades, and should investigate the site subsurface and develop foundation systems that are appropriate for their specific needs.

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We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project. No other representation, express or implied, is included or intended, and no warranty or guarantee is included or intended in this report or other instrument of service.

We appreciate the opportunity to be of service for this project. Please call us if you have any questions regarding this report.

Sincerely,

SCHNABEL ENGINEERING, LLC



Steven E. Conner, PE
Principal



Steven J. Winter, PE
Principal

SEC:SJW:rl

Figures
Appendix A: Mine Feature Documentation (16 sheets)
Appendix B: USGS Report – Sarah Ellen Mine

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FIGURES

Figure 1: Feature Location Plan
Figure 2: Proposed Site Grading Plan

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200 0 200 400 ft

N

01 02 03 04 05 06 07 08 09 10 11 12 13A 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

Legend

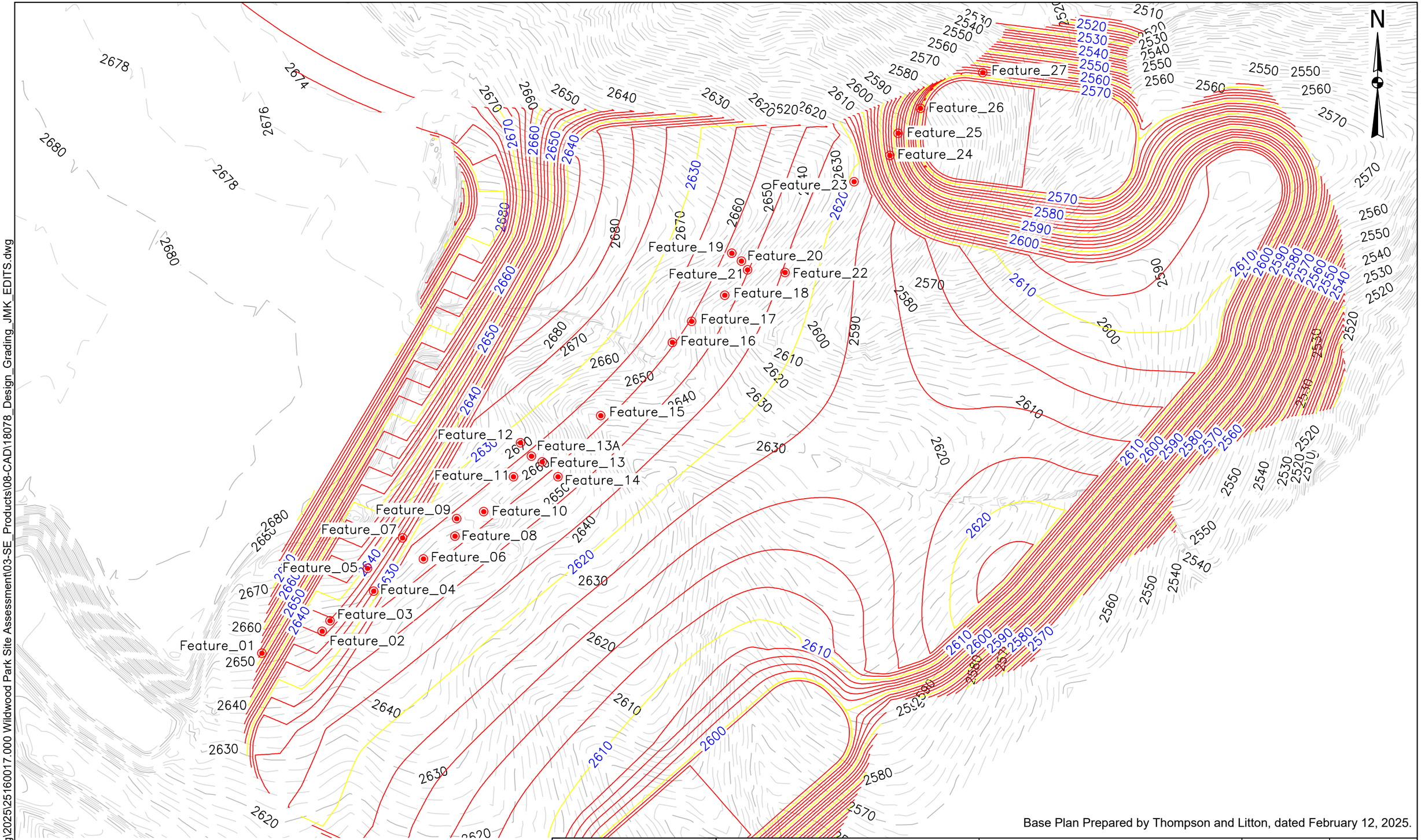
Investigation Features

U.S. Geological Survey, 20210629, USGS 1 Meter 17 x51y408 VA_FEMA-NRCS_SouthCentral_2017_D17: U.S. Geological Survey.

Schnabel ENGINEERING

WILDWOOD COMMERCE PARK
AUSTINVILLE, CARROLL COUNTY, VIRGINIA

Figure Name:	Done:	Figure Number:
FEATURE LOCATION PLAN	J. KRELL	1
Project Number:	**Reviewed:**	**Date:**
25160017.000	S. CONNER	APR 2025



Base Plan Prepared by Thompson and Litton, dated February 12, 2025.

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WILDWOOD COMMERCE PARK
AUSTINVILLE, CARROLL COUNTY, VIRGINIA

Figure Name:	Done:	Figure Number:
PROPOSED SITE GRADING PLAN	J. KRELL	2
Project Number:	**Reviewed:**	**Date:**
25160017.000	S. CONNER	APR 2025

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APPENDIX A

MINE FEATURE DOCUMENTATION

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FEATURE NO.: 1

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3451626.9093

Easting: 10803300.8107

COMMENTS:

16-ft diameter, 6-ft deep.

Approx. Exist. G.S. El. 2653
Proposed G.S. El. 2652

1-ft of cut planned for grading



FEATURE NO.: 2

