Doddridge County Sheriff
Flood Plain Ordinance Fund

1015
69-217/515

DATE July 2, 2013

PAY TO THE ORDER OF ANTERO RESOURCES $ 3,646.77

Three Thousand Six Hundred Fourty-Six Dollars and 77/100---------- DOLLARS

Security features included. Details on back.

CORNERSTONE BANK
West Union, WV 26456

Ralph Sandora Jr.
Beth A. Rogers

MEMO #13-020 Hinter Heirs South Reimbursement

MP

⑈001015⑈ ⑆051502175⑆ ⑆⑆⑈9649⑈9⑈

BLUE TRADITIONAL

By: BH - MEH - AML
Asst. Chief Tax Deputy

Michael Headley
Sheriff of Doddridge County

The Person paying Money into the Treasury shall forthwith file one of these Receipts with the County Clerk

Doddridge County, West Virginia

No. 4784

Date: June 26, 2013
Customer copy

Received: #13-020 Antero Resources $3,786.07

In Payment For: 318 Building Permits (LP)

For: 12-Flood Plain Ordinanc Fund #20 Fund

By: BH - MEH - AML
Asst. Chief Tax Deputy

Michael Headley
Sheriff of Doddridge County

ANTERO RESOURCES APPALACHIAN
1625 17th STREET, SUITE 300
DENVER, COLORADO 80202

Vendor Name	Vendor No.	Date	Check Number	Check Total
DODDRIDGE COUNTY COMMISSION	43312	Jun-18-2013	31801	$3,786.07

VOUCHER	VENDOR INV #	INV DATE	TOTAL AMOUNT	PRIOR PMTS & DISCOUNTS	NET AMOUNT
06-AP-8198	ERHEIRSSOUTH	06/18/13	3,786.07	0.00	3,786.07
FLOOD PLAIN PERMIT - HINTER HEIRS SOUTH					
TOTAL INVOICES PAID					3,786.07

2013 JUN 25 PM 5:28

DETACH AND RETAIN FOR TAX PURPOSES

Doddridge County Flood Plain Refund Calculator (if not in Flood Plain)	
Hinter Heirs South	
Estimated Construction Costs	457,214.00
Amount over $100,000	357,214.00
Drilling Oil and Gas Well Fee	1,000.00
Deposit for additional charges	1,000.00
$5 per $1,000 over $100,000	1,786.07
Amount Due with application	3,786.07
95% of Application Fee minus $1,000 deposit	2,646.77
Cost for Permit	139.30
Total Refund (Includes 100% of 1,000 deposit)	$3,646.77

ANTERO
RESOURCES

Antero Resources
1625 17th Street
Denver, Colorado 80202
Office 303.357.7310
Fax 303.357.7315

June 21, 2013

Doddridge County Commission
Attn: Dan Wellings, Doddridge County Floodplain Manager
118 East Court Street, Room 102
West Union, WV 26456

Mr. Wellings:

Antero Resources Appalachian Corporation (Antero) would like to submit a Doddridge County Floodplain permit application for our Hinter South Centralized Impoundment. Our project is located in Doddridge County, New Milton District and per FIRM map #54017C0250C, this location is not within the floodplain.

Attached you will find the following:

- Doddridge County Floodplain Permit Application
- FIRM Map
- A detailed set of plans signed by a WV licensed professional engineer
- Copies of other required permits
- Maintenance, Monitoring and Emergency Action Plan

If you have any questions please feel free to contact me at (303) 357-6820.

Thank you in advance for your consideration.

Sincerely,

Shauna Redican
Permit Representative
Antero Resources Appalachian Corporation

Enclosures

2013 JUN 25 PM 2:34

ANTERO RESOURCES

Antero Resources
1625 17th Street
Denver, Colorado 80202
Office 303.357.7310
Fax 303.357.7315

June 24, 2013

Doddridge County Commission
Attn: Dan Wellings, Doddridge County Floodplain Manager
118 East Court Street, Room 102
West Union, WV 26456

Mr. Wellings:

Please find enclosed the Doddridge County Flood Plain Permit application fee for our Hinter Heirs South Impoundment location. The flood plain permit application was submitted to your office on Monday, June 24th.

If you have any questions please feel free to contact me at (303) 357-6820.

Thank you in advance for your consideration.

