west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
(304) 926-0450
fax: (304) 926-0452

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Thursday, October 25, 2018
WELL WORK PERMIT
Horizontal 6A / New Drill

HG ENERGY II APPALACHIA, LLC
5260 DUPONT ROAD

PARKERSBURG, WV 26101

Re: Permit approval for STICKEL 1210 S-3H
47-033-05926-00-00

This well work permit is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to any additional specific conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas Inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days of completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

Per 35 CSR 4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin
Chief

Operator's Well Number:	STICKEL 1210 S-3H
Farm Name:	DANNY & ALICIA STICKEL
U.S. WELL NUMBER:	47-033-05926-00-00
Horizontal 6A	New Drill
Date Issued:	10/25/2018

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Austin Caperton, Cabinet Secretary
dep.wv.gov

October 24, 2018

Casey C. Bowie
7500 Old Mill Rd.
Jane lew, WV 26378

Re: Water Well Owner Comments on HG Energy, LLC Well Permits API Nos 47-033-05924; 47-033-05925; 47-033-05927; 47-033-05928 and 47-33-005929 on the proposed Stickel 1210 Well Pad.

Dear Mr. Bowie,

The Office of Oil and Gas (OOG) has completed its review of the above referenced permit applications submitted by HG Energy. The Harrison County oil and gas inspector examined the site to ensure compliance with all applicable requirements. Also, your comments were sent to the applicant to ensure it is aware of your concerns. The applicant's response is enclosed for your records.

After considering your comments, the applicant's response, and the inspector's findings, the OOG has determined that the applications meet the requirements set forth in Article 6A Chapter 22 of the West Virginia Code and Legislative Rule Title 35 Series 8. Consequently, the OOG is issuing the permits today. For your information and convenience, I am including with this letter a copy of the permits as issued.

Please contact Taylor Brewer at (304) 926-0499, extension 1547 if you have questions.

Sincerely,

Laura L. Adkins

Laura L. Adkins
WVDEP Office of Oil and Gas
601 57th Street, SE
Charleston, WV 25304
Environmental Resource Specialist

HG Energy, LLC
5260 Dupont Road
Parkersburg, WV 26101
(304) 420-1100 - Office
(304) 863-3172 - Fax

July 3, 2018

James Martin
WV DEP - Office of Oil & Gas
601 57th Street
Charleston, WV 25304

RE: Response to a Letter from Casey Bowie - Harrison County, WV
Proposed Well Pad – Stickel 1210, (47-033-05924, 05925,05926,05927,05928, 05929)

Dear Mr. Martin,

This letter is in response to a property owner with a water well within 1500' of the Stickel 1210 well pad. Casey Bowie, who, in a letter received by the WV DEP June 29, 2018, expressed concern regarding the proximity of the proposed drilling to his surface property by HG Energy II Appalachia, LLC (HGE).

The property exceeds the 625' restriction from the center of the well pad for an occupied dwelling. Water testing has been conducted on the water sources on his property. As such HGE has met the WV DEP requirements, as they pertain to Mr. Bowie, governing the drilling of new horizontal wells and therefore HGE should be granted the drilling permits.

I trust we have adequately addressed Mr. Bowie's concerns and respectfully request the subject drilling permits be issued by the WV DEP – Office of Oil and Gas.

Sincerely,

Diane White

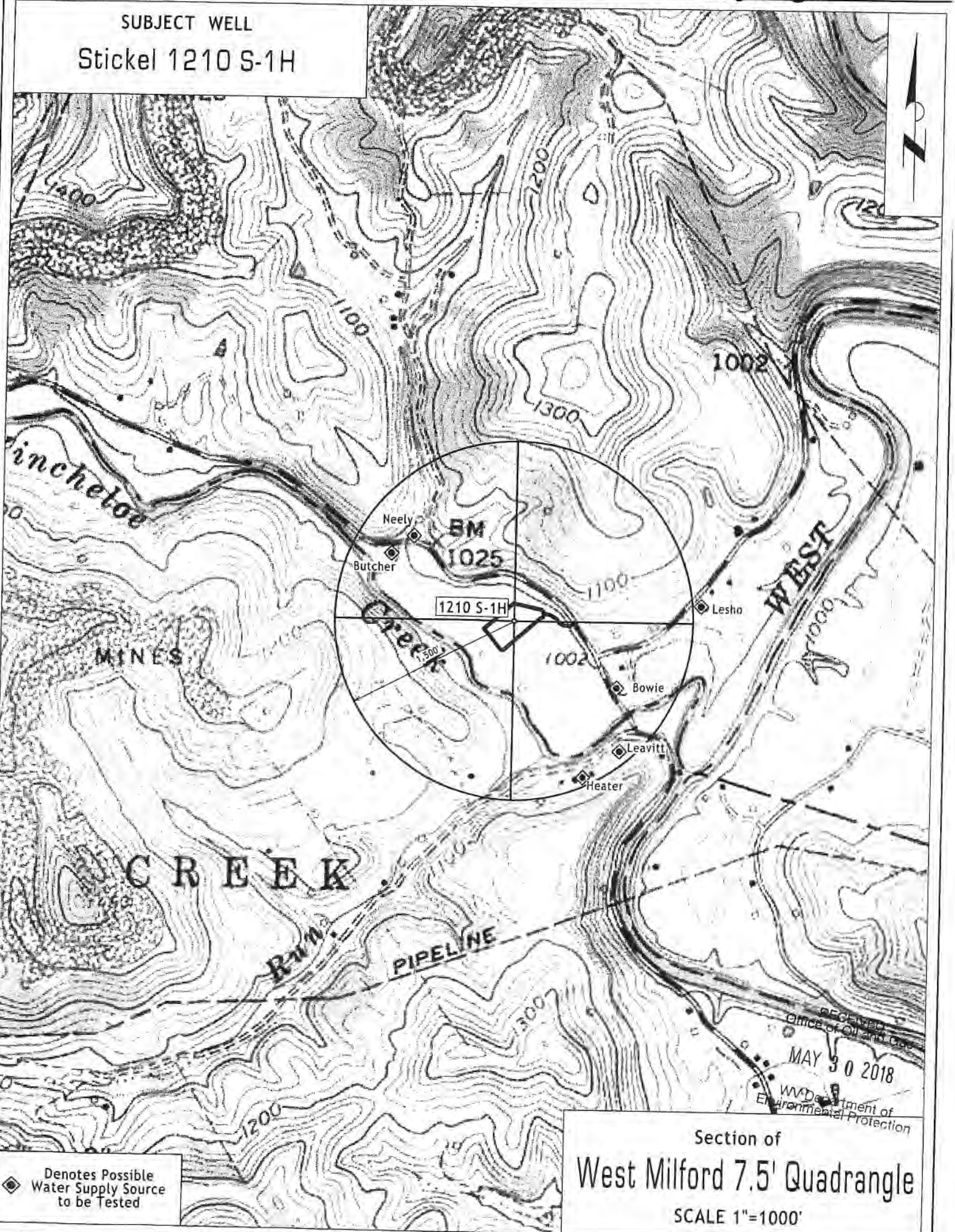
Diane White

CC: Wade Stansberry
Casey Bowie
Sam Ward – DEP Inspector

33-05925

SUBJECT WELL

Stickel 1210 S-1H



Denotes Possible Water Supply Source to be Tested

Section of

West Milford 7.5' Quadrangle

SCALE 1"=1000'

Adkins, Laura L

From: Diane White <dwhite@hgenergyllc.com>
Sent: Friday, September 21, 2018 8:27 AM
To: Adkins, Laura L
Subject: RE: WVDEP HG Energy 2nd letter.pdf Bowie Kincheloe
Attachments: 1210 ARM H&H Report.pdf

Laura,
I'm responding to the email you forwarded to me from Mr. Bowie to Marlan Zwoll, dated 9/10/18. Thank you for giving us the opportunity to provide additional information for Mr. Bowie.

Jared Stemple, HG Energy Construction Manager requested the ARM Group, Inc to research and develop a hydrologic report earlier this year. Attached is the H&H Report on the results of the hydrologic analysis for the Stickel 1210 Well Pad located in Harrison County. The ARM Group Inc., Earth Resource Engineers and Scientists, specialize in environmental research and services such as geotechnical engineering, water resources and hydrogeology. The report has been shared with Mr. Dan Hamrick, Flood Plain Coordinator of the Harrison County Planning Department. Mr. Hamrick approved the ARM findings.

The purpose of the report was to determine and quantify the effect, if any, that the well pad site might have on the 100 year flood elevation. Based on the results of ARM's H&H evaluation presented in the study, the geometry of the proposed 1210 well pad won't cause a notable increase in flooding risks to this or nearby properties as compared to the existing regulatory base flood.

Mr. Bowie's primary concern was the construction of the well pad would create a disturbance to the flood area and might cause his home and property to be flooded. Based on the ARM Study, we conclude his property is not exposed to a greater risk of flooding by the construction of the 1210 well pad.

Additionally, the engineered construction plans for the 1210 Well Pad have been designed by Penn E&R, an Engineering Firm specializing in environmentally engineered designs for Oil and Gas Field Operations, well versed in the WV DEP Rules and Regulations and the WV Erosion and Sediment Control Field Manual.

Construction of the well pad will be managed by Jared Stemple through the use of a qualified construction contractor. Sam Ward, WV State Inspector for Harrison County, will regularly review the site construction progress on behalf of the DEP and community citizens.

I trust we have addressed Mr. Bowie's concerns of flooding on his property because of the 1210 Well Pad. We respectfully request the well permit applications be approved. Please let me know if you'd like further information. We would also be happy to schedule a meeting with representatives of ARM Group, Penn E&R and HG Staff at your convenience, to discuss any concerns or questions you might have.

Sincerely,
Diane White

From: Adkins, Laura L [mailto:Laura.L.Adkins@wv.gov]
Sent: Wednesday, September 19, 2018 11:49 AM

ARM Group Inc.
Earth Resource Engineers and Consultants

July 27, 2018

Mr. Dan Hamrick
Harrison County Planning Department
301 W Main Street
Clarksburg, WV 26301

Re: Summary of Hydrologic/Hydraulic Analysis ***(rev.1)***
Proposed 1210 Well Pad
Harrison County, West Virginia
ARM Project 180198

Dear Mr. Hamrick:

ARM Group Inc. (ARM) has prepared this report for HG Energy, LLC (HG) to summarize the findings and recommendations from a hydrologic and hydraulic (H&H) evaluation of the above-referenced project site in Harrison County, West Virginia. The site is bounded by Kincheloe Run Road (north) and by Kincheloe Creek (south), and is approximately 2,000 feet upstream of the confluence with West Fork River. The purpose of this work was to better determine and quantify the effect, if any, that the proposed grading activities may have on the 100-year flood elevation in the area of the site. The scope of this project included: (1) a review of available published H&H information relevant to the site; (2) a desktop hydrologic study to determine the 100-year flood event discharge; (3) the development of a HEC-RAS (Hydrologic Evaluation Center – River Analysis System, developed by the US Army Corps of Engineers) hydraulic computer model of the baseline (i.e., pre-project) conditions at the site; (4) the development of a HEC-RAS hydraulic model of the proposed well pad geometry (i.e., post-project) conditions at the site; 5) analysis of the 100-year flood event under both modelled scenarios; and (6) compilation of this summary report.

BACKGROUND

Based on information received from HG, ARM understands that the proposed activities include the establishment of a well pad at the site along with the accompanying access road off of Kincheloe Run Road (T-35) and the associated soil borrow areas and temporary topsoil stockpile. The proposed top-of-pad elevation is understood to be approximately 994 to 994.4 feet above mean sea level (AMSL), and ARM understands that an elevation 996 ft AMSL (i.e., approximately 2-ft above the adjacent pad elevation) embankment is proposed around the perimeter of the pad. The proposed development activities will be completed at least partially within the mapped Federal Emergency Management Agency (FEMA) 100-year floodplain, as shown on the available regional FEMA Flood Insurance Rate Map (FIRM) panel(s). A majority of the proposed limits of disturbance will be within an area mapped as Zone A; however, portions of the proposed Material Borrow Area 1 and the proposed access drive will be within an

1129 West Governor Road • P O Box 797 • Hershey, PA 17033-0797
voice: (717) 533 – 8600 • fax: (717) 533 – 8605 • www.armgroup.net

area mapped as Zone AE. The general project site location is displayed on the attached Site Location and Drainage Area Delineation Map (Figure 1), following the text of this report.

REVIEW OF AVAILABLE H&H INFORMATION

ARM compiled and reviewed the following available published documents and references to develop a preliminary understanding of the H&H conditions at the site:

- Flood Insurance Study – Harrison County, West Virginia (No. 54033CV000A), effective October 2, 2012, Federal Emergency Management Agency (FEMA).
- NFIP Flood Insurance Rate Map (FIRM) (No. 54033C0239D), effective October 2, 2012, Federal Emergency Agency (FEMA).
- Flood Insurance Study – Lewis County, West Virginia (No. 54041CV000A), effective April 19, 2010, Federal Emergency Management Agency (FEMA).
- NFIP Flood Insurance Rate Map (FIRM) (No. 54041C0065E), effective April 10, 2010, Federal Emergency Agency (FEMA).
- 7.5-Minute Series Topographic Maps of West Virginia, West Virginia Geological Survey, West Milford, Big Isaac, Camden, and Weston Quadrangles, Photorevised 1976-1977.
- Construction Improvements Plan with Erosion and Sediment Controls for HG Well Pad 1210, by Penn E&R, June 28, 2018. [existing and proposed topographic contours]
- Estimation of Flood-Frequency Discharges for Rural Unregulated Streams in West Virginia (Scientific Investigations Report 2010-5033), J. B. Wiley & J. T. Atkins, Jr., U.S. Geological Survey (USGS), 2010.
- Hydrology and Floodplain Analysis (2008). P. B., Bedient, W. C. Huber, and B. E., Vieux, Prentice Hall: Upper Saddle River, NJ.

Available Hydrologic Information

Because the regulatory floodplain at the site is mapped as Zone A on the available FEMA FIRM panel(s), no detailed study was completed as part of the development of the 100-year floodplain boundary in the area of the site; furthermore, no discussion of Kincheloe Creek is provided in the available FEMA Flood Insurance Study (FIS) documents. Because there has not been a regulatory 100-year flood (i.e., base flood) discharge established for Kincheloe Creek, ARM completed a desktop hydrologic study to determine an appropriate estimate of the 100-year peak discharge at the downstream boundary of the study area.

Published regression equations have been established in Estimation of Flood-Frequency Discharges for Rural Unregulated Streams in West Virginia, which was published in 2010 by the U.S. Geological Survey. Based on a detailed review of this document, the peak 100-year flood discharge rate (i.e., Q_{100}) at the site in cubic feet per second (cfs) can be approximated as an empirically-derived convolution function of the total drainage area in square miles (i.e., DA):

$$Q_{100} = (557)(DA)^{0.674}$$

ARM reviewed the available regional 7.5-minute USGS Topographic Quadrangles and manually delineated the total drainage area based on the published contours therein, in accordance with

standard industry practices. ARM's total drainage boundary (refer to Figure 1, following the text of this report) includes approximately 21.2 square miles. Approximately 20.1 square miles of the total drainage area exists upstream of the confluence of Hollick Run, which occurs upstream of ARM's HEC-RAS cross section 0.000 (i.e., downstream boundary condition), and downstream of cross section 1.000. Therefore the peak 100-year flood discharge rate at the downstream boundary of the site is estimated as:

$$Q_{100} = (557)(21.2\ sq.mi.)^{0.674} = 4{,}360\ cfs$$

The standard error associated with the published USGS regression equation is notably approximately 33%; therefore, as part of a sensitivity analysis of the H&H computations, ARM also considered an approximately worst case peak 100-year flood discharge rate of 5,800 cfs (i.e., 33% higher than the value computed above). These two estimated peak discharge values were incorporated into ARM's hydraulic analysis, discussed below and presented herein.

Upstream of the confluence with Hollick Run (i.e., ARM HEC-RAS cross section 1.000 through 8.000, the peak 100-year flood discharge rate is estimated as:

$$Q_{100} = (557)(20.1\ sq.mi.)^{0.674} = 4{,}210\ cfs$$

As such, the approximate associated worst case peak 100-year flood discharge rate upstream of the Hollick Run confluence is 5,600 cfs. ARM's HEC-RAS model incorporates these estimated flow changes associated with the confluence of Hollick Run and Kincheloe Creek.

Available Hydraulic Information

Because no detailed study has been completed thus far by FEMA, there are no available regulatory cross sections or existing hydraulic models (e.g., HEC-2 or HEC-RAS) to directly tie a hydraulic model into in the immediate vicinity of the site. However, as shown on the available regulatory FIRM panel(s), FEMA has established a base flood elevation (BFE) for elevation 996 feet above mean sea level (AMSL) beginning approximately 630 feet downstream of the proposed well pad site and extending to the confluence with West Fork River; according to the regulatory FIRM panel(s), a tailwater condition at this same elevation exists between this location and the downstream confluence with the West Fork River. This published BFE was determined as part of the previous detailed study associated with West Fork River, although, as already mentioned, no additional specific information is provided in the regional FIS documents that would otherwise corroborate the regression equation derived discharge value presented in the previous section (e.g., the FIS documents do not provide information regarding the change in discharge for the West Fork River immediately upstream of the confluence with Kincheloe Creek versus immediately downstream of the confluence). Based on this information, ARM utilized the published BFE at the location of cross section 0.000 as a "known" downstream boundary condition for our hydraulic model.

HEC-RAS HYDRAULIC MODELLING, ASSESSMENT, AND CONCLUSIONS

Development of Pre-Project (Baseline) Conditions Model

ARM developed a detailed baseline hydraulic model utilizing the USACE HEC-RAS computer software program (Version 4.1.0). This model was created utilizing results of the topographic survey completed by ARM, a review of site photographs and aerial imagery, as well as relevant information from the available FEMA Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) panels, as discussed previously. Manning's roughness coefficients were derived from a review of the available site photographs and aerial imagery (e.g., Kincheloe Creek channel and floodplains) in conjunction with typical published values [e.g., as available in Hydrology and Floodplain Analysis (2008) and other standard textbooks].

The locations of each of ARM's HEC-RAS cross sections are shown on the attached HEC-RAS Cross Section Location Map (Figure 2), following the text of this report. Cross Section 0.000 is coincident with the existing FEMA BFE (Base flood elevation 996 ft AMSL), and represents the downstream "known" boundary of the model. The Cross Section designations increase upstream (i.e., 1.000, 2.000, etc.). Cross Sections 1.000, 2.000, and 3.000 represent typical sections of the area between the downstream boundary of the model and the proposed well pad location (this area includes the proposed Material Borrow Area 1, the proposed access road, and the proposed topsoil stockpile). Cross Sections 4.000, 5.000, and 6.000 represent transects across the downstream, central, and upstream portions of the proposed well pad, respectively. Cross Sections 6.000 and 7.000 represent transects across the proposed Material Borrow Area 2, and Cross Section 8.000 is located upstream of the proposed limits of disturbance.

Post-Project Conditions Model and 100-year Flood Comparison

ARM adjusted the baseline HEC-RAS model to represent the geometry of the proposed well pad based on the grading plan provided by HG, dated June 28, 2018. The computed steady flow analysis results associated with this "Post-Project" model are compared to results of the "Pre-Project" model in both tabular and graphical form following the text of this report. As shown on the attached HEC-RAS output table(s), water surface profiles, and cross sections, the proposed pad development activities do not alter the computed water surface profile at any of ARM's cross-sections by more than 0.05 foot.

The results of this study indicate that the proposed development pad does not increase the base flood water surface elevation within this reach by more than approximately 0.05 foot (i.e., considerably less than one foot). Furthermore, the hydraulics in the area of the proposed development are largely controlled by tailwater effects associated with the downstream West Fork River; as such, the water surface profile in the area of the site is classified as a nearly level (i.e., approximate elevation 996 ft AMSL) M1 profile. Notably, even utilizing the higher discharge estimate (i.e., 5,600 cfs) did not impact this conclusion; results from both steady flow simulations (i.e., 4,210 cfs vs. 5,600 cfs) show negligible differences because of the predominate tailwater effects associated with West Fork River.

Based on the results of ARM's H&H evaluation presented herein, the geometry of the proposed 1210 well pad provided by HG will not cause a notable increase in flooding risks to this or any

other nearby properties as compared to the existing regulatory base flood. It should be noted that the 100-year floodplain (Zone A) delineated on the regulatory FEMA FIRM panel(s) was likely generated based on a relatively lower-resolution regional digital elevation model, and the results of recent detailed site-specific topographic surveying should be considered as appropriate when estimating the lateral extent of inundation within the survey boundary.

LIMITATIONS

All conclusions and recommendations presented in this report are based on the appropriateness of available regression equations and historic data by others, the assumption that the topographic and geometric conditions do not deviate appreciably from those presented herein, and other factors presented in this report. In the event that the proposed construction and/or anticipated geometry change with respect to those currently proposed or assumed, if significant development or other activities that can increase stormwater runoff are known to occur in upstream locations, or in the event that conditions encountered during construction are different from those described herein, ARM should be notified so supplementary recommendations can be provided, if warranted.

CLOSING

Please contact either of the undersigned at 717-533-8600 if you have any questions or comments regarding this report. We appreciate your time and look forward to an efficient review.

Sincerely,
ARM Group Inc.

DRAFT

Jeremy B. Byler, P.E., P.G.
Project Engineer and Geologist

DRAFT

Tessa Antolick, P.E.
Director – Oil and Gas Services

Attachments:

- Figure 1 - Site Location and Drainage Area Delineation Map
- Figure 2 - HEC-RAS Cross Section Location Map
- Appendix A – HEC-RAS Output (Pre-Project Conditions)
- Appendix B – HEC-RAS Output (Post-Project Conditions)

Figures

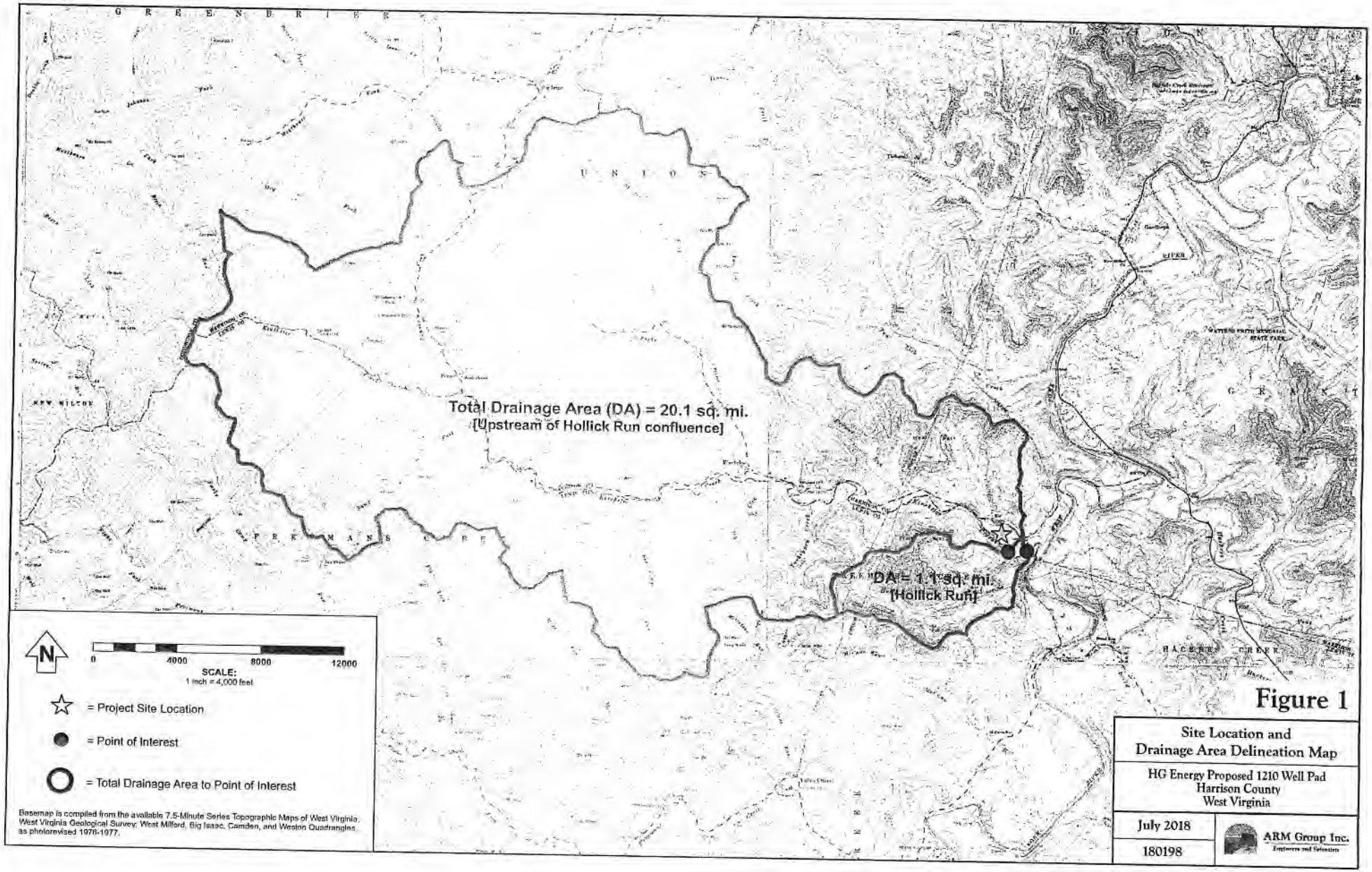


Figure 1

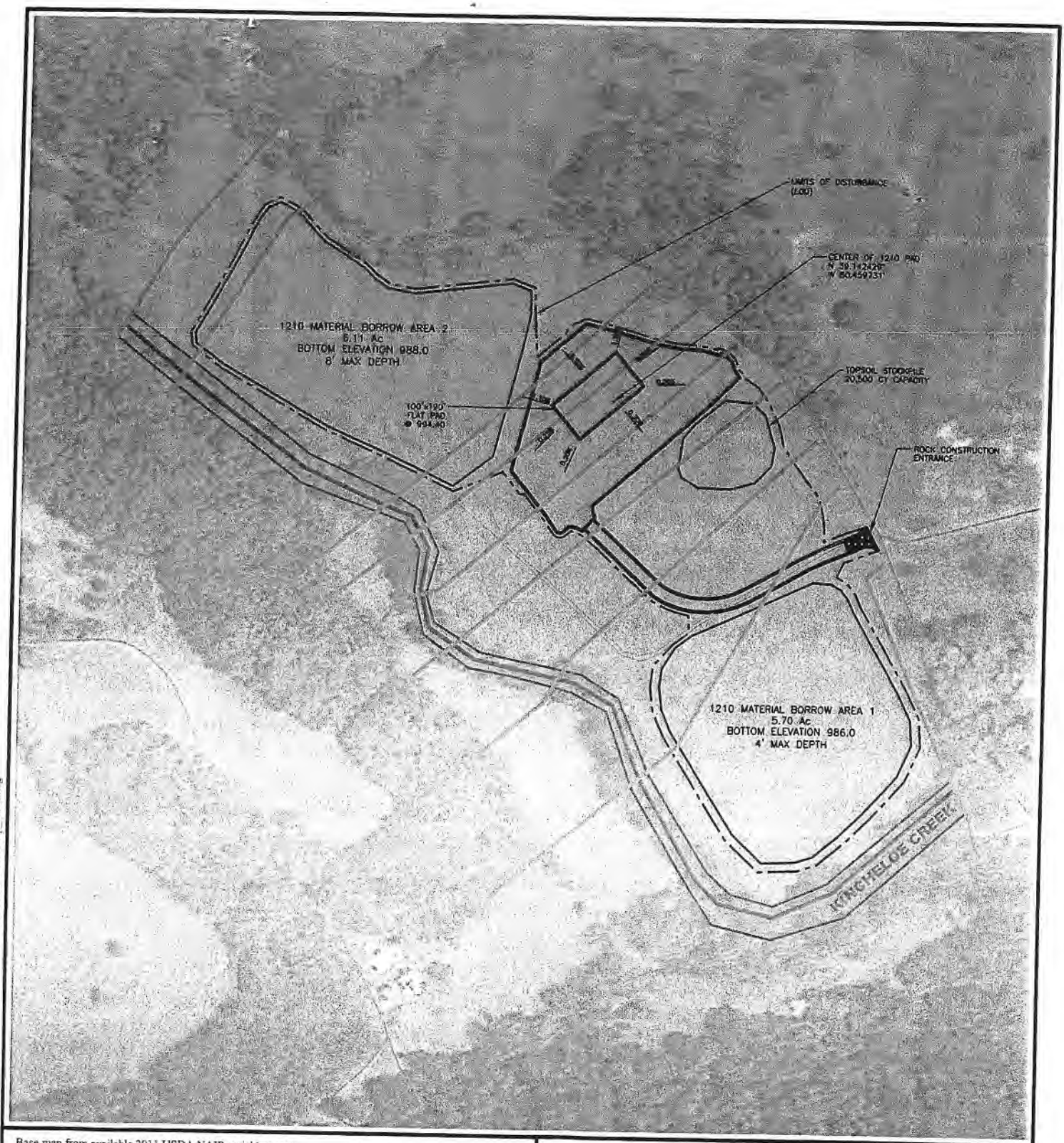
Site Location and Drainage Area Delineation Map

HG Energy Proposed 1210 Well Pad
Harrison County
West Virginia

July 2018

180198

ARM Group Inc.
Engineers and Scientists



Base map from available 2011 USDA NAIP aerial imagery.