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3451676.7159

Easting: 10803438.2769

COMMENTS:

18-ft diameter, 6-ft deep

Approx. Exist. G.S. El. 2654
Proposed G.S. El. 2636

18-ft of cut planned for grading

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FEATURE NO.: 3

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3451700.623

Easting: 10803456.2072

COMMENTS:

7-ft diameter, 2-ft deep.

Approx. Exist. G.S. El. 2656
Proposed G.S. El. 2637

19-ft of cut planned for grading



FEATURE NO.: 4

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3451768.36

Easting: 10803555.8204

COMMENTS:

20-ft diameter, 22-ft deep
Looks like there is an adit trending west from deep part of the pit.

Approx. Exist. G.S. El. 2662
Proposed G.S. El. 2632

30-ft of cut planned for grading

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FEATURE NO.: 5

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3451820.1588

Easting: 10803541.8746

COMMENTS:

13-ft diameter, 4-ft deep.

Approx. Exist. G.S. El. 2668
Proposed G.S. El. 2640

28-ft of cut planned for grading



FEATURE NO.: 6

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3451842.0737

Easting: 10803669.3794

COMMENTS:

22-ft diameter, 7-ft deep

Approx. Exist. G.S. El. 2659
Proposed G.S. El. 2627

32-ft of cut planned for grading

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FEATURE NO.: 7

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3451889.8881

Easting: 10803621.5651

COMMENTS:

16-ft diameter, 6-ft deep.

Approx. Exist. G.S. El. 2668
Proposed G.S. El. 2636

32-ft of cut planned for grading



FEATURE NO.: 8

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3451893.8726

Easting: 10803741.1009

COMMENTS:

Trash dump with appliances. Oblong shape about 30-ft long and 11-ft wide. Bottom not visible.

Approx. Exist. G.S. El. 2659
Proposed G.S. El. 2627

32-ft of cut planned for grading

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FEATURE NO.: 9

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3451933.7178

Easting: 10803745.0854

COMMENTS:

Trash dump with tires, food cans, jars, woven wire, oil cans/filters, and a toilet. Cannot see bottom because of trash.