Sincerely,

Shauna Redican
Permit Representative
Antero Resources Appalachian Corporation

Enclosures

Hinter Heirs South
PERMIT # 13-020

DODDRIDGE COUNTY
FLOODPLAIN DEVELOPMENT PERMIT APPLICATION

SECTION 1: GENERAL PROVISIONS (APPLICANT TO READ AND SIGN)

1. No work may start until a permit is issued.
2. The permit may be revoked if any false statements are made herein.
3. If revoked, all work must cease until permit is re-issued.
4. Development shall not be used or occupied until a Certificate of Compliance is issued.
5. The permit will expire if no work is commenced within six months of issuance.
6. Applicant is hereby informed that other permits may be required to fulfill local, state, and federal requirements.
7. Applicant hereby gives consent to the Floodplain Administrator/Manager or his/her representative to make inspections to verify compliance.
8. **I, THE APPLICANT CERTIFY THAT ALL STATEMENTS HEREIN AND IN ATTACHMENTS TO THIS APPLICATION ARE, TO THE BEST OF MY KNOWLEDGE, TRUE AND ACCURATE.**

APPLICANT'S SIGNATURE 

DATE June 21, 2013

SECTION 2: PROPOSE DEVELOPMENT (TO BE COMPLETED BY APPLICANT).

IF THE APPLICANT IS NOT A NATURAL PERSON, THE NAME, ADDRESS, AND TELEPHONE NUMBER OF A NATURAL PERSON WHO SHALL BE APPOINTED BY THE APPLICANT TO RECEIVE NOTICE PURSUANT TO ANY PROVISION OF THE CURRENT DODDRIDGE COUNTY FLOODPLAIN ORDINANCE.

APPLICANT'S NAME: Antero Resources Appalachian Corporation - Gerard G. Alberts, Environmental & Regulatory Manager

ADDRESS: 1625 17th Street, Denver, CO 80202

TELEPHONE NUMBER: Contact Shauna Redican: 303-357-6820

BUILDER'S NAME: Antero Resources Appalachian Corporation

ADDRESS: 1625 17th Street, Denver, CO 80202

TELEPHONE NUMBER: (303) 357-7310

ENGINEER'S NAME: Navitus Engineering, Inc. - Cyrus S. Kump

ADDRESS: 151 Windy Hill Lane

TELEHONE NUMBER: 888-662-4185

PROJECT LOCATION:

NAME OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT) Please see attached Exhibit A

ADDRESS OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT) Please see attached Exhibit A

DISTRICT: New Milton

DATE/FROM WHOM PROPERTY PURCHASED: N/A

LAND BOOK DESCRIPTION:

DEED BOOK REFERENCE: Please see attached Exhibit A

TAX MAP REFERENCE: Please see attached Exhibit A

EXISTING BUILDINGS/USES OF PROPERTY: None

NAME OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE SUBJECT PROPERTY Please see attached Exhibit A

ADDRESS OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE SUBJECT PROPERTY Please see attached Exhibit A

To avoid delay in processing the application, please provide enough information to easily identify the project location.

DESCRIPTION OF WORK (CHECK ALL APPLICABLE BOXES)

A. STRUCTURAL DEVELOPMENT

ACTIVITY		STRUCTURAL TYPE	
[]	New Structure	[]	Residential (1 – 4 Family)
[]	Addition	[]	Residential (more than 4 Family)
[]	Alteration	[]	Non-residential (floodproofing)
[]	Relocation	[]	Combined Use (res. & com.)
[]	Demolition	[]	Replacement
[]	Manufactured/Mobil Home		

B. OTHER DEVEOPLMENT ACTIVITIES:

X	Fill	[]	Mining	X	Drilling	[]	Pipelining

X Grading

[] Excavation (except for STRUCTURAL DEVELOPMENT checked above)

[] Watercourse Altercation (including dredging and channel modification)

[] Drainage Improvements (including culvert work)

X Road, Street, or Bridge Construction *Access Road Construction as shown on attached design

[] Subdivision (including new expansion)

[] Individual Water or Sewer System

[] Other (please specify)