0 300 600 900

SCALE IN FEET

HEC-RAS Cross Section Location Map

HG Energy Proposed 1210 Well Pad
Harrison County, West Virginia

July 2018	Scale: 1" = 300'	180198

ARM Group Inc.
Engineers and Scientists

Figure 2

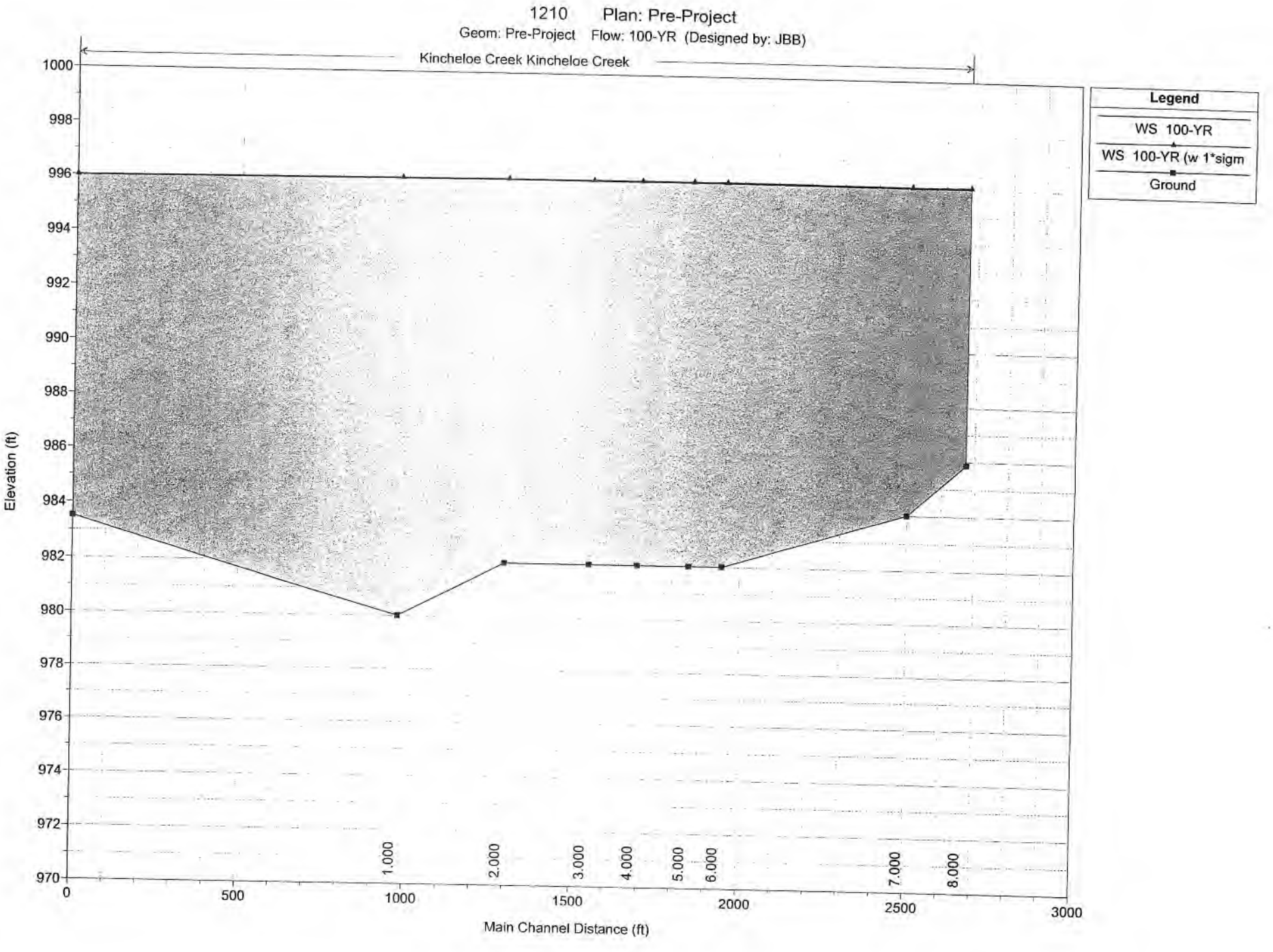
P:\HG Energy\180198 PAD 1210 H+H\Documents\Engineering\H&H\Figure 2 - HEC-RAS Cross Section Location Map_rev1.dwg

APPENDIX A

HEC-RAS Output
(Pre-Project Conditions)

HEC-RAS Plan: Pre-Project River: Kincheloe Creek Reach: Kincheloe Creek

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Kincheloe Creek	8.000	100-YR	4210.00	985.87	996.04		996.13	0.000290	2.65	1883.17	401.44	0.16
Kincheloe Creek	8.000	100-YR (w 1*sigm	5600.00	985.87	996.08		996.22	0.000502	3.49	1896.39	401.93	0.21
Kincheloe Creek	7.000	100-YR	4210.00	984.00	996.03		996.08	0.000142	2.10	2356.95	415.04	0.11
Kincheloe Creek	7.000	100-YR (w 1*sigm	5600.00	984.00	996.05		996.14	0.000248	2.78	2366.56	415.24	0.15
Kincheloe Creek	6.000	100-YR	4210.00	982.00	996.04		996.05	0.000022	0.94	5802.51	888.30	0.05
Kincheloe Creek	6.000	100-YR (w 1*sigm	5600.00	982.00	996.06		996.08	0.000038	1.24	5827.40	888.64	0.06
Kincheloe Creek	5.000	100-YR	4210.00	982.00	996.04		996.04	0.000022	0.88	6033.97	941.95	0.05
Kincheloe Creek	5.000	100-YR (w 1*sigm	5600.00	982.00	996.06		996.08	0.000039	1.17	6059.22	942.23	0.06
Kincheloe Creek	4.000	100-YR	4210.00	982.00	996.03		996.04	0.000017	0.81	6102.90	934.20	0.04
Kincheloe Creek	4.000	100-YR (w 1*sigm	5600.00	982.00	996.06		996.07	0.000029	1.07	6126.57	934.61	0.05
Kincheloe Creek	3.000	100-YR	4210.00	982.00	996.03		996.04	0.000009	0.61	7497.16	992.92	0.03
Kincheloe Creek	3.000	100-YR (w 1*sigm	5600.00	982.00	996.06		996.07	0.000016	0.81	7522.56	993.17	0.04
Kincheloe Creek	2.000	100-YR	4210.00	982.00	996.03		996.04	0.000011	0.65	7437.12	962.44	0.03
Kincheloe Creek	2.000	100-YR (w 1*sigm	5600.00	982.00	996.05		996.06	0.000019	0.86	7459.97	962.62	0.04
Kincheloe Creek	1.000	100-YR	4210.00	980.00	996.03		996.03	0.000009	0.57	7881.41	1034.32	0.03
Kincheloe Creek	1.000	100-YR (w 1*sigm	5600.00	980.00	996.05		996.06	0.000016	0.76	7904.52	1034.50	0.04
Kincheloe Creek	0.000	100-YR	4360.00	983.50	996.00	986.66	996.02	0.000045	1.19	4276.69	664.36	0.06
Kincheloe Creek	0.000	100-YR (w 1*sigm	5800.00	983.50	996.00	987.17	996.03	0.000079	1.59	4276.69	664.36	0.09


1210 Plan: Pre-Project
Geom: Pre-Project Flow: 100-YR (Designed by: JBB)
Kincheloe Creek Kincheloe Creek
Legend
WS 100-YR
WS 100-YR (w 1*sigm
Ground
Elevation (ft)
1000
998
996
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990
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982
980
978
976
974
972
970
0
500
1000
1500
2000
2500
3000
Main Channel Distance (ft)
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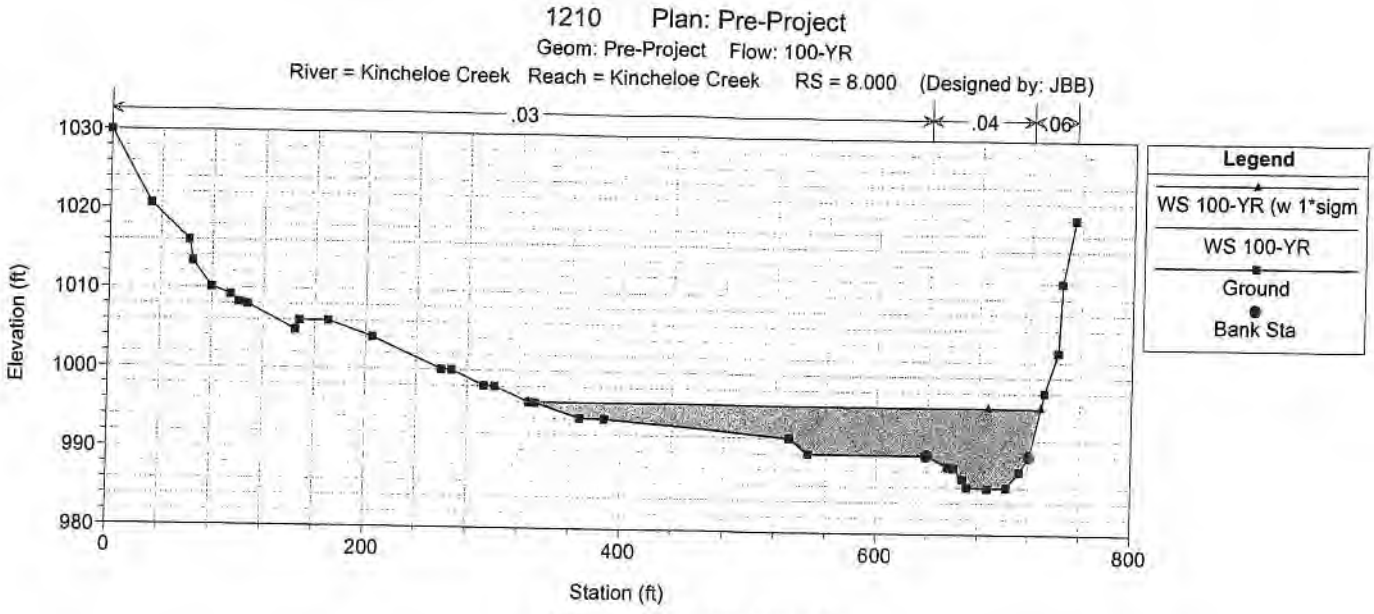
2.000
3.000
4.000
5.000
6.000
7.000
8.000


1210 Plan: Pre-Project
Geom: Pre-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 8.000 (Designed by: JBB)
.03
.04
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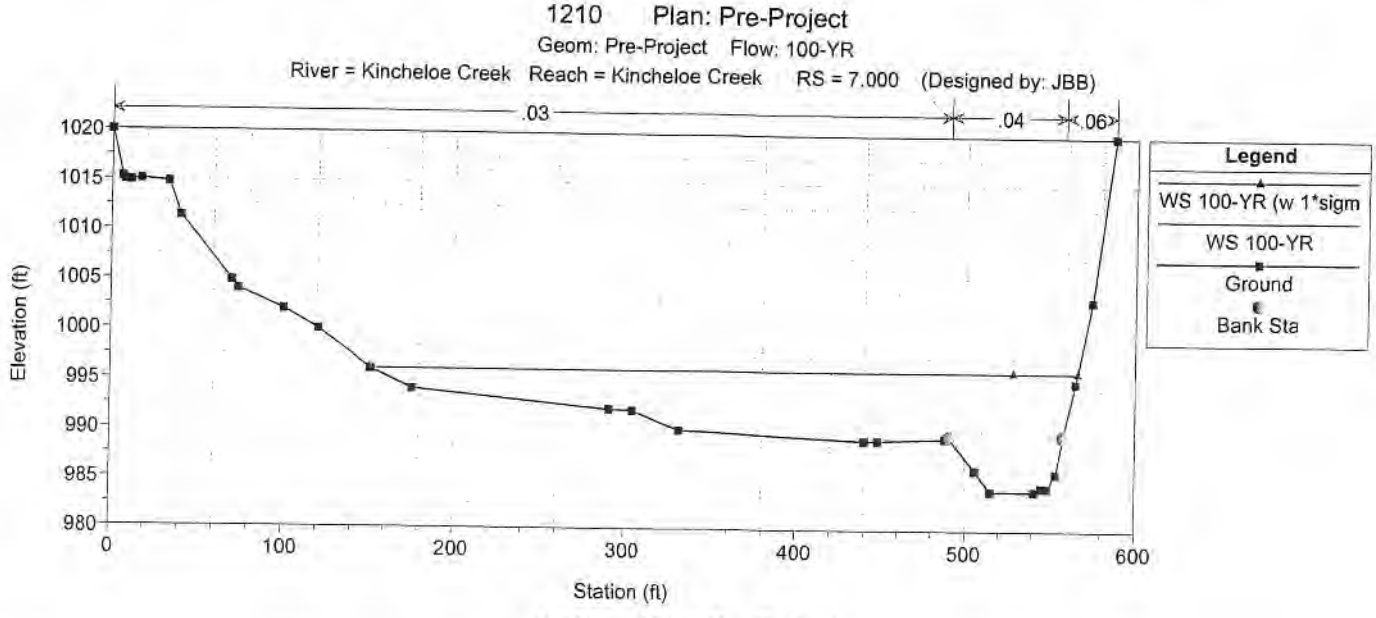
Elevation (ft)
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Bank Sta


1210 Plan: Pre-Project
Geom: Pre-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 7.000 (Designed by: JBB)
.03
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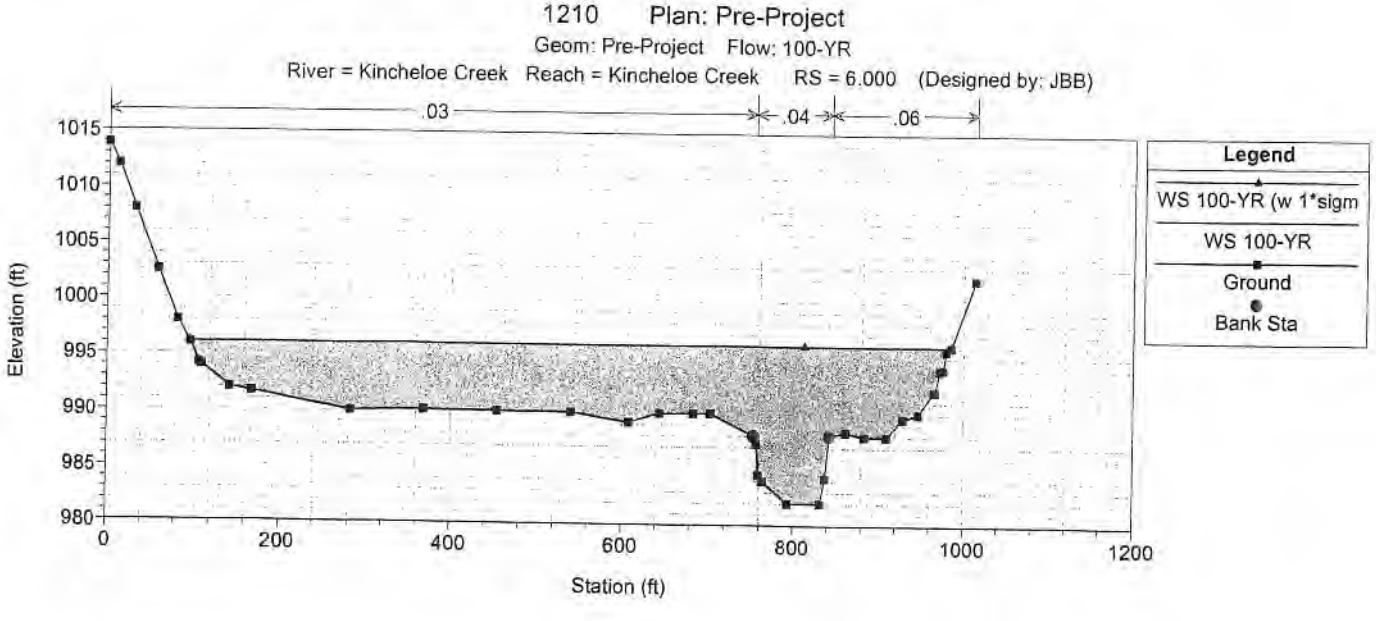
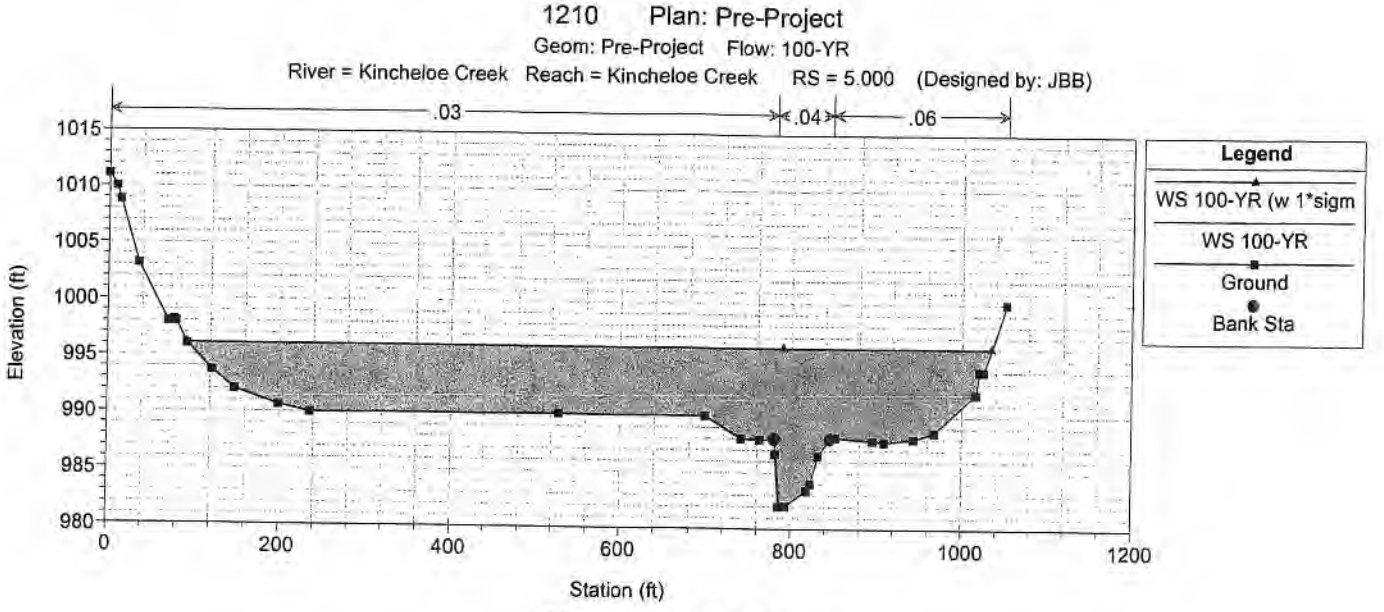
Elevation (ft)
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Bank Sta


1210 Plan: Pre-Project
Geom: Pre-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 6.000 (Designed by: JBB)
.03
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Bank Sta


1210 Plan: Pre-Project
Geom: Pre-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 5.000 (Designed by: JBB)
.03
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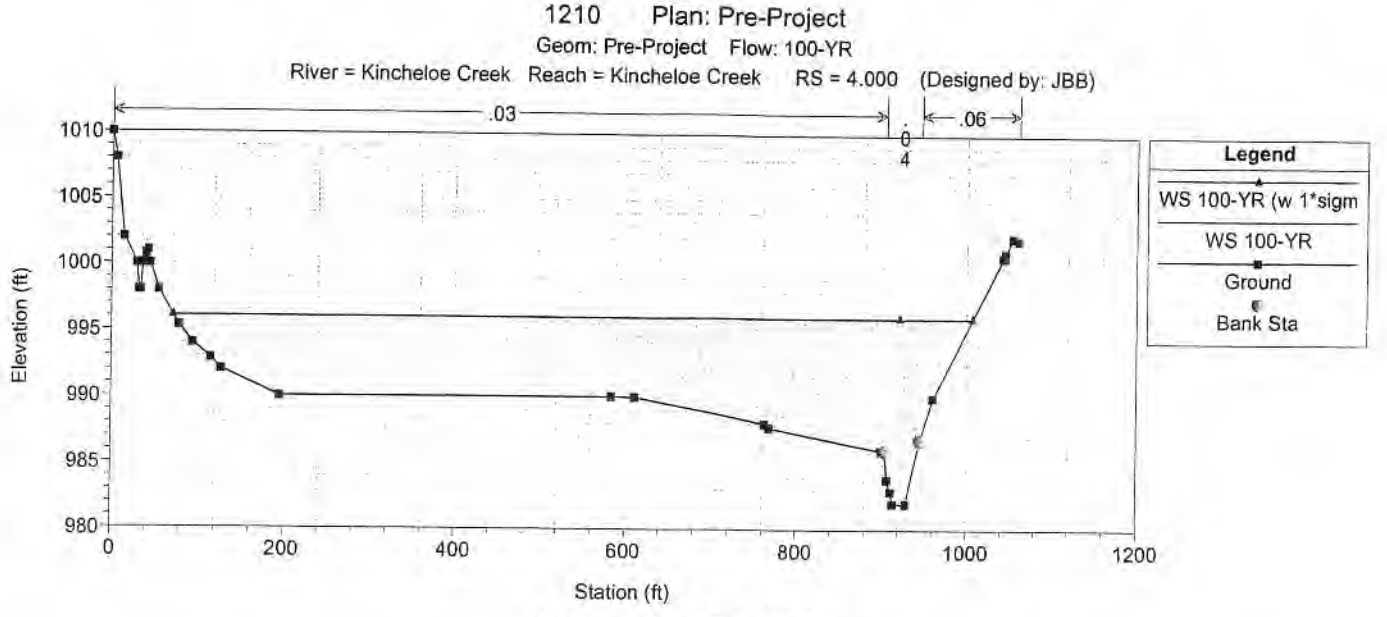
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


1210 Plan: Pre-Project
Geom: Pre-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 4.000 (Designed by: JBB)
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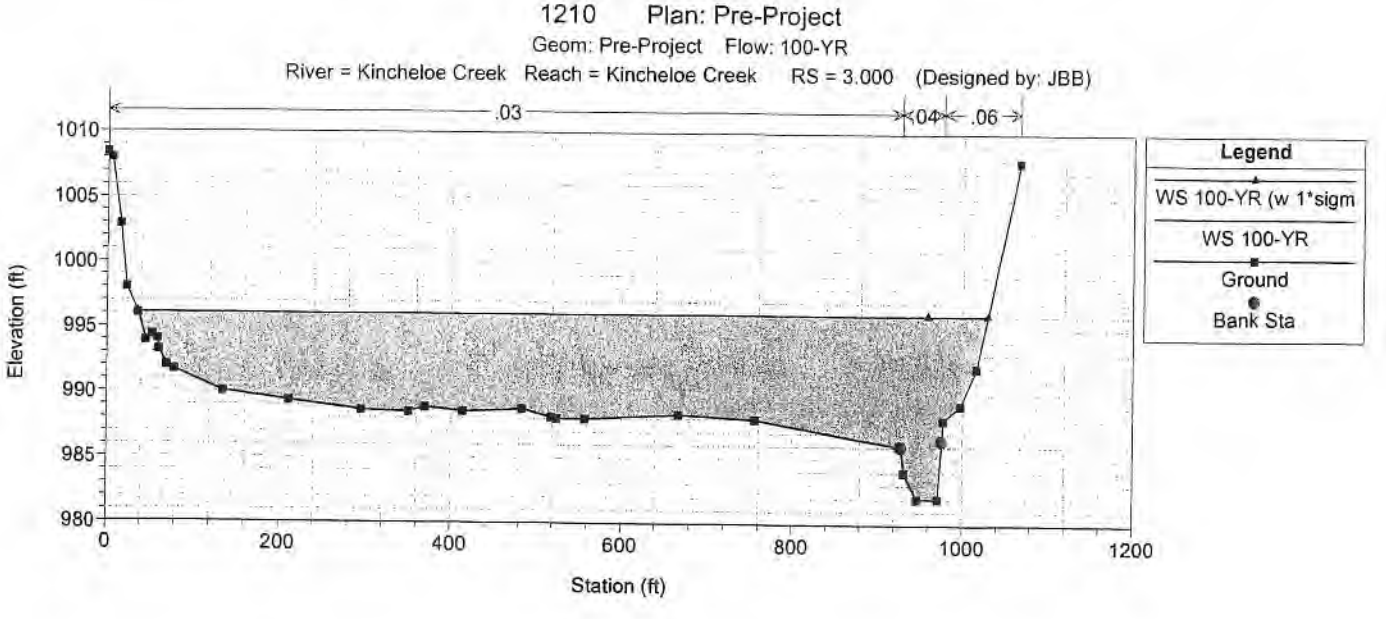
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


1210 Plan: Pre-Project
Geom: Pre-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 3.000 (Designed by: JBB)
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Legend
WS 100-YR (w 1*sigm
WS 100-YR
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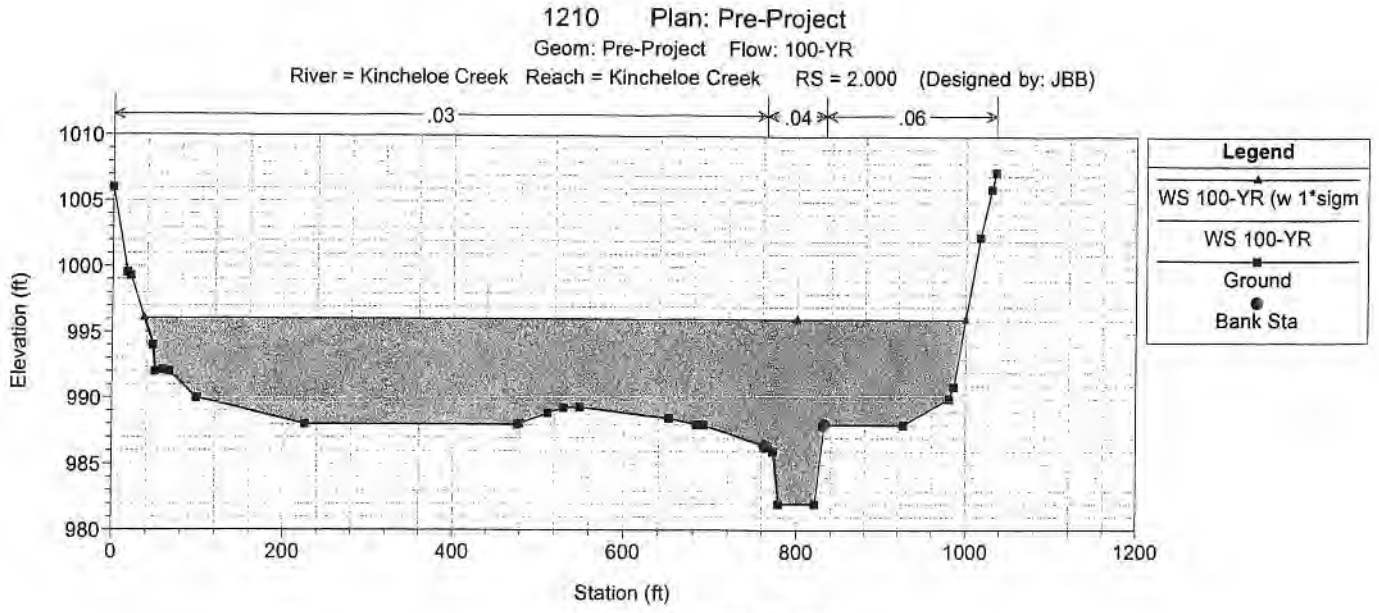
Bank Sta
Elevation (ft)
Station (ft)


1210 Plan: Pre-Project
Geom: Pre-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 2.000 (Designed by: JBB)
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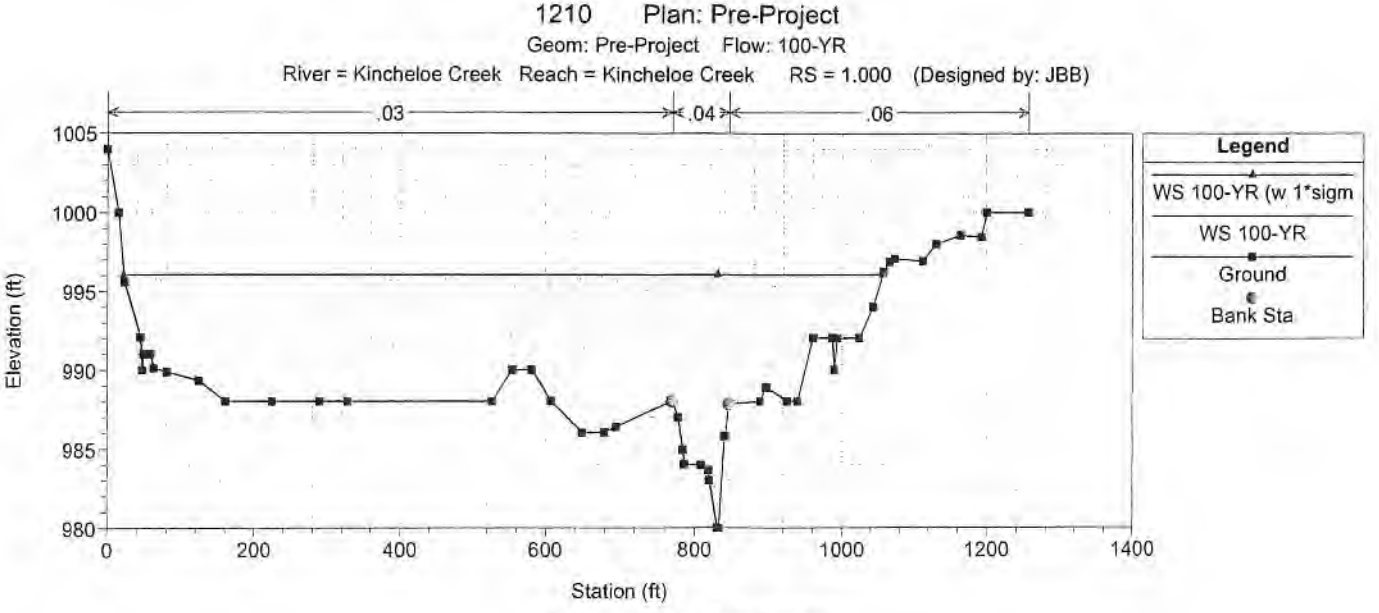
Elevation (ft)
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Bank Sta