Approx. Exist. G.S. El. 2663
Proposed G.S. El. 2627

36-ft of cut planned for grading



FEATURE NO.: 10

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3451949.656

Easting: 10803806.8456

COMMENTS:

15-ft diameter, 8-ft deep. Appears to have 2 adits at the bottom but the roof has caved in over both adits.

Approx. Exist. G.S. El. 2663
Proposed G.S. El. 2627

36-ft of cut planned for grading

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FEATURE NO.: 11

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452029.3465

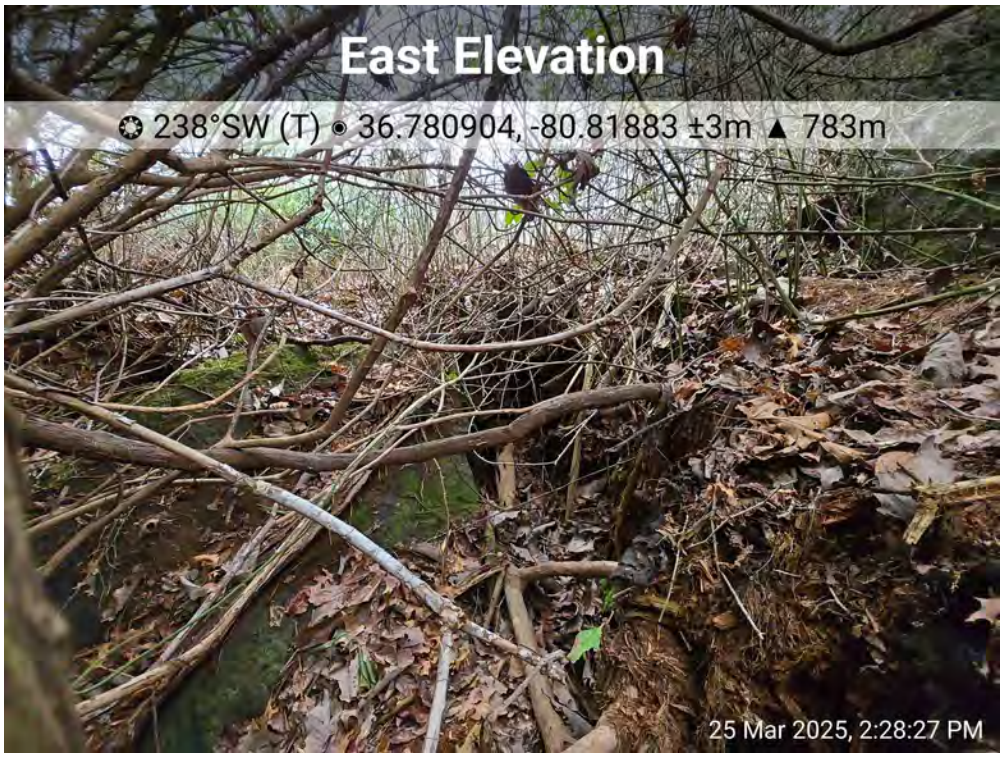
Easting: 10803874.5826

COMMENTS:

17-ft diameter, 9-ft deep.
Pit with an adit that has caved in.

Approx. Exist. G.S. El. 2663
Proposed G.S. El. 2627

36-ft of cut planned for grading



FEATURE NO.: 12

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452107.0448

Easting: 10803890.5207

COMMENTS:

10-ft diameter, 6-ft deep.