C. STANDARD SITE PLAN OR SKETCH

1. **SUBMIT ALL STANDARD SITE PLANS, IF ANY HAVE BEEN PREPARED.**
2. **IF STANDARD SITE PLANS HAVE NOT BEEN PREPARED:**
   SKETCH ON A SEPARATE 8 ½ X 11 INCH SHEET OF PAPER THE SHAPE AND LOCATION OF THE LOT. SHOW THE LOCATION OF THE INTENDED CONSTRUCTION OR LAND USE INDICATING BUILDING SETBACKS, SIZE & HEIGHT. IDENTIFY EXISTING BUILDINGS, STRUCTURES OR LAND USES ON THE PROPERTY.
3. **SIGN AND DATE THE SKETCH.**

ACTUAL TOTAL CONSTRUCTION COSTS OF THE COMPLETE DEVELOPMENT IRRESPECTIVE OF WHETHER ALL OR ANY PART OF THE SUBJECT PROPOSED CONSTRUCTION PROJECT IS WITHIN THE FLOODPLAIN $ 457,214.00

*See attached Floodplain Calculation Fee

D. ADJACENT AND/OR AFFECTED LANDOWNER

1. **NAME AND ADDRESS OF ALL OWNERS OF SURFACE TRACTS ADJACENT TO THE AREA OF THE SURFACE TRACT (UP & DOWN STREAM) UPON WHICH THE PROPOSED ACTIVITY WILL OCCUR AND ALL OTHER SURFACE OWNERS UP & DOWN STREAM) WHO OWN PROPERTY THAT MAY BE AFFECTED BY FLOODING AS IS DEMONSTRATED BY A FLOODPLAIN STUDY OR SURVEY (IF ONE HAS BEEN COMPLETED).**

NAME: N/A
ADDRESS:_____

NAME:_____
ADDRESS:_____

NAME:_____
ADDRESS:_____

NAME:_____
ADDRESS:_____

1. **NAME AND ADDRESS OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON ANY ADJACENT PROPERTY AT THE TIME THE FLOODPLAIN PERMIT APPLICATION IS FILED AND THE NAME AND ADDRESS OF AT LEAST ONE ADULT RESIDING IN ANY HOME ON ANY PROPERTY THAT MAY BE AFFECTED BY FLOODING AS IS DEMONSTRATED BY A FLOODPLAIN STUDY OR SURVEY.**

NAME: N/A
ADDRESS:_____

NAME:_____
ADDRESS:_____

NAME:_____
ADDRESS:_____

NAME:_____
ADDRESS:_____

E. CONFIRMATION FORM

THE APPLICANT ACKNOWLEDGES, AGREES, AND CONFIRMS THAT HE/IT WILL PAY WITHIN 30 DAYS OF RECEIPT OF INVOICE BY THE COUNTY FOR ALL EXPENSES RELATIVE TO THE PERMIT APPLICATION PROCESS GREATER THAN THE REQUIRED DEPOSIT FOR EXPENSES INCLUDING:

(A) PERSONAL SERVICE OF PROCESS BY THE DODDRIDGE COUNTY SHERIFF AT THE RATES PERMITTED BY LAW FOR SUCH SERVICE.

(B) SERVICE BY CERTIFIED MAIL RETURN RECEIPT REQUESTED.

(C) PUBLICATION.

Hinter Heirs South Doddridge County Floodplain Permit – Exhibit A

Surface Owner Name	Address	Deed/Page	Tax Map/ Parcel
David Burton and Vivian Burton	1094 Williamstown Pike, Williamstown, WV 26187	29/444	15/12
Richard and Lreta Delaney	903 56th Street, Vienna, WV 26105	29/444	15/12

(D) COURT REPORTING SERVICES AT ANY HEARINGS REQUESTED BY THE APPLICANT.

(E) CONSULTANTS AND/OR HEARING EXPERTS UTILIZED BY DODDRIDGE COUNTY FLOODPLAIN ADMINISTRATOR/MANAGER OR FLOODPLAIN APPEALS BOARD FOR REVIEW OF MATERIALS AND/OR TESTIMONY REGARDING THE EFFICACY OF GRANTING OR DENYING THE APPLICANT'S FLOODPLAIN PERMIT.

NAME (PRINT): Anthony Smith

SIGNATURE: _____ **DATE:** 6/24/13

After completing SECTION 2, APPLICANT should submit form to Floodplain Administrator/Manager or his/her representative for review.