1210 Plan: Pre-Project
Geom: Pre-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 1.000 (Designed by: JBB)
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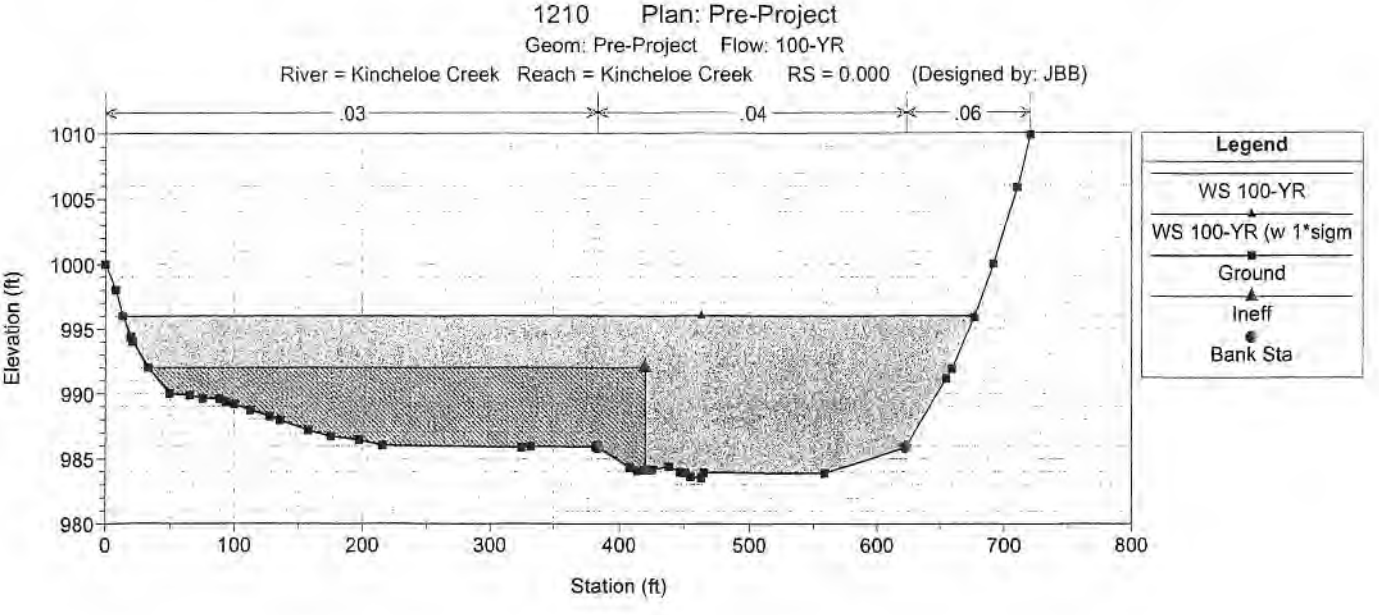
Elevation (ft)
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Bank Sta


1210 Plan: Pre-Project
Geom: Pre-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 0.000 (Designed by: JBB)
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Elevation (ft)
Station (ft)
Legend
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WS 100-YR (w 1*sigm
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Bank Sta

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 8.000 Profile: 100-YR

E.G. Elev (ft)	996.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.04	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)	1154.21	702.66	26.29
E.G. Slope (ft/ft)	0.000290	Area (sq ft)	1154.21	702.66	26.29
Q Total (cfs)	4210.00	Flow (cfs)	2329.03	1860.65	20.32
Top Width (ft)	401.44	Top Width (ft)	311.53	81.21	8.70
Vel Total (ft/s)	2.24	Avg. Vel. (ft/s)	2.02	2.65	0.77
Max Chl Dpth (ft)	10.17	Hydr. Depth (ft)	3.71	8.65	3.02
Conv. Total (cfs)	247327.6	Conv. (cfs)	136825.0	109308.9	1193.7
Length Wtd. (ft)	175.00	Wetted Per. (ft)	311.73	82.00	10.59
Min Ch El (ft)	985.87	Shear (lb/sq ft)	0.07	0.16	0.04
Alpha	1.07	Stream Power (lb/ft s)	754.55	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	195.76	73.77	42.32
C & E Loss (ft)	0.01	Cum SA (acres)	28.73	6.22	7.05

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 8.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.08	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)	1164.47	705.34	26.58
E.G. Slope (ft/ft)	0.000502	Area (sq ft)	1164.47	705.34	26.58
Q Total (cfs)	5600.00	Flow (cfs)	3108.20	2464.67	27.14
Top Width (ft)	401.93	Top Width (ft)	311.97	81.21	8.75
Vel Total (ft/s)	2.95	Avg. Vel. (ft/s)	2.67	3.49	1.02
Max Chl Dpth (ft)	10.21	Hydr. Depth (ft)	3.73	8.69	3.04
Conv. Total (cfs)	249937.8	Conv. (cfs)	138724.3	110002.4	1211.1
Length Wtd. (ft)	175.00	Wetted Per. (ft)	312.18	82.00	10.65
Min Ch El (ft)	985.87	Shear (lb/sq ft)	0.12	0.27	0.08
Alpha	1.07	Stream Power (lb/ft s)	754.55	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	196.40	73.86	42.47
C & E Loss (ft)	0.02	Cum SA (acres)	28.74	6.22	7.06

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 7.000 Profile: 100-YR

E.G. Elev (ft)	996.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	500.00	550.00	650.00
Crit W.S. (ft)		Flow Area (sq ft)	1605.59	724.28	27.08
E.G. Slope (ft/ft)	0.000142	Area (sq ft)	1605.59	724.28	27.08
Q Total (cfs)	4210.00	Flow (cfs)	2674.64	1520.32	15.04
Top Width (ft)	415.04	Top Width (ft)	338.83	67.91	8.29
Vel Total (ft/s)	1.79	Avg. Vel. (ft/s)	1.67	2.10	0.56
Max Chl Dpth (ft)	12.03	Hydr. Depth (ft)	4.74	10.67	3.27
Conv. Total (cfs)	353021.2	Conv. (cfs)	224276.3	127483.8	1261.1
Length Wtd. (ft)	522.18	Wetted Per. (ft)	339.02	70.22	10.50
Min Ch El (ft)	984.00	Shear (lb/sq ft)	0.04	0.09	0.02
Alpha	1.05	Stream Power (lb/ft s)	587.40	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	190.22	70.90	42.21
C & E Loss (ft)	0.01	Cum SA (acres)	27.42	5.92	7.02

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 7.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	500.00	550.00	650.00
Crit W.S. (ft)		Flow Area (sq ft)	1613.43	725.85	27.27
E.G. Slope (ft/ft)	0.000248	Area (sq ft)	1613.43	725.85	27.27
Q Total (cfs)	5600.00	Flow (cfs)	3563.02	2016.91	20.07
Top Width (ft)	415.24	Top Width (ft)	339.01	67.91	8.32
Vel Total (ft/s)	2.37	Avg. Vel. (ft/s)	2.21	2.78	0.74
Max Chl Dpth (ft)	12.05	Hydr. Depth (ft)	4.76	10.69	3.28
Conv. Total (cfs)	355242.8	Conv. (cfs)	226024.7	127944.9	1273.2
Length Wtd. (ft)	522.14	Wetted Per. (ft)	339.20	70.22	10.54
Min Ch El (ft)	984.00	Shear (lb/sq ft)	0.07	0.16	0.04
Alpha	1.05	Stream Power (lb/ft s)	587.40	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	190.82	70.98	42.37
C & E Loss (ft)	0.02	Cum SA (acres)	27.43	5.92	7.03

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 6.000 Profile: 100-YR

E.G. Elev (ft)	996.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.04	Reach Len. (ft)	95.00	100.00	92.00
Crit W.S. (ft)		Flow Area (sq ft)	3739.46	1148.25	914.80
E.G. Slope (ft/ft)	0.000022	Area (sq ft)	3739.46	1148.25	914.80
Q Total (cfs)	4210.00	Flow (cfs)	2768.10	1078.04	363.86
Top Width (ft)	888.30	Top Width (ft)	656.42	88.53	143.35
Vel Total (ft/s)	0.73	Avg. Vel. (ft/s)	0.74	0.94	0.40
Max Chl Dpth (ft)	14.04	Hydr. Depth (ft)	5.70	12.97	6.38
Conv. Total (cfs)	898255.8	Conv. (cfs)	590608.2	230013.6	77634.1
Length Wtd. (ft)	95.72	Wetted Per. (ft)	656.72	91.70	144.21
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.14	Stream Power (lb/ft s)	1013.19	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	159.54	59.08	35.18
C & E Loss (ft)	0.00	Cum SA (acres)	21.71	4.94	5.89

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 6.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.06	Reach Len. (ft)	95.00	100.00	92.00
Crit W.S. (ft)		Flow Area (sq ft)	3757.85	1150.73	918.82
E.G. Slope (ft/ft)	0.000038	Area (sq ft)	3757.85	1150.73	918.82
Q Total (cfs)	5600.00	Flow (cfs)	3686.56	1429.48	483.97
Top Width (ft)	888.64	Top Width (ft)	656.63	88.53	143.48
Vel Total (ft/s)	0.96	Avg. Vel. (ft/s)	0.98	1.24	0.53
Max Chl Dpth (ft)	14.06	Hydr. Depth (ft)	5.72	13.00	6.40
Conv. Total (cfs)	904328.2	Conv. (cfs)	595331.4	230842.2	78154.6
Length Wtd. (ft)	95.72	Wetted Per. (ft)	656.93	91.70	144.35
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.03	0.02
Alpha	1.14	Stream Power (lb/ft s)	1013.19	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	159.99	59.14	35.31
C & E Loss (ft)	0.00	Cum SA (acres)	21.72	4.94	5.89

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 5.000 Profile: 100-YR

E.G. Elev (ft)	996.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.04	Reach Len. (ft)	126.00	153.00	110.00
Crit W.S. (ft)		Flow Area (sq ft)	3970.25	771.39	1292.34
E.G. Slope (ft/ft)	0.000022	Area (sq ft)	3970.25	771.39	1292.34
Q Total (cfs)	4210.00	Flow (cfs)	2985.83	680.89	543.28
Top Width (ft)	941.95	Top Width (ft)	688.16	65.14	188.65
Vel Total (ft/s)	0.70	Avg. Vel. (ft/s)	0.75	0.88	0.42
Max Chl Dpth (ft)	14.04	Hydr. Depth (ft)	5.77	11.84	6.85
Conv. Total (cfs)	891737.1	Conv. (cfs)	632439.7	144222.2	115075.2
Length Wtd. (ft)	128.39	Wetted Per. (ft)	688.38	68.32	189.56
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.13	Stream Power (lb/ft s)	1051.58	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	151.13	56.88	32.85
C & E Loss (ft)	0.00	Cum SA (acres)	20.25	4.76	5.54

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 5.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.06	Reach Len. (ft)	126.00	153.00	110.00
Crit W.S. (ft)		Flow Area (sq ft)	3988.69	773.13	1297.40
E.G. Slope (ft/ft)	0.000039	Area (sq ft)	3988.69	773.13	1297.40
Q Total (cfs)	5600.00	Flow (cfs)	3974.83	903.00	722.18
Top Width (ft)	942.23	Top Width (ft)	688.33	65.14	188.77
Vel Total (ft/s)	0.92	Avg. Vel. (ft/s)	1.00	1.17	0.56
Max Chl Dpth (ft)	14.06	Hydr. Depth (ft)	5.79	11.87	6.87
Conv. Total (cfs)	897780.0	Conv. (cfs)	637235.8	144766.4	115777.8
Length Wtd. (ft)	128.39	Wetted Per. (ft)	688.55	68.32	189.68
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.03	0.02
Alpha	1.13	Stream Power (lb/ft s)	1051.58	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	151.55	56.93	32.97
C & E Loss (ft)	0.00	Cum SA (acres)	20.25	4.76	5.54

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 4.000 Profile: 100-YR

E.G. Elev (ft)	996.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	120.00	145.00	145.00
Crit W.S. (ft)		Flow Area (sq ft)	5320.61	528.98	253.31
E.G. Slope (ft/ft)	0.000017	Area (sq ft)	5320.61	528.98	253.31
Q Total (cfs)	4210.00	Flow (cfs)	3717.18	426.95	65.87
Top Width (ft)	934.20	Top Width (ft)	831.63	41.63	60.94
Vel Total (ft/s)	0.69	Avg. Vel. (ft/s)	0.70	0.81	0.26
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	6.40	12.71	4.16
Conv. Total (cfs)	1028445.0	Conv. (cfs)	908056.1	104297.3	16091.1
Length Wtd. (ft)	122.84	Wetted Per. (ft)	831.85	43.26	61.66
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.01	0.00
Alpha	1.05	Stream Power (lb/ft s)	1060.69	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	137.69	54.60	30.90
C & E Loss (ft)	0.00	Cum SA (acres)	18.05	4.57	5.22

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 4.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.06	Reach Len. (ft)	120.00	145.00	145.00
Crit W.S. (ft)		Flow Area (sq ft)	5341.68	530.04	254.86
E.G. Slope (ft/ft)	0.000029	Area (sq ft)	5341.68	530.04	254.86
Q Total (cfs)	5600.00	Flow (cfs)	4945.89	566.32	87.79
Top Width (ft)	934.61	Top Width (ft)	831.85	41.63	61.13
Vel Total (ft/s)	0.91	Avg. Vel. (ft/s)	0.93	1.07	0.34
Max Chl Dpth (ft)	14.06	Hydr. Depth (ft)	6.42	12.73	4.17
Conv. Total (cfs)	1034758.0	Conv. (cfs)	913893.3	104644.1	16221.1
Length Wtd. (ft)	122.84	Wetted Per. (ft)	832.07	43.26	61.86
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.05	Stream Power (lb/ft s)	1060.69	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	138.05	54.64	31.01
C & E Loss (ft)	0.00	Cum SA (acres)	18.05	4.57	5.23

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 3.000 Profile: 100-YR

E.G. Elev (ft)	996.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	180.00	253.00	253.00
Crit W.S. (ft)		Flow Area (sq ft)	6560.08	649.64	287.45
E.G. Slope (ft/ft)	0.000009	Area (sq ft)	6560.08	649.64	287.45
Q Total (cfs)	4210.00	Flow (cfs)	3745.14	399.10	65.76
Top Width (ft)	992.92	Top Width (ft)	891.24	48.99	52.68
Vel Total (ft/s)	0.56	Avg. Vel. (ft/s)	0.57	0.61	0.23
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	7.36	13.26	5.46
Conv. Total (cfs)	1381499.0	Conv. (cfs)	1228957.0	130961.8	21580.3
Length Wtd. (ft)	192.09	Wetted Per. (ft)	891.82	51.39	54.46
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.00	0.01	0.00
Alpha	1.04	Stream Power (lb/ft s)	1066.34	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	121.33	52.63	30.00
C & E Loss (ft)	0.00	Cum SA (acres)	15.68	4.42	5.03

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 3.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.06	Reach Len. (ft)	180.00	253.00	253.00
Crit W.S. (ft)		Flow Area (sq ft)	6582.87	650.89	288.80
E.G. Slope (ft/ft)	0.000016	Area (sq ft)	6582.87	650.89	288.80
Q Total (cfs)	5600.00	Flow (cfs)	4982.73	529.68	87.59
Top Width (ft)	993.17	Top Width (ft)	891.41	48.99	52.77
Vel Total (ft/s)	0.74	Avg. Vel. (ft/s)	0.76	0.81	0.30
Max Chl Dpth (ft)	14.06	Hydr. Depth (ft)	7.38	13.29	5.47
Conv. Total (cfs)	1389033.0	Conv. (cfs)	1235923.0	131383.1	21726.8
Length Wtd. (ft)	192.07	Wetted Per. (ft)	892.00	51.39	54.54
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.01	0.01
Alpha	1.04	Stream Power (lb/ft s)	1066.34	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	121.63	52.67	30.10
C & E Loss (ft)	0.00	Cum SA (acres)	15.68	4.42	5.04

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 2.000 Profile: 100-YR

E.G. Elev (ft)	996.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	217.00	317.00	277.00
Crit W.S. (ft)		Flow Area (sq ft)	5357.80	879.11	1200.21
E.G. Slope (ft/ft)	0.000011	Area (sq ft)	5357.80	879.11	1200.21
Q Total (cfs)	4210.00	Flow (cfs)	3280.38	570.18	359.44
Top Width (ft)	962.44	Top Width (ft)	726.53	68.50	167.41
Vel Total (ft/s)	0.57	Avg. Vel. (ft/s)	0.61	0.65	0.30
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	7.37	12.83	7.17
Conv. Total (cfs)	1289176.0	Conv. (cfs)	1004510.0	174600.0	110065.4
Length Wtd. (ft)	234.56	Wetted Per. (ft)	727.52	71.11	168.43
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.00	0.01	0.00
Alpha	1.11	Stream Power (lb/ft s)	1034.50	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	96.71	48.19	25.68
C & E Loss (ft)	0.00	Cum SA (acres)	12.33	4.08	4.40

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 2.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	217.00	317.00	277.00
Crit W.S. (ft)		Flow Area (sq ft)	5375.05	880.74	1204.18
E.G. Slope (ft/ft)	0.000019	Area (sq ft)	5375.05	880.74	1204.18
Q Total (cfs)	5600.00	Flow (cfs)	4364.74	757.02	478.25
Top Width (ft)	962.62	Top Width (ft)	726.65	68.50	167.48
Vel Total (ft/s)	0.75	Avg. Vel. (ft/s)	0.81	0.86	0.40
Max Chl Dpth (ft)	14.05	Hydr. Depth (ft)	7.40	12.86	7.19
Conv. Total (cfs)	1295578.0	Conv. (cfs)	1009796.0	175138.7	110643.6
Length Wtd. (ft)	234.54	Wetted Per. (ft)	727.64	71.11	168.50
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.01	0.01
Alpha	1.11	Stream Power (lb/ft s)	1034.50	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	96.92	48.23	25.77
C & E Loss (ft)	0.00	Cum SA (acres)	12.33	4.08	4.40

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 1.000 Profile: 100-YR

E.G. Elev (ft)	996.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	675.00	980.00	1050.00
Crit W.S. (ft)		Flow Area (sq ft)	5773.57	907.36	1200.48
E.G. Slope (ft/ft)	0.000009	Area (sq ft)	5773.57	907.36	1200.48
Q Total (cfs)	4210.00	Flow (cfs)	3402.34	519.76	287.89
Top Width (ft)	1034.32	Top Width (ft)	747.69	76.17	210.46
Vel Total (ft/s)	0.53	Avg. Vel. (ft/s)	0.59	0.57	0.24
Max Chl Dpth (ft)	16.03	Hydr. Depth (ft)	7.72	11.91	5.70
Conv. Total (cfs)	1380234.0	Conv. (cfs)	1115446.0	170402.6	94385.3
Length Wtd. (ft)	820.37	Wetted Per. (ft)	749.46	79.82	212.23
Min Ch El (ft)	980.00	Shear (lb/sq ft)	0.00	0.01	0.00
Alpha	1.14	Stream Power (lb/ft s)	1256.31	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	68.98	41.69	18.05
C & E Loss (ft)	0.00	Cum SA (acres)	8.66	3.55	3.19

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 1.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	675.00	980.00	1050.00
Crit W.S. (ft)		Flow Area (sq ft)	5790.27	909.06	1205.19
E.G. Slope (ft/ft)	0.000016	Area (sq ft)	5790.27	909.06	1205.19
Q Total (cfs)	5600.00	Flow (cfs)	4526.20	690.31	383.49
Top Width (ft)	1034.50	Top Width (ft)	747.73	76.17	210.60
Vel Total (ft/s)	0.71	Avg. Vel. (ft/s)	0.78	0.76	0.32
Max Chl Dpth (ft)	16.05	Hydr. Depth (ft)	7.74	11.93	5.72
Conv. Total (cfs)	1386679.0	Conv. (cfs)	1120784.0	170935.5	94959.7
Length Wtd. (ft)	820.36	Wetted Per. (ft)	749.51	79.82	212.37
Min Ch El (ft)	980.00	Shear (lb/sq ft)	0.01	0.01	0.01
Alpha	1.14	Stream Power (lb/ft s)	1256.31	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	69.11	41.71	18.11
C & E Loss (ft)	0.00	Cum SA (acres)	8.66	3.55	3.20

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 0.000 Profile: 100-YR

E.G. Elev (ft)	996.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.00	Reach Len. (ft)			
Crit W.S. (ft)	986.66	Flow Area (sq ft)	1445.31	2534.30	297.07
E.G. Slope (ft/ft)	0.000045	Area (sq ft)	3129.51	2799.14	297.07
Q Total (cfs)	4360.00	Flow (cfs)	1183.68	3026.02	150.30
Top Width (ft)	664.36	Top Width (ft)	370.13	239.70	54.53
Vel Total (ft/s)	1.02	Avg. Vel. (ft/s)	0.82	1.19	0.51
Max Chl Dpth (ft)	12.50	Hydr. Depth (ft)	3.90	10.57	5.45
Conv. Total (cfs)	653161.3	Conv. (cfs)	177323.9	453320.6	22516.8
Length Wtd. (ft)		Wetted Per. (ft)	370.74	239.85	55.48
Min Ch El (ft)	983.50	Shear (lb/sq ft)	0.01	0.03	0.01
Alpha	1.14	Stream Power (lb/ft s)	720.30	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Plan: Pre-Project Kincheloe Creek Kincheloe Creek RS: 0.000 Profile: 100-YR (w 1*sigm

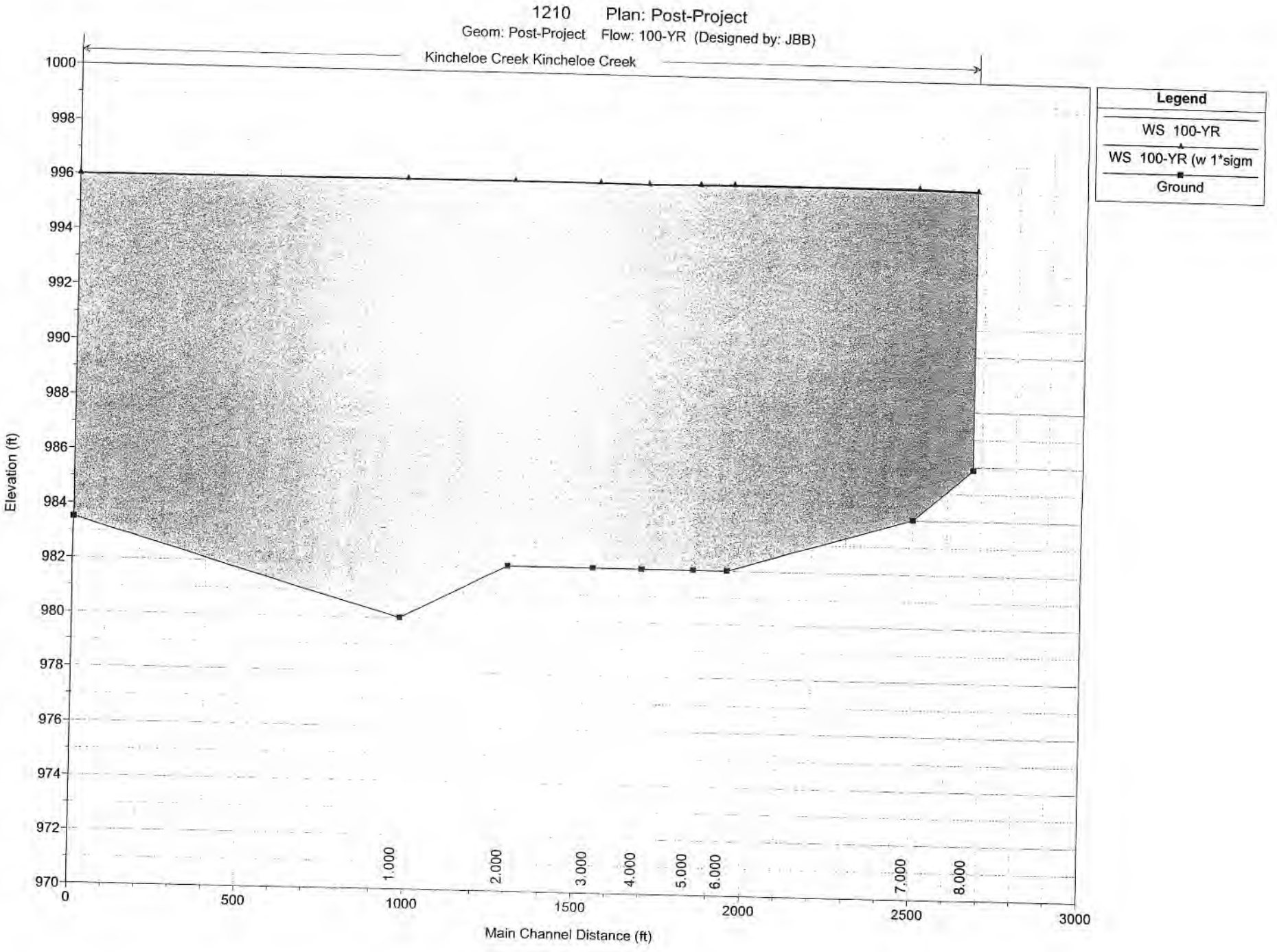
E.G. Elev (ft)	996.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.00	Reach Len. (ft)			
Crit W.S. (ft)	987.17	Flow Area (sq ft)	1445.31	2534.30	297.07
E.G. Slope (ft/ft)	0.000079	Area (sq ft)	3129.51	2799.14	297.07
Q Total (cfs)	5800.00	Flow (cfs)	1574.62	4025.44	199.95
Top Width (ft)	664.36	Top Width (ft)	370.13	239.70	54.53
Vel Total (ft/s)	1.36	Avg. Vel. (ft/s)	1.09	1.59	0.67
Max Chl Dpth (ft)	12.50	Hydr. Depth (ft)	3.90	10.57	5.45
Conv. Total (cfs)	653161.3	Conv. (cfs)	177323.9	453320.6	22516.8
Length Wtd. (ft)		Wetted Per. (ft)	370.74	239.85	55.48
Min Ch El (ft)	983.50	Shear (lb/sq ft)	0.02	0.05	0.03
Alpha	1.14	Stream Power (lb/ft s)	720.30	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