Approx. Exist. G.S. El. 2671
Proposed G.S. El. 2629

42-ft of cut planned for grading

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FEATURE NO.: 13

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452063.215

Easting: 10803940.3273

COMMENTS:

16-ft diameter, 6-ft deep. Collapsed adit trending southeast. Could reach about 4-ft into adit with a stick

Approx. Exist. G.S. El. 2661
Proposed G.S. El. 2627

34-ft of cut planned for grading



FEATURE NO.: 13A

DATE TAKEN: 03/25/2025

LOCATION:

Northing:

Easting:

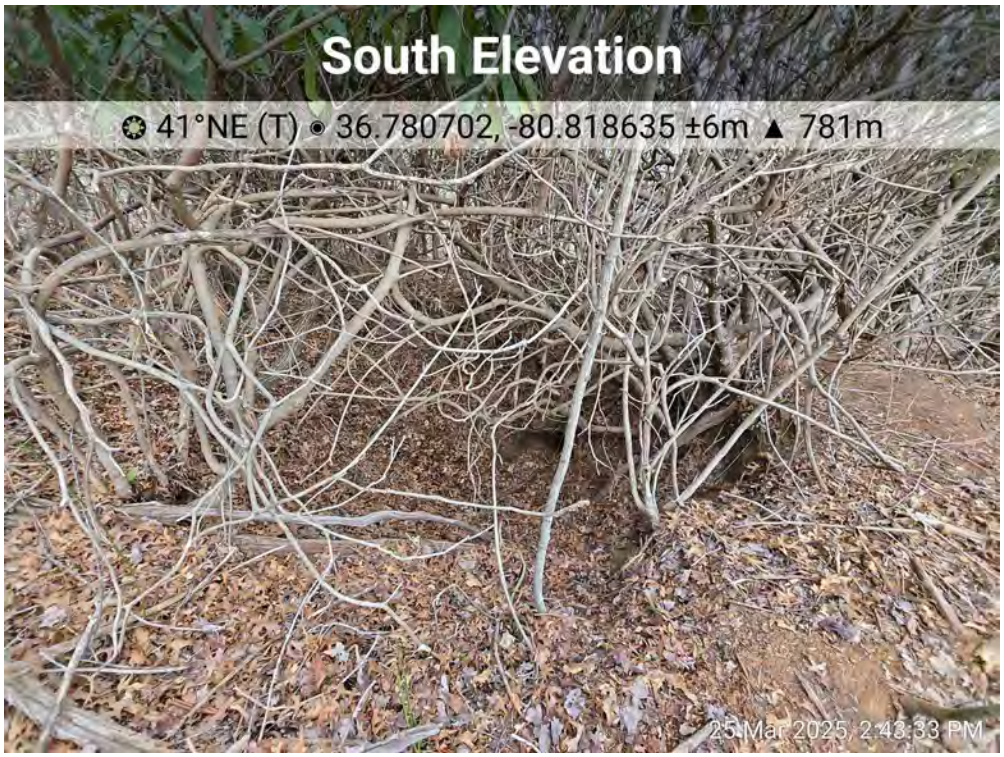
COMMENTS:

10-ft diameter, 6-ft deep.

Approx. Exist. G.S. El. 2671
Proposed G.S. El. 2629

42-ft of cut planned for grading

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FEATURE NO.: 14

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452029.3465

Easting: 10803976.188

COMMENTS:

16-ft diameter, 5-ft deep.

Approx. Exist. G.S. El. 2654
Proposed G.S. El. 2625

29-ft of cut planned for grading



FEATURE NO.: 14

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452107.0448

Easting: 10803890.5207

COMMENTS:

16-ft diameter, 5-ft deep.

Approx. Exist. G.S. El. 2654
Proposed G.S. El. 2625

29-ft of cut planned for grading

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FEATURE NO.: 15

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452168.8049

Easting: 10804073.8089

COMMENTS:

Stepped trough trending N/S. Bottom step is 40-ft long and 25-ft wide, and 7-ft deep. Upper step is 20-ft wide and 25-ft long, 5-ft deep.

