Larson Design Group®

March 3, 2020

Doug Grayson
GC&P Development, LLC
99 Aaron Woods
Wheeling, WV 26003

Re: Preliminary Geotechnical Report
GC&P Mixed Use Development
City of Wheeling, Wheeling District
Ohio County, West Virginia
LDG Project No. 12540-001

Dear Mr. Doug Grayson,

As requested, Larson Design Group (LDG) has completed a preliminary geotechnical report for the Subject project. The exploration was performed to assess the subsurface conditions within the project area and to provide recommendations for the mixed-use development.

We appreciate the opportunity to serve as your geotechnical consultant during this phase of the project, and we look forward to working with you on projects in the future. If you have any questions regarding this report, or if we may be of further service, please do not hesitate to contact us.

Sincerely,

Larson Design Group

Richard K. Hubble, E.I.
Geotechnical Engineering Associate

David W. Hooper, P.E.
Technical Manager, Geotechnical Section

Report of Geotechnical Exploration

GC&P Development, LLC
City of Wheeling, Wheeling District
Ohio County, West Virginia

GC&P Mixed Use Development
Wheeling District, Ohio County, West Virginia
LDG Project No.: 12540-001

Prepared by:

Larson Design Group
310 Lawless Road, Suite 110
Morgantown, West Virginia 26501

March 2020

Larson Design Group®

Preliminary Report of Geotechnical Exploration

GC&P Development
Wheeling, Ohio County, West Virginia

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Preliminary Report of Geotechnical Exploration

GC&P Development
Wheeling, Ohio County, West Virginia
LDG Project No. 12540-001

SITE AND PROJECT DESCRIPTION

The proposed mixed-use commercial and residential development is planned for a parcel located east of Bethany Pike (WV-88) and north of National Road (I-40) and the community of Edgewood, Wheeling, Ohio County, West Virginia as shown on Figure A-1. The existing parcel is mostly undeveloped and has been partially cleared over the recent years. Upon review of the property boundary, the majority of the southern slope of the hill is not part of the subject property. Therefore, it was observed that the southern slope of the ridge remained undisturbed and in its wooded condition.

The top elevation of the parcel is approximately 1150 feet and the proposed building development pad is proposed to be at an elevation of 950 feet. Although the difference in elevation between the top and proposed grade is approximately 200 feet, the average cut has been calculated by The Thrasher Group, Inc. to be less than 100 feet.

The proposed entry to the development is located on the west side of the site, connecting to Bethany Pike (WV-88).To construct the entrance and two parcels (each just under 2 acres), a highwall will be created from an approximate elevation of 750 (approximate elevation of the lower parcels) to 925 feet. The entrance will wrap around the site to the north becoming the proposed “Main Blvd.” providing access to the main pad area near the northeast corner of the site. Alternate access is to the main pad area is also being considered. A version of the site plan is included as Figure A-2.

The proposed Building Pad C at the elevation of 950 feet is approximately 44 acres. This is proposed as a mixed-use development with commercial buildings such as storefronts and a movie theater, office and institutional buildings, a hotel and a residential housing complex.

As part of the development, improvements to Bethany Pike have been proposed in three phases of construction in order to handle the changes in traffic that this development will cause. These phases will expand the roadway and allow for the entryway into the GC&P Development.

GEOLOGIC SETTING

According to the Geologic Map of West Virginia, published by the West Virginia Geological and Economic Survey (WVGES) in 1968, the project site is underlain by the Dunkard Group of the Lower Permian and Upper Pennsylvanian Series. The Dunkard Group extends from the top of the exposed rock section to the base of the Waynesburg coal. The group is divided into the Greene, Washington, and Waynesburg Formations, and consists of non-marine cyclic sequences of sandstone, siltstone, red and gray shale, limestone, and coal. Prominent units within this section include, from youngest to oldest, the Washington coal, Waynesburg “A” coal, Waynesburg Sandstone, and the Waynesburg coal. The base of the Washington coal, which is the uppermost prominent coal bed at this site, is located at an elevation of approximately 1,111 feet in this area.

The Dunkard Group is underlain by the Monongahela Group of the Upper Pennsylvanian Series. The

Monongahela Group extends from the base of the Waynesburg coal to the base of the Pittsburgh coal, and consists of non-marine cyclic sequences of sandstone, siltstone, red and gray shale, limestone, and coal. Prominent units within this section include, from youngest to oldest, the Uniontown coal, Benwood Limestone, Sewickley coal, Fishpot Limestone, Redstone coal, Pittsburgh Sandstone, and the Pittsburgh coal. The Pittsburgh coal is located at an elevation of approximately 760 feet in the area of the project site. Please refer to Figure A-3 for the extent of the Pittsburgh coal, provided by the WVGES.

The Monongahela Group is underlain by the Conemaugh Group of the Upper Pennsylvanian Series. The Conemaugh Group extends from the base of the Pittsburgh coal to the top of the Upper Freeport coal. The group is divided into the Casselman and Glenshaw Formations, and consists of cyclic sequences of red and gray shale, siltstone, sandstone, and thin limestones and coals. Notable units within this section include the Clarksburg, Washington and Pittsburgh red beds, the Ames and Brush Creek Limestones, and the Elk Lick, Bakerstown, and Mahoning coals.

The westernmost portion of the site sloping down toward Bethany Pike (WV-88) is mapped as Quaternary alluvium. Alluvium, which typically consists of unconsolidated sand, gravel, silt, and clay, is generally described as sediment transported and deposited by moving water in a non-marine environment.

Based on our review of the interactive coal maps provided by the WVGES, the project site appears to be underlain by the Pittsburgh-Wheeling, Hutchinson, and Stratford coal mines which all targeted the Pittsburgh coal. Whereas available mapping shows extensive mining of the Pittsburgh coal in the Pittsburgh-Wheeling mine, operated by the Pittsburgh-Wheeling Coal Company, no public records are available to show the extent of mining in the Hutchinson and Stratford mines. Please refer to Figure A-4 for the map of the Pittsburgh-Wheeling mine. As previously mentioned, the Pittsburgh coal is located at an elevation of approximately 760 feet in the area of the project site and has a local thickness of up to 5.6 feet. Based on structure contour lines of the Pittsburgh coal, the bedrock in the area dips gently to the southeast at an approximate angle of 2 degrees.

Coal beds that may be exposed during the construction of the highwall directly opposite of WV-88 include the Redstone coal located at an elevation of approximately 780 feet, and the Sewickley coal located at an elevation of approximately 845 feet. Each of these coal beds are less than one foot in thickness. It is also anticipated that the Waynesburg coal, located at approximately 1006 feet, the Waynesburg “A” coal, located at approximately 1053 feet, and the Washington coal, located at approximately 1111 feet, will all be encountered as part of the Phase 1 removal of overburden to an elevation of 950 feet for construction of Building Pad C.

For more information on the approximate elevations of the Washington, Waynesburg “A,” Waynesburg, Sewickley, Redstone and Pittsburgh coal seams, please refer to Figure A-5. This approximation of elevations is from the WVGES and shows which seams should be expected during the phases of excavation.

SITE RECONNAISSANCE

Site reconnaissance was performed on February 12th, 2020. Kevin Coyne of GC&P Development, LLC, David Hooper and Richard Hubble, both of LDG, were present. Several documents and site plans were reviewed with Mr. Coyne in order to gather a detailed understanding of the site as well as indicating several topics of discussion for the site visit. The site visit included a review of the perimeter and then crossing pattern over the interior of the site. The following was observed:

- Rock outcrops were observed above the road level and creek along Bethany Pike. At one location, orange-colored acid mine drainage (AMD) was observed on the rock face. Although not confirmed by survey, it is our understanding that this AMD discharge is from the mined Pittsburgh seam. It is also our understanding that this AMD discharge is off the property.
- A filled mine entry was also viewed on mapping and observed during the reconnaissance to the south of the AMD discharge and higher up the hillside.
- Although not visible due to the site being secured, we understand that rock outcrop including the Pittsburgh coal seams was visible during construction of the former Toyota dealership on the northern portion of the site.
- Access to the top portion of the site roughly followed the proposed access road. Several areas of the rock outcrop were observed along the access road that has been cut in.
- The slope below the current access road was steep in places and exhibited signs of instability as a result of the soil types. These instabilities are in area that have not been affected by site clearing. As part of the final grading design for the site, slopes will need to be addressed prior to fill placement. A surficial (topsoil) slip was observed at the entrance of the property. We understand that this slip has not been repaired due to the halt work order that was issued for the site. This slip can be readily addressed through normal earthwork operations when construction is allowed to continue.
- One seep was observed on the northern hillside slope. Water from this seep was clear. It is anticipated that this seep is located above the proposed pad elevation and will be removed as part of the site preparation work.
- Various sediment ponds were observed across the site which were reported to be installed as part of the site clearing which was performed.
- The top of the southern slope was observed. Various outcrops were observed along the slope. Near the western edge the outcrops could be observed on the southwest corner of the site. The soil thickness on the southern slope appears to be relatively thin. Although some signs of colluvial soils were visible the slope appears to be in a stable condition. Due to the thin soil overburden we would anticipate that runoff from the slope is fairly intense and fast.
- Outcropping of the uppermost coal seam (likely the Washington coal) was observed at several locations on the project site where it outcropped.
- Test boring locations (performed by others) were observed.