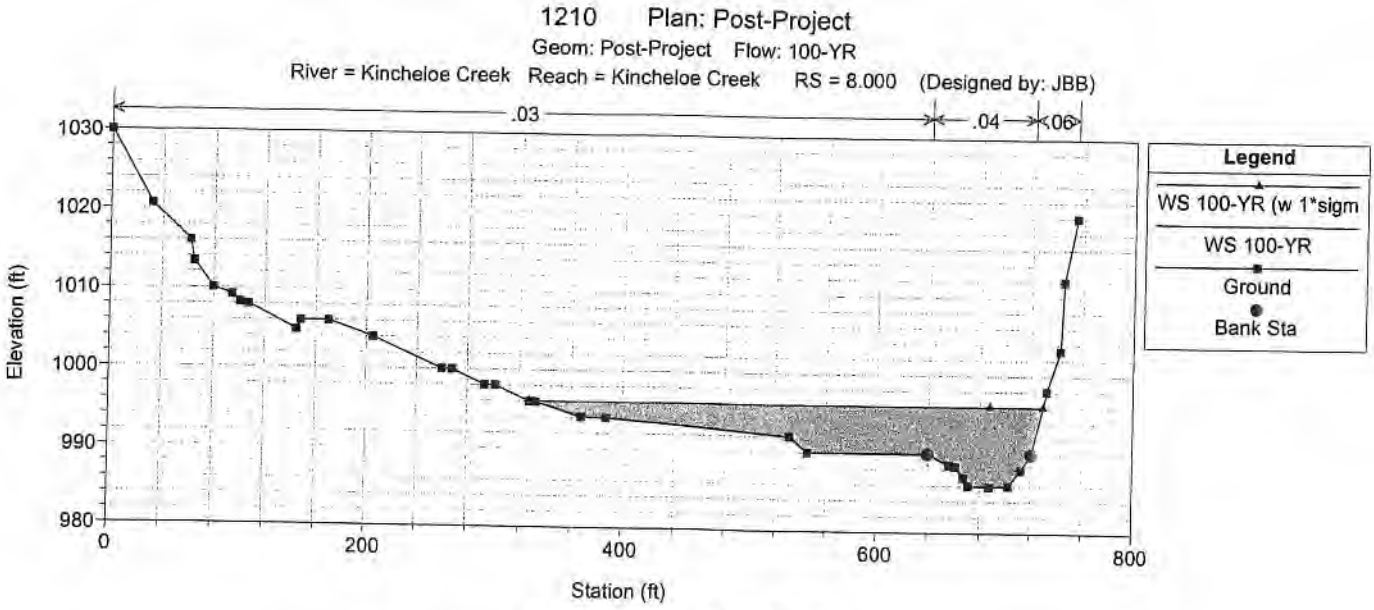
APPENDIX B

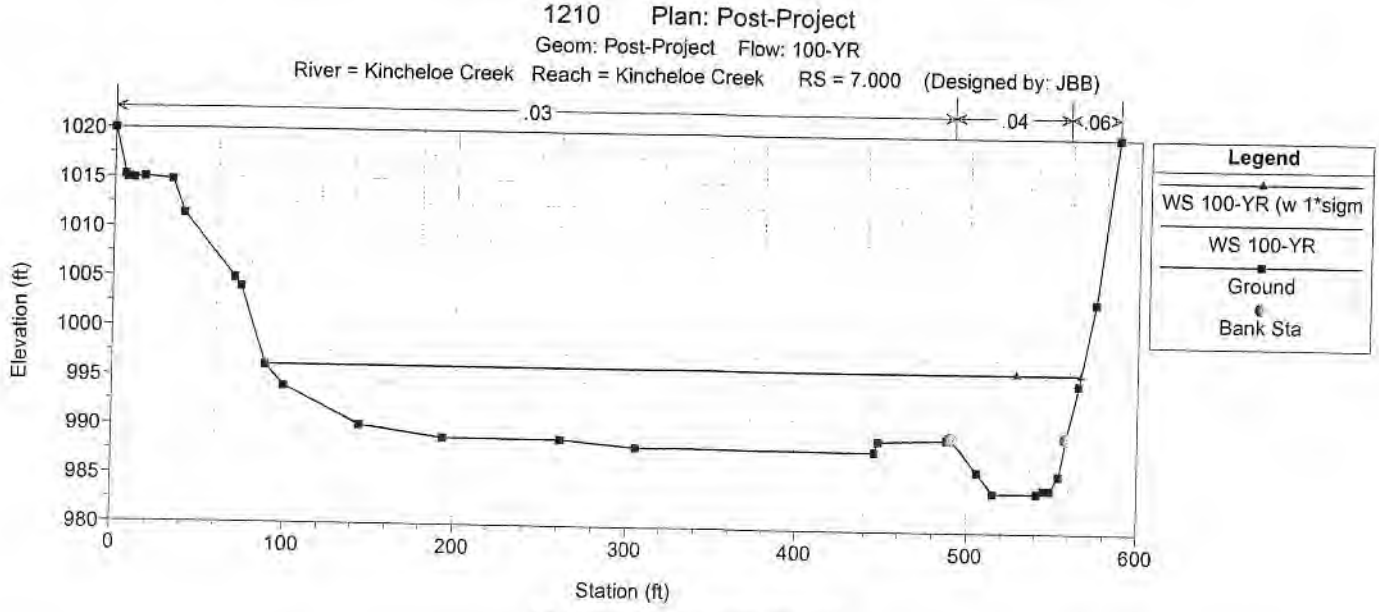
HEC-RAS Output
(Post-Project Conditions)

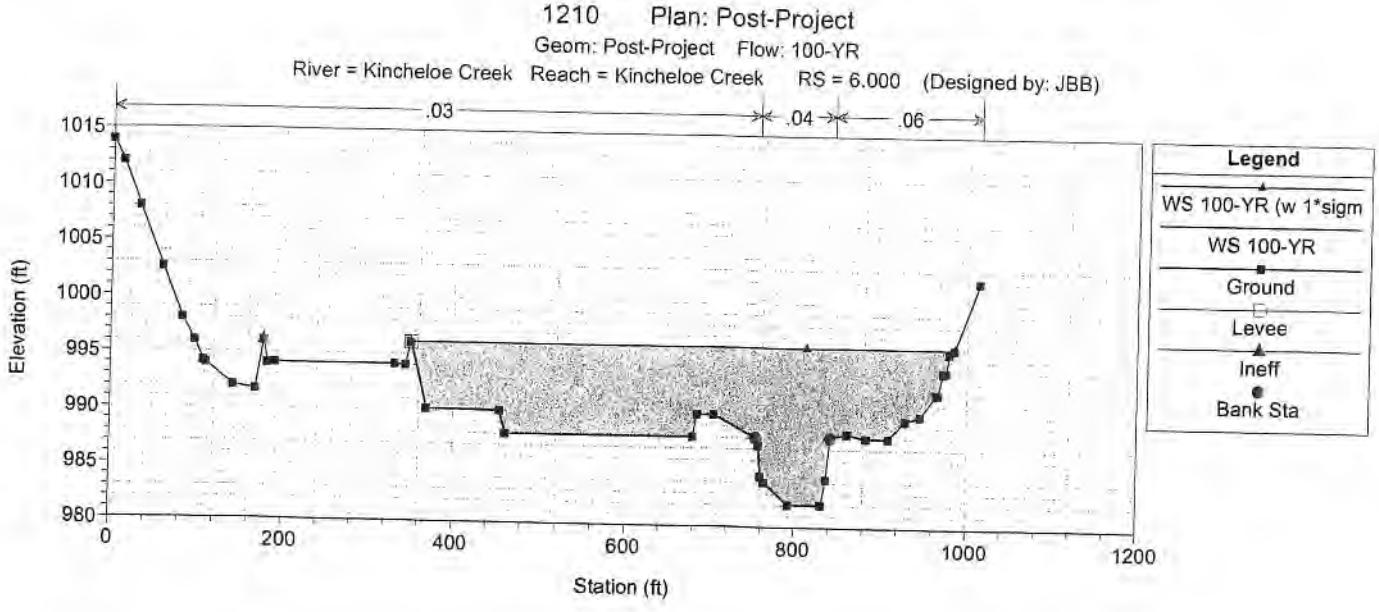
HEC-RAS Plan: Post-Project River: Kincheloe Creek Reach: Kincheloe Creek

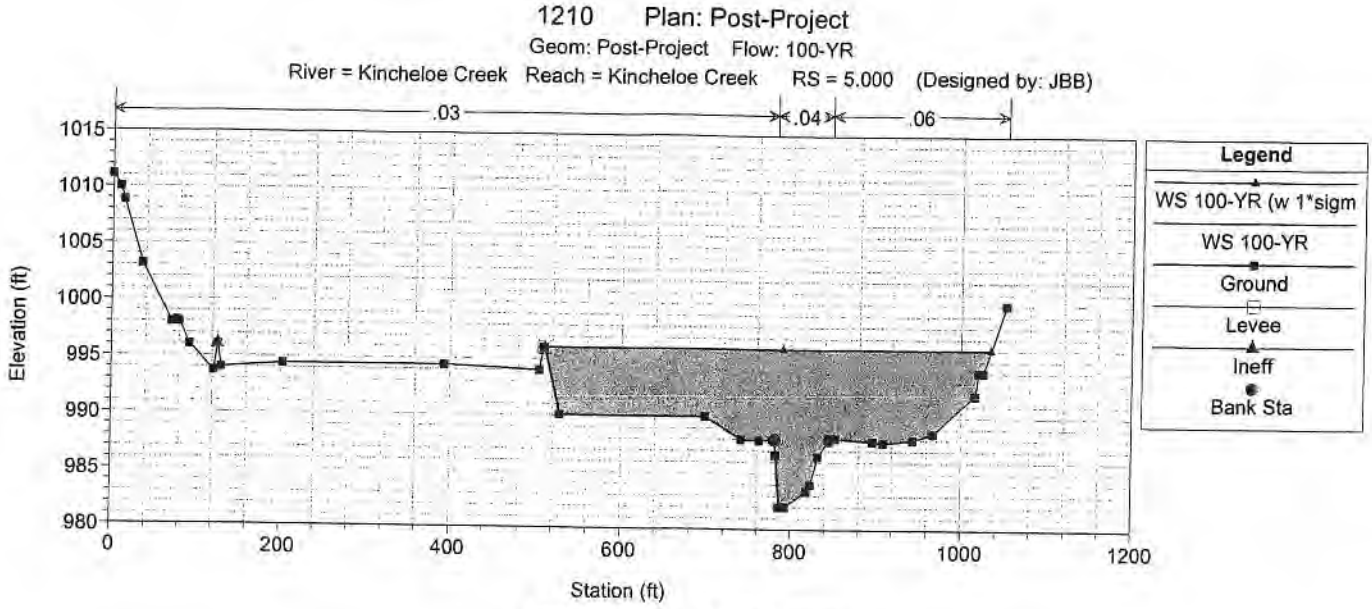
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Kincheloe Creek	8.000	100-YR	4210.00	985.87	996.03		996.11	0.000292	2.66	1877.88	401.24	0.16
Kincheloe Creek	8.000	100-YR (w 1*sigm	5600.00	985.87	996.05		996.20	0.000510	3.51	1887.00	401.58	0.21
Kincheloe Creek	7.000	100-YR	4210.00	984.00	996.06		996.08	0.000045	1.18	3539.42	477.84	0.06
Kincheloe Creek	7.000	100-YR (w 1*sigm	5600.00	984.00	996.10		996.14	0.000077	1.55	3559.90	477.97	0.08
Kincheloe Creek	6.000	100-YR	4210.00	982.00	996.05	987.10	996.06	0.000026	1.01	4934.36	635.07	0.05
Kincheloe Creek	6.000	100-YR (w 1*sigm	5600.00	982.00	996.08	989.04	996.10	0.000045	1.34	4956.58	635.23	0.07
Kincheloe Creek	5.000	100-YR	4210.00	982.00	996.03	989.50	996.05	0.000060	1.45	3756.91	524.03	0.07
Kincheloe Creek	5.000	100-YR (w 1*sigm	5600.00	982.00	996.05	990.00	996.10	0.000105	1.92	3769.07	524.13	0.10
Kincheloe Creek	4.000	100-YR	4210.00	982.00	996.02	988.98	996.05	0.000048	1.36	3325.71	433.44	0.07
Kincheloe Creek	4.000	100-YR (w 1*sigm	5600.00	982.00	996.04	989.52	996.08	0.000084	1.81	3332.35	433.55	0.09
Kincheloe Creek	3.000	100-YR	4210.00	982.00	996.03		996.04	0.000017	0.84	5696.90	807.26	0.04
Kincheloe Creek	3.000	100-YR (w 1*sigm	5600.00	982.00	996.05		996.07	0.000031	1.11	5715.04	807.61	0.05
Kincheloe Creek	2.000	100-YR	4210.00	982.00	996.03		996.03	0.000013	0.72	7034.10	962.42	0.04
Kincheloe Creek	2.000	100-YR (w 1*sigm	5600.00	982.00	996.05		996.06	0.000023	0.95	7054.95	962.59	0.05
Kincheloe Creek	1.000	100-YR	4210.00	980.00	996.03		996.03	0.000007	0.50	8477.37	1034.31	0.03
Kincheloe Creek	1.000	100-YR (w 1*sigm	5600.00	980.00	996.05		996.06	0.000012	0.66	8499.09	1034.48	0.03
Kincheloe Creek	0.000	100-YR	4360.00	983.50	996.00	986.66	996.02	0.000045	1.19	4276.69	664.36	0.06
Kincheloe Creek	0.000	100-YR (w 1*sigm	5800.00	983.50	996.00	987.17	996.03	0.000079	1.59	4276.69	664.36	0.09

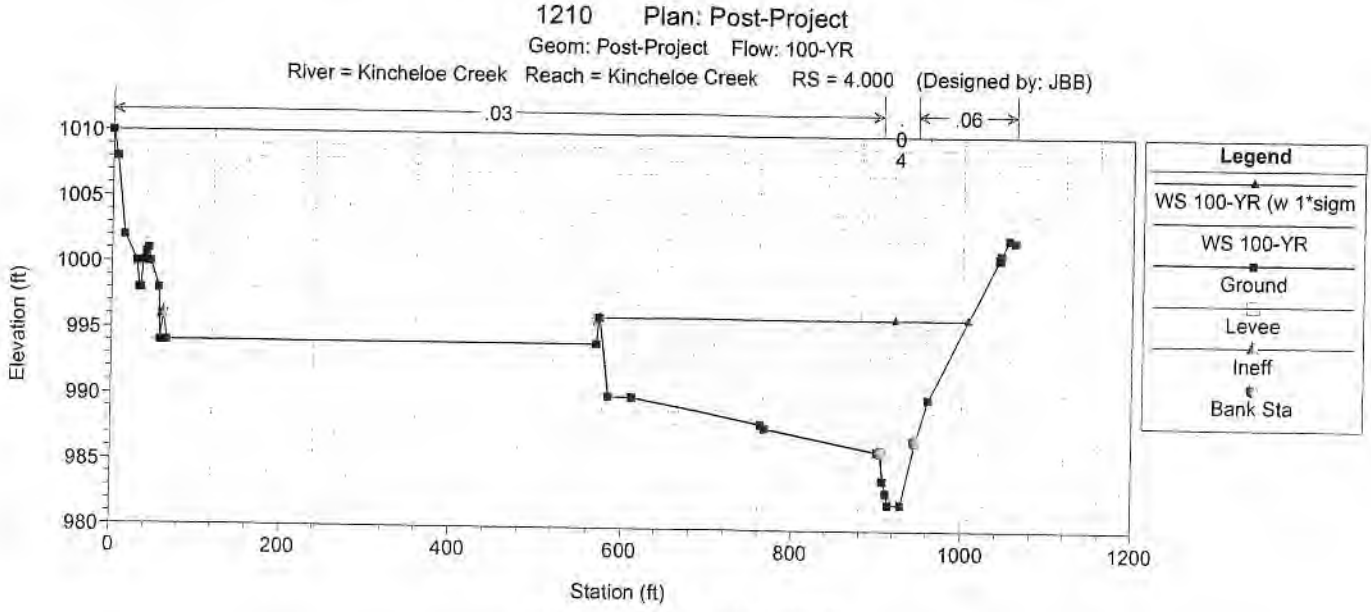

1210 Plan: Post-Project
Geom: Post-Project Flow: 100-YR (Designed by: JBB)
Kincheloe Creek Kincheloe Creek
Legend
WS 100-YR
WS 100-YR (w 1*sigm
Ground
Elevation (ft)
1000
998
996
994
992
990
988
986
984
982
980
978
976
974
972
970
0
500
1000
1500
2000
2500
3000
1.000
2.000
3.000
4.000
5.000
6.000
7.000
8.000
Main Channel Distance (ft)


1210 Plan: Post-Project
Geom: Post-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 8.000 (Designed by: JBB)
.03
.04
.06
Elevation (ft)
1030
1020
1010
1000
990
980
0
200
400
600
800
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Bank Sta


1210 Plan: Post-Project
Geom: Post-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 7.000 (Designed by: JBB)
.03
.04
.06
Elevation (ft)
1020
1015
1010
1005
1000
995
990
985
980
0
100
200
300
400
500
600
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Bank Sta


1210 Plan: Post-Project
Geom: Post-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 6.000 (Designed by: JBB)
.03
.04
.06
Elevation (ft)
1015
1010
1005
1000
995
990
985
980
0
200
400
600
800
1000
1200
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Levee
Ineff
Bank Sta


1210 Plan: Post-Project
Geom: Post-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 5.000 (Designed by: JBB)
.03
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Levee
Ineff
Bank Sta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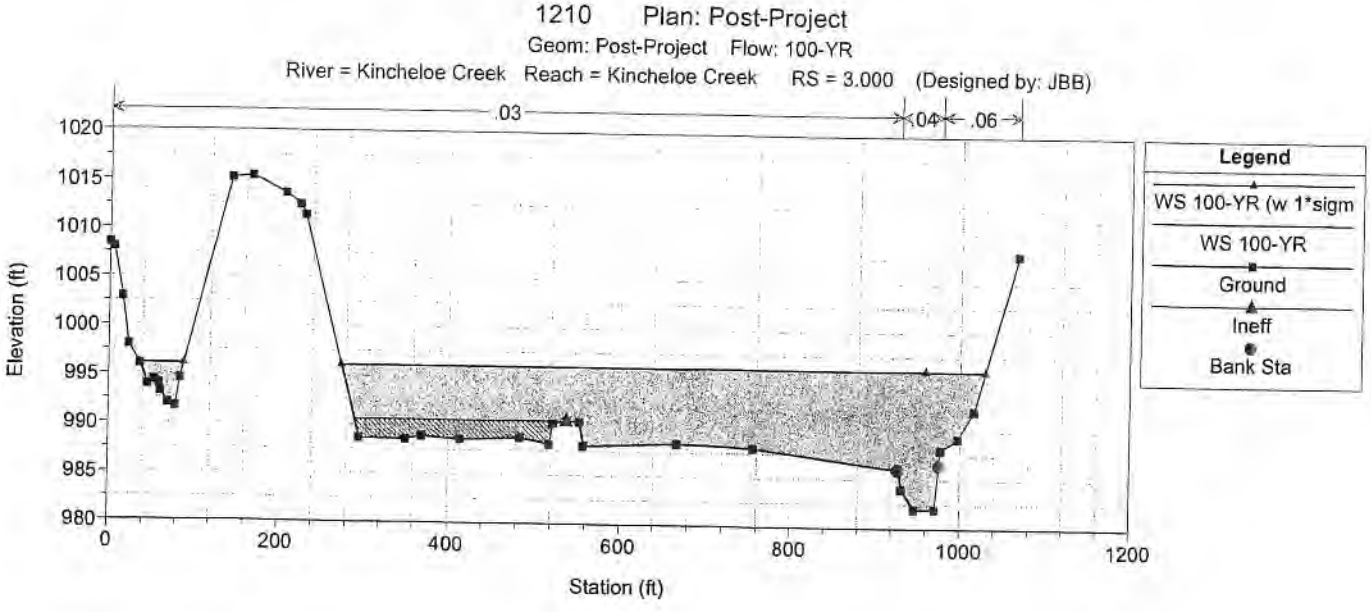
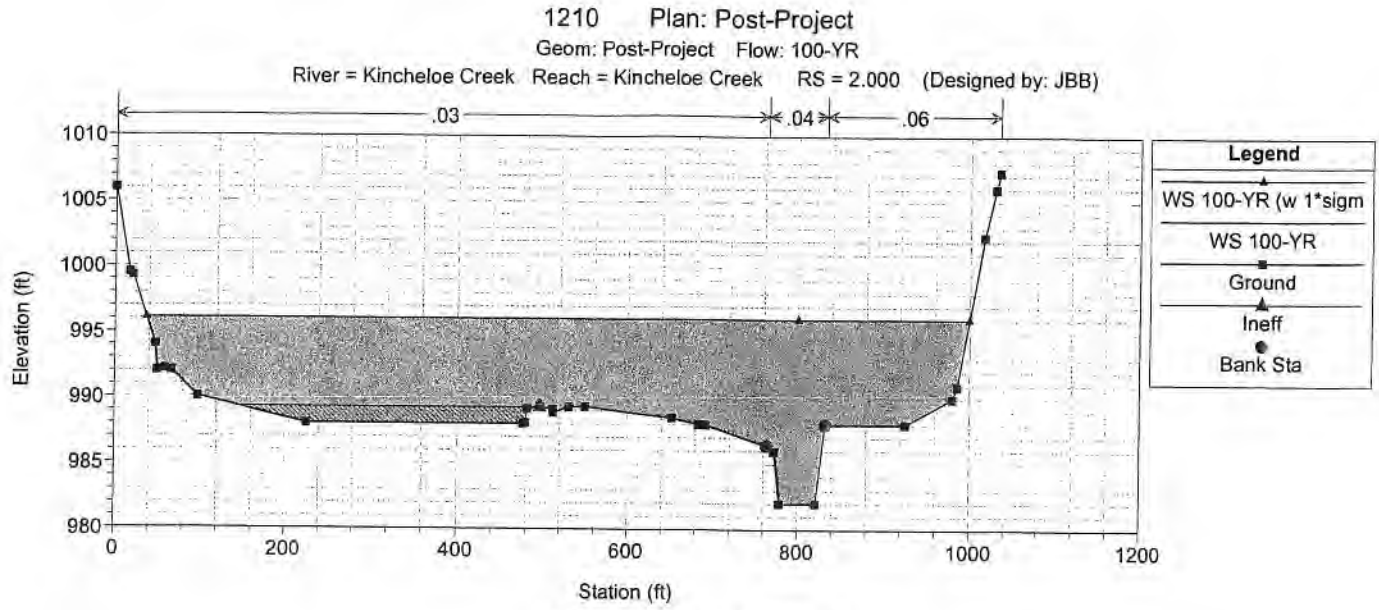
Geom: Post-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 4.000 (Designed by: JBB)
.03
.06
Elevation (ft)
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Levee
Ineff
Bank Sta


1210 Plan: Post-Project
Geom: Post-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 3.000 (Designed by: JBB)
.03
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Ineff
Bank Sta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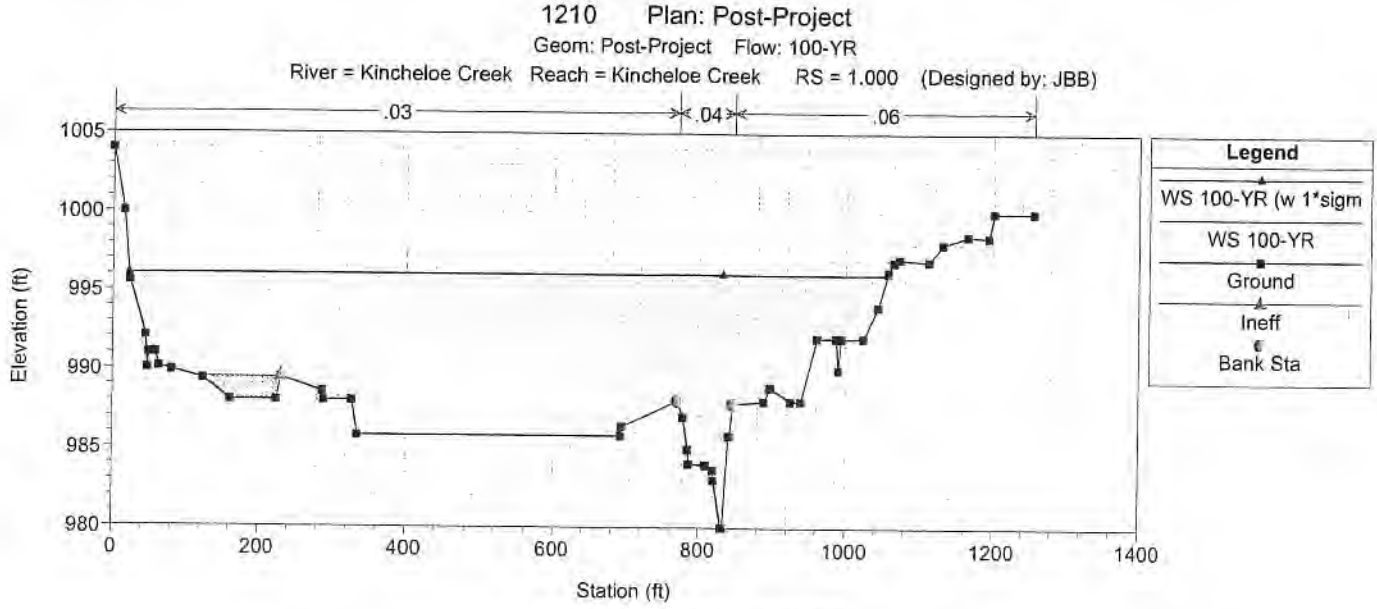
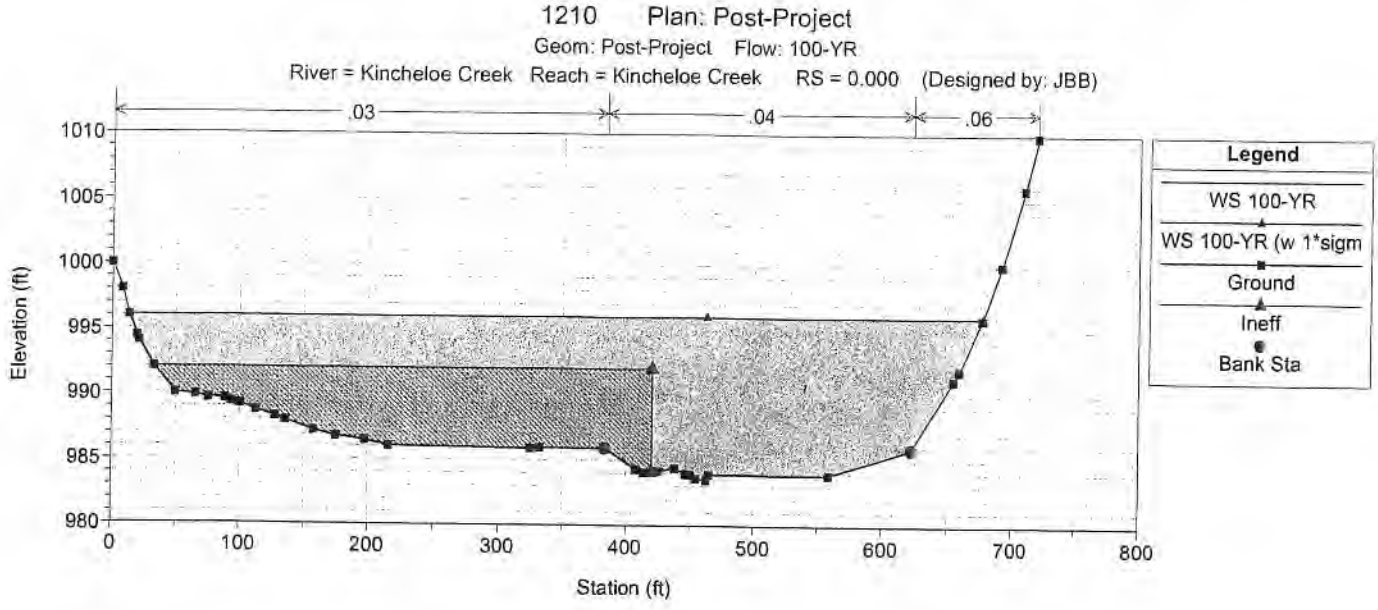
Geom: Post-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 2.000 (Designed by: JBB)
.03
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Ineff
Bank Sta


1210 Plan: Post-Project
Geom: Post-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 1.000 (Designed by: JBB)
.03
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100-YR (w 1*sigm
WS 100-YR
Ground
Ineff
Bank Sta


1210 Plan: Post-Project
Geom: Post-Project Flow: 100-YR
River = Kincheloe Creek Reach = Kincheloe Creek RS = 0.000 (Designed by: JBB)
.03
.04
.06
Elevation (ft)
Station (ft)
Legend
WS 100-YR
WS 100-YR (w 1*sigm
Ground
Ineff
Bank Sta

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 8.000 Profile: 100-YR

E.G. Elev (ft)	996.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)	1150.11	701.59	26.18
E.G. Slope (ft/ft)	0.000292	Area (sq ft)	1150.11	701.59	26.18
Q Total (cfs)	4210.00	Flow (cfs)	2325.93	1863.78	20.29
Top Width (ft)	401.24	Top Width (ft)	311.35	81.21	8.68
Vel Total (ft/s)	2.24	Avg. Vel. (ft/s)	2.02	2.66	0.77
Max Chl Dpth (ft)	10.16	Hydr. Depth (ft)	3.69	8.64	3.01
Conv. Total (cfs)	246285.3	Conv. (cfs)	136067.1	109031.4	1186.8
Length Wtd. (ft)	175.00	Wetted Per. (ft)	311.55	82.00	10.57
Min Ch El (ft)	985.87	Shear (lb/sq ft)	0.07	0.16	0.05
Alpha	1.07	Stream Power (lb/ft s)	754.55	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	187.93	73.78	42.32
C & E Loss (ft)	0.02	Cum SA (acres)	24.37	6.22	7.05

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 8.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)		Flow Area (sq ft)	1157.18	703.44	26.38
E.G. Slope (ft/ft)	0.000510	Area (sq ft)	1157.18	703.44	26.38
Q Total (cfs)	5600.00	Flow (cfs)	3100.96	2471.98	27.06
Top Width (ft)	401.58	Top Width (ft)	311.66	81.21	8.72
Vel Total (ft/s)	2.97	Avg. Vel. (ft/s)	2.68	3.51	1.03
Max Chl Dpth (ft)	10.18	Hydr. Depth (ft)	3.71	8.66	3.03
Conv. Total (cfs)	248081.7	Conv. (cfs)	137373.5	109509.4	1198.7
Length Wtd. (ft)	175.00	Wetted Per. (ft)	311.86	82.00	10.61
Min Ch El (ft)	985.87	Shear (lb/sq ft)	0.12	0.27	0.08
Alpha	1.07	Stream Power (lb/ft s)	754.55	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	188.49	73.88	42.47
C & E Loss (ft)	0.03	Cum SA (acres)	24.38	6.22	7.06

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 7.000 Profile: 100-YR

E.G. Elev (ft)	996.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.06	Reach Len. (ft)	500.00	550.00	650.00
Crit W.S. (ft)		Flow Area (sq ft)	2786.05	726.07	27.30
E.G. Slope (ft/ft)	0.000045	Area (sq ft)	2786.05	726.07	27.30
Q Total (cfs)	4210.00	Flow (cfs)	3346.97	854.52	8.51
Top Width (ft)	477.84	Top Width (ft)	401.61	67.91	8.32
Vel Total (ft/s)	1.19	Avg. Vel. (ft/s)	1.20	1.18	0.31
Max Chl Dpth (ft)	12.06	Hydr. Depth (ft)	6.94	10.69	3.28
Conv. Total (cfs)	630667.6	Conv. (cfs)	501383.2	128009.5	1274.9
Length Wtd. (ft)	519.15	Wetted Per. (ft)	402.28	70.22	10.54
Min Ch El (ft)	984.00	Shear (lb/sq ft)	0.02	0.03	0.01
Alpha	1.01	Stream Power (lb/ft s)	587.40	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	180.02	70.91	42.21
C & E Loss (ft)	0.00	Cum SA (acres)	22.94	5.92	7.02