Approx. Exist. G.S. El. 2634
Proposed G.S. El. 2627

7-ft of cut planned for grading



FEATURE NO.: 15

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452168.8049

Easting: 10804073.8089

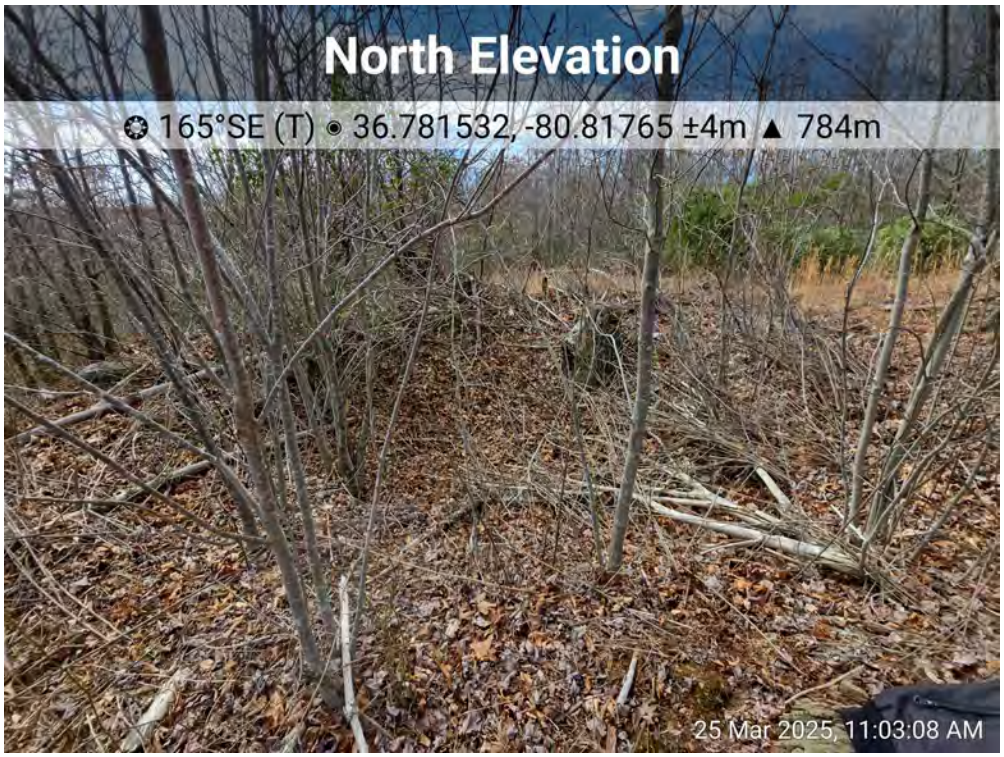
COMMENTS:

Adit in Feature 15 starts trending S and turns SW after 10 ft.

Approx. Exist. G.S. El. 2634
Proposed G.S. El. 2627

7-ft of cut planned for grading

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FEATURE NO.: 16

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452336.1551

Easting: 10804237.1745

COMMENTS:

14-ft diameter, 4-ft deep.

Approx. Exist. G.S. El. 2649
Proposed G.S. El. 2626

23-ft of cut planned for grading



FEATURE NO.: 17

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452383.9694

Easting: 10804281.0043

COMMENTS:

10-ft diameter, 4-ft deep

Approx. Exist. G.S. El. 2641
Proposed G.S. El. 2626

15-ft of cut planned for grading

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FEATURE NO.: 18

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452443.7373

Easting: 10804356.7103

COMMENTS:

8-ft diameter, 8-ft deep.

Approx. Exist. G.S. El. 2636
Proposed G.S. El. 2625

11-ft of cut planned for grading



FEATURE NO.: 19

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452539.3659

Easting: 10804372.6484

COMMENTS:

8-ft long N/S, 4-ft wide E/W,
4-ft deep

Approx. Exist. G.S. El. 2652
Proposed G.S. El. 2626

26-ft of cut planned for grading

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FEATURE NO.: 20

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452521.4356

Easting: 10804394.5633

COMMENTS:

8-ft diameter, 3-ft deep.

Approx. Exist. G.S. El. 2646
Proposed G.S. El. 2625

21-ft of cut planned for grading



FEATURE NO.: 21

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452501.5129

Easting: 10804372.6484

COMMENTS:

14-ft diameter, 4-ft deep

Approx. Exist. G.S. El. 2639
Proposed G.S. El. 2624

15-ft of cut planned for grading

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FEATURE NO.: 22

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452495.5361

Easting: 10804494.1765

COMMENTS:

17-ft diameter, 11-ft deep.