The conditions observed on site was used to verify the conditions expected during the conducted research. Photographs from our site reconnaissance are included in Appendix C of this report.

SUBSURFACE EXPLORATION

The subsurface exploration was conducted by others at the subject site in the summer of 2015. Three (3) borings were advanced at strategic locations throughout the project site, as shown on Sheet C1 prepared by Hamilton and included in Appendix B. The results of the field exploration are contained in Appendix B.

SUBSURFACE CONDITIONS

Detailed information and descriptions of the materials, as well as any groundwater levels encountered in the borings, are contained in Appendix B on the boring logs prepared by others. Although the core boxes for the borings were observed in storage, LDG did not re-log the borings as part of our work. The various substrata revealed by the borings are briefly described below.

Weathered Bedrock and Bedrock: Each of the three borings penetrated decomposed to hard bedrock. Alternating stratigraphic sequences of shale, limestone and sandstone were penetrated in the borings. Boring B-1 extended from an elevation of approximately 1,136 feet to 938 feet, B-2 from 1,141 feet to 937.8 feet and B-3 from 1,055 feet to 952.1 feet. Coal was encountered in each of the borings. Some coal encountered may be smaller seams or pockets of coal and may not reflect conditions across the entire site. However, there are three major coal seams that are within the elevations of the core holes and these are, in order of decreasing elevation, the Washington coal seam, the Waynesburg "A" coal seam and the Waynesburg coal seam. There has been no recorded mining of these three seams.

In B-1, coal was recovered at elevation 1,127 to 1,126 feet, which could be the Washington coal seam, and 1,015 to 1,012, which could be the Waynesburg coal seam. There was no material recovered from 1,105 to 1,103 feet, 1,086 to 1,082 feet, 1,064 feet, and 1,025 to 1,023 feet.

In B-2, coal was recovered at elevation 1,113 to 1,111 feet and 1,110 to 1,108 feet, both of which could be the Washington coal seam, 1,028 to 1,026 feet, 1,023 to 1,022 feet, and 1,017 to 1,016 feet which could be the Waynesburg coal seam. There was no material recovered from 1,135 to 1,126 feet, 1,086 to 1,082 feet and 1,068 to 1,065 feet which could be the Waynesburg "A" coal seam.

In B-3, coal was recovered at elevation 1,016 to 1,013 feet, which could be the Waynesburg coal seam. There was no material recovered from 1,055 to 1,045 and 967.1 to 965.3 feet. The zone of no recovery from 1,055 to 1,045 feet generally lines up with the Waynesburg coal seam, so washout in this area is a possible explanation for no recovery.

DISCUSSION

Based on the current plan the proposed buildings will be placed on the site, on a level pad developed mainly through excavation of weathered and competent bedrock. Although the borings performed do not extend a significant depth below the pad elevation (Boring B-1 extends to 938 feet and B-2 to 937.8 feet while B-3 extends to 952.1 feet) these boring do establish the presence of competent bedrock over the majority of the building pad at a pad elevation of 950 feet. Site observations further confirm the presence of competent bedrock. Based on the proposed construction practice, often times building pads are undercut when in rock to allow for the installation of utilities on the site. Building pads in these conditions often provide foundation support through bedrock weathered rock or new fill placed on bedrock. Foundation recommendations for these conditions are provided below and settlement of the structures will be minimal.

Although acceptable for development, the presence of six coal seams can present issues for development which need to be addressed. These issues are not unique to this site and are readily addressed following requirements from WVDEP and appropriate practices by contractors to minimize the impact. The upper three seams, the Washington, Waynesburg "A" and Waynesburg, will be removed during excavation to achieve pad level. These coal seams should be addressed during excavation in accordance with lawful practices.

As part of the construction of the entrance road off of Bethany Pike (WV-88), a highwall will be created extending vertically from the access road to the undisturbed ground leading up to the proposed building pad C. This highwall is approximately 170 feet in height, cut back at a 0.5:1 slope. Based on information provided by the WVGES *Mine Map Atlas,* the elevation of the Pittsburgh coal seam is approximately ten (10) feet above the proposed "Main Boulevard" which will give access to pad C from the access road. In addition, the Redstone and Sewickley coal seams will be exposed in the highwall. Based on the local dip

of the bedrock to the southwest, these seams will be exposed on the down dip side. For the case of the Pittsburgh which has been mined beneath the site and to a less extend the Redstone and Sewickley can produce acid mine drainage (AMD) which can be harmful if discharged into streams or other waterways. AMD which is generated from highwall or other exposures should be treated in accordance with current regulations.

Based on the down dip outcrops on the edge of the site, it is not anticipated that a large pool of water exists which would require treatment when the seam is exposed. The condition of the Pittsburgh No. 8 coal seam in the Hutchinson Mine should be determined prior to exposing the seam. Groundwater wells should be installed and sampled to determine the presence of mine water and quality within the Hutchinson Mine and the overlying coal seams. Based on the results of this sampling the potential for AMD treatment can be assessed.

As indicated above, the Pittsburgh No. 8 coal seam has been mined beneath the proposed structures. The depth to the top of the Pittsburgh seam/broken zone is approximately 190 feet from the proposed final pad elevation and the overburden consists nearly of all bedrock. The potential for mine subsidence on a site decreases when the depth to the mined coal seam is more than 100 feet. The potential for mine subsidence is low. It is LDG's opinion that treatment of the mined seam is not required.

In order to prevent the AMD, sealing techniques should be considered, assessed and implemented. There are several deep mine sealing techniques and the increased hydrostatic pressure from the mine must be considered when a technique is selected.

The current highwall cut slope proposed for the project has been identified as 0.5:1 (Horizontal to Vertical). Although specific cuts slope information is not available for design at this point, the proposed highwall is an acceptable slope design for slopes in rock. Specific borings may be performed to further characterize the bedrock and aid in the design of the cut slope.

In addition, some fill slopes will be necessary for the design of the development. Where necessary, the fill slope should be constructed with proper sized and constructed toe keys and drains and with bonding benches as necessary. Additional subsurface exploration will be required to develop these recommendations and perform slope stability analysis.

DESIGN RECOMMENDATIONS

Specific foundation recommendations are provided below. Additional recommendations for design, construction and construction inspection should be provided as part of a final geotechnical investigation and report.

The geotechnical engineering evaluation of the site and subsurface conditions at the property are based on our site observations, the data obtained from the subsurface exploration by others and our understanding of the project information as presented in this report. If the site or building design is modified, it should be determined if additional geotechnical information is required such that specific design and construction recommendations can be provided for the final conditions. After the pads reach their proposed elevations, additional geotechnical exploration should be conducted in order to determine the conditions beneath the proposed building foundations.

If our understanding of the project is incorrect, please contact us so that we can review our findings. Also, the discovery of any site or subsurface conditions during construction that deviate from the information detailed herein should be reported to us for our evaluation.

Spread Foundations Preliminary Recommendations

Presumptive bearing capacities for shale, siltstone and sandstone range from 4ksf (kips per square feet) to well over 200 ksf. Other references use minimum bearing capacity for soft shales of 8 ksf with hard shale and sandstone much higher. For spread foundations bearing on weathered bedrock, it is our opinion that the foundations can be proportioned utilizing a maximum allowable bearing pressure of 4ksf. This design value will also be acceptable if the site is over-excavated so that utilities may be more readily installed, and the foundations are supported by fill soils. Minimum dimensions of two (2) feet for rectangular or continuous footings, and three (3) feet for individual or square footings should be considered in design to reduce the potential for a localized shear or punching type failure of the foundation materials. Exterior foundations should bear a minimum of 3 feet below existing and proposed grades to prevent damage from frost. Although not necessary for frost protection, due to the potential for softer conditions in the upper three (3) feet at the site due to softening over time of exposed materials, consideration should be given to both interior and exterior foundations be founded at a depth of three (3) feet.

Foundations will need to be designed to resist lateral forces as described above. Active lateral earth pressure and sliding resistance may be used as provided below.