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 7.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.10	Reach Len. (ft)	500.00	550.00	650.00
Crit W.S. (ft)		Flow Area (sq ft)	2803.26	728.98	27.66
E.G. Slope (ft/ft)	0.000077	Area (sq ft)	2803.26	728.98	27.66
Q Total (cfs)	5600.00	Flow (cfs)	4455.07	1133.52	11.41
Top Width (ft)	477.97	Top Width (ft)	401.69	67.91	8.37
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)	1.59	1.55	0.41
Max Chl Dpth (ft)	12.10	Hydr. Depth (ft)	6.98	10.73	3.30
Conv. Total (cfs)	636643.7	Conv. (cfs)	506480.6	128865.6	1297.4
Length Wtd. (ft)	519.13	Wetted Per. (ft)	402.37	70.22	10.61
Min Ch El (ft)	984.00	Shear (lb/sq ft)	0.03	0.05	0.01
Alpha	1.01	Stream Power (lb/ft s)	587.40	0.00	0.00
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	180.54	71.00	42.36
C & E Loss (ft)	0.00	Cum SA (acres)	22.94	5.92	7.03

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 6.000 Profile: 100-YR

E.G. Elev (ft)	996.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	95.00	100.00	92.00
Crit W.S. (ft)	987.10	Flow Area (sq ft)	2869.18	1149.07	916.12
E.G. Slope (ft/ft)	0.000026	Area (sq ft)	2869.18	1149.07	916.12
Q Total (cfs)	4210.00	Flow (cfs)	2651.85	1164.66	393.50
Top Width (ft)	635.07	Top Width (ft)	403.14	88.53	143.40
Vel Total (ft/s)	0.85	Avg. Vel. (ft/s)	0.92	1.01	0.43
Max Chl Dpth (ft)	14.05	Hydr. Depth (ft)	7.12	12.98	6.39
Conv. Total (cfs)	832436.4	Conv. (cfs)	524345.3	230286.1	77805.1
Length Wtd. (ft)	95.90	Wetted Per. (ft)	404.83	91.70	144.26
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.15	Stream Power (lb/ft s)	1013.19	350.14	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	147.57	59.08	35.17
C & E Loss (ft)	0.00	Cum SA (acres)	18.32	4.94	5.89

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 6.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.08	Reach Len. (ft)	95.00	100.00	92.00
Crit W.S. (ft)	989.04	Flow Area (sq ft)	2883.27	1152.16	921.14
E.G. Slope (ft/ft)	0.000045	Area (sq ft)	2883.27	1152.16	921.14
Q Total (cfs)	5600.00	Flow (cfs)	3530.86	1545.10	524.04
Top Width (ft)	635.23	Top Width (ft)	403.14	88.53	143.56
Vel Total (ft/s)	1.13	Avg. Vel. (ft/s)	1.22	1.34	0.57
Max Chl Dpth (ft)	14.08	Hydr. Depth (ft)	7.15	13.01	6.42
Conv. Total (cfs)	838393.1	Conv. (cfs)	528616.3	231321.2	78455.8
Length Wtd. (ft)	95.89	Wetted Per. (ft)	404.87	91.70	144.43
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.02	0.03	0.02
Alpha	1.15	Stream Power (lb/ft s)	1013.19	350.14	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	147.90	59.13	35.29
C & E Loss (ft)	0.00	Cum SA (acres)	18.33	4.94	5.89

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 5.000 Profile: 100-YR

E.G. Elev (ft)	996.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	126.00	153.00	110.00
Crit W.S. (ft)	989.50	Flow Area (sq ft)	1694.41	771.07	1291.43
E.G. Slope (ft/ft)	0.000060	Area (sq ft)	1694.41	771.07	1291.43
Q Total (cfs)	4210.00	Flow (cfs)	2203.96	1115.97	890.06
Top Width (ft)	524.03	Top Width (ft)	270.26	65.14	188.63
Vel Total (ft/s)	1.12	Avg. Vel. (ft/s)	1.30	1.45	0.69
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	6.27	11.84	6.85
Conv. Total (cfs)	543708.0	Conv. (cfs)	284634.8	144124.3	114948.9
Length Wtd. (ft)	129.98	Wetted Per. (ft)	271.28	68.32	189.53
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.02	0.04	0.03
Alpha	1.23	Stream Power (lb/ft s)	1051.58	510.25	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	142.59	56.87	32.84
C & E Loss (ft)	0.00	Cum SA (acres)	17.59	4.76	5.54

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 5.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	126.00	153.00	110.00
Crit W.S. (ft)	990.00	Flow Area (sq ft)	1700.68	772.58	1295.81
E.G. Slope (ft/ft)	0.000105	Area (sq ft)	1700.68	772.58	1295.81
Q Total (cfs)	5600.00	Flow (cfs)	2934.35	1481.60	1184.05
Top Width (ft)	524.13	Top Width (ft)	270.26	65.14	188.73
Vel Total (ft/s)	1.49	Avg. Vel. (ft/s)	1.73	1.92	0.91
Max Chl Dpth (ft)	14.05	Hydr. Depth (ft)	6.29	11.86	6.87
Conv. Total (cfs)	546527.5	Conv. (cfs)	286375.6	144595.2	115556.7
Length Wtd. (ft)	129.97	Wetted Per. (ft)	271.31	68.32	189.64
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.04	0.07	0.04
Alpha	1.23	Stream Power (lb/ft s)	1051.58	510.25	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	142.90	56.92	32.94
C & E Loss (ft)	0.00	Cum SA (acres)	17.59	4.76	5.54

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 4.000 Profile: 100-YR

E.G. Elev (ft)	996.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.02	Reach Len. (ft)	120.00	145.00	145.00
Crit W.S. (ft)	988.98	Flow Area (sq ft)	2544.77	528.44	252.51
E.G. Slope (ft/ft)	0.000048	Area (sq ft)	2544.77	528.44	252.51
Q Total (cfs)	4210.00	Flow (cfs)	3380.30	719.04	110.66
Top Width (ft)	433.44	Top Width (ft)	330.97	41.63	60.84
Vel Total (ft/s)	1.27	Avg. Vel. (ft/s)	1.33	1.36	0.44
Max Chl Dpth (ft)	14.02	Hydr. Depth (ft)	7.69	12.69	4.15
Conv. Total (cfs)	609611.6	Conv. (cfs)	489470.8	104117.0	16023.7
Length Wtd. (ft)	124.35	Wetted Per. (ft)	332.54	43.26	61.56
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.02	0.04	0.01
Alpha	1.08	Stream Power (lb/ft s)	1060.69	573.37	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	136.46	54.59	30.89
C & E Loss (ft)	0.01	Cum SA (acres)	16.72	4.57	5.22

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 4.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.04	Reach Len. (ft)	120.00	145.00	145.00
Crit W.S. (ft)	989.52	Flow Area (sq ft)	2549.84	529.07	253.44
E.G. Slope (ft/ft)	0.000084	Area (sq ft)	2549.84	529.07	253.44
Q Total (cfs)	5600.00	Flow (cfs)	4497.16	955.39	147.46
Top Width (ft)	433.55	Top Width (ft)	330.97	41.63	60.95
Vel Total (ft/s)	1.68	Avg. Vel. (ft/s)	1.76	1.81	0.58
Max Chl Dpth (ft)	14.04	Hydr. Depth (ft)	7.70	12.71	4.16
Conv. Total (cfs)	611510.9	Conv. (cfs)	491082.3	104326.5	16102.1
Length Wtd. (ft)	124.35	Wetted Per. (ft)	332.55	43.26	61.68
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.04	0.06	0.02
Alpha	1.08	Stream Power (lb/ft s)	1060.69	573.37	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	136.75	54.63	30.99
C & E Loss (ft)	0.01	Cum SA (acres)	16.72	4.57	5.23

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 3.000 Profile: 100-YR

E.G. Elev (ft)	996.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	180.00	253.00	253.00
Crit W.S. (ft)		Flow Area (sq ft)	4760.25	649.43	287.22
E.G. Slope (ft/ft)	0.000017	Area (sq ft)	5199.20	649.43	287.22
Q Total (cfs)	4210.00	Flow (cfs)	3573.75	546.29	89.97
Top Width (ft)	807.26	Top Width (ft)	705.60	48.99	52.67
Vel Total (ft/s)	0.74	Avg. Vel. (ft/s)	0.75	0.84	0.31
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	6.75	13.26	5.45
Conv. Total (cfs)	1008726.0	Conv. (cfs)	856278.9	130891.5	21555.9
Length Wtd. (ft)	194.42	Wetted Per. (ft)	709.40	51.39	54.45
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.01	0.01
Alpha	1.05	Stream Power (lb/ft s)	1066.34	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	125.79	52.63	29.99
C & E Loss (ft)	0.00	Cum SA (acres)	15.29	4.42	5.03

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 3.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	180.00	253.00	253.00
Crit W.S. (ft)		Flow Area (sq ft)	4776.11	650.53	288.41
E.G. Slope (ft/ft)	0.000031	Area (sq ft)	5215.06	650.53	288.41
Q Total (cfs)	5600.00	Flow (cfs)	4755.14	725.08	119.78
Top Width (ft)	807.61	Top Width (ft)	705.88	48.99	52.74
Vel Total (ft/s)	0.98	Avg. Vel. (ft/s)	1.00	1.11	0.42
Max Chl Dpth (ft)	14.05	Hydr. Depth (ft)	6.77	13.28	5.47
Conv. Total (cfs)	1013774.0	Conv. (cfs)	860827.8	131261.4	21684.4
Length Wtd. (ft)	194.40	Wetted Per. (ft)	709.69	51.39	54.52
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.05	Stream Power (lb/ft s)	1066.34	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	126.06	52.67	30.09
C & E Loss (ft)	0.00	Cum SA (acres)	15.29	4.42	5.04

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 2.000 Profile: 100-YR

E.G. Elev (ft)	996.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	217.00	317.00	277.00
Crit W.S. (ft)		Flow Area (sq ft)	4955.46	878.91	1199.73
E.G. Slope (ft/ft)	0.000013	Area (sq ft)	5332.93	878.91	1199.73
Q Total (cfs)	4210.00	Flow (cfs)	3182.89	630.04	397.07
Top Width (ft)	962.42	Top Width (ft)	726.52	68.50	167.40
Vel Total (ft/s)	0.60	Avg. Vel. (ft/s)	0.64	0.72	0.33
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	6.82	12.83	7.17
Conv. Total (cfs)	1166261.0	Conv. (cfs)	881730.0	174535.0	109995.7
Length Wtd. (ft)	234.50	Wetted Per. (ft)	727.81	71.11	168.43
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.01	0.01
Alpha	1.11	Stream Power (lb/ft s)	1034.50	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	104.03	48.19	25.67
C & E Loss (ft)	0.00	Cum SA (acres)	12.33	4.08	4.39

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 2.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	217.00	317.00	277.00
Crit W.S. (ft)		Flow Area (sq ft)	4971.20	880.40	1203.36
E.G. Slope (ft/ft)	0.000023	Area (sq ft)	5348.67	880.40	1203.36
Q Total (cfs)	5600.00	Flow (cfs)	4235.44	836.40	528.16
Top Width (ft)	962.59	Top Width (ft)	726.62	68.50	167.46
Vel Total (ft/s)	0.79	Avg. Vel. (ft/s)	0.85	0.95	0.44
Max Chl Dpth (ft)	14.05	Hydr. Depth (ft)	6.84	12.85	7.19
Conv. Total (cfs)	1171865.0	Conv. (cfs)	886314.9	175026.5	110523.1
Length Wtd. (ft)	234.49	Wetted Per. (ft)	727.92	71.11	168.49
Min Ch El (ft)	982.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.11	Stream Power (lb/ft s)	1034.50	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	104.23	48.22	25.75
C & E Loss (ft)	0.00	Cum SA (acres)	12.33	4.08	4.40

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 1.000 Profile: 100-YR

E.G. Elev (ft)	996.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.03	Reach Len. (ft)	675.00	980.00	1050.00
Crit W.S. (ft)		Flow Area (sq ft)	6370.04	907.22	1200.11
E.G. Slope (ft/ft)	0.000007	Area (sq ft)	6495.12	907.22	1200.11
Q Total (cfs)	4210.00	Flow (cfs)	3503.87	454.46	251.67
Top Width (ft)	1034.31	Top Width (ft)	747.69	76.17	210.45
Vel Total (ft/s)	0.50	Avg. Vel. (ft/s)	0.55	0.50	0.21
Max Chl Dpth (ft)	16.03	Hydr. Depth (ft)	8.52	11.91	5.70
Conv. Total (cfs)	1578169.0	Conv. (cfs)	1313468.0	170360.4	94339.9
Length Wtd. (ft)	816.46	Wetted Per. (ft)	749.96	79.82	212.22
Min Ch El (ft)	980.00	Shear (lb/sq ft)	0.00	0.01	0.00
Alpha	1.14	Stream Power (lb/ft s)	1256.31	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	74.57	41.69	18.04
C & E Loss (ft)	0.00	Cum SA (acres)	8.66	3.55	3.19

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 1.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.05	Reach Len. (ft)	675.00	980.00	1050.00
Crit W.S. (ft)		Flow Area (sq ft)	6385.74	908.82	1204.53
E.G. Slope (ft/ft)	0.000012	Area (sq ft)	6510.82	908.82	1204.53
Q Total (cfs)	5600.00	Flow (cfs)	4660.84	603.84	335.31
Top Width (ft)	1034.48	Top Width (ft)	747.73	76.17	210.58
Vel Total (ft/s)	0.66	Avg. Vel. (ft/s)	0.73	0.66	0.28
Max Chl Dpth (ft)	16.05	Hydr. Depth (ft)	8.54	11.93	5.72
Conv. Total (cfs)	1584559.0	Conv. (cfs)	1318818.0	170861.2	94879.6
Length Wtd. (ft)	816.46	Wetted Per. (ft)	750.00	79.82	212.35
Min Ch El (ft)	980.00	Shear (lb/sq ft)	0.01	0.01	0.00
Alpha	1.14	Stream Power (lb/ft s)	1256.31	0.00	0.00
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	74.69	41.71	18.10
C & E Loss (ft)	0.00	Cum SA (acres)	8.66	3.55	3.20

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 0.000 Profile: 100-YR

E.G. Elev (ft)	996.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.00	Reach Len. (ft)			
Crit W.S. (ft)	986.66	Flow Area (sq ft)	1445.31	2534.30	297.07
E.G. Slope (ft/ft)	0.000045	Area (sq ft)	3129.51	2799.14	297.07
Q Total (cfs)	4360.00	Flow (cfs)	1183.68	3026.02	150.30
Top Width (ft)	664.36	Top Width (ft)	370.13	239.70	54.53
Vel Total (ft/s)	1.02	Avg. Vel. (ft/s)	0.82	1.19	0.51
Max Chl Dpth (ft)	12.50	Hydr. Depth (ft)	3.90	10.57	5.45
Conv. Total (cfs)	653161.3	Conv. (cfs)	177323.9	453320.6	22516.8
Length Wtd. (ft)		Wetted Per. (ft)	370.74	239.85	55.48
Min Ch El (ft)	983.50	Shear (lb/sq ft)	0.01	0.03	0.01
Alpha	1.14	Stream Power (lb/ft s)	720.30	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Plan: Post-Project Kincheloe Creek Kincheloe Creek RS: 0.000 Profile: 100-YR (w 1*sigm

E.G. Elev (ft)	996.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.040	0.060
W.S. Elev (ft)	996.00	Reach Len. (ft)			
Crit W.S. (ft)	987.17	Flow Area (sq ft)	1445.31	2534.30	297.07
E.G. Slope (ft/ft)	0.000079	Area (sq ft)	3129.51	2799.14	297.07
Q Total (cfs)	5800.00	Flow (cfs)	1574.62	4025.44	199.95
Top Width (ft)	664.36	Top Width (ft)	370.13	239.70	54.53
Vel Total (ft/s)	1.36	Avg. Vel. (ft/s)	1.09	1.59	0.67
Max Chl Dpth (ft)	12.50	Hydr. Depth (ft)	3.90	10.57	5.45
Conv. Total (cfs)	653161.3	Conv. (cfs)	177323.9	453320.6	22516.8
Length Wtd. (ft)		Wetted Per. (ft)	370.74	239.85	55.48
Min Ch El (ft)	983.50	Shear (lb/sq ft)	0.02	0.05	0.03
Alpha	1.14	Stream Power (lb/ft s)	720.30	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

API Number: 33-05926

PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

CONDITIONS

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.

2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than one hundred (100) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.

3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.

4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.

5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations,* 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.

6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.

7. 24 hours prior to the initiation of the completion process the operator shall notify the Chief or his designee.

8. During the completion process the operator shall monitor annular pressures and report any anomaly noticed to the chief or his designee immediately.

9. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.

10. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

API Number: 33-05926

PERMIT CONDITIONS

11. The operator shall provide to the Office of Oil and Gas the dates of each of the following within 30 days of their occurrence: completion of construction of the well pad, commencement of drilling, cessation of drilling, completion of any other permitted well work, and completion of the well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov.

WW-6B
(04/15)

API NO. 47- 33 - 05926
OPERATOR WELL NO. Stickel 1210 S-3H
Well Pad Name: Stickel 1210

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: HG Energy II Appalachia, L	494519932	Harrison	Union	West Milford 7.5'
	Operator ID	County	District	Quadrangle

2) Operator's Well Number: Stickel 1210 S-3H Well Pad Name: Stickel 1210

3) Farm Name/Surface Owner: Danny & Alicia Stickel Public Road Access: Kincheloe Run Rd/SLS 35

4) Elevation, current ground: 989' Elevation, proposed post-construction: 994'

5) Well Type (a) Gas x Oil _____ Underground Storage _____
Other _____
(b)If Gas Shallow x Deep _____
Horizontal x

6) Existing Pad: Yes or No No

SDW
10/18/2018

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus at 6863'/6914' and 51' in thickness. Anticipated pressure at 4314#.

8) Proposed Total Vertical Depth: 6900'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 19,653'

11) Proposed Horizontal Leg Length: 12,244'

12) Approximate Fresh Water Strata Depths: 135', 500'

13) Method to Determine Fresh Water Depths: Nearest offset well data

14) Approximate Saltwater Depths: None noted in offsets

15) Approximate Coal Seam Depths: 660' to 665'

16) Approximate Depth to Possible Void (coal mine, karst, other): None

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes _____ No X

(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

WW-6B
(04/15)

API NO. 47- 33 - 05926
OPERATOR WELL NO. Stickel 1210 S-3H
Well Pad Name: Stickel 1210

18) **CASING AND TUBING PROGRAM**

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	New	LS	157.5	100'	100'	Drilled In
Fresh Water	20"	NEW	J-55	94	600'	600'	CTS 30% excess yield =1.20,CTS
Coal	13 3/8"	NEW	J-55	54.5	1635'	1635'	40% excess yield = 1.20,CTS
Intermediate	9 5/8"	NEW	J-55	40	2500'	2500'	40% excess yield Lead/ 0% Excess Tail CTS
Production	5 1/2"	NEW	P-110	23	19653'	19653'	20% excess yield = 1.19, tail yield = 1.94
Tubing							
Liners							

SDW
10/18/2018

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	30"	.500				CTS
Fresh Water	20"	24"	.438	2110	1200	Type 1, Class A	30 % excess yield = 1.20, CTS
Coal	13 3/8"	17 1/2"	.380	2730		Type 1/Class A	40% excess yield = 1.20, CTS
Intermediate	9 5/8"	12 1/4"	.395	3950		Type 1/Class A	40% excess yield = 0% Excess Lead
Production	5 1/2"	8 1/2"	.415	14520	12500	Type 1/ClassA	20% excess yield = 1.19, tail yield 1.94
Tubing							
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

WW-6B
(10/14)

API NO. 47-_____-_____
OPERATOR WELL NO. Stickel 1210 S-3H
Well Pad Name: Stickel 1210
4703305926

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill the vertical depth to the Marcellus at an estimated total vertical depth of approximately 6900 feet. Drill horizontal leg to estimated 12244 TMD, stimulate and be capable of producing from the Marcellus Formation. Should we encounter an unanticipated void in the coal, we will install a minimum of 20' of casing below the void but not more than 100' below the void, set a basket and grout to surface.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

The stimulation will be completed with multiple stages divided over the lateral length of the well. Stage spacing is dependent upon engineering design. Slickwater fracturing technique will be utilized on each stage using sand, water, and chemicals. See attached list. Maximum pressure not to exceed 12,500 psi.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 3.456 acres

22) Area to be disturbed for well pad only, less access road (acres): 3.0 acres

23) Describe centralizer placement for each casing string:

No centralizers will be used with conductor casing. Freshwater every 3 joints to surface. Coal - Bow Spring on first 2 joints then every third joint to 100' from surface. Intermediate - Bow Spring on first 2 joints then every third joint to 100' from surface. Production - Run 1 spiral centralizer every 5 joints from the top of the curve to surface. Run 1 spiral centralizer every 3 joints from the 1st 5.5" long joint to the top of the curve.

24) Describe all cement additives associated with each cement type:

Conductor -N/A, Casing to be drilled in w/ Dual Rotary Rig.
Fresh Water - "15.6 ppg PNE-1 + 3% bwoc CaCl, 40% Excess Yield = 1.20 / CTS".
Coal - "Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl40% Excess / Tail: 15.9 ppg PNE-1 + 2.5% bwoc CaCl zero% Excess. CTS"
Intermediate - "Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl,40% Excess, Tail: 15.9 ppg, PNE-1 + 2.5% bwoc CaCl, zero% Excess, CTS
Production - "Lead: 14.5 ppg POZ:PNE-1 + 0.3% bwoc R3 + 1% bwoc EC1 + 0.75 gal/sk FP13L + 0.3% bwoc MPA170, Tail: 14.8 ppg PNE-1 + 0.35% bwoc R3 + 0.75 gal/sk FP13L + 50% bwoc ASCA1 + 0.5% bwoc MPA17020% ExcessLead Yield=1.19Tail Yield=1.94CTS"

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Environmental Protection

25) Proposed borehole conditioning procedures:

Conductor - Ensure the hole is clean at TD.
Fresh Water - Once casing is at setting depth, circulate a minimum of one hole volume with Fresh Water prior to pumping cement.
Coal - Once casing is at setting depth, Circulate and condition at TD. Circulate a minimum of one hole volume prior to pumping cement.
Intermediate - Once casing is at setting depth, Circulate and condition mud at TD. Circulate a minimum of one hole volume prior to pumping cement.
Production - Once on bottom/TD with casing, circulate at max allowable pump rate for at least 2x bottoms up, or until returns and pump pressures indicate the hole is clean. Circulate a minimum of one hole volume prior to pumping cement.

*Note: Attach additional sheets as needed.

Stickel 1210 S Well Pad (1H, 2H, 3H, 4H, 5H, 6H)
Cement Additives

47033059 26

Material Name	Material Type	Material Description	CAS #

Premium NE-1 — Portland Cement

Premium NE-1 is a portland cement with early compressive strength properties.

Ingredient name	%	CAS number
Portland cement	90 - 100	65997-15-1
Calcium oxide	1 - 5	1305-78-8
Magnesium oxide	1 - 5	1309-48-4
Crystalline silica: Quartz (SiO2)	0.1 - 1	14808-60-7

Bentonite — Extender

Commonly called gel, it is a clay material used as a cement extender and to control excessive free water.

Ingredient name	%	CAS number
bentonite	90 - 100	1302-78-9
Crystalline silica: Quartz (SiO2)	5 - 10	14808-60-7

Calcium Chloride — Accelerator

A powdered, flaked or pelletized material used to decrease thickening time and increase the rate of strength development

Ingredient name	%	CAS number
Calcium chloride	90 - 100	10043-52-4

Cello Flake — Lost Circulation

Graded (3/8 to 3/4 inch) cellophane flakes used as a lost circulation material.

Ingredient name	%	CAS number
No hazardous ingredient		

FP-13L — Foam Preventer

FP-13L is a clear liquid organic phosphate antifoaming agent used in cementing operations. It is very effective minimizing air entrapment and preventing foaming tendencies of latex systems.

Ingredient name	%	CAS number
Tributyl phosphate	90 - 100	126-73-8

Granulated Sugar — Retarder

Used to retard cement returns at surface.

Ingredient name	%	CAS number
Sucrose	90 - 100	57-50-1

EC-1

A proprietary product that provides expansive properties and improves bonding at low to moderate temperatures.

Ingredient name	%	CAS number
Calcium magnesium oxide	90 - 100	37247-91-9

MPA-170 — Gas Migration

Multi-purpose polymer additive used to control free fluid, fluid loss, rheology, and gas migration.

Ingredient name	%	CAS number
No hazardous ingredient		

Poz (Fly Ash) — Base

A synthetic pozzolan, (primarily Silicon Dioxide). When blended with cement, Pozzolan can be used to create lightweight cement slurries used as either a filler slurry or a sulfate resistant completion cement.

Ingredient name	%	CAS number
Crystalline silica: Quartz (SiO2)	5 - 10	14808-60-7
Calcium oxide	1 - 5	1305-78-8

R-3 — Retarder

A low temperature retarder used in a wide range of slurry formulations to extend the slurry thickening time.

Ingredient name	%	CAS number
Organic acid salt	40 - 50	Trade secret.

S-5 — Surfactant

Used to water wet casing and formation to facilitate cement bonding.

Ingredient name	%	CAS number
2-Butoxyethanol	20 - 30	111-76-2
Proprietary surfactant	10 - 20	Trade secret.
D-Glucopyranose, oligomeric, C10-16-alkyl glycosides	5 - 10	110615-47-9
Alkylarylsulfonate amine salt	1 - 5	Trade secret.
Polyoxyalkylenes	0.1 - 1	Trade secret.

Stickel 1210 S-3H
Macellus Shale Horizontal
Harrison County, WV

		Stickel 1210 S-3H SHL	235411.19N 1727692.52E
Ground Elevation	1019'	Stickel 1210 S-3H LP	234336.14N 1727175.81E
Azm	161.492°	Stickel 1210 S-3H BHL	222725.46N 1731062.42E

WELLBORE DIAGRAM	HOLE	CASING	GEOLOGY	TOP	BASE	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS
	30"	30" 157.5# LS	**Conductor**	**0**	**100**	AIR	N/A, Casing to be drilled in w/ Dual Rotary Rig	N/A	Ensure the hole is clean at TD.	Conductor casing = 0.5" wall thickness
	24"	20" 94# J-55	Fresh Water	0	135	AIR	15.6 ppg PNE-1 + 3% bwoc CaCl 40% Excess Yield=1.20 / CTS	Centralized every 3 joints to surface	Once casing is at setting depth, circulate a minimum of one hole volume with Fresh Water prior to pumping cement.	Surface casing = 0.438" wall thickness Burst=2110 psi
			Fresh Water	**0**	**500**					
	17.5"	13-3/8" 54.5# J-55 BTC	Kittaning Coal	660	665	AIR / KCL - Salt Polymer	Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl 40% Excess / Tail: 15.9 ppg PNE-1 + 2.5% bwoc CaCl zero% Excess. CTS	Bow Spring on every joint	Once casing is at setting depth, Circulate and condition at TD. Circulate a minimum of one hole volume prior to pumping cement.	Intermediate casing = 0.380" wall thickness Burst=2730 psi
			Little/Big Lime	1126 / 1167	1151 / 1243					
			Injun / Gantz (Storage)	1243 / 1535	1349 / 1585					
			Intermediate 1 (Shoe 50' below storage)	***0***	***1635***					
	12.25"	9-5/8" 40# J-55 BTC	Fifty / Thirty Foot	1650 / 1730	1697 / 1742	AIR / KCL - Salt Polymer	Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl 40% Excess / Tail: 15.9 ppg PNE-1 + 2.5% bwoc CaCl zero% Excess. CTS	Bow Spring on first 2 joints then every third joint to 100' form surface	Once casing is at setting depth, Circulate and condition mud at TD. Circulate a minimum of one hole volume prior to pumping cement.	Intermediate casing = 0.395" wall thickness Burst=3950 psi
			Gordon Stray / Gordon	1785 / 1850	1850 / 1940					
			5th Sand	2035	2070					
			Bayard Sand	2125	2160					
			Intermediate 2	**0**	**2500**					
	8.5" Vertical	5-1/2" 23# P-110 HC CDC HTQ	Speechley	2745	2763	9.0ppg SOBM	**Lead**: 14.5 ppg POZ:PNE-1 + 0.3% bwoc R3 + 1% bwoc EC1 + 0.75 gal/sk FP13L + 0.3% bwoc MPA170 **Tail**: 14.8 ppg PNE-1 + 0.35% bwoc R3 + 0.75 gal/sk FP13L + 50% bwoc ASCA1 + 0.5% bwoc MPA170 20% Excess Lead Yield=1.19 Tail Yield=1.94 CTS	Run 1 spiral centralizer every 5 joints from the top of the curve to surface.	Once on bottom/TD with casing, circulate at max allowable pump rate for at least 2x bottoms up, or until returns and pump pressures indicate the hole is clean. Circulate a minimum of one hole volume prior to pumping cement.	Production casing = 0.415" wall thickness Burst=14520 psi Note:Actual centralizer schedules may be changed due to hole conditions
			Balltown	2965	3005					
			Benson	4050	4083					
			West Falls	4620	5865					
	8.5" Curve		Rhinestreet	5865	6140	11.5ppg-12.5ppg SOBM		Run 1 spiral centralizer every 3 joints from the 1st 5.5" long joint to the top of the curve.		
			Cashaqua	6140	6341					
			Middlesex	6341	6421					
			West River	6421	6514					
			Burkett	6514	6540					
			Tully Limestone	6540	6644					
			Hamilton	6644	6863					
	8.5" Lateral		Marcellus	6863	6914	11.5ppg-12.5ppg SOBM				
			TMD / TVD (Production)	**19653**	**6900**					
			Onondaga	6914						

LP @ 6900' TVD / 7409' MD

8.5" Hole - Cemented Long String
5-1/2" 23# P-110 HC CDC HTQ

+/-12244' ft Lateral

TD @ +/-6900' TVD
+/-19653' MD

X=centralizers

33-05926

4703305926

List of Frac Additives by Chemical Name and CAS

Stickel 1210 S Well Pad (S-1H, S-2H, S-3H, S-4H, S-5H, S-6H)

Chemical Name	CAS #	Multiple CAS #'s
Pro Shale Slik 405	Mixture	68551-12-2
		7647-14-5
		12125-02-9
		64742-47-8
Pro Hib II	Mixture	68412-54-4
		68607-28-3
		107-21-1
		111-76-2
		67-56-1
		107-19-7
Silica Sand and Ground Sand	Mixture	14808-60-7
		1344-28-1
		1309-37-1
		13463-67-7
Hydrochloric Acid 22 DEG BE	7647-01-0	
PROGEL - 4.5	64742-96-7	
BIO CLEAR 2000	Mixture	25322-68-3
		10222-01-2
SCALE CLEAR SI 112	107-21-1	
PROBREAK 4	Mixture	57-50-1
		107-21-1
Sulfamic Acid	5329-14-6	
PRO - Flow - 102-N	Mixture	67-63-0
		68439-45-2
		2687-96-9
PROGEL - 4	9000-30-0	

WW-9
(4/16)

API Number 47 - 033 - 05926
Operator's Well No. Stickel 1210 S-3H

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name HG Energy II Appalachia, LLC OP Code 494501907

Watershed (HUC 10) West Fork Quadrangle West Milford 7.5'

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes ☑ No ☐

Will a pit be used? Yes ☐ No ☑

If so, please describe anticipated pit waste: NA

Will a synthetic liner be used in the pit? Yes ☐ No ☑ If so, what ml.? _____

Proposed Disposal Method For Treated Pit Wastes:

SDW 5/17/2018

_____ Land Application
_____ Underground Injection (UIC Permit Number _____)
■ Reuse (at API Number TBD - At next anticipated well)
■ Off Site Disposal (Supply form WW-9 for disposal location)
_____ Other (Explain _____

Will closed loop system be used? If so, describe: Yes

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air, Freshwater and SOBM

-If oil based, what type? Synthetic, petroleum, etc. Synthetic

Additives to be used in drilling medium? Water, Soap, KCl, Barite, Base Oil, Wetting Agents

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Approved Landfill

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) NA

-Landfill or offsite name/permit number? See Attached

Permittee shall provide written notice to the Office of Oil and Gas of any load of drill cuttings or associated waste rejected at any West Virginia solid waste facility. The notice shall be provided within 24 hours of rejection and the permittee shall also disclose where it was properly disposed.