Approx. Exist. G.S. El. 2624
Proposed G.S. El. 2622

2-ft of cut planned for grading



FEATURE NO.: 23

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452702.7315

Easting: 10804651.5653

COMMENTS:

20-ft diameter, 8-ft deep

Approx. Exist. G.S. El. 2624
Proposed G.S. El. 2620

4-ft of cut planned for grading

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FEATURE NO.: 24

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452762.4994

Easting: 10804733.2481

COMMENTS:

Deep shaft. 21-ft diameter at the top, total depth is 72-ft. The top slopes down for 11ft and the shaft below is 61-ft deep.

Approx. Exist. G.S. El. 2610
Proposed G.S. El. 2595

15-ft of cut planned for grading



FEATURE NO.: 25

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452813.3022

Easting: 10804752.1746

COMMENTS:

Three depressions, 3 to 4-ft deep and 7 to 15-ft across

Approx. Exist. G.S. El. 2606
Proposed G.S. El. 2586

20-ft of cut planned for grading

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FEATURE NO.: 26

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452870.0817

Easting: 10804802.9773

COMMENTS:

Circular depression, 11-ft diameter, 6-ft deep.

Approx. Exist. G.S. El. 2590
Proposed G.S. El. 2570

20-ft of cut planned for grading



FEATURE NO.: 27

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452951.7645

Easting: 10804945.4242

COMMENTS:

136-ft long trench that varies in width from 10-ft at the south and north ends, and 23-ft at the midpoint.

Approx. Exist. G.S. El. 2558
Proposed G.S. El. 2566

8-ft of fill planned for grading

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FEATURE NO.: 27

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452951.7645

Easting: 10804945.4242

COMMENTS:

Horizontal adit trending southward.

Approx. Exist. G.S. El. 2558
Proposed G.S. El. 2566

8-ft of fill planned for grading for pond embankment



FEATURE NO.: 27

DATE TAKEN: 03/25/2025

LOCATION:

Northing: 3452951.7645

Easting: 10804945.4242

COMMENTS:

Horizontal adit trending southward. Length is undetermined. Could see about 20-ft. Adit is inclined downward.

Approx. Exist. G.S. El. 2558
Proposed G.S. El. 2566

8-ft of fill planned for grading for pond embankment.

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APPENDIX B

USGS REPORT – SARAH ELLEN MINE

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Sarah Ellen Mine

Past Producer in Carroll county in Virginia, United States with commodities Copper, Zinc, Lead, Iron, Iron, Pig Iron, Arsenic

Map (https://www.google.com/maps/place/36.78064,-80.8198/@36.78064,-80.8198,12z/data=!3m1!1e3) | XML (/mrds/xml/10079992) | JSON (/mrds/json/10079992) | KML (/mrds/kml/10079992) | B (/mrds/grade-summary.php?dep_id=10079992)

Geologic information

Identification information

Deposit ID	10079992 (/mrds/show-mrds.php?dep_id=10079992)
MRDS ID	W030865
Record type	Site
Current site name	Sarah Ellen Mine
Alternate or previous names	Vaughan Mine, Vaughn Mine

Geographic coordinates

Geographic coordinates:	-80.8198, 36.78064 (WGS84)
Elevation	786
Relative position	2.5 KM (1.6 MI) N35W OF FIVE FORKS.

Political divisions (FIPS codes)

Carroll (county)
Virginia (state)
United States (country)
North America (continent)
Land (continent)

USGS map quadrangles

Sylvatus (quadrangle 1:24,000 scale)
Galax (quadrangle 1:100,000 scale)
Winston-salem (quadrangle 1:250,000 scale)

Hydrologic units (watersheds)

Upper New (hydrologic unit)
Kanawha (hydrologic accounting unit)
Kanawha (hydrologic subregion)
Ohio (hydrologic region)

Geographic areas

Country	State	County
United States	Virginia	Carroll

Comments on the location information

LOCATION AND ELEVATION GIVEN ARE FOR A COLLAPSED PORTAL AT THE NORTHERN OF THE WORKINGS. THESE WORKINGS EXTEND AT LEEAST 2300 FT S55W FROM THE PORTAL, AND PERHAPS AS MUCH AS 6000 FT (1.75 KM). LOCATION FIELD CHECKED APRIL 1987.