SECTION 3: FLOODPLAIN DETERMINATION (to be completed by Floodplain Administrator/Manager or his/her representative)

THE PROPOSED DEVELOPMENT:

THE PROPOSED DEVELOPMENT IS LOCATED ON:

FIRM Panel: 250

Dated: 10/04/2011

[X] Is **NOT** located in a Specific Flood Hazard Area (Notify applicant that the application review is complete and **NO FLOOPLAIN DEVELOPMENT PERMIT IS REQUIRED**).

[] Is located in Special Flood Hazard Area.

FIRM zone designation _____

100-Year flood elevation is: _____ NGVD (MSL)

[] Unavailable

[] The proposed development is located in a floodway.

FBFM Panel No. _____ Dated _____

[] See section 4 for additional instructions.

SIGNED Dan Wellington DATE 06/25/2013

SECTION 4: ADDITIONAL INFORMATION REQUIRED (To be completed by Floodplain Administrator/Manager or his/her representative)

The applicant must submit the documents checked below before the application can be processed.

[] A plan showing the location of all existing structures, water bodies, adjacent roads, lot dimensions and proposed development.

[] Development plans, drawn to scale, and specifications, including where applicable: details for anchoring structures, storage tanks, proposed elevation of lowest floor, (including basement or crawl space), types of water resistant materials used below the first floor, details of flood proffing of utilities located below the first floor and details of enclosures below the first floor. Also_____

_____

[] Subdivision or other development plans (If the subdivision or development exceeds 50 lots or 5 acres, whichever is the lesser, the applicant must provide 100-year flood elevations if they are not otherwise available).

[] Plans showing the extent of watercourse relocation and/or landform alterations.

[] Top of new fill elevation_____Ft. NGVD (MSL).
For floodproofing structures applicant must attach certification from registered engineer or architect.

[] Certification from a registered engineer that the proposed activity in a regulatory floodway will not result in any increase in the height of the 100-year flood. A copy of all data and calculations supporting this finding must also be submitted.

[] Manufactured homes located in a floodplain area must have a West Virginia Contractor's License and a Manufactured Home Installation License as required by the Federal Emergency Management Agency (FEMA).

[] Other:

_____

_____

_____

SECTION 5: PERMIT DETERMINATION (To be completed by Floodplain Administrator/Manager or his/her representative)

I have determined that the proposed activity **(type is or is not)** in conformance with provisions of the Floodplain Ordinance adopted by the County Commission of Doddridge County on May 21, 2013. The permit is issued subject to the conditions attached to and made part of this permit.

SIGNED Dan Wellings DATE 06/25/2013

If the Floodplain Administrator/Manager found that the above was not in conformance with the provisions of the Doddridge County Floodplain Ordinance and/or denied that application, the applicant may complete an appealing process below.

APPEALS: Appealed to the County Commission of Doddridge County? [] Yes {} No
Hearing Date:_____
County Commission Decision - Approved [] Yes [] No

CONDITIONS:_____

_____

_____

_____

SECTION 6: AS-BUILT ELEVATIONS (To be submitted by APPLICANT before Certificate of Compliance is issued).

The following information must be provided for project structures. This section must be completed by a registered professional engineer or a licensed land surveyor (or attach a certification to this application).

COMPLETE 1 OR 2 BELOW:

1 Actual (As-Built) Elevation of the top of the lowest floor (including basement or crawl space is_____FT. NGVD (MSL)

2 Actual (As Built) elevation of floodproofing is_____FT. NGVD (MSL)

Note: Any work performed prior to submittal of the above information is at risk of the applicant.

SECTION 7: COMPLIANCE ACTION (To be completed by the Floodplain Administrator/Manager or his/her representative).

The Floodplain Administrator/Manager or his/her representative will complete this section as applicable based on inspection of the project to ensure compliance with the Doddridge County Floodplain Ordinance.

INSPECTIONS:

DATE:_____ **BY:**_____

DEFICIENCIES ? **Y/N**

COMMENTS_____

_____

_____

_____

_____

_____

SECTION 8: CERTIFICATE OF COMPLIANCE (To be completed by Floodplain Administrator/Manager or his/her representative).

Certificate of Compliance issued: DATE:_____ BY:_____

CERTIFICATE OF COMPLIANCE
FOR DEVELOPMENT IN SPECIAL