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature Diane White

Company Official (Typed Name) Diane White

Company Official Title Agent

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Office of Oil and Gas
MAY 30 2018
WV Department of
Environmental Protection

Subscribed and sworn before me this 11th day of May, 2018

Joanne M. Gauthier Notary Public

My commission expires Aug 30 2022

OFFICIAL SEAL
NOTARY PUBLIC
STATE OF WEST VIRGINIA
JEANINE M. GAUTHIER
HG Energy, LLC
5260 Dupont Road
Parkersburg, West Virginia 26101
My Commission Expires Aug. 30, 2022

Form WW-9

Operator's Well No. Stickel 1210 S-3H

HG Energy II Appalachia, LLC

4703305926

Proposed Revegetation Treatment: Acres Disturbed 3.456 Prevegetation pH _____

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount 500 lbs/acre

Mulch Hay 2 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
Tall Fescue	40	Tall Fescue	40
Ladino Clover	5	Ladino Clover	5

Maintain E&S controls through the drilling and completion process

Attach:
Maps(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided). If water from the pit will be land applied, include dimensions (L x W x D) of the pit, and dimensions (L x W), and area in acreage, of the land application area.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: [signature]

Comments: Pre-seed/mulch as soon as reasonably possible per regulations. Upgrade E&S per WV DEP E&S manual if needed

Title: OOG Inspector Date: 5/17/2018

Field Reviewed? (X) Yes ( ) No

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Cuttings Disposal/Site Water

Cuttings –Haul off Company:

Eap Industries, Inc. DOT # 0876278
1575 Smith Two State Rd. Atlasburg, PA 15004
1-888-294-5227

Waste Management
200 Rangos Lane
Washington, PA 15301
724-222-3272

Environmental Coordination Services & Recycling (ECS&R)
8237 US Highway 19
Cochranton, PA 16314
814-425-7773

Disposal Locations:

Apex Environmental, LLC Permit # 06-08438
11 County Road 78
Amsterdam, OH 43903
740-543-4389

Westmoreland Waste, LLC Permit # 100277
111 Conner Lane
Belle Vernon, PA 15012
724-929-7694

Sycamore Landfill Inc, Permit #R30-079001 05-2010
4301 Sycamore Ridge Road
Hurricane, WV 25526
304-562-2611

Max Environmental Technologies, Inc. Facility Permit # PAD004835146 / 301071
233 Max Lane
Yukon, PA 25968
724-722-3500

Max Environmental Technologies, Inc. Facility Permit # PAD05087072 / 301359
200 Max Drive
Bulger, PA 15019
724-796-1571

Waste Management Kelly Run Permit # 100663
1901 Park Side Drive
Elizabeth, PA 15037
412-384-7569

Waste Management South Hills (Arnoni) Permit # 100592
3100 Hill Road
Library, PA 15129
724-348-7013
412-384-7569

Waste Management Arden Permit # 100172
200 Rangos Lane
Washington, PA 15301
724-222-3272

Waste Management Meadowfill Permit # 1032
1488 Dawson Drive
Bridgeport, WV 26330

Brooke County Landfill Permit # SWF-103-97 / WV 0109029
Rd 2 Box 410
Colliers, WV 26035
304-748-0014

47033 05926

Wetzel County Landfill Permit # SWF-1021-97 / WV 0109185
Rt 1 Box 156A
New Martinsville, WV 26035
304-455-3800

Energy Solutions, LLC Permit # UT 2300249
423 West 300 South
Suite 200
Salt Lake City, UT 84101

Energy Solutions Services, Inc. Permit # R-73006-L24
1560 Bear Creek Road
Oak Ridge, TN 37830

Northern A-1 Environmemental Services Permit ID MIP020906814
3947 US 131 North, PO Box 1030
Kalkaska, MI 49646
231-258-9961

Water Haul off Companies:

Dynamic Structures, Clear Creek DOT # 720485
3790 State Route 7
New Waterford, OH 44445
330-892-0164

Nabors Completion & Production Services Co.
PO Box 975682
Dallas, TX 75397-5682

Select Energy Services, LLC
PO Box 203997
Dallas, TX 75320-3997

Nuverra Environmental Solutions
11942 Veterans Memorial Highway
Masontown, WV 26542

Mustang Oilfield Services LLC
PO Box 739
St. Clairsville, OH 43950

Wilson's Outdoor Services, LLC
456 Cracraft Road
Washington, PA 15301

CMS of Delaware Inc. DBA CMS Oilfield Serv
301 Commerce Drive
Moorestown, NJ 08057

Force, Inc.
1380 Rte. 286 Hwy. E, Suite 303
Indiana, PA 15701

Solo Construction
P.O. Box 544
St. Mary's, WV 26170

Equipment Transport
1 Tyler Court
Carlisle, PA 17015

Myers Well Service, ____
2001 Ballpark Court
Export, PA 15632

Burns Drilling & Excavating
618 Crabapple Road P.O. Box
Wind Ridge, PA 15380

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Disposal Locations:

Solidification
Waste Management, Arden Landfill Permit # 100172
200 Rangos Lane
Washington, PA 15301
724-225-1589

Solidification/Incineration
Soil Remediation, Inc. Permit # 02-20753
6065 Arrel-Smith Road
Lowelville, OH 44436
330-536-6825

Adams #1 (Buckeye Brine, LLC)
Permit # 34-031-2-7177
23986 Airport Road
Coshocton, OH 43812
740-575-4484
512-478-6545

Nichlos 1-A (SWIW #13)
Permit # 3862
300 Cherrington Pkwy, Suite 200
Coraopolis, PA 15108
412-329-7275

Groselle (SWIW #34)
Permit # 4096
Rt. 88
Garrettsville, OH
713-275-4816

Kemble 1-D Well
Permit # 8780
7675 East Pike
Norwich, Oh 43767
614-648-8898
740-796-6495

Adams #2 (Buckeye Brine, LLC)
2205 Westover Road
Austin Tx 78703
Permit # 34-031-2-7178
740-575-4484
512-478-6545

Adams #3 (Buckeye Brine, LLC)
Permit #34-031-2-7241-00-00
2680 Exposition, Suite 117
Austin, TX 78703
512-478-6545

Mozena #1 Well (SWIW # 13)
Permit # 34-157-2-5511-00-00
5367 E. State Street
Newcomerstown, OH 43832
740-763-3966

Goff SWD #1 (SWIW # 27)
Permit # 34-119-2-8776-000
300 Cherrington Pkwy, Suite 200
Coraopolis, PA 15108
412-329-7275

SOS D#1 (SWIW #12)
Permit # 34-059-2-4202-00-00
Silcor Oilfield Services, Inc.
2939 Hubbard Road
Youngstown, PH 44505

Dudley #1 UIC (SWIW #1)
Permit # 34-121-2-2459-00-00
Select Energy Services, LLC
7994 S. Pleasants Hwy
St. Marys, WV 26170
304-665-2652

OH UIC #1 Buckeye UIC Barnesville 1 & 2
CNX Gas Company, LLC
1000 Consol Energy Drive
Permit # 34-013-2-0609-00-00
Permit # 34-013-2-0614-00-00
304-323-6568

US Steele 11385
Permit # 47-001-00561
200 Evergreen Drive
Waynesburg, PA 15730
304-323-6568

Chapin #7 UIC (SWIW #7)
Permit # 34-083-2-4137-00-00
Elkhead Gas& Oil Company
12163 Marne Rd. NE
Newark, OH 43055
740-763-3966

4703305926

47033059 26

HG Energy II Appalachia, LLC

Site Safety Plan

Stickle 1210 Well Pad
Jane Lew, Harrison County, WV

April 2018: Version 1

For Submission to
West Virginia Department of Environmental Protection,
Office of Oil and Gas

HG Energy II Appalachia, LLC

5260 Dupont Road

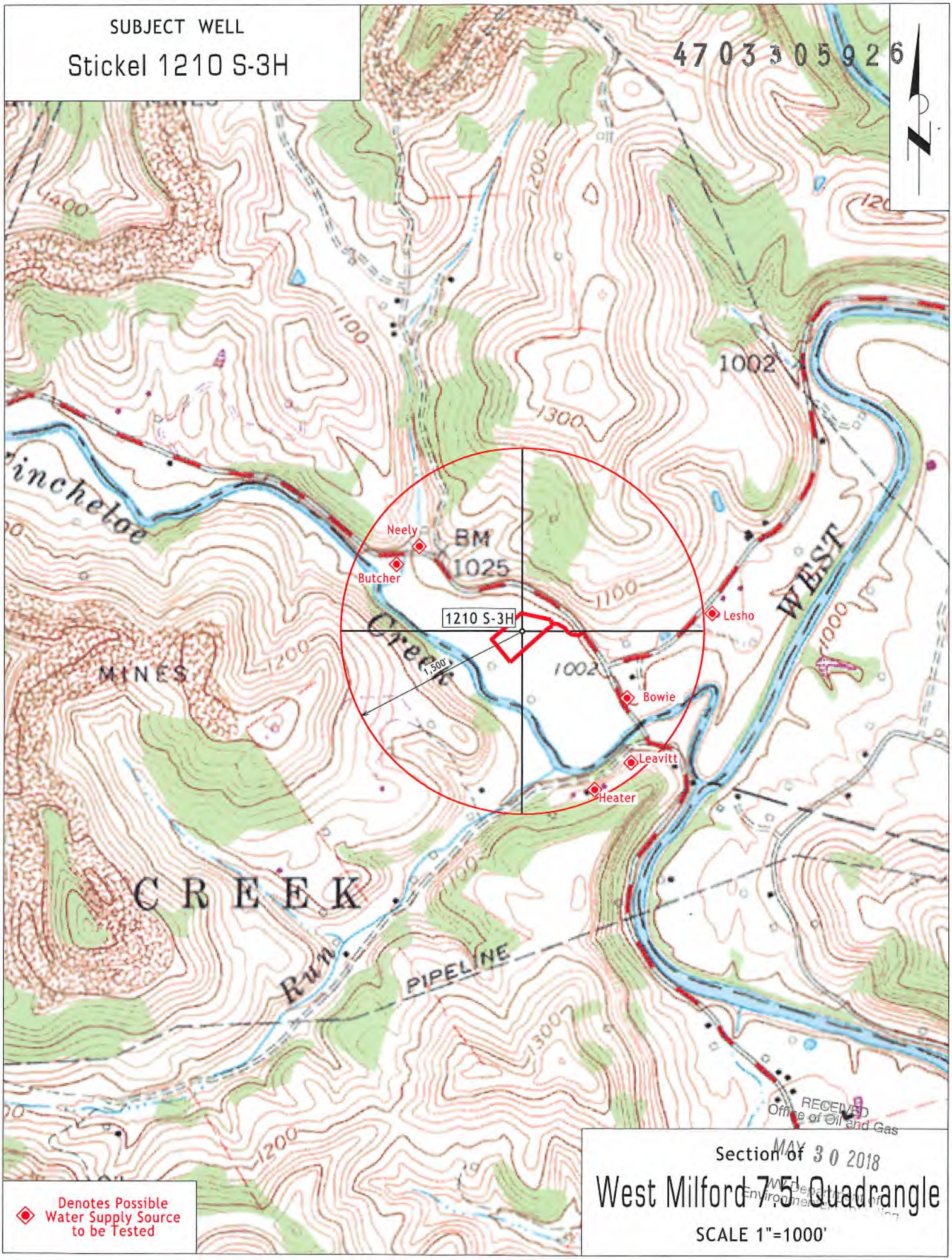
Parkersburg, WV 26101

SDW
5/17/2018

SUBJECT WELL

Stickel 1210 S-3H

4703305926



Denotes Possible Water Supply Source to be Tested

Section of

West Milford 7.5' Quadrangle

SCALE 1"=1000'

RECEIVED
Office of Oil and Gas
MAY 30 2018
WV Department of
Environmental Protection

BHL is located on topo map 6,300 feet south of Latitude: 39°07'30"
SHL is located on topo map 8,824 feet south of Latitude: 39°10'00"

BHL is located on topo map 8,759 feet west of Longitude: 80°25'00"
SHL is located on topo map 441 feet west of Longitude: 80°27'30"

SEE PAGE 2 FOR PLAT DUE TO LENGTH OF LATERAL

	LESSOR	DIST-TM/PAR
A	A. W. RHODES ET UX	20-444/19.2
B	W. E. BEEGHLEY ET AL	3-7B/23
		3-7B/23.1
C	ANNA C. BARB ET AL	3-7B/27
D	CAROLINE BEEGHLEY ET AL	3-7B/31
E	MAUDIE BARB ET AL	3-7B/32.1
		3-7B/32
F	BERTHA BRINKLEY ET AL	3-7B/32
		4-7C/18.13
G	BERTHA H. NAY ET AL	4-7C/18.13
		4-7C/18.18
H	BERTHA H. NAY ET AL	4-7C/18.18
		4-7C/18.20
		4-7C/18.25
		4-7C/18.15
		4-7C/18.17
		4-7C/18.12
		4-7C/18.14
J	MYRTLE B. SMITH ET VIR	4-7C/15.4
K	JOHN S. BARB ET UX	3-7C/62
L	DELBERT WILLIAMS ET AL	3-7C/63
		3-7C/64
M	E. C. STROTHER & ET AL	3-7C/66
N	N. L. ALLMAN ET VIR	3-7C/72
		3-7C/72.1
		3-7C/71.1
		3-7C/71.2
		3-7C/70

SURFACE HOLE LOCATION (SHL)
UTM 17-NAD83
N:4332722.249
E:546675.392
NAD27, WV NORTH
N:235411.194
E:1727692.517
LAT/LON DATUM-NAD83
LAT:39.142439
LON:-80.459889

APPROX. LANDING POINT
UTM 17-NAD83
N:4332392.111
E:546523.431
NAD27, WV NORTH
N:234336.136
E:1727175.815
LAT/LON DATUM-NAD83
LAT:39.139472
LON:-80.461670

BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83
N:4328874.630
E:547766.380
NAD27, WV NORTH
N:222725.465
E:1731062.423
LAT/LON DATUM-NAD83
LAT:39.107711
LON:-80.447536

BHL

SHL

	SURFACE OWNER	DIST-TM/PAR
1	DANNY LEE & ALICIA A. STICKEL	20-444/19.2
2	ATLANTIC COAST PIPELINE, LLC	3-7B/23
3	DEBORAH JO HEATER	3-7B/23.1
4	SHANE L. STUTLER	3-7B/27
5	JOHN J. OLDAKER, JR.	3-7B/31
6	TIMOTHY L. WOLFE	3-7B/32.1
7	TIMOTHY R. JAMES	3-7B/32
8	DAVID & DINESSIA MCDOUGAL	4-7C/18.13
9	JEARLD V. ALLMAN III	4-7C/18.18
10	MICHAEL A. & CARRIE B. GRILLI	4-7C/18.20
11	STEVEN E. LOAR	4-7C/18.25
12	BERNARD & DARLENE MOORE	4-7C/18.15
13	DAVID & TAMATHA R. JONES	4-7C/18.17
14	STALNEY F. & LINDA L. WILLIAMS	4-7C/18.12
15	STANLEY F. & LINDA L. WILLIAMS	4-7C/18.14
16	*STEVEN D. BUMBARDNER	4-7C/15.4
17	VALLERIE A. SNOW	3-7C/62
18	HARRY MAXWELL EAKIN	3-7C/63
19	DELBERT F. WILLIAMS	3-7C/64
20	JOSHUA V. & MARSHA T. GARTON	3-7C/66
21	CARL V. RATLIFF	3-7C/72
22	JANET B. RINEHART	3-7C/72.1
23	BARBARA TRUMBULL SQUIRES	3-7C/71.1
24	JAMES R. & BARBARA G. SQUIRES	3-7C/71.2
25	BARBARA G. SQUIRES	3-7C/70

* - DENOTES PARCEL WITHIN 30 FEET OF PLANNED WELL BORE

Blue Mountain
11023 MASON DIXON HIGHWAY
BURTON, WV 26562
PHONE: (304) 662-6486

FILE #: STICKEL 3H
DRAWING #: STICKEL 3H
SCALE: 1" = 2000'
MINIMUM DEGREE OF ACCURACY: 1/2500
PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT THOMAS 1498.81'

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed: George D. Six
R.P.E.: L.L.S.: P.S. No. 2000

GEORGE D. SIX LICENSED No. 2000 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR
PLACE SEAL HERE

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS
WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

DATE: MAY 8, 2018
OPERATOR'S WELL #: STICKEL 3H
API WELL #: 47 (STATE) 33 (COUNTY) 05926 H6A (PERMIT)

Well Type: [ ] Oil [ ] Waste Disposal [X] Production [ ] Deep
[X] Gas [ ] Liquid Injection [ ] Storage [X] Shallow

WATERSHED: MIDDLE WEST FORK CREEK
ELEVATION: 994'±
COUNTY/DISTRICT: HARRISON / UNION
QUADRANGLE: WEST MILFORD, WV 7.5'
SURFACE OWNER: DANNY LEE & ALICIA A. STICKEL
ACREAGE: 35.00±
OIL & GAS ROYALTY OWNER: A. W. RHODES ET UX
ACREAGE: 649.876±

DRILL [X] CONVERT [ ] DRILL DEEPER [ ] REDRILL [ ] FRACTURE OR STIMULATE [X]
PLUG OFF OLD FORMATION [ ] PERFORATE NEW FORMATION [ ] PLUG & ABANDON [ ]
CLEAN OUT & REPLUG [ ] OTHER CHANGE [ ] (SPECIFY):

TARGET FORMATION: MARCELLUS
ESTIMATED DEPTH: TVD: 6,900'± TMD: 19,654'±

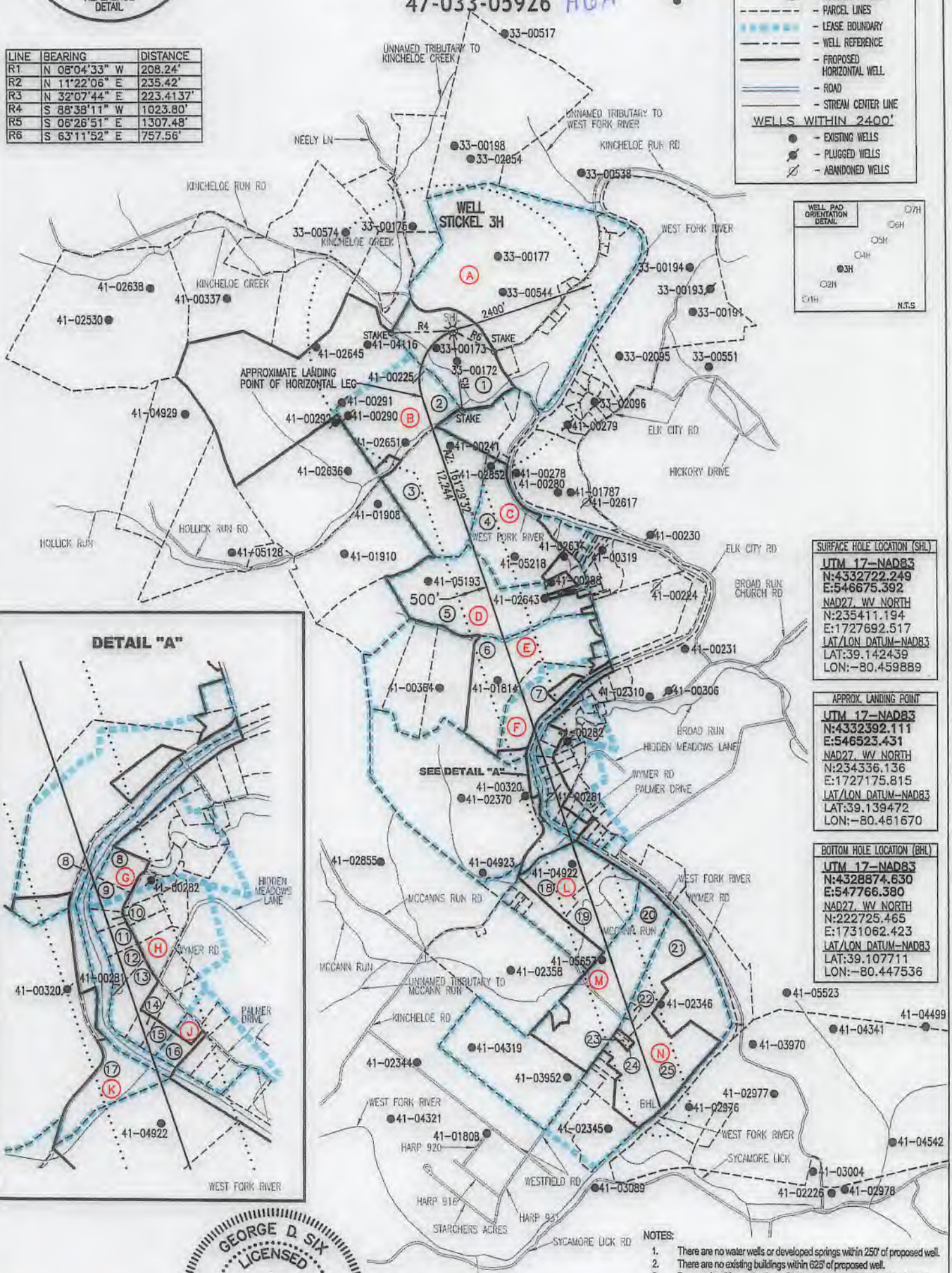
WELL OPERATOR: HG ENERGY II APPALACHIA, LLC
Address: 5260 DUPONT ROAD
City: PARKERSBURG State: WV Zip Code: 26101

DESIGNATED AGENT: DIANE C. WHITE
Address: 5260 DUPONT ROAD
City: PARKERSBURG State: WV Zip Code: 26101

STICKEL 3H
PAGE 2 OF 2

47-033-05926 H6A

LINE	BEARING	DISTANCE
R1	N 05°04'33" W	208.24'
R2	N 11°22'06" E	235.42'
R3	N 32°07'44" E	223.4137'
R4	S 88°38'11" W	1023.80'
R5	S 06°26'51" E	1307.48'
R6	S 63°11'52" E	757.56'



SURFACE HOLE LOCATION (SHL)
UTM 17-NAD83
N:4332722.249
E:546675.392
NAD27, WV NORTH
N:235411.194
E:1727692.517
LAT/LON DATUM-NAD83
LAT:39.142439
LON:-80.459889

APPROX. LANDING POINT
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E:546523.431
NAD27, WV NORTH
N:234336.136
E:1727175.815
LAT/LON DATUM-NAD83
LAT:39.139472
LON:-80.461670

BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83
N:4328874.630
E:547766.380
NAD27, WV NORTH
N:222725.465
E:1731062.423
LAT/LON DATUM-NAD83
LAT:39.107711
LON:-80.447536

NOTES:
1. There are no water wells or developed springs within 250' of proposed well.
2. There are no existing buildings within 625' of proposed well.
3. Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
4. There are no native trout streams within 300' of proposed well.
5. Proposed well is greater than 1000' from surface/groundwater intake or public water supply.
6. It is not the purpose or intention of this plat to represent surveyed locations of the surface or mineral parcels depicted hereon. The location of the boundary lines, as shown, are based on record deed descriptions, field evidence found and/or tax map position, unless otherwise noted.