Commodities

Commodity	Importance
Copper	Primary
Zinc	Tertiary

Commodity	Importance
Lead	Tertiary
Iron	Tertiary
Iron, Pig Iron	Tertiary
Arsenic	Tertiary

Comments on the commodity information

PAST MINING OPERATIONS CONCENTRATED ON SUPERGENE MINERALS.

Materials information

Materials	Type of material
Chalcocite	Ore
Chalcopyrite	Ore
Covellite	Ore
Cubanite	Ore
Cuprite	Ore
Galena	Ore
Goethite	Ore
Malachite	Ore
Pyrrhotite	Ore
Sphalerite	Ore
Muscovite	Gangue
Quartz	Gangue

Alteration

(Local) Low Grade Regional Metamorphism

Mineral occurrence model information

Model code	91
USGS model code	24b
Deposit model name	Massive sulfide, Besshi (Japanese deposits)
Mark3 model number	30

Host and associated rocks

Host or associated	Host
Rock type	Metamorphic Rock > Schist
Rock unit name	Lynchburg Group, Ashe Formation
Rock description	Lynchburg Group, Ashe Formation

Stratigraphic age (youngest)	Neoproterozoic
Stratigraphic age (youngest)	Neoproterozoic

Host or associated	Host
Rock type	Metamorphic Rock > Gneiss

Host or associated	Host
Rock type	Metamorphic Rock > Amphibolite

Nearby scientific data

(1) Ashe Formation - Biotite gneiss (/geology/state/sgmc-unit.php?x=-80.8198&y=36.78064)

List (/general/near-point.php?x=-80.8198&y=36.78064&d=0.01&format=html)

Map (/mrds/map-graded.html?x=-80.8198&y=36.78064&z=14)

Geologic structures

Type of structure	Regional
Structure description	Blue Ridge Anticlinorium, Fries Thrust, 3 Phases Of Regional Deformation.

Ore body information

General form	POD/LENS
Strike	N. 65 DEG. E.
Dip	30-50 DEG SE.
Depth to top	12.2M
Width	22.9M

Controls for ore emplacement

Lenticular Troughs

Economic information

Economic information about the deposit and operations

Development status	Past Producer
Commodity type	Metallic
Deposit size	Small
Significant	No
Discovery year	<1861
Year of first production	1856

Mining district

District name	Sarah Ellen Segment/Gossan Lead District/Southern Section-Blue Ridge Province.

Land status

Ownership category	Private

Ownership information

Type	Owner
Owner	Virginia Iron, Coal And Coke Co. (Vaughan Dobyns Tract, R. A. Harman Tract).

Type	Owner
Owner	Allied Chemical Corp. (Kirkbride-Vaughan Tract).

Type	Operator
Owner	Tennessee And Virginia Mining Co.

Production statistics

Year	1859
Period	1856-1859
Material	ORE CU
Accuracy	Accurate
Description	Cp_Grade: ^14% Cu

Importance	Item	Commodity	Group	Amount recovered	Grade	Recovery percentage
Major	Ore	Copper	Copper		14wt-pct	

Comments on the reserve resource information

PROBABLY INCLUDES SARAH ELLEN, WILDCAT, AND CRANBERRY CREEK SEGMENTS.