Lateral Earth Parameters

Material Type	Saturated Unit Weight (pcf)	Angle of Internal Friction (Degrees)	Active Earth Pressure Coefficient (ka)	Passive Earth Pressure Coefficient (kp)	At-Rest Earth Pressure Coefficient (ko)
Fill Soils	130	32	0.31	3.25	0.47
Weathered Bedrock	135	36	0.25	3.85	0.41

A face-of-footing setback should be observed on all fill embankments. Typically, this setback should be the slope height divided by three, as presented in the 2012 International Building Code (IBC) Figure 1808.7.1, *Foundation Clearances from Slopes*. Therefore, if any structures are built out over the face of planned embankments, the depth of the footings must be increased to provide some protection against surficial slope failures, bearing failures and freeze thaw movements.

Slabs-On-Grade

It is recommended that concrete floor slabs be designed and constructed as slabs supported at grade, bearing on weathered bedrock or newly placed fill. For design of slabs-on-grade supported by weathered bedrock, a subgrade modulus of 100 pci is recommended. All slabs-on-grade should bear on a minimum 6-inch thick layer of crushed, clean stone, such as AASHTO No. 57 aggregate, to serve as a capillary water barrier and a leveling surface. The need for such drainage is particularly evident for exterior slabs, or interior slabs in unheated areas, which may be subjected to potential freeze-thaw conditions.

Concrete slabs should be appropriately separated from the foundations such that they move independently from adjacent elements. Slabs should be designed and planned with well-placed, field identified control joints to control distress cracking arising from differential movement. Proper joint installation should be specified and maintained throughout construction of all floor slabs. Joints should be installed in the floor slabs in accordance with the guidelines specified by the Portland Cement Association (PCA) or American Concrete Institute (ACI). Additional expansion and control joints should be designed in any masonry/concrete portions of the structures to allow for any movements that may occur.

The preceding recommendations are preliminary and are based on information available at the time of the preparation of this report. Final foundation recommendations should be developed based on the actual planned construction and existing conditions after construction of the pad.

LIMITATIONS

This report has been prepared by Larson Design Group for the exclusive use of GC&P Development and their design team for specific application to the planned GC&P Development. Work on the project has been carried out in accordance with reasonable and acceptable engineering practices. No other warranty, either express or implied, is applicable to this project.

The conclusions and recommendations contained in this report are based, in part, upon our field observations and data obtained from the test borings drilled at the site by others. The nature and extent of variations may not become evident until construction. If variations then appear evident, it may be necessary to reevaluate the recommendations presented herein.

It is suggested that a licensed geotechnical engineer be retained to provide continuous engineering and testing services during the earthwork and foundation construction phases of the work. This is to observe compliance with design concepts and specifications, and to facilitate design changes in the event that subsurface conditions differ from those anticipated prior to construction.

Appendix A
Illustrations

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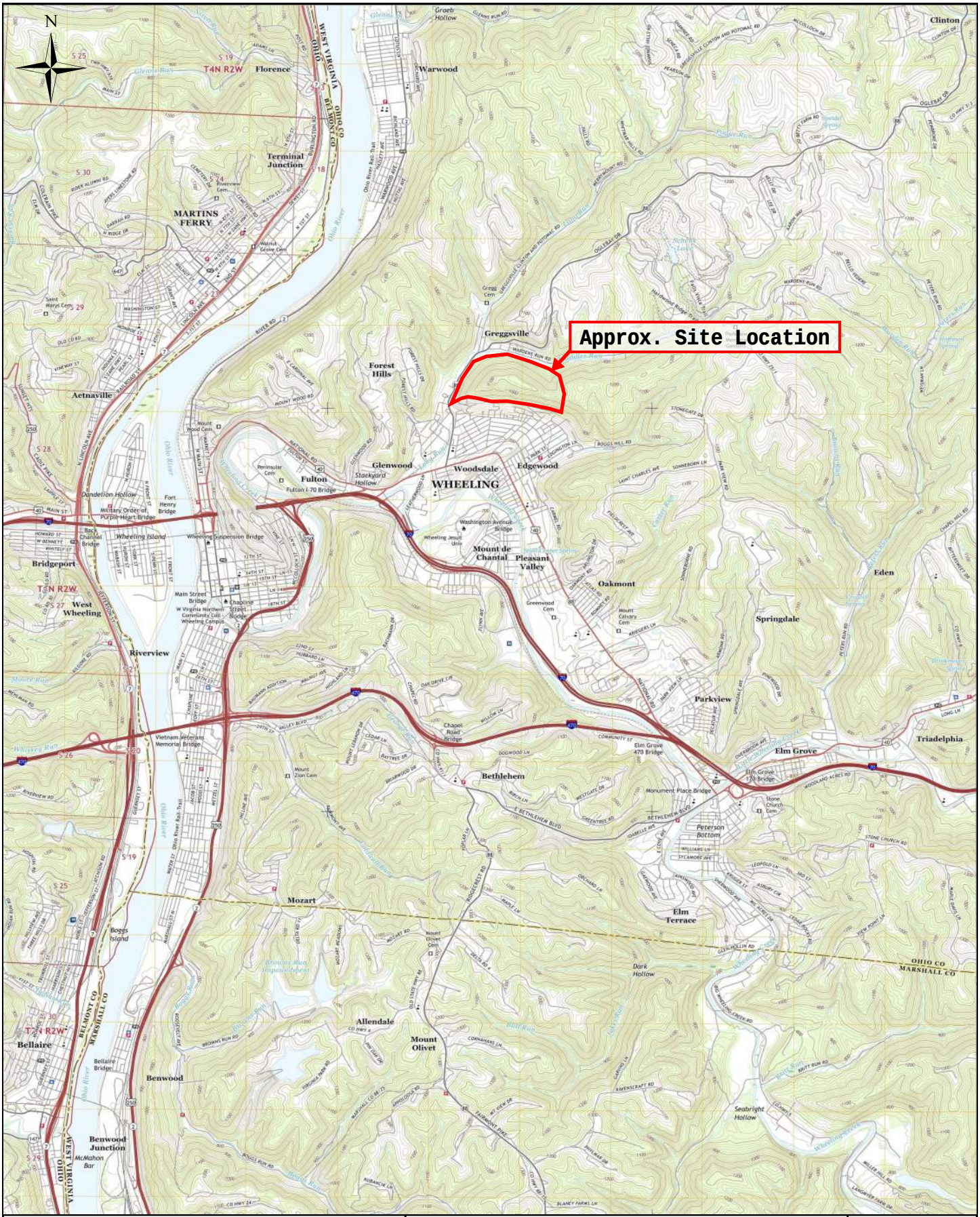