GEORGE D. SIX
LICENSED
No. 2000
STATE OF
WEST VIRGINIA
PROFESSIONAL SURVEYOR

George D. Six

MAY 8, 2018

Blue Mountain
11023 MASON DIXON HIGHWAY
BURTON, WV 26562
PHONE: (304) 662-6486

WW-6A1
(5/13)

Operator's Well No. Stickel 12H S3H 4703305926

INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

(1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;

(2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page

** See Attached **

Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

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Office of Oil and Gas
MAY 30 2018
WV Department of
Environmental Protection

The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Well Operator: HG Energy II Appalachia, LLC
By: Diane White Diane White
Its: Agent

47033059 26

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
A			A.W. Rhodes and Mary Rhodes, his wife	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 175	162
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 903	179
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 1136	250
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
FK013939	Q100459000	HARRISON COUNTY: 20-444-19; 20-444-19.1; 20-444-19.2; 20-444-19.3; 20-444-19.4; 20-444-19.5; 20-444-19.6; 20-444-19.7; 20-444-19.8; 20-19.9; 20-444-19.10; 20-444-19.11; 20-444-19.12; 20-444-19.13	CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 1522	33
			Dominion Transmission, Inc.	CNX Gas Company LLC	Farmout Amendment		DB 1524	491
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 1543	1235
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 1576	125
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 1584	942
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 1600	660
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 1600	692
			Dominion Energy Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Farmout Amendment		DB 1601	581
B			W.E. Beeghley and Harriet Beeghley, his wife	Lloyd Beeghley and Lloyd Rinehart	Oil And Gas Lease	NOT LESS THAN 1/8	DB 65	404
			Lloyd Beeghley and Lloyd Rinehart	Lloyd Rinehart	Assignment		DB 66	576
			Lloyd Rinehart	Reserve Gas Company	Assignment		DB 66	576
			Reserve Gas Company	Hope Natural Gas Company	Merger/Name Change		DB 155	202
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
FK053278	Q100388000	LEWIS COUNTY: 03-007B-0023-0000; 03-007B-023-0001 AND 03-007B-0023-0002	Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	

4703305926

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
FK053234	Q100672000	LEWIS COUNTY: 03-07B-0027-0000; 03-07B-0027-0001; 03-07B-0027-0003; 03-07B-0027-0004; 03-07B-0028-0000; 03-07B-0029-0000; 03-07B-0043-0000; 03-07B-0044-0000	Anna C. Barb, and S.W. Barb and Emma A. Barb, his wife	Reserve Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 68	144
			Reserve Gas Company	Hope Natural Gas Company	Assignment		DB 155	202
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
			South Penn Oil Company	South Penn Gas Company	Assignment (OIL)		DB 156	570
			South Penn Natural Gas Company	South Penn Oil Company	Assignment		DB 234	323
			South Penn Natural Gas Company	South Penn Oil Company	Conveyance		DB 260	87
			South Penn Oil Company	Pennzoil Company	Merger/Name Change		WV SOS	
			Pennzoil Company and United Gas Company	Pennzoil United, Inc.	Assignment		DB 307	359
			Pennzoil United, Inc.	Pennzoil Company	Merger/Name Change		WV SOS	
			Pennzoil Company and United Gas Company	Pennzoil Products Company	Assignment		DB 454	34
			Pennzoil Company	Pennzoil Products Company	Assignment		DB 460	139
			Pennzoil Products Company	Pennzoil Exploration and Production Company	Assignment		DB 551	627
			Pennzoil Exploration and Production Company	PennzEnergy Exploration and Production, LLC	Merger/Name Change		CORP 8	343

4703305926

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
			PennzEnergy Exploration and Production, LLC	Devon Energy Production Company	Merger/Name Change		CORP 8	442
			Devon Energy Production Company, L.P.	East Resources, Inc.	Assignment		DB 566	368
			East Resources	HG Energy, LLC	Assignment		DB 652	294
FK053256	Q100337000	LEWIS COUNTY: 03-007B-0031-0000, 03-007B-0031-0002, 03-007B-0031-0003 and 03-007B	Caroline Beeghley, Lloyd Beeghley and Hattie Beeghley, his wife, Charles Beeghley and Maude Beeghley, his wife, Cora Beeghley, Mary Swisher and Wirt Swisher, her husband, and Louisa Beeghley	Reserve Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 65	338
			Reserve Gas Company	Hope Natural Gas Company	Merger/Name Change		DB 155	202
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			South Penn Oil Company	South Penn Natural Gas Company	Assignment		DB 79	136
			South Penn Natural Gas Company	South Penn Oil Company	Assignment		DB 234	323
			South Penn Natural Gas Company	South Penn Oil Company	Conveyance		DB 260	87
			South Penn Oil Company	Pennzoil Company	Merger/Name Change		WVSOS	
			Pennzoil Company	Pennzoil United	Conveyance		DB 307	359
			Pennzoil Company	Pennzoil Products Company	Conveyance		DB 454	34
			Pennzoil Company	Pennzoil Productions Company	Assignment		DB 460	139
			Pennzoil Products Company	Pennzoil Exploration and Production Company	Assignment		DB 551	627
			Pennzoil Exploration and Production Company	Pennzenergy Exploration and Production Company LLC	Merger/Name Change		CORP 8	343
			Pennzenergy Exploration and Production Company	Devon Energy Production Company, LP	Merger/Name Change		CORP 8	442
			Devon Energy Production Company, LP	East Resources, Inc.	Assignment		DB 566	368

4703305926

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
			East Resources, Inc.	HG Energy LLC	Assignment		DB 652	294
FK 064783 M208276	Q100558000	LEWIS COUNTY: 03-007B-0017-0000; 03-007B-0018-0000; 03-007B-0019-0000; 03-007B-0032-0001; 03-007B-0031-0001; AND 03-007B-0035-0000	Maudie Barb, widow; James Barb, single; Francis W. Smith and Wavelene Smith, his wife; George H. Smith and Virginia L. Smith, his wife; Ida Musser Post, single; Lummie E. Nicholson, widow; Versie M. Kelly and O.W. Kelly, her husband; Lloyd Minter and Addie V. Minter, his wife; Bertha Brinkley and Allman Brinkley, her husband; Ann Patton, single; Geraldine Wolverton and Harold G. Wolverton, her husband; Fred C. Nicholson and Elizabeth Nicholson, his wife; Helen Ehase and Michael Ehase, her husband; Harold J. Plunkett, a married woman, living separate and apart from her husband; Mary Katherine Kearney and James J. Kearney, her husband; Orval L. Musser, single; Herbert H. Post and Nelly D. Post, his wife; W.G. Post and Effie Post, his wife; Bessie A. Horne and C.S. Horne, her husband; Lacy Barbe and Cusie Barbe, his wife; Myrtle Barbe, wife of Clarence Barbe; Mary R. Minter, single; Zella B. Barbe, single	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 223	169
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memo of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		752	784
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499

47033059 26

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
FK065485	Q100444000	LEWIS COUNTY: p/o 03-007B-0032-0000, p/o 03-007B-0032-0000, 03-007B-0032-0002, 03-007B-0032-0003, 03-007B-0031-0001, 03-007B-0035-0000	Bertha Brinkley and Allman Brinkley, her husband; Francis W. Smith and Wavelene Smith, his wife; Ida M. Post; George H. Smith and Virginia LK. Smith, his wife, Mary Katherine Kearney and James J. Kearney, her husband, Virginia Plunkett, single; Oral L. Musser, Single; Herbert H. Post and Neely D. Post, his wife; W.G. Post and Effie Post, his wife	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 230	315
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			CNX Gas Company LLC	Noble Energy, Inc.	Corrective Assignment		DB 725	784
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
FK062342	Q101046000	LEWIS COUNTY: 04-007C-0018-0000; p/o 04-007C-0018-0008; p/o 04-007C-0018-0010; 04-007C-0018-0013; p/o 04-007C-0018-0018; p/o 04-007C-0018-0020; 04-007C-0018-0023;	Bertha H. Nay, widow; Ethel V. Law, widow; Betty Ann Newman and C.B. Newman, her husband	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 212	502
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	

47033059 26

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
		04-007C-0018-0024; 04-007C-0026; 04-007C-0018-0027; p/o 04-007C-0018-0029; p/o 04-007C-0018--0030; 04-007b-0038-0000; 04-007b-0012-0000	CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
FK062343	Q101044000	LEWIS COUNTY: 04-007C-0018-0001; 04-007C-0018-0001; 04-007C-0018-0001; 04-007C-0018-0001; 04-007C-0018-0001; 04-007C-0018-0001; 04-007C-0018-0001; 04-007C-0018-0001;04-007C-0018-0001;04-007C-0018-0001;04-007C-0018-0002; 04-007C-0018-0005; 04-007C-0018-0009; 04-007C-0018-0011; 04-007C-0018-0012; 04-007C-0018-0014;04-007C-0018-0015; 04-007C-0018-0017; p/o 04-007C-0018-0018; p/o 04-007C-0018-0019; p/o 04-007C-0018-0020; 04-007C-0018-0021; p/o 04-007C-0018-0022; 04-007C-0018-0025; p/o 04-007C-0018-0028; p/o 04-007C-0018-0029; p/o 04-007C-0018-0030	Bertha H. Nay, widow, Ethel V. Law, widow, and Betty Anne Newman and C.B. Newman, her husband	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 212	496
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499

Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
FK064658	Q100900000	LEWIS COUNTY: 04-7C-0015-0000; 04-7C-0015-0001; 04-7C-0015-0002; 04-7C-0015-0003; 04-7C-0015-0004; 04-7C-0015-0005; 04-7C-0015-0006; p/o 04-7C-0015-0007; p/o 04-7C-0015-0008; 04-7C-0015-0009; 04-7C-0015-0010	Myrtle B. Smith and George C. Smith, her husband	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 222	305
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company, LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
K			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
FK053273	Q100770000	LEWIS COUNTY: 03-007C-0061-000; 030-007C-0062-000; and 03-007C-0062-0001	John S. Barb and Minnie A. Barb, his wife	Reserve Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 71	538
			Reserve Gas Company	Hope Natural Gas Company	Merger/Name Change		DB 155	202
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
L			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1

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Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
FK062097	Q098895000	LEWIS COUNTY: 03-007C-0063-0000; 03-007C-0064-0000; 03-007C-0065-0000; 03-007C-0058-0000; 03-007C-0058-0001; 03-007c-0058-0002; 03-007C-0059-0000	Delbert Williams and Pauline Williams, his wife; Ethel Williams, single; Lillie M. Allman, widow; Abraham G. Barb and Cornelia Barb, his wife; Mae Barb, widow; Vieva Prince and Denzel Prince, her husband; Rev. Raymond Barbe and Ada B. Barbe, his wife, and W.S. Barbe, Jr., widower	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 211	257
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			CNX Gas Company LLC	Noble Energy, Inc.	Corrective Assignment		DB 725	784
M			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
N			Elbert C. Strother and Delora Strother, his wife; Lucinda S. Dawson and N.B. Dawson, her husband; Effie M. Strother	Hope Natural Gas Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 230	20
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			Dominion Transmission, Inc.	CNX Gas Company LLC	Memorandum of Farmout		DB 672	154
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
FK065412	Q101062000	LEWIS COUNTY: 03-007C-0066-0000 and 03-007C-	CNX Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57

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Legacy Lease Number	HG ENERGY II APALACHIA LEASE NUMBER	MPID	Original Lessor	Original Lessee	Agreement Type	Royalty	Book	Page
		0066-0001	Dominion Transmission, Inc.	CNX Gas Company LLC and Noble Energy Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
FK053192	Q101144000	LEWIS COUNTY: 03-7C-0068-0000; 03-7C-0068-0001; 03-7C-0068-0002; 03-7C-0068-0003; 03-7C-0068-0004; 03-7C-0069-0001; 03-7C-0070-0000; 03-7C-0070-0001; 03-7C-0070-0002; 03-7C-0070-0003; 03-7C-0071-0001; 03-7C-0071-0002; 03-7C-0072-0000; 03-7C-0072-0001; 03-7C-0072-0002 AND PART OF 03-01-0069-0000	N.L. Allman and L.M. Allman, her husband	South Penn Oil Company	Oil And Gas Lease	NOT LESS THAN 1/8	DB 42	20
			South Penn Oil Company	Hope Natural Gas Company	Assignment		DB 85	127
			Hope Natural Gas Company	Reserve Gas Company	Assignment		DB 79	370
			South Penn Oil Company	Reserve Gas Company	Assignment		DB 79	237
			Reserve Gas Company	Hope Natural Gas Company	Merger/Name Change		DB 155	202
			Hope Natural Gas Company	Consolidated Gas Supply Corporation	Merger/Name Change		DB 294	89
			Consolidated Gas Supply Corporation	Consolidated Gas Transmission Corporation	Assignment		DB 425	127
			Consolidated Gas Transmission Corporation	CNG Transmission Corporation	Merger/Name Change		WV SOS	
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Transmission, Inc.	CNX Gas Company, LLC	Memorandum of Farmout		DB 672	154
			CNG Transmission Corporation	Dominion Transmission, Inc.	Merger/Name Change		CORP 9	628
			CNG Gas Company LLC	Noble Energy, Inc.	Limited Partial Assignment (50%)		DB 684	57
			Dominion Transmission, Inc.	CNX Gas Company, LLC and Noble Energy, Inc.	Partial Assignment (32%)		DB 712	848
			CNX Gas Company LLC	Noble Energy, Inc.	Assignment		DB 717	1
			CNX Gas Company LLC	Noble Energy, Inc.	Corrective Assignment		DB 725	784
			Noble Energy, Inc.	HG Energy II Appalachia LLC	Assignment		DB 722	139
			Dominion Transmission, Inc.	Dominion Energy Transmission, Inc.	Merger/Name Change		WV SOS	
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Second Amendment to Farmout		DB 723	499
			Dominion Energy Transmission, Inc.	HG Energy II Appalachia LLC	Amended and Restated Partial Assignment		DB 723	527

HG Energy, LLC
5260 Dupont Road
Parkersburg, WV 26101
(304) 420-1100 - Office
(304) 863-3172 - Fax

4703105926

May 15, 2018

Laura Adkins
WV DEP
Division of Oil & Gas
601 57th Street
Charleston, WV 25304

CK# 006977
Amt $ 5150.00
Date 4/24/18

RE: Drilling Under Roads – Stickel 1210 S-3H
Union District, Harrison County
West Virginia

Dear Ms. Adkins:

HG Energy II Appalachia, LLC, has the right to drill, stimulate and produce wells that are drilled under the County and State Roads as designated on the plats.

Should you have any questions or desire further information, please contact me at dwhite@hgenergyllc.com or 304-420-1119.

Very truly yours,

Diane White

Diane C. White

RECEIVED
Office of Oil and Gas
MAY 30 2018
WV Department of
Environmental Protection

Enclosures

WW-6AC
(1/12)

47033 05926

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE CERTIFICATION

Date of Notice Certification: 05/23/2018

API No. 47- _____ - _____
Operator's Well No. Stickel 1210 S-3H
Well Pad Name: Stickel 1210

Notice has been given:
Pursuant to the provisions in West Virginia Code § 22-6A, the Operator has provided the required parties with the Notice Forms listed below for the tract of land as follows:

State:	West Virginia	UTM NAD 83 Easting:	546675.392
County:	Harrison	Northing:	4332722.249
District:	Union	Public Road Access:	Kincheloe Run Road / SR35
Quadrangle:	West Milford 7.5'	Generally used farm name:	Danny & Alicia Stickel
Watershed:	West Fork		

Pursuant to West Virginia Code § 22-6A-7(b), every permit application filed under this section shall be on a form as may be prescribed by the secretary, shall be verified and shall contain the following information: (14) A certification from the operator that (i) it has provided the owners of the surface described in subdivisions (1), (2) and (4), subsection (b), section ten of this article, the information required by subsections (b) and (c), section sixteen of this article; (ii) that the requirement was deemed satisfied as a result of giving the surface owner notice of entry to survey pursuant to subsection (a), section ten of this article six-a; or (iii) the notice requirements of subsection (b), section sixteen of this article were waived in writing by the surface owner; and Pursuant to West Virginia Code § 22-6A-11(b), the applicant shall tender proof of and certify to the secretary that the notice requirements of section ten of this article have been completed by the applicant.

Pursuant to West Virginia Code § 22-6A, the Operator has attached proof to this Notice Certification that the Operator has properly served the required parties with the following: *PLEASE CHECK ALL THAT APPLY	OOG OFFICE USE ONLY
☐ 1. NOTICE OF SEISMIC ACTIVITY or ☒ NOTICE NOT REQUIRED BECAUSE NO SEISMIC ACTIVITY WAS CONDUCTED	☐ RECEIVED/ NOT REQUIRED
☐ 2. NOTICE OF ENTRY FOR PLAT SURVEY or ☒ NO PLAT SURVEY WAS CONDUCTED	☐ RECEIVED
☒ 3. NOTICE OF INTENT TO DRILL or ☐ NOTICE NOT REQUIRED BECAUSE NOTICE OF ENTRY FOR PLAT SURVEY WAS CONDUCTED or ☐ WRITTEN WAIVER BY SURFACE OWNER (PLEASE ATTACH)	☐ RECEIVED/ NOT REQUIRED
☒ 4. NOTICE OF PLANNED OPERATION	☐ RECEIVED
☒ 5. PUBLIC NOTICE	☐ RECEIVED
☒ 6. NOTICE OF APPLICATION	☐ RECEIVED

RECEIVED
Office of Oil and Gas
MAY 30 2018
WV Department of
Environmental Protection

Required Attachments:
The Operator shall attach to this Notice Certification Form all Notice Forms and Certifications of Notice that have been provided to the required parties and/or any associated written waivers. For the Public Notice, the operator shall attach a copy of the Class II Legal Advertisement with publication date verification or the associated Affidavit of Publication. The attached Notice Forms and Certifications of Notice shall serve as proof that the required parties have been noticed as required under West Virginia Code § 22-6A. Pursuant to West Virginia Code § 22-6A-11(b), the Certification of Notice to the person may be made by affidavit of personal service, the return receipt card or other postal receipt for certified mailing.

33-05926

WW-6AC
(1/12)

Certification of Notice is hereby given:

THEREFORE, I Diane White, have read and understand the notice requirements within West Virginia Code § 22-6A. I certify that as required under West Virginia Code § 22-6A, I have served the attached copies of the Notice Forms, identified above, to the required parties through personal service, by registered mail or by any method of delivery that requires a receipt or signature confirmation. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this Notice Certification and all attachments, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Well Operator:	HG Energy II Appalachia, LLC	Address:	5260 Dupont Road
By:	Diane White		Parkersburg, WV 26101
Its:	Agent	Facsimile:	304-863-3172
Telephone:	304-420-1119	Email:	dwhite@hgenergyllc.com

NOTARY SEAL
OFFICIAL SEAL
NOTARY PUBLIC. STATE OF WEST VIRGINIA
MARK J SCHALL
H G Energy L L C
PO Box 5519, Vienna, WV 26105
My Commission Expires November 2, 2021

Subscribed and sworn before me this 23rd day of May, 2018.

Notary Public

My Commission Expires 11/2/2021

Oil and Gas Privacy Notice:
The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.

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Office of Oil and Gas
MAY 30 2018
WV Department of
Environmental Protection

WW-6A
(9-13)

API NO. 47- 33 - 05926
OPERATOR WELL NO. Stickel 1210 S-3H
Well Pad Name: Stickel 1210

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF APPLICATION

Notice Time Requirement: notice shall be provided no later than the **filing date of permit application.**

Date of Notice: 5/17/18 **Date Permit Application Filed:** 5/23/18

Notice of:

☑ PERMIT FOR ANY WELL WORK ☐ CERTIFICATE OF APPROVAL FOR THE CONSTRUCTION OF AN IMPOUNDMENT OR PIT

Delivery method pursuant to West Virginia Code § 22-6A-10(b)

☐ PERSONAL SERVICE ☐ REGISTERED MAIL ☑ METHOD OF DELIVERY THAT REQUIRES A RECEIPT OR SIGNATURE CONFIRMATION

Pursuant to W. Va. Code § 22-6A-10(b) no later than the filing date of the application, the applicant for a permit for any well work or for a certificate of approval for the construction of an impoundment or pit as required by this article shall deliver, by personal service or by registered mail or by any method of delivery that requires a receipt or signature confirmation, copies of the application, the erosion and sediment control plan required by section seven of this article, and the well plat to each of the following persons: (1) The owners of record of the surface of the tract on which the well is or is proposed to be located; (2) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for roads or other land disturbance as described in the erosion and sediment control plan submitted pursuant to subsection (c), section seven of this article; (3) The coal owner, operator or lessee, in the event the tract of land on which the well proposed to be drilled is located [sic] is known to be underlain by one or more coal seams; (4) The owners of record of the surface tract or tracts overlying the oil and gas leasehold being developed by the proposed well work, if the surface tract is to be used for the placement, construction, enlargement, alteration, repair, removal or abandonment of any impoundment or pit as described in section nine of this article; (5) Any surface owner or water purveyor who is known to the applicant to have a water well, spring or water supply source located within one thousand five hundred feet of the center of the well pad which is used to provide water for consumption by humans or domestic animals; and (6) The operator of any natural gas storage field within which the proposed well work activity is to take place. (c)(1) If more than three tenants in common or other co-owners of interests described in subsection (b) of this section hold interests in the lands, the applicant may serve the documents required upon the person described in the records of the sheriff required to be maintained pursuant to section eight, article one, chapter eleven-a of this code. (2) Notwithstanding any provision of this article to the contrary, notice to a lien holder is not notice to a landowner, unless the lien holder is the landowner. W. Va. Code R. § 35-8-5.7.a requires, in part, that the operator shall also provide the Well Site Safety Plan ("WSSP") to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

☑ Application Notice ☑ WSSP Notice ☑ E&S Plan Notice ☑ Well Plat Notice is hereby provided to:

☐ SURFACE OWNER(s)
Name: Danny & Alicia Stickel
Address: 1404 Kincheloe Road
Jane Lew, WV 26378
Name:
Address:

☐ SURFACE OWNER(s) (Road and/or Other Disturbance)
Name: See Above
Address:
Name:
Address:

☐ SURFACE OWNER(s) (Impoundments or Pits)
Name: NA
Address:

☐ COAL OWNER OR LESSEE
Name: NA
Address:

☐ COAL OPERATOR
Name: NA
Address:

☐ SURFACE OWNER OF WATER WELL AND/OR WATER PURVEYOR(s)
Name: **See Attached Sheet**
Address:

☐ OPERATOR OF ANY NATURAL GAS STORAGE FIELD
Name:
Address:

*Please attach additional forms if necessary

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Office of Oil and Gas
MAY 30 2018
WV Department of
Environmental Protection

WW-6A
(8-13)

API NO. 47- 33 - 05924
OPERATOR WELL NO. Stickel 1210 S-3H
Well Pad Name: Stickel 1210

Notice is hereby given:
Pursuant to West Virginia Code § 22-6A-10(b), notice is hereby given that the undersigned well operator has applied for a permit for well work or for a certificate of approval for the construction of an impoundment or pit.

This Notice Shall Include:
Pursuant to W. Va. Code § 22-6A-10(b), this notice shall include: (1) copies of the application; (2) the erosion and sediment control plan required by section seven of this article; and (3) the well plat.

Pursuant to W. Va. Code § 22-6A-10(f), this notice shall include: (1) a statement of the time limits for filing written comments; (2) who may file written comments; (3) the name and address of the secretary for the purpose of filing the comments and obtaining additional information; and (4) a statement that the persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

Pursuant to W. Va. Code R. § 35-8-5.7.a, the operator shall provide the Well Site Safety Plan to the surface owner and any water purveyor or surface owner subject to notice and water testing as provided in section 15 of this rule.

Pursuant to W. Va. Code R. § 35-8-15.2.c, this notice shall: (1) contain a statement of the surface owner's and water purveyor's right to request sampling and analysis; (2) advise the surface owner and water purveyor of the rebuttable presumption for contamination or deprivation of a fresh water source or supply; advise the surface owner and water purveyor that refusal to allow the operator to conduct a pre-drilling water well test constitutes a method to rebut the presumption of liability; (3) advise the surface owner and water purveyor of his or her independent right to sample and analyze any water supply at his or her own expense; advise the surface owner and water purveyor whether or not the operator will utilize an independent laboratory to analyze any sample; and (4) advise the surface owner and or water purveyor that he or she can obtain from the Chief a list of water testing laboratories in the subject area capable of and qualified to test water supplies in accordance with standard acceptable methods.

Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

Well Location Restrictions
Pursuant to W. Va. Code § 22-6A-12, Wells may not be drilled within two hundred fifty feet measured horizontally from any existing water well or developed spring used for human or domestic animal consumption. The center of well pads may not be located within six hundred twenty-five feet of an occupied dwelling structure, or a building two thousand five hundred square feet or larger used to house or shelter dairy cattle or poultry husbandry. This limitation is applicable to those wells, developed springs, dwellings or agricultural buildings that existed on the date a notice to the surface owner of planned entry for surveying or staking as provided in section ten of this article or a notice of intent to drill a horizontal well as provided in subsection (b), section sixteen of this article was provided, whichever occurs first, and to any dwelling under construction prior to that date. This limitation may be waived by written consent of the surface owner transmitted to the department and recorded in the real property records maintained by the clerk of the county commission for the county in which such property is located. Furthermore, the well operator may be granted a variance by the secretary from these distance restrictions upon submission of a plan which identifies the sufficient measures, facilities or practices to be employed during well site construction, drilling and operations. The variance, if granted, shall include terms and conditions the department requires to ensure the safety and protection of affected persons and property. The terms and conditions may include insurance, bonding and indemnification, as well as technical requirements. (b) No well pad may be prepared or well drilled within one hundred feet measured horizontally from any perennial stream, natural or artificial lake, pond or reservoir, or a wetland, or within three hundred feet of a naturally reproducing trout stream. No well pad may be located within one thousand feet of a surface or ground water intake of a public water supply. The distance from the public water supply as identified by the department shall be measured as follows: (1) For a surface water intake on a lake or reservoir, the distance shall be measured from the boundary of the lake or reservoir. (2) For a surface water intake on a flowing stream, the distance shall be measured from a semicircular radius extending upstream of the surface water intake. (3) For a groundwater source, the distance shall be measured from the wellhead or spring. The department may, in its discretion, waive these distance restrictions upon submission of a plan identifying sufficient measures, facilities or practices to be employed during well site construction, drilling and operations to protect the waters of the state. A waiver, if granted, shall impose any permit conditions as the secretary considers necessary. (c) Notwithstanding the foregoing provisions of this section, nothing contained in this section prevents an operator from conducting the activities permitted or authorized by a Clean Water Act Section 404 permit or other approval from the United States Army Corps of Engineers within any waters of the state or within the restricted areas referenced in this section. (d) The well location restrictions set forth in this section shall not apply to any well on a multiple well pad if at least one of the wells was permitted prior to the effective date of this article. (e) The secretary shall, by December 31, 2012, report to the Legislature on the noise, light, dust and volatile organic compounds generated by the drilling of horizontal wells as they relate to the well location restrictions regarding occupied dwelling structures pursuant to this section. Upon a finding, if any, by the secretary that the well location restrictions regarding occupied dwelling structures are inadequate or otherwise require alteration to address the items

examined in the study required by this subsection, the secretary shall have the authority to propose for promulgation legislative rules establishing guidelines and procedures regarding reasonable levels of noise, light, dust and volatile organic compounds relating to drilling horizontal wells, including reasonable means of mitigating such factors, if necessary.

Water Well Testing:
Pursuant to West Virginia Code § 22-6A-10(d), notification shall be made, with respect to surface landowners identified in subsection (b) or water purveyors identified in subdivision (5), subsection (b) of this section, of the opportunity for testing their water well. The operator shall provide an analysis to such surface landowner or water purveyor at their request.

Water Testing Laboratories:
Pursuant to West Virginia Code § 22-6A-10(i), persons entitled to notice pursuant to subsection (b) of this section may contact the department to ascertain the names and locations of water testing laboratories in the subject area capable and qualified to test water supplies in accordance with standard accepted methods. In compiling that list of names the department shall consult with the state Bureau for Public Health and local health departments. A surface owner and water purveyor has an independent right to sample and analyze any water supply at his or her own expense. The laboratory utilized by the operator shall be approved by the agency as being certified and capable of performing sample analyses in accordance with this section.

Rebuttable Presumption for Contamination or Deprivation of a Fresh Water Source or Supply:

W. Va. Code § 22-6A-18 requires that (b) unless rebutted by one of the defenses established in subsection (c) of this section, in any action for contamination or deprivation of a fresh water source or supply within one thousand five hundred feet of the center of the well pad for horizontal well, there is a rebuttable presumption that the drilling and the oil or gas well or either was the proximate cause of the contamination or deprivation of the fresh water source or supply. (c) In order to rebut the presumption of liability established in subsection (b) of this section, the operator must prove by a preponderance of the evidence one of the following defenses: (1) The pollution existed prior to the drilling or alteration activity as determined by a predrilling or prealteration water well test. (2) The landowner or water purveyor refused to allow the operator access to the property to conduct a predrilling or prealteration water well test. (3) The water supply is not within one thousand five hundred feet of the well. (4) The pollution occurred more than six months after completion of drilling or alteration activities. (5) The pollution occurred as the result of some cause other than the drilling or alteration activity. (d) Any operator electing to preserve its defenses under subdivision (1), subsection (c) of this section shall retain the services of an independent certified laboratory to conduct the predrilling or prealteration water well test. A copy of the results of the test shall be submitted to the department and the surface owner or water purveyor in a manner prescribed by the secretary. (e) Any operator shall replace the water supply of an owner of interest in real property who obtains all or part of that owner's supply of water for domestic, agricultural, industrial or other legitimate use from an underground or surface source with a comparable water supply where the secretary determines that the water supply has been affected by contamination, diminution or interruption proximately caused by the oil or gas operation, unless waived in writing by that owner. (f) The secretary may order the operator conducting the oil or gas operation to: (1) Provide an emergency drinking water supply within twenty-four hours; (2) Provide temporary water supply within seventy-two hours; (3) Within thirty days begin activities to establish a permanent water supply or submit a proposal to the secretary outlining the measures and timetables to be used in establishing a permanent supply. The total time in providing a permanent water supply may not exceed two years. If the operator demonstrates that providing a permanent replacement water supply cannot be completed within two years, the secretary may extend the time frame on case-by-case basis; and (4) Pay all reasonable costs incurred by the real property owner in securing a water supply. (g) A person as described in subsection (b) of this section aggrieved under the provisions of subsections (b), (e) or (f) of this section may seek relief in court... (i) Notwithstanding the denial of the operator of responsibility for the damage to the real property owner's water supply or the status of any appeal on determination of liability for the damage to the real property owner's water supply, the operator may not discontinue providing the required water service until authorized to do so by the secretary or a court of competent jurisdiction.

Written Comment:
Pursuant to West Virginia Code § 22-6A-11(a), all persons described in subsection (b), section ten of this article may file written comments with the secretary as to the location or construction of the applicant's proposed well work within thirty days after the application is filed with the secretary. All persons described in West Virginia Code § 22-6A-10(b) may file written comments as to the location or construction of the applicant's proposed well work to the Secretary at:

Chief, Office of Oil and Gas
Department of Environmental Protection
601 57th St. SE
Charleston, WV 25304
(304) 926-0450

RECEIVED
Office of Oil and Gas
MAY 30 2018
WV Department of
Environmental Protection

Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water. **NOTE: YOU ARE NOT REQUIRED TO FILE ANY COMMENT.**

WW-6A
(8-13)

API NO. 47- 33 - 05926
OPERATOR WELL NO. Stickel 1210 S-3H
Well Pad Name: Stickel 1210

Time Limits and Methods for Filing Comments.

The law requires these materials to be served on or before the date the operator files its Application. You have **THIRTY (30) DAYS** after the filing date to file your comments. Comments must be filed in person or received in the mail by the Chief's office by the time stated above. You may call the Chief's office to be sure of the date. Check with your postmaster to ensure adequate delivery time or to arrange special expedited handling. If you have been contacted by the well operator and you have signed a "voluntary statement of no objection" to the planned work described in these materials, then the permit may be issued at any time.

Pursuant to West Virginia Code § 22-6A-11(c)(2), Any objections of the affected coal operators and coal seam owners and lessees shall be addressed through the processes and procedures that exist under sections fifteen, seventeen and forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article. The written comments filed by the parties entitled to notice under subdivisions (1), (2), (4), (5) and (6), subsection (b), section ten of this article shall be considered by the secretary in the permit issuance process, but the parties are not entitled to participate in the processes and proceedings that exist under sections fifteen, seventeen or forty, article six of this chapter, as applicable and as incorporated into this article by section five of this article.

Comment Requirements

Your comments must be in writing and include your name, address and telephone number, the well operator's name and well number and the approximate location of the proposed well site including district and county from the application. You may add other documents, such as sketches, maps or photographs to support your comments.