Workings at the site

Type of workings	Surface/Underground
Length	358.2M
Overall depth	12.2M

Comments on the workings information

1859: CURREY REPORTED 304.9 M OF LEVELS AND 53.3 M OF SHAFTS. 1987: MUCH OF THE AREA HAS BEEN CLEAR-CUT, BUT NOT BULLDOZED. SMALL PITS, CROSS-CUT TRENCHES, AND POSSIBLE COLLAPSED SHAFTS ARE VISIBLE FROM THE COLLAPSED PORTAL TRENCHES, AND POSSIBLE COLLAPSED SHAFTS ARE VISIBLE FROM THE COLLAPSED PORTAL LOCATION ALMOST UP TO THE INTERSTATE. INTERSTATE 77 CUTS THROUGH THE ORIGINAL EXTENT OF THE SARAH ELLEN WORKINGS, CUTTING THEM INTO SMALLER SEGMENTS AND PROBABLY DESTROYING SOME.

Comments on development

MINING OPERATIONS BEGUN IN 1856 AND CEASED PROBABLY IN 1859. ; ECON.COM: ORE WAS SHIPPED TO MAX MEADOWS AND THENCE TO BALTIMORE.

Reference information

Links to other databases

Agency	Database name	Acronym	Record ID	Notes
USGS	Mineral Resources Data System	MRDS	W030865	

Bibliographic references

Deposit

CURREY, R.O., 1859, A GEOLOGICAL VISIT TO THE VIRGINIA COPPER REGION: KNOXVILLE, TENN., BECKETT, HAWS AND CO.; REPRINTED IN PART UNDER COPPER AND IRON REGION OF THE FLOYD-CARROLL-GRAYSON PLATEAU OF THE BLUE RIDGE IN VIRGINIA, ETC.: THE VIRGINIAS, 1880, V. 1, P. 62-64, 69-71, 74-77, 80-81, 95.

Deposit

ROSS, C.S., 1935, ORIGIN OF THE COPPER DEPOSITS OF THE DUCKTOWN TYPE IN THE SOUTHERN APPALACHIAN STATES: U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 179, 165 P.

Deposit

WRIGHT, R.J., AND RAMAN, N.D., 1948, THE GOSSAN LEAD, CARROLL COUNTY, VIRGINIA: U.S. GEOLOGICAL SURVEY OPEN-FILE REPORT, 21 P.

Deposit
WEED, W.H., 1911, COPPER DEPOSITS OF THE APPALACHIAN STATES: U.S. GEOLOGICAL SURVEY BULLETIN 455, 166 P.

Deposit
CONLEY, JAMES F., 1985, GEOLOGY OF THE SOUTHWESTERN VIRGINIA PIEDMONT: VIRGINIA DIVISION OF MINERAL RESOURCES PUBLICATION 59, 33 P.

Deposit
1856 DIREXPL TENNESSEE & VIRGINIA MINING CO.: OPENED MINE.

Deposit
1911 RECON W.H. WEED: BULL. 455.

Deposit
1935 RECON C.S. ROSS: PROF. PAPER 179.

Deposit
1939 GEOLMAP VA. GEOL. SURV.: BULL. 72.

Deposit
1948 RECON R.J. WRIGHT & N.D. RAMAN: OPEN-FILE REPORT.

Production
CURREY (1859)

General comments

Subject category	Comment text
Deposit	Discovery Year: PRE-CIVIL WAR
Deposit	WEED (1911) REFERS TO THIS MINE AS THE VAUGHAN MINE, HOWEVER IT IS FELT THAT THE SARAH ELLEN, WHICH WAS ON THE VAUGHAN TRACT, ENCOMPASSED THOSE WORKINGS. A MR. HEISKELL AND A MR. VAUGHAN WERE IN CHARGE OF OPERATIONS IN THE NORTHERN AND SOUTHERN PARTS RESPECTIVELY (CURRY, 1859 (1880 REPRINT, P. 74). "ORE ZONE" VISIBLE IN DIRT ROAD LEADING UP THE HILL TO THE LOGGING OPERATIONS. ; INFO.SRC : 1 PUB LIT; 2 UNPUB REPT; 3 FIELD OBSERV

Reporter information

Type	Date	Name	Affiliation	Comment
Reporter	01-MAR-1980	Meintzer, Robert E. (Le Van, D.C.)	Virginia Division of Mineral Resources	
Updater	01-AUG-1987	Myers, Lesley L.	Virginia Division of Mineral Resources	

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