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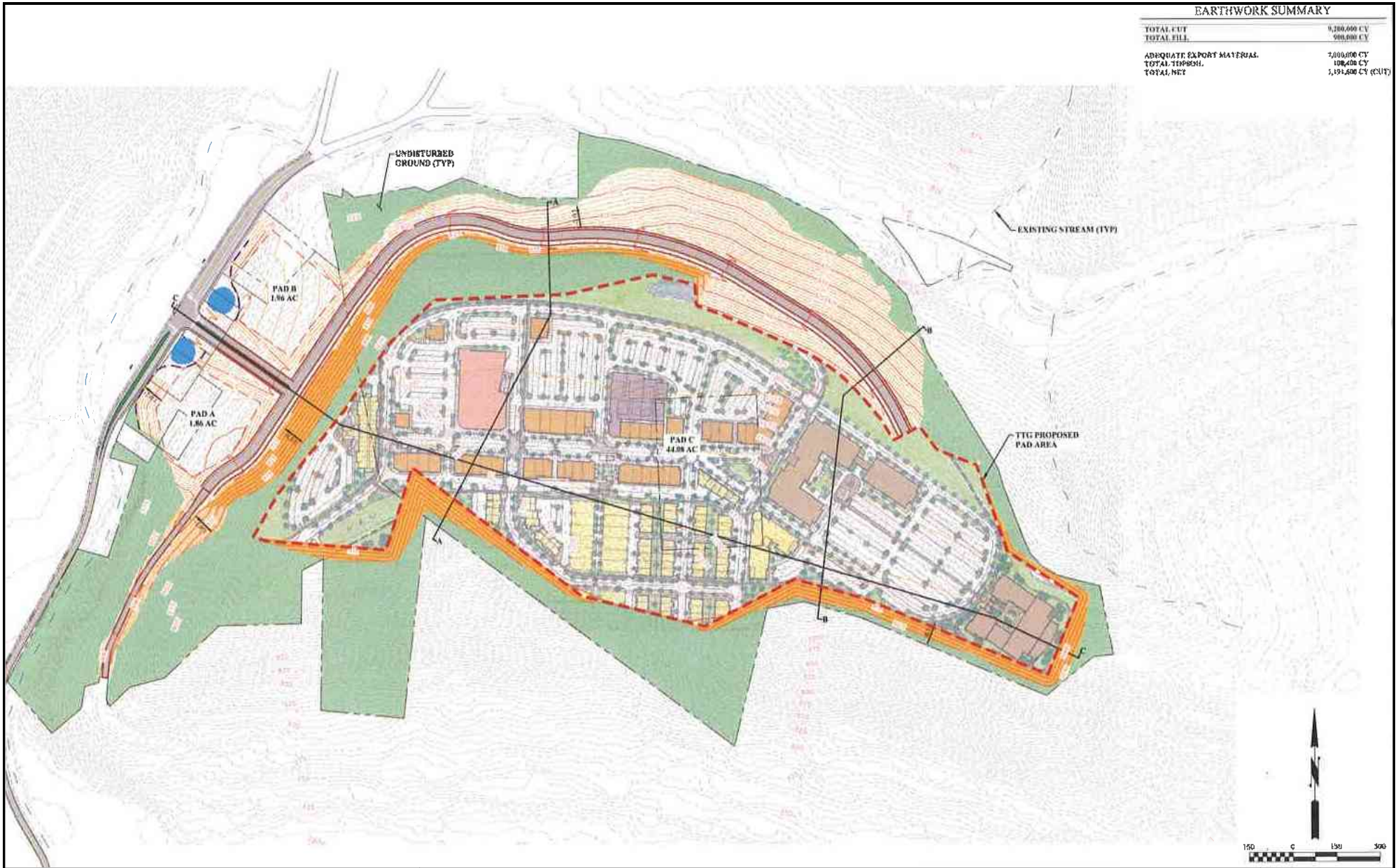
GENERAL SITE VICINITY
GC&P Mixed Development
Wheeling, Ohio County, WV
Wheeling 7.5' USGS QUAD

DATE:	1/29/20
SHEET NO.:	Figure A-1
PROJECT NO.:	12540-001
SCALE:	1:24,000



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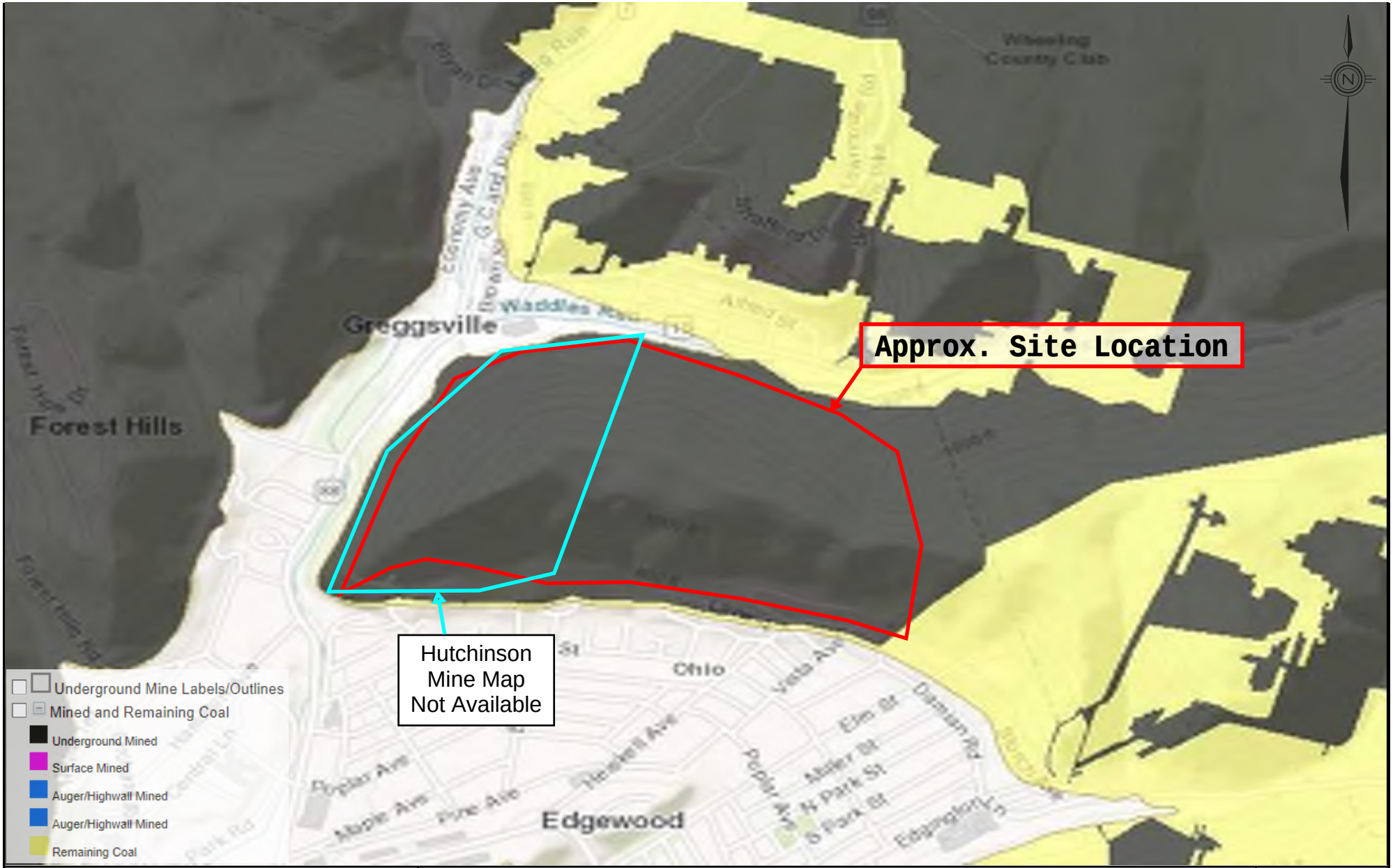
General Site Plan with Cross Sections
GC & P Development
Wheeling, Ohio County, West Virginia
The Thrasher Group

DATE: **1/13/20**
SHEET NO.: **Figure A-2**
PROJECT NO.: **12540-001**
SCALE: **NTS**



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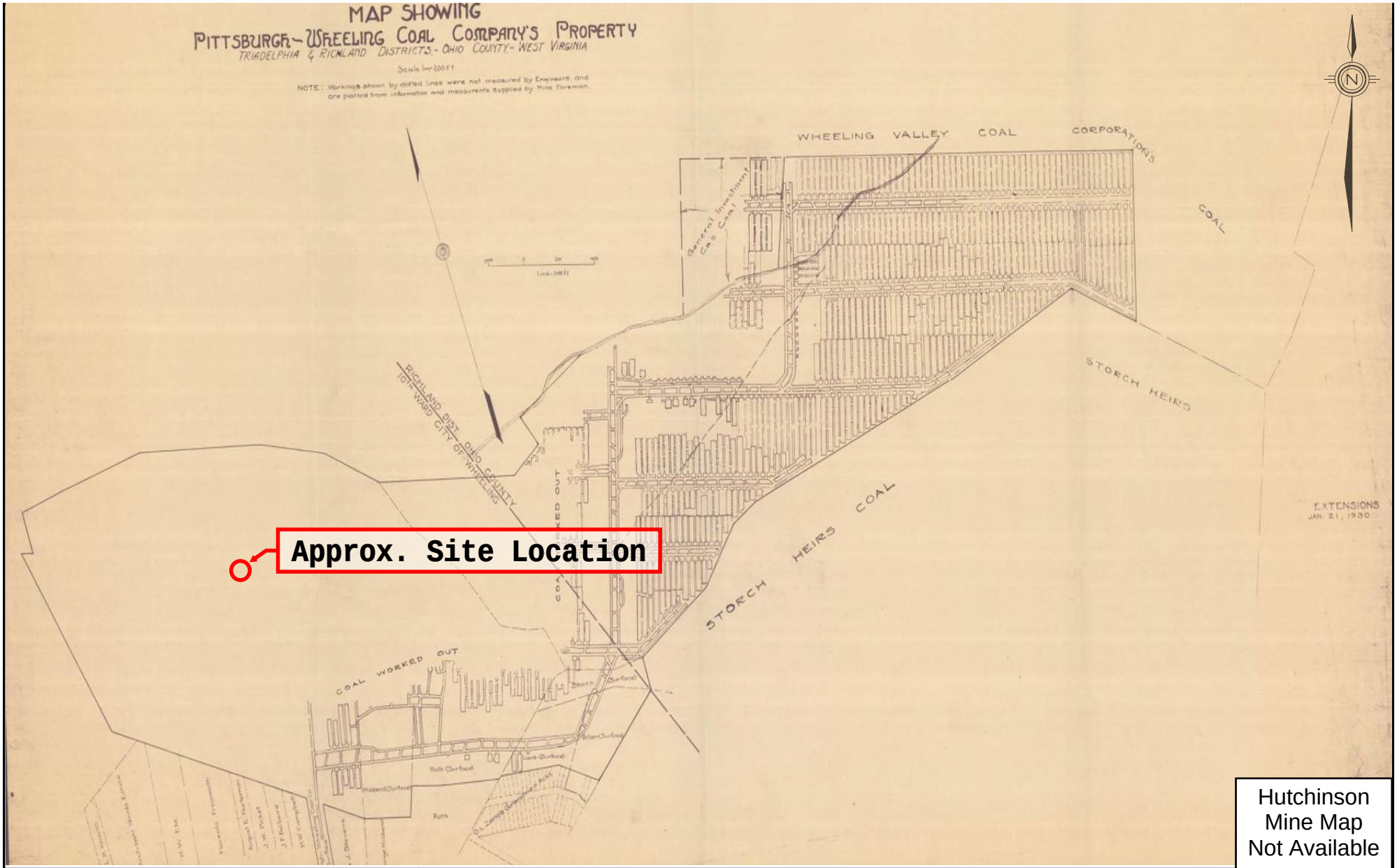
Pittsburgh Coal Structure Map
GC & P Development
Wheeling, Ohio County, West Virginia
WVGES MINE MAP ATLAS

DATE: **1/13/20**
SHEET NO.: **Figure A-3**
PROJECT NO.: **12540-001**
SCALE: **NTS**



Hutchinson Mine Map Not Available

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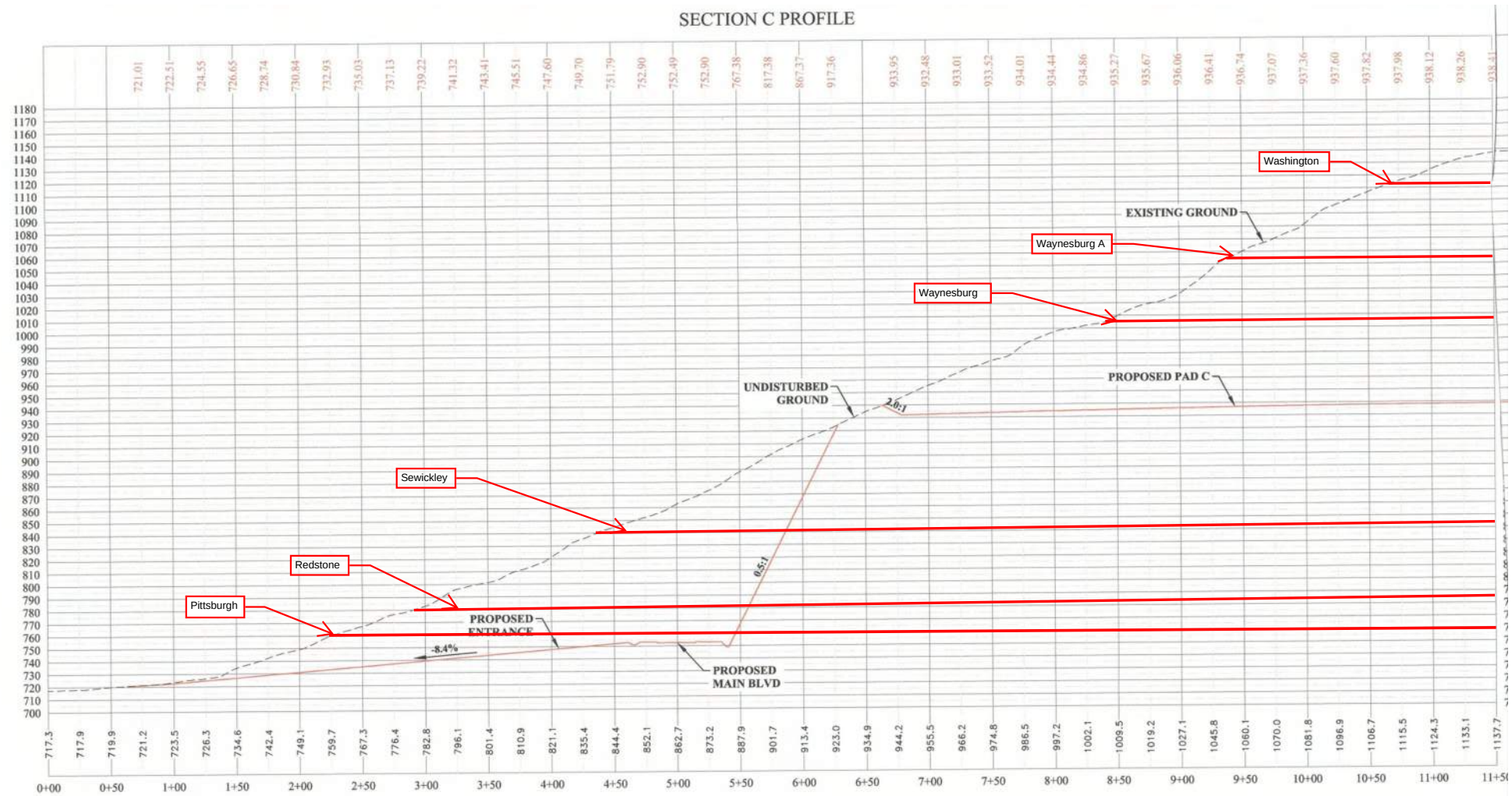
Pittsburgh - Wheeling Coal Mine Map
GC & P Development
Wheeling, Ohio County, West Virginia
WVGES MINE MAP ATLAS

DATE:	1/13/20
SHEET NO.:	Figure A-4
PROJECT NO.:	12540-001
SCALE:	NTS



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Cross Section C Profile with Coal Elevations
GC & P Development
Wheeling, Ohio County, West Virginia
Coal: WVGES MINE MAP ATLAS - Cross Section: The Thrasher Group

DATE: **2/27/20**
SHEET NO.: **Figure A-5**
PROJECT NO.: **12540-001**
SCALE: **NTS**

Appendix B
Boring Logs by Others

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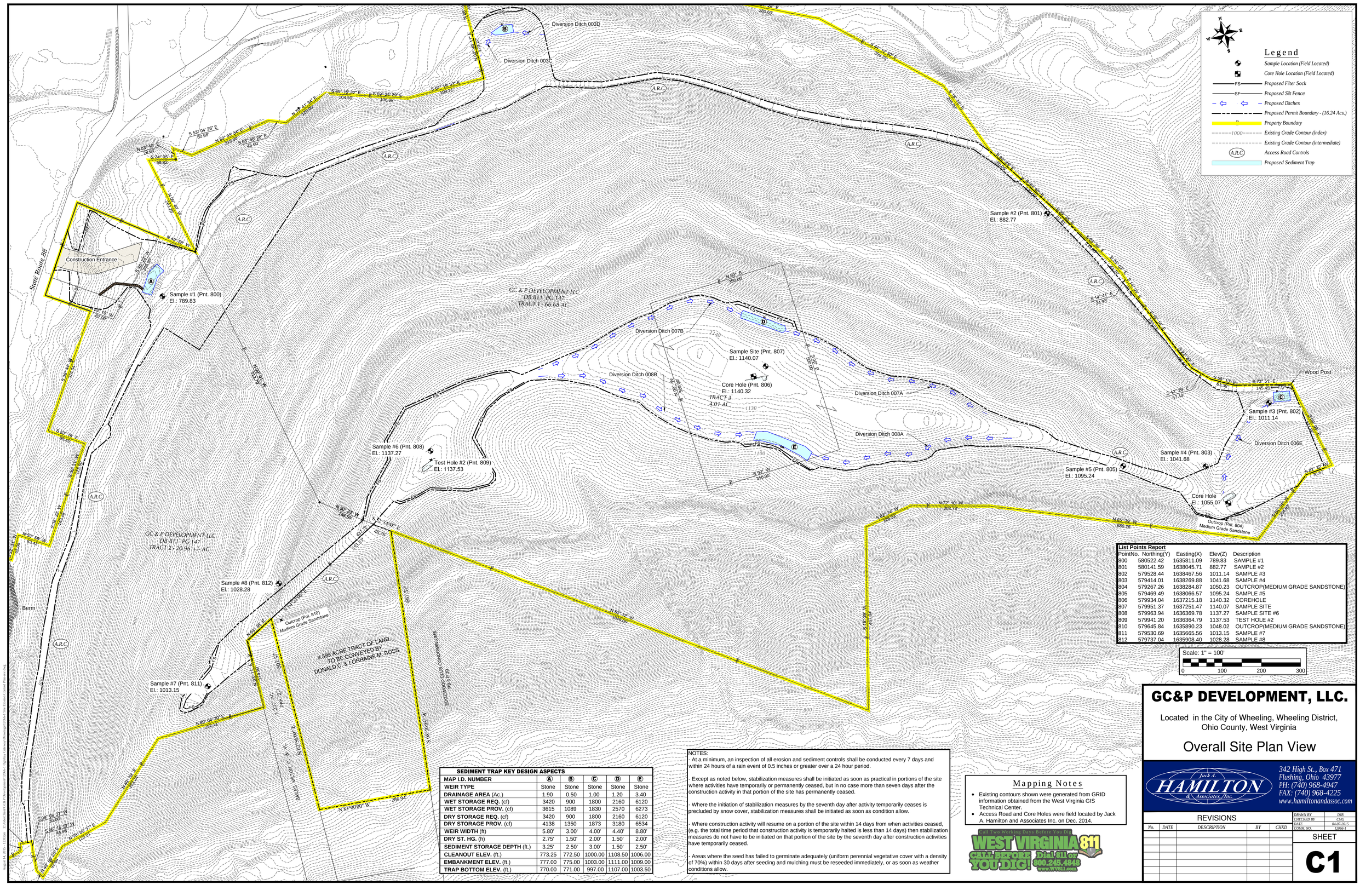

List Points Report

PointNo.	Northing(Y)	Easting(X)	Elev(Z)	Description
800	580522.42	1635811.09	789.83	SAMPLE #1
801	580141.59	1638045.71	882.77	SAMPLE #2
802	579528.44	1638467.56	1011.14	SAMPLE #3
803	579414.01	1638269.88	1041.68	SAMPLE #4
804	579267.26	1638284.87	1050.23	OUTCROP(MEDIUM GRADE SANDSTONE)
805	579469.49	1638066.57	1095.24	SAMPLE #5
806	579934.04	1637215.18	1140.32	COREHOLE
807	579951.37	1637251.47	1140.07	SAMPLE SITE
808	579963.94	1636369.78	1137.27	SAMPLE SITE #6
809	579941.20	1636364.79	1137.53	TEST HOLE #2
810	579645.84	1635890.23	1048.02	OUTCROP(MEDIUM GRADE SANDSTONE)
811	579530.69	1635665.56	1013.15	SAMPLE #7
812	579737.04	1635908.40	1028.28	SAMPLE #8

Scale: 1" = 100'

0 100 200 300

SEDIMENT TRAP KEY DESIGN ASPECTS

MAP I.D. NUMBER	A	B	C	D	E
WEIR TYPE	Stone	Stone	Stone	Stone	Stone
DRAINAGE AREA (Ac.)	1.90	0.50	1.00	1.20	3.40
WET STORAGE REQ. (cf)	3420	900	1800	2160	6120
WET STORAGE PROV. (cf)	3615	1089	1830	2570	6273
DRY STORAGE REQ. (cf)	3420	900	1800	2160	6120
DRY STORAGE PROV. (cf)	4138	1350	1873	3180	6534
WEIR WIDTH (ft)	5.80'	3.00'	4.00'	4.40'	8.80'
DRY ST. HG. (h)	2.75'	1.50'	2.00'	1.50'	2.00'
SEDIMENT STORAGE DEPTH (ft.)	3.25'	2.50'	3.00'	1.50'	2.50'
CLEANOUT ELEV. (ft.)	773.25	772.50	1000.00	1108.50	1006.00
EMBANKMENT ELEV. (ft.)	777.00	775.00	1003.00	1111.00	1009.00
TRAP BOTTOM ELEV. (ft.)	770.00	771.00	997.00	1107.00	1003.50

NOTES:
- At a minimum, an inspection of all erosion and sediment controls shall be conducted every 7 days and within 24 hours of a rain event of 0.5 inches or greater over a 24 hour period.

- Except as noted below, stabilization measures shall be initiated as soon as practical in portions of the site where activities have temporarily or permanently ceased, but in no case more than seven days after the construction activity in that portion of the site has permanently ceased.

- Where the initiation of stabilization measures by the seventh day after activity temporarily ceases is precluded by snow cover, stabilization measures shall be initiated as soon as condition allow.

- Where construction activity will resume on a portion of the site within 14 days from when activities ceased, (e.g. the total time period that construction activity is temporarily halted is less than 14 days) then stabilization measures do not have to be initiated on that portion of the site by the seventh day after construction activities have temporarily ceased.

- Areas where the seed has failed to germinate adequately (uniform perennial vegetative cover with a density of 70%) within 30 days after seeding and mulching must be reseeded immediately, or as soon as weather conditions allow.

Mapping Notes

- Existing contours shown were generated from GRID information obtained from the West Virginia GIS Technical Center.
- Access Road and Core Holes were field located by Jack A. Hamilton and Associates Inc. on Dec. 2014.

Call Two Working Days Before You Dig
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www.WV811.com

GC&P DEVELOPMENT, LLC.

Located in the City of Wheeling, Wheeling District, Ohio County, West Virginia

Overall Site Plan View

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REVISIONS

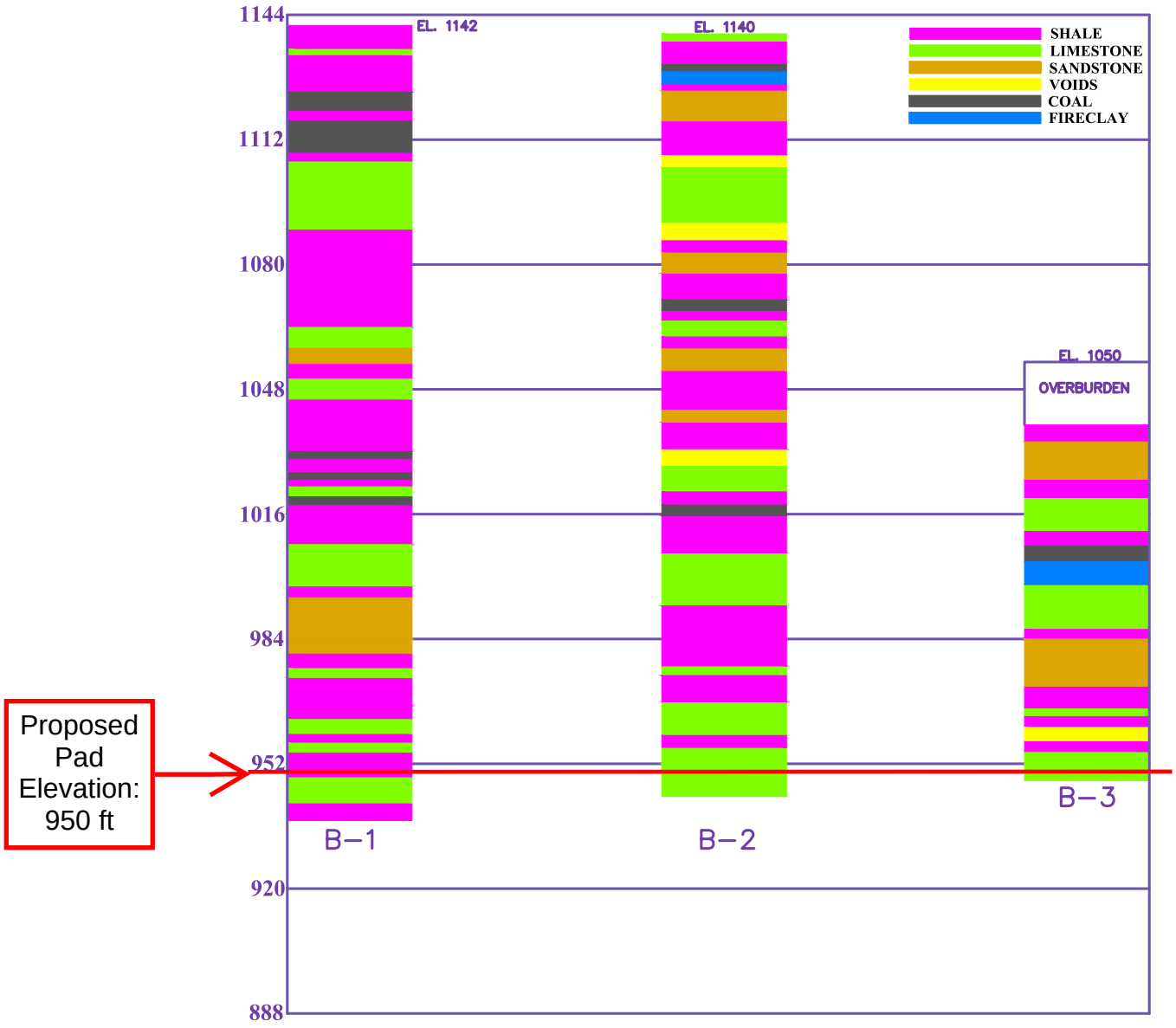
No.	DATE	DESCRIPTION	BY	CHKD

DRAWN BY	DJB
CHECKED BY	CMG
DATE	04-07-2015
COMM. NO.	12066-J

SHEET

C1

APPENDIX 1- Lithologic Column at GC&P



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APPENDIX 2: GC-P CORE LOG 2015

BHID	LITH3	from	to	TopEl	BotEl	% recovered	COMMENTS
B-1	LIMESTONE	0	2	1136	1134	100	LIGHT GRAY WEATHERED LIMESTONE
B-1	SHALE	2	9	1134	1127	100	WEATHERED SHALE WITH HARDER INCLUSIONS
B-1	COAL	9	10.5	1127	1126	100	COAL
B-1	SILT	10.5	13	1126	1123	100	BROWN SANDY SILT
B-1	SHALE	13	15	1123	1121	100	LIGHT BROWN WATER-IMPACTED SANDY SHALE
B-1	SANDSTONE	15	23	1121	1113	100	LIGHT GRAY WEATHERED SANDSTONE
B-1	SHALE	23	27.5	1113	1109	100	MEDIUM-GRAY WEATHERED SHALE
B-1	SH-CAR	27.5	30.8	1109	1105	100	DARK GRAY SHALE
B-1	WASH-OUT	30.8	33	1105	1103	0	POSSIBLE SHALE (WASH-OUT)
B-1	LIMESTONE	33	43	1103	1093	100	GRAY LIMESTONE
B-1	LIMESTONE	43	50	1093	1086	100	LIGHT GRAY FRACTURED WATER-IMPACTED LIMESTONE
B-1	WASH-OUT	50	53	1086	1083	0	POSSIBLE SHALE (WASH-OUT)
B-1	WASH-OUT	53	53.7	1083	1082	0	SAME
B-1	SH-CAL	53.7	58	1082	1078	100	LIGHT GRAY SHALE
B-1	SANDSTONE	58	61	1078	1075	100	LIGHT GRAY SHALEY SANDSTONE
B-1	SH-CAL	61	63	1075	1073	100	LIGHT GRAY SHALE
B-1	SHALE	63	71	1073	1065	100	SAME
B-1	SH-CAR	71	71.6	1065	1064	100	BLACK SHALE
B-1	COAL	71.6	72.1	1064	1064	0	COAL (WASH-OUT)
B-1	SH-CAR	72.1	73	1064	1063	100	BLACK SHALE
B-1	SH-CAR	73	73.5	1063	1063	100	SAME
B-1	LIMESTONE	73.5	78.9	1063	1057	100	MEDIUM-GRAY LIMESTONE
B-1	SH-CAL	78.9	81	1057	1055	57.14	LIGHT GRAY SHALE (SOME WASH-OUT)
B-1	SANDSTONE	81	83	1055	1053	100	LIGHT GRAY SANDSTONE
B-1	SANDSTONE	83	87	1053	1049	100	LIGHT GRAYISH-BROWN SANDSTONE
B-1	SH-CAL	87	93	1049	1043	100	LIGHT GRAY SANDY SHALE
B-1	SH-CAL	93	97	1043	1039	100	LIGHT GRAY SANDY SHALE
B-1	SANDSTONE	97	101	1039	1035	100	LIGHT GRAY SANDSTONE
B-1	SH-CAL	101	103	1035	1033	100	LIGHT GRAY SANDY SHALE
B-1	SH-CAL	103	111	1033	1025	100	LIGHT GRAY FRACTURED SHALE
B-1	WASH OUT	111	113	1025	1023	0	WASH-OUT (POSSIBLE SHALE)
B-1	LIMESTONE	113	119	1023	1017	100	DARK GRAY LIMESTONE
B-1	SH-CAR	119	121.5	1017	1015	100	DARK GRAY SHALE
B-1	COAL	121.5	123	1015	1013	100	COAL
B-1	COAL	123	124	1013	1012	100	COAL
B-1	SH-CAR	124	126	1012	1010	100	DARK GRAY SHALE
B-1	SH-CAR	126	133	1010	1003	100	DARK GRAY SHALE
B-1	LIMESTONE	133	143	1003	993	100	DARK TO LIGHT-GRAY LIMESTONE
B-1	LIMESTONE	143	148	993	988	100	MEDIUM-GRAY LIMESTONE
B-1	SH-CAL	148	153	988	983	100	LIGHT GRAY SHALE
B-1	SH-CAL	153	163	983	973	95	LIGHT GRAY SHALE (6 IN. WASH-OUT)
B-1	SH-CAL	163	165	973	971	100	LIGHT GRAY SHALE
B-1	LIMESTONE	165	167	971	969	100	MEDIUM-GRAY LIMESTONE
B-1	SH-CAL	167	173	969	963	100	MEDIUM GRAY SHALE
B-1	SH-CAL	173	174	963	962	100	SAME
B-1	LIMESTONE	174	183	962	953	100	MEDIUM-GRAY LIMESTONE
B-1	SH-CAL	183	186	953	950	100	LIGHT GRAY SHALE
B-1	LIMESTONE	186	193	950	943	100	LIGHT GRAY LIMESTONE
B-1	LIMESTONE	193	198	943	938	100	SAME
B-2	SHALE	0	5	1141	1136		BROWN CLAYEY WEATHERED SHALE W/ROCK FRAGMENTS
B-2	LIMESTONE	5	6	1136	1135	100	LIGHT GRAY WEATHERED LIMESTONE
B-2	SHALE	6	15	1135	1126	0	WEATHERED SHALE-9FT. WASH·OUT
B-2	SH-CAL	15	18	1126	1123	100	LIGHT GRAY WEATHERED SHALE

BHID	LITH3	from	to	TopEl	BotEl	% recovered	COMMENTS
B-2	SH-CAL	18	21	1123	1120	100	LIGHT GRAY WEATHERED SHALE
B-2	SHALE	21	23	1120	1118	100	SAME
B-2	SANDSTONE	23	24	1118	1117	100	LIGHT GRAY WEATHERED SANDSTONE
B-2	SHALE	24	27.4	1117	1113	100	LIGHT GRAY WEATHERED SHALE
B-2	COAL	27.4	30	1113	1111	100	COAL
B-2	FIRECLAY	30	31	1111	1110	100	LIGHT GRAY FIRECLAY AND WEATHERED SHALE
B-2	SH-CAR	31	31.3	1110	1110	100	DARK GRAY SHALE
B-2	COAL	31.3	32.5	1110	1108	83.3333	COAL {LOST 0.2 FT.)
B-2	SHALE	32.5	36.7	1108	1104	100	DARK GRAY SHALE
B-2	LIMESTONE	36.7	41	1104	1100	100	MEDIUM-GRAY LIMESTONE
B-2	LIMESTONE	41	51	1100	1090	100	LIGHT-GRAY LIMESTONE
B-2	LIMESTONE	51	54	1090	1087	100	SAME
B-2	SH-CAL	54	55	1087	1086	100	LIGHT GRAY SHALE
B-2	SHALE	55	61	1086	1080	0	WEATHERED SHALE {WASH-OUT)
B-2	SHALE	61	64	1080	1077	0	SAME
B-2	SHALE	64	71	1077	1070	100	LIGHT GRAY FRACTURED AND WATER-IMPACTED SHALE
B-2	SHALE	71	73	1070	1068	100	MEDIUM-GRAY SHALE
B-2	SHALE	73	75.5	1068	1065	0	WASH-OUT (SOFT WEATHERED SHALE)
B-2	LIMESTONE	75.5	81	1065	1060	100	LIGHT GRAY LIMESTONE
B-2	LIMESTONE	81	83	1060	1058	100	SAME
B-2	SANDSTONE	83	88	1058	1053	100	LIGHT GRAY SANDSTONE
B-2	SH-CAL	88	91	1053	1050	100	LIGHT GRAY SHALE
B-2	SH-CAL	91	92.5	1050	1048	100	MOTTLED LIGHT GRAY SHALE
B-2	LIMESTONE	92.5	96	1048	1045	100	LIGHT GRAY LIMESTONE
B-2	SH-CAL	96	103	1045	1038	100	LIGHT GRAY SHALE
B-2	SH-CAL	103	113	1038	1028	100	SAME
B-2	COAL	113	114.5	1028	1026	100	COAL
B-2	SHALE	114.5	118	1026	1023	100	BLACK SHALE
B-2	COAL	118	118.5	1023	1022	100	COAL
B-2	SH-CAL	118.5	120	1022	1021	100	LIGHT GRAY SHALE
B-2	LIMESTONE	120	123	1021	1018	100	DARK GRAY LIMESTONE
B-2	SH-CAR	123	123.6	1018	1017	100	DARK GRAY BRinLE SHALE
B-2	COAL	123.6	124.6	1017	1016	100	COAL
B-2	SH-CAR	124.6	126.4	1016	1014	100	BLACK SHALE WITH COAL INCLUSIONS
B-2	SH-CAL	126.4	132.6	1014	1008	100	LIGHT GRAY SHALE
B-2	LIMESTONE	132.6	133	1008	1008	100	LIGHT GRAY LIMESTONE
B-2	LIMESTONE	133	143	1008	997.8	100	SAME
B-2	LIMESTONE	143	145	997.8	995.8	100	SAME
B-2	SH-CAL	145	149	995.8	991.8	100	LIGHT GRAY SHALE
B-2	SANDSTONE	149	153	991.8	987.8	100	LIGHT GRAY SANDSTONE
B-2	SANDSTONE	153	163	987.8	977.8	100	SAME
B-2	SH-CAL	163	168	977.8	972.8	100	LIGHT GRAY SANDY SHALE
B-2	LIMESTONE	168	169	972.8	971.8	100	LIGHT GRAY SHALEY LIMESTONE
B-2	SH-CAL	169	173	971.8	967.8	100	LIGHT GRAY SHALE
B-2	SH-CAL	173	179	967.8	961.8	100	SAME
B-2	LIMESTONE	179	183	961.8	957.8	100	LIGHT GRAY FRACTURED LIMESTONE
B-2	SH-CAL	183	184.5	957.8	956.3	100	LIGHT GRAY SHALE
B-2	LIMESTONE	184.5	187.5	956.3	953.3	100	LIGHT GRAY LIMESTONE
B-2	SH-CAL	187.5	191.5	953.3	949.3	100	LIGHT GRAY SHALE
B-2	LIMESTONE	191.5	193	949.3	947.8	100	LIGHT GRAY LIMESTONE
B-2	LIMESTONE	193	199	947.8	941.8	100	LIGHT GRAY LIMESTONE
B-2	LIMESTONE	199	203	941.8	937.8	100	LIGHT GRAY SHALE
B-3	OVERBURDEN	0	6	1055	1049	0	BROWN SILTY CLAYEY WEATHERED SHALE

BHID	LITH3	from	to	TopEl	BotEl	% recovered	COMMENTS
B-3	OVERBURDEN	6	10	1049	1045	0	LIGHT BROWN AND GRAY SANDY CLAYEY WEATHERED SHALE
B-3	OVERBURDEN	10	13	1045	1042	41.67	LIGHT BROWN SANDY CLAY AND WEATHERED SHALE
B-3	SHALE	13	17.2	1042	1038	35.71	SAME
B-3	SANDSTONE	17.2	23	1038	1032	100	BROWN SANDSTONE
B-3	SANDSTONE	23	27	1032	1028	100	LIGHT BROWN SANDSTONE
B-3	SH-CAR	27	31	1028	1024	100	DARK GRAY WEATHERED AND WATER-IMPACTED SHALE
B-3	LIMESTONE	31	33	1024	1022	100	DARK GRAY LIMESTONE
B-3	LIMESTONE	33	37	1022	1018	100	SAME
B-3	SH-CAR	37	39	1018	1016	100	DARK GRAY SHALE AND FIRECLAY WITH COAL STREAKINGS
B-3	COAL	39	42.2	1016	1013	93.75	COAL
B-3	FIRECLAY	42.2	43	1013	1012	100	BLACK SHALE AND FIRECLAY
B-3	FIRECLAY	43	47	1012	1008	100	BLACK SHALE AND FIRECLAY
B-3	LIMESTONE	47	53	1008	1002	100	MEDIUM-GRAY FRACTURED LIMESTONE
B-3	LIMESTONE	53	63	1002	992.1	100	MEDIUM-GRAY LIMESTONE
B-3	SHALE	63	67	992.1	988.1	100	MEDIUM-GRAY WEATHERED SHALE
B-3	SANDSTONE	67	73	988.1	982.1	100	LIGHT GRAY SANDSTONE
B-3	SANDSTONE	73	79	982.1	976.1	100	SAME
B-3	SH-CAR	79	83	976.1	972.1	100	DARK GRAY SHALE
B-3	SH-CAR	83	84.4	972.1	970.7	100	SAME
B-3	LIMESTONE	84.4	86.4	970.7	968.7	100	LIGHT GRAY LIMESTONE
B-3	SH-CAR	86.4	88	968.7	967.1	100	DARK GRAY SHALE WITH COAL STREAKINGS
B-3	WASH-OUT	88	89.8	967.1	965.3	0	WASH-OUT (POSSIBLE SOME COAL)
B-3	SH-CAL	89.8	93	965.3	962.1	100	LIGHT GRAY SANDY SHALE
B-3	SH-CAL	93	95	962.1	960.1	100	SAME
B-3	LIMESTONE	95	103	960.1	952.1	100	MED-GRAY FRACTURED LIMESTONE (END OF BORING)

Appendix C

Site Reconnaissance

Photo Report

Larson Design Group®

PHOTO 1: Acid mine drainage along WV-88

PHOTO 2: Topsoil slide along property

PHOTO 3: Topsoil slide along property

PHOTO 4: View of the cleared hillside from below

PHOTO 5: View of the neighboring property to the east

PHOTO 6: View of the property looking west

PHOTO 7: View of the clearing looking west

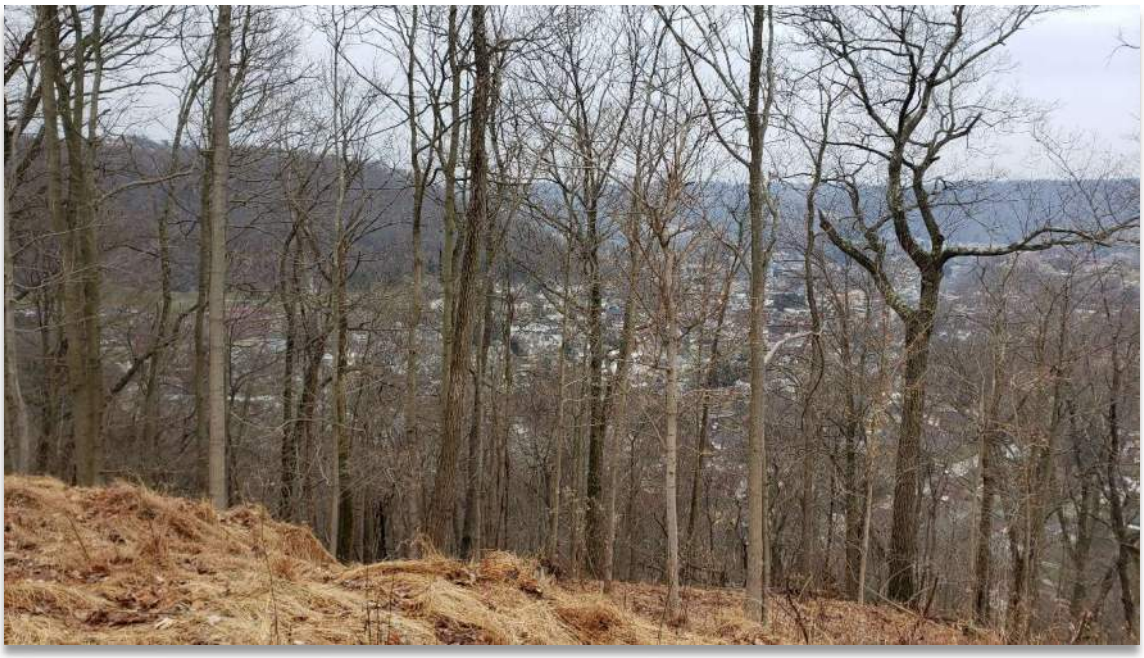

PHOTO 8: View from the site looking south

PHOTO 9: Location of B-1 looking west

PHOTO 10: Location of B-1 looking west

PHOTO 11: Outcrop on the western end of the site, looking east

PHOTO 12: Outcrop on the western end of the site, looking east.
Note: Bowed trees indicating slow movement over time