Disclaimer: All comments received will be placed on our web site http://www.dep.wv.gov/oil-and-gas/Horizontal-Permits/Pages/default.aspx and the applicant will automatically be forwarded an email notice that such comments have been submitted. The applicant will be expected to provide a response to comments submitted by any surface owner, water purveyor or natural gas storage operator noticed within the application.

Permit Denial or Condition

The Chief has the power to deny or condition a well work permit. Pursuant to West Virginia Code § 22-6A-8(d), the permit may not be issued or be conditioned, including conditions with respect to the location of the well and access roads prior to issuance if the director determines that:

(1) The proposed well work will constitute a hazard to the safety of persons;
(2) The plan for soil erosion and sediment control is not adequate or effective;
(3) Damage would occur to publicly owned lands or resources; or
(4) The proposed well work fails to protect fresh water sources or supplies.

A permit may also be denied under West Virginia Code § 22-6A-7(k), the secretary shall deny the issuance of a permit if the secretary determines that the applicant has committed a substantial violation of a previously issued permit for a horizontal well, including the applicable erosion and sediment control plan associated with the previously issued permit, or a substantial violation of one or more of the rules promulgated under this article, and in each instance has failed to abate or seek review of the violation within the time prescribed by the secretary pursuant to the provisions of subdivisions (1) and (2), subsection (a), section five of this article and the rules promulgated hereunder, which time may not be unreasonable.

Pursuant to West Virginia Code § 22-6A-10(g), any person entitled to submit written comments to the secretary pursuant to subsection (a), section eleven of this article, shall also be entitled to receive from the secretary a copy of the permit as issued or a copy of the order modifying or denying the permit if the person requests receipt of them as a part of the written comments submitted concerning the permit application. Such persons may request, at the time of submitting written comments, notice of the permit decision and a list of persons qualified to test water.

WW-6A
(8-13)

API NO. 47- 33 - 05924
OPERATOR WELL NO. Stickel 1210 S-3H
Well Pad Name: Stickel 1210

Notice is hereby given by:

Well Operator: HG Energy II Appalachia, LLC Diane White
Telephone: 304-420-1119
Email: dwhite@hgenergyllc.com

Address: 5260 Dupont Road
Parkersburg, WV 26101
Facsimile: 304-863-3172

Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.

OFFICIAL SEAL
STATE OF WEST VIRGINIA
NOTARY PUBLIC
CASSIDY A. BOARDMAN
5301 13th Ave Vienna, WV 26105
My Commission Expires July 31, 2022

Subscribed and sworn before me this 17th day of May, 2018.

Cassidy A. Boardman Notary Public

My Commission Expires 7/31/2022

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Office of Oil and Gas
MAY 30 2018
WV Department of
Environmental Protection

SUBJECT WELL

Stickel 1210 S-3H

4703105926

Denotes Possible Water Supply Source to be Tested

Section of

West Milford 7.5' Quadrangle

SCALE 1"=1000'

33-05924

WW-6A4
(1/12)

Operator Well No. Stickel 1210 S-3H

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF INTENT TO DRILL

Pursuant to W. Va. Code § 22-6A-16(b), the Notice of Intent to Drill is only required if the notice requirements of W. Va. Code § 22-6A-10(a) have NOT been met or if the Notice of Intent to Drill requirement has NOT been waived in writing by the surface owner.

Notice Time Requirement: Notice shall be provided at least **TEN (10)** days prior to filing a permit application.
Date of Notice: 04/19/2018 **Date Permit Application Filed:** 04/29/2018

Delivery method pursuant to West Virginia Code § 22-6A-16(b)

☐ HAND DELIVERY ☒ CERTIFIED MAIL RETURN RECEIPT REQUESTED

Pursuant to W. Va. Code § 22-6A-16(b), at least ten days prior to filing a permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner notice of its intent to enter upon the surface owner's land for the purpose of drilling a horizontal well: *Provided,* That notice given pursuant to subsection (a), section ten of this article satisfies the requirements of this subsection as of the date the notice was provided to the surface owner: *Provided, however,* That the notice requirements of this subsection may be waived in writing by the surface owner. The notice, if required, shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative.

Notice is hereby provided to the SURFACE OWNER(s):

Name: Danny & Alicia Stickel
Address: 1404 Kincheloe Road
Jane Lew, WV 26378

Name:
Address:

Notice is hereby given:
Pursuant to West Virginia Code § 22-6A-16(b), notice is hereby given that the undersigned well operator has an intent to enter upon the surface owner's land for the purpose of drilling a horizontal well on the tract of land as follows:

State: West Virginia
County: Harrison
District: Union - Outside
Quadrangle: West Milford 7.5'
Watershed: West Fork

UTM NAD 83 Easting: 546675.392
Northing: 4332722.249
Public Road Access: Kincheloe Run Rd / SLS 35
Generally used farm name: Danny & Alicia Stickel

This Notice Shall Include:
Pursuant to West Virginia Code § 22-6A-16(b), this notice shall include the name, address, telephone number, and if available, facsimile number and electronic mail address of the operator and the operator's authorized representative. Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

Notice is hereby given by:

Well Operator: HG Energy II Appalachia, LLC
Address: 5260 Dupont Road
Parkersburg, WV 26101
Telephone: 304-420-1119
Email: dwhite@hgenergyllc.com
Facsimile: 304-863-3172

Authorized Representative: Diane White
Address: 5260 Dupont Road
Parkersburg, WV 26101
Telephone: 304-420-1119
Email: dwhite@hgenergyllc.com
Facsimile: 304-863-3172

Diane White

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Office of Oil and Gas
MAY 30 2018
WV Department of
Environmental Protection

Oil and Gas Privacy Notice:
The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.

33-05926

WW-6A5
(1/12)

Operator Well No. Stickel 1210 S-3H

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE OF PLANNED OPERATION

Notice Time Requirement: notice shall be provided no later than the **filing date of permit application.**
Date of Notice: 04/20/2018 **Date Permit Application Filed:** 04/30/2018

Delivery method pursuant to West Virginia Code § 22-6A-16(c)

☒ CERTIFIED MAIL RETURN RECEIPT REQUESTED ☐ HAND DELIVERY

Pursuant to W. Va. Code § 22-6A-16(c), no later than the date for filing the permit application, an operator shall, by certified mail return receipt requested or hand delivery, give the surface owner whose land will be used for the drilling of a horizontal well notice of the planned operation. The notice required by this subsection shall include: (1) A copy of this code section; (2) The information required to be provided by subsection (b), section ten of this article to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. (d) The notices required by this section shall be given to the surface owner at the address listed in the records of the sheriff at the time of notice.

Notice is hereby provided to the SURFACE OWNER(s)
(at the address listed in the records of the sheriff at the time of notice):

Name: Danny & Alicia Stickel
Address: 1404 Kincheloe Road
Jane Lew, WV 26378

Name:
Address:

Notice is hereby given:
Pursuant to West Virginia Code § 22-6A-16(c), notice is hereby given that the undersigned well operator has developed a planned operation on the surface owner's land for the purpose of drilling a horizontal well on the tract of land as follows:

State: West Virginia
County: Harrison
District: Union - Outside
Quadrangle: West Milford 7.5'
Watershed: West Fork

UTM NAD 83 Easting: 546675.392
Northing: 4332722.249
Public Road Access: Kincheloe Run Road / SLS 35
Generally used farm name: Danny & Alicia Stickel

This Notice Shall Include:
Pursuant to West Virginia Code § 22-6A-16(c), this notice shall include: (1)A copy of this code section; (2) The information required to be provided by **W. Va. Code § 22-6A-10(b)** to a surface owner whose land will be used in conjunction with the drilling of a horizontal well; and (3) A proposed surface use and compensation agreement containing an offer of compensation for damages to the surface affected by oil and gas operations to the extent the damages are compensable under article six-b of this chapter. Additional information related to horizontal drilling may be obtained from the Secretary, at the WV Department of Environmental Protection headquarters, located at 601 57th Street, SE, Charleston, WV 25304 (304-926-0450) or by visiting www.dep.wv.gov/oil-and-gas/pages/default.aspx.

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Office of Oil and Gas
MAY 30 2018
WV Department of
Environmental Protection

Well Operator: HG Energy II Appalachia, LLC
Telephone: 304-420-1119
Email: dwhite@hgenergyllc.com

Address: 5260 Dupont Road
Parkersburg, WV 26101
Facsimile: 304-863-3172

Oil and Gas Privacy Notice:
The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.

4703305926

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
Division of Highways
1900 Kanawha Boulevard East • Building Five • Room 110
Charleston, West Virginia 25305-0430 • (304) 558-3505

Thomas J. Smith, P. E.
Secretary of Transportation/
Commissioner of Highways

Jill M. Newman
Deputy Commissioner

May 1, 2018

James A. Martin, Chief
Office of Oil and Gas
Department of Environmental Protection
601 57th Street, SE
Charleston, WV 25304

Subject: DOH Permit for the Stickel 1210 Well Pad, Harrison County
S-3H Well Site

Dear Mr. Martin,

This well site will be accessed from Permit #06-2018-0517 issued to HG Energy II Appalachia for access to the State Road for a well site located off of Harrison County 35 SLS.

The operator has signed a STATEWIDE OIL AND GAS ROAD MAINTENANCE BONDING AGREEMENT and provided the required Bond. This operator is currently in compliance with the DOH OIL AND GAS POLICY dated January 3, 2012.

Very Truly Yours,

Gary K. Clayton

Gary K. Clayton, P.E.
Regional Maintenance Engineer
Central Office O&G Coordinator

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Office of Oil and Gas
MAY 30 2018
WV Department of
Environmental Protection

Cc: Diane C. White
HG Energy II, LLC
CH, OM, D-4
File

33-059246

List of Frac Additives by Chemical Name and CAS

Stickel 1210 S Well Pad (S-1H, S-2H, S-3H, S-4H, S-5H, S-6H)

Chemical Name	CAS #	Multiple CAS #'s
Pro Shale Slik 405	Mixture	68551-12-2
		7647-14-5
		12125-02-9
		64742-47-8
Pro Hib II	Mixture	68412-54-4
		68607-28-3
		107-21-1
		111-76-2
		67-56-1
		107-19-7
Silica Sand and Ground Sand	Mixture	14808-60-7
		1344-28-1
		1309-37-1
		13463-67-7
Hydrochloric Acid 22 DEG BE	7647-01-0	
PROGEL - 4.5	64742-96-7	
BIO CLEAR 2000	Mixture	25322-68-3
		10222-01-2
SCALE CLEAR SI 112	107-21-1	
PROBREAK 4	Mixture	57-50-1
		107-21-1
Sulfamic Acid	5329-14-6	
PRO - Flow - 102-N	Mixture	67-63-0
		68439-45-2
		2687-96-9
PROGEL - 4	9000-30-0	

CONSTRUCTION IMPROVEMENT PLANS WITH EROSION AND SEDIMENT CONTROLS

HG WELL PAD 1210

APPROVED
WVDEP OOG
6 / 25 / 2018

UNION DISTRICT
HARRISON COUNTY
WEST VIRGINIA

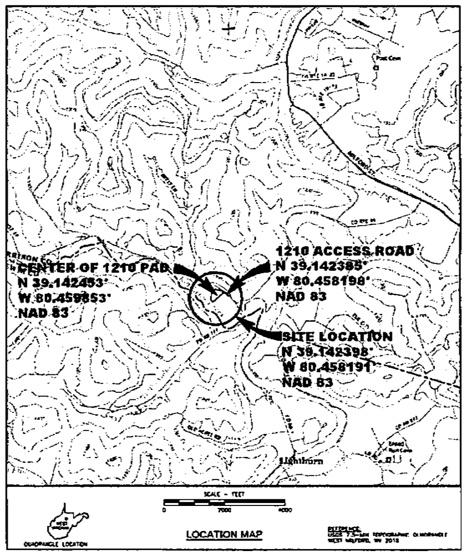
Estimated Gross Material Balance (CY)			
Final Development - Gravel Option			
	Cut	Fill	Stockpile
Pad & Road	85	19,867	-0-
Totals	85	19,867	-0-
Soil Adjustment for Aggregate Import			
Pad			-0-
Total Site Balance:			19,782 Fill
Stripped Topsoil (Limit of Disturbance)			2,790
Est. Swell Factor	(20%)		560
Est. Topsoil Stockpile Volume (Loose CY)			3,350
Minimum Total Stockpile Capacity Required (C.Y.)			3,350

Notes
1. Material balance for est. gross earthwork quantities only.
2. Topsoil est. volume based on 6 inches average depth.
3. Material balance and aggregate quantities based on estimates and may not be representative of actual quantities.
4. Estimates do not reflect contractor pay volumes.

Estimated Gravel Quantities (Placed CY)		Access Road	Pad	TOTAL
Gravel Quantities	8" Soil Cement	220	2,275	2,495
	3" Crusher Run	–	855	855
Top Coat: Chip & Seal (Placed SY)		990 sy.	--	
Estimated Compost Filter Sock Length (LF)		180	1,335	1,515
Estimated Total Limit of Disturbance (Acres)				3.456
Estimated Well Pad Limit of Disturbance (Acres)				2.791
Estimated Access Road Limit of Disturbance (Acres)				0.665
Well Pad Peak Pre-Construction Elevation (Ft)				997.8

CONSTRUCTION SEQUENCE

1. Prior to commencement of any earth disturbance activity including clearing and grubbing, the registrant shall call West Virginia 811 by dialing 811 or 1-800-245-4848 to identify all utility lines. The registrant also must clearly delineate sensitive areas, riparian forest buffer boundaries, the limits of clearing, and trees that are to be conserved within the project site, and shall install appropriate barriers where equipment may not be parked, staged, operated or located for any purpose.
2. Site access - This is the first land-disturbance activity to take place at the site and should provide BMPs to minimize accelerated erosion and sedimentation from the following areas: entrance to the site, construction routes, and areas designated for equipment or other use at the site including parking, stockpiles.
3. Sediment Barriers - Install perimeter BMPs after the construction site is accessed, keeping associated clearing and grubbing limited to only that amount required for installing perimeter BMPs.
4. Land Clearing and Grading - Implement clearing and grading only after all downslope E&S BMPs have been constructed and stabilized.
5. Surface Stabilization - Apply temporary or permanent stabilization measures immediately to any disturbed areas where work has reached final grade, has been delayed or otherwise temporarily suspended.
6. Construction of Buildings, Utilities, and Paving - During construction, install and maintain any additional erosion and sediment control BMPs, and implement any structural post construction stormwater BMPs that may be required.
7. Upon completion of pad grading, compact the pad to grade and begin placement of pad soil cement.
8. Final Stabilization, Topsoiling, Trees and Shrubs - After construction is completed, install stabilization BMPs including: permanent seeding, mulching and riprap, and complete implementation of stormwater BMPs in this last construction phase. Stabilize all open areas, including borrow and spoil areas, and remove all temporary BMPs and stabilize any disturbances associated with the removal of the BMP.



PREPARED FOR
HG ENERGY II APPALACHIA, LLC
5260 DUPONT ROAD
PARKERSBURG, WEST VIRGINIA 26101
(304) 420-1100

PREPARED BY
PENN ENVIRONMENTAL & REMEDIATION, INC.
111 RYAN COURT
PITTSBURGH, PA 15205
(412) 722-1222

SHT. NO.	SHEET TITLE
1	TITLE SHEET
2	SITE LAYOUT PLAN
3	PAD & ACCESS ROAD SECTIONS
4-5	GENERAL NOTES
6-9	DETAILS
10	RESTORATION PLAN
11	PROPERTY MAP

RECORD OWNER	RECORD LOT #	RECORD AREA OF LOT	AREA WITHIN LOD
DANNY LEE & ALICIA STICKEL	20-444-19.2	35.0 AC.	3.456 AC.
TOTAL LIMIT OF DISTURBANCE			3.456 AC.

WELL #	LATITUDE	LONGITUDE
S-6H	N 39.142519	W 80.459769
S-5H	N 39.142492	W 80.459808
S-4H	N 39.142464	W 80.459847
S-3H	N 39.142439	W 80.459889
S-2H	N 39.142411	W 80.459928
S-1H	N 39.142383	W 80.459969
N-7H	N 39.142546	W 80.459731

	LATITUDE	LONGITUDE
ACCESS ROAD ENTRANCE	N 39.142385	W 80.458198

WEST VIRGINIA 811 CALL BEFORE YOU DIG! Dial 811 or 800.245.4848 Miss Utility of West Virginia

1. SERVICE UTILITY LINES ARE NOT SHOWN ON THE PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING, MAINTAINING, AND REPLACING AS NECESSARY TO ENSURE CONTINUAL SERVICE.

REVISION	DATE	DESCRIPTION
1	5/30/18	ADDED PROPERTY MAP, MODIFICATIONS PER DEP COMMENTS
2	6/25/18	ADDED TOE KEY BENCH LOCATIONS TO PLAN SHEETS.

MATTHEW E. PIERCE REGISTERED 20458 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER 5-22-18

TITLE SHEET
HG WELL PAD 1210
UNION DISTRICT
HARRISON COUNTY, WEST VIRGINIA

PREPARED FOR
HG ENERGY II APPALACHIA, LLC
PARKERSBURG, WEST VIRGINIA

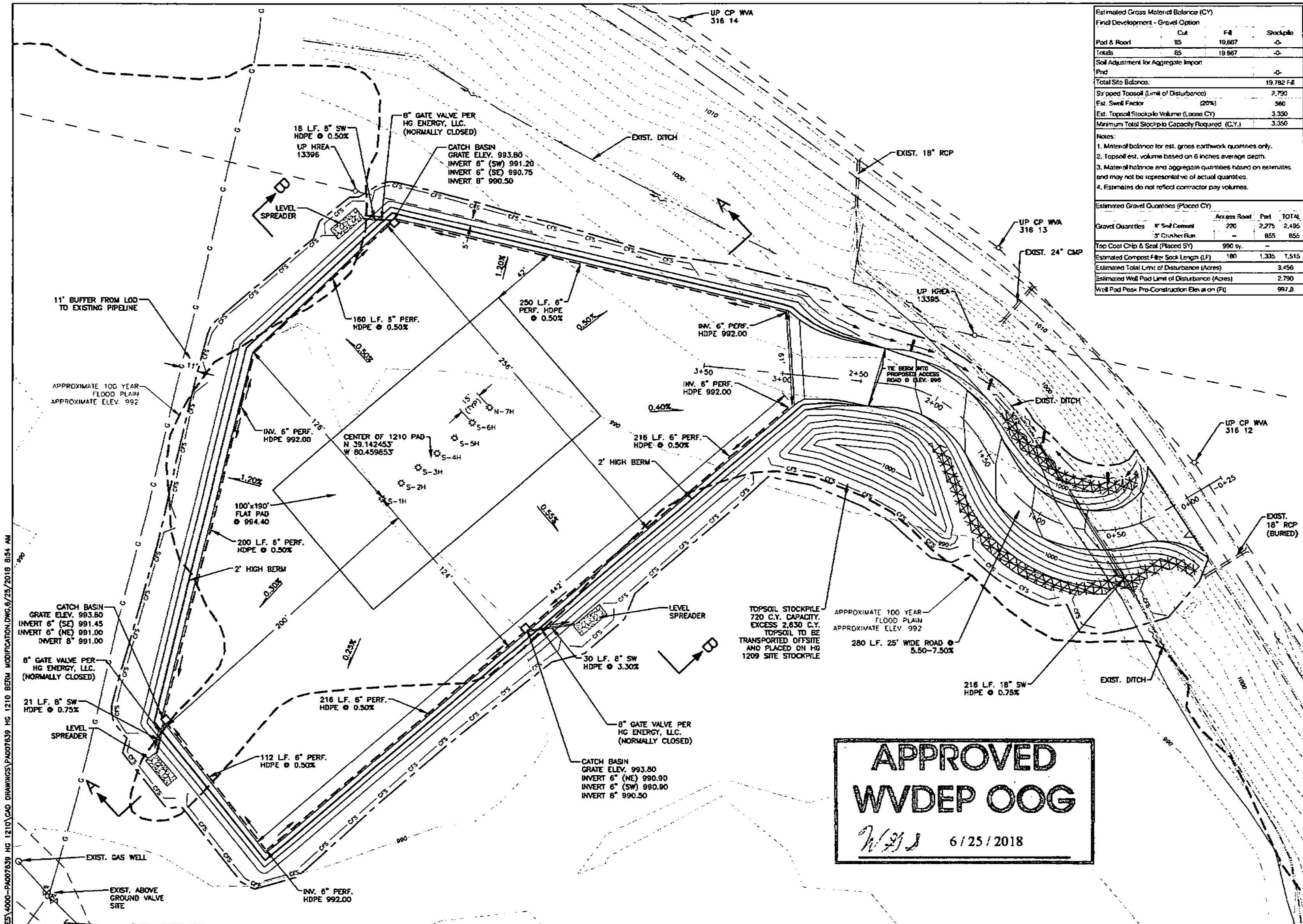
APPROVED	MEP	05/22/2018
CHECKED	MEP	05/22/2018
DRAWN	MFR	05/21/2018
PROJECT No.	4000-PA007639	

DRAWING NUMBER
PA007639-001
SHEET 1

Penn E&R
Environmental & Remediation, Inc.
111 RYAN COURT, PITTSBURGH, PA 15205; 412-722-1222

33-05926

S:\PROJECT FILES\4000-PA007639 HG 1210\CAD DRAWINGS\PA007639 TITLE SHEET REV1.DWG,6/25/2018 8:56 AM



APPROVED WVDEP OOG 6/25/2018

Estimated Gross Material Balance (CY)			
Final Development - Gravel Option	Cut	Fill	Stockpile
Pad & Road	85	19,867	-0-
Totals	85	19 867	-0-
Soil Adjustment for Aggregate Import			
Pad			-0-
Total Site Balance:			19,782 Fill
Stripped Topsoil (Limit of Disturbance)			2,790
Est. Swell Factor	(20%)		560
Est. Topsoil Stockpile Volume (Loose CY)			3,350
Minimum Total Stockpile Capacity Required (C.Y.)			3,350

Notes:
1. Material balance for est. gross earthwork quantities only.
2. Topsoil est. volume based on 6 inches average depth.
3. Material balance and aggregate quantities based on estimates and may not be representative of actual quantities.
4. Estimates do not reflect contractor pay volumes.

Estimated Gravel Quantities (Placed CY)		Access Road	Pad	TOTAL
Gravel Quantities	8" Soil Cement	220	2,275	2,495
	3" Crusher Run	–	855	855
Top Coat Chip & Seal (Placed SY)		990 sy.	–	
Estimated Compost Filter Sock Length (LF)		180	1,335	1,515
Estimated Total Limit of Disturbance (Acres)				3.456
Estimated Well Pad Limit of Disturbance (Acres)				2.790
Well Pad Peak Pre-Construction Elevation (Ft)				997.8

LEGEND

- ROCK CHECK DAM
- LEVEL SPREADER
- ACCESS ROAD/PAD CHANNEL
- CFS — COMPOST FILTER SOCK 8" UNLESS OTHERWISE NOTED
- 3CFS — STACKED COMPOST FILTER SOCK 8"
- APPROXIMATE LIMITS OF DISTURBANCE
- APPROXIMATE PROPERTY LINE
- EXISTING OVERHEAD ELECTRIC LINE
- G — EXISTING DOMINION GAS TRANSMISSION LINE
- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- PROPOSED FINAL GRADE INDEX CONTOUR
- PROPOSED FINAL GRADE INTERMEDIATE CONTOUR
- APPROXIMATE 100 YR FLOOD PLAIN BOUNDARY
- TOE KEY BENCH
- A A SECTION (SEE SHEET 3)

WEST VIRGINIA GENERAL NOTES:

1. REFERENCE THIS SHEET WITH THE CONSTRUCTION NOTES AND DETAILS.
2. CONTRACTOR SHALL CONTACT WEST VIRGINIA UTILITIES PROTECTION SERVICES (811) A MINIMUM OF 3 DAYS PRIOR TO EXCAVATION WORK. UTILITIES MUST BE IDENTIFIED AND EITHER RELOCATED OR PROTECTED BY CONTRACTOR PRIOR TO BEGINNING WORK AT THE SITE.
3. SITE SHALL BE CONSTRUCTED IN ACCORDANCE WITH WELL DRILLING PERMIT. CONTRACTOR RESPONSIBLE TO OBTAIN ALL OTHER ANCILLARY PERMITS/APPROVALS REQUIRED TO CONSTRUCT SITE INCLUDING BUT NOT LIMITED TO FEDERAL, STATE, AND LOCAL REQUIREMENTS.
4. NO GEOTECHNICAL OR SLOPE STABILITY ANALYSIS WAS PERFORMED FOR THIS SITE. CONTRACTOR IS RESPONSIBLE TO CONSTRUCT PROPER TOE AND BONDING BENCHES BASED ON FIELD CONDITIONS TO PREPARE SURFACES FOR FILL PLACEMENT ON STEEP SLOPES. PENN E&R IS NOT RESPONSIBLE FOR SLIPS, SLIDES, OR EARTH MOVEMENT RESULTING FROM CONSTRUCTION.
5. ESTABLISH EROSION AND SEDIMENTATION CONTROL BMPS PRIOR TO EARTHWORK. SITE CONSTRUCTION SHALL FOLLOW WEST VIRGINIA EROSION AND SEDIMENT CONTROL FIELD MANUAL DATED MAY 2012.
6. CLEAR AND GRUB WORK AREA. REMOVE AND STOCKPILE AVAILABLE TOPSOIL FROM LIMIT OF DISTURBANCE TO A LOCATION DESIGNATED BY HG ENERGY, LLC.
7. NO EMBANKMENT FILL SHALL BE PLACED ON FROZEN MATERIAL. FILL MATERIAL SHALL BE FREE OF ORGANICS, LARGE ROCKS, FROZEN SOIL OR OTHER OBJECTIONABLE MATERIAL.
8. CUT/FILL SLOPES SHALL BE CONSTRUCTED TO A MAXIMUM SLOPE OF [illegible] UNLESS NOTED OTHERWISE.
9. FILL MATERIAL SHALL BE PLACED IN LIFTS OR LAYERS OVER THE LENGTH OF THE FILL. LIFT THICKNESS OF THE SOIL SHALL BE AS THIN AS THE SUITABLE RANDOM EXCAVATED MATERIAL WILL PERMIT, TYPICALLY, 8-12 INCHES THICK. THE SIZE OF ROCK LIFTS SHALL NOT EXCEED 36 INCHES. THE ROCK SHALL NOT BE GREATER IN ANY DIMENSION THAN 36 INCHES. COMPACTION SHALL BE OBTAINED BY COMPACTION EQUIPMENT, SHEEP'S FOOT OR PAD ROLLER, DEPENDING ON MATERIAL, WITH COMPACTION TO VISIBLE NON-MOVEMENT OF THE EMBANKMENT MATERIAL. COMPACTION EFFORT SHALL NOT EXCEED OPTIMUM MOISTURE LIMITS. EACH LIFT SHALL BE COMPACTED TO A STANDARD PROCTOR DENSITY OF AT LEAST 95% BEFORE BEGINNING THE NEXT LIFT. QC TESTING SHALL BE PERFORMED AT A RATE OF 2 TESTS/ACRE/LIFT.
10. CONTRACTOR SHALL CONSTRUCT ACCESS ROAD IN ACCORDANCE WITH DETAILS PROVIDED. ADDITIONAL COVER MATERIAL PLACEMENT REQUIRED IN AREA OF UTILITY LINES.
11. CONTRACTOR SHALL COORDINATE MATERIAL MANAGEMENT (EXCESS CUT/FILL, TOPSOIL STOCKPILES, GRAVEL SOURCING) WITH HG ENERGY, LLC PRIOR TO MOBILIZATION. CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER EROSION AND SEDIMENT CONTROLS, BOTH ON SITE AND OFF SITE.
12. ALL SEDIMENT CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL DISTURBED AREAS ARE STABILIZED AND THE VEGETATIVE GROUND COVER HAS ACHIEVED A UNIFORM 70% GROWTH. ANY AREAS NOT ACHIEVING A 70% VEGETATIVE COVER SHALL BE RESEEDED AND MULCHED WITHIN 24 HOURS OF DETECTION.
13. SECONDARY CONTAINMENT SHALL BE PROVIDED DURING DRILLING PROCESS. A LINER AND MAT SYSTEM WITH BERM SHALL BE INSTALLED PRIOR TO DRILLING AND WATER INSIDE SECONDARY CONTAINMENT SHALL BE DISPOSED OFFSITE IN ACCORDANCE WITH WV REGULATIONS.

REFERENCE:

1. TOPOGRAPHY PROVIDED BY HG ENERGY, LLC. ON 02/23/2018.
2. WETLANDS AND STREAMS ARE SHOWN BASED ON FIELD LOCATIONS PROVIDED BY HG ENERGY, LLC. ON 04/09/2018.
3. GAS LINE FIELD LOCATED ON 05/21/2018 WITH DOMINION ENERGY.

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SCALE - FEET 0 30 60 90

SITE LAYOUT
HG WELL PAD 1210
UNION DISTRICT
HARRISON COUNTY, WEST VIRGINIA

PREPARED FOR
HG ENERGY II APPALACHIA, LLC
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DRAWING NUMBER
PA007639-001
SHEET 2

Penn E&R Environmental & Remediation, Inc.
111 RYAN COURT, PITTSBURGH, PA 15205; 412-722-1222

WEST VIRGINIA 811 CALL BEFORE YOU DIG! Dial 811 or 800.245.4848 Miss Utility of West Virginia

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COORDINATES WV STATE PLANE, NORTH ZONE, NAD 83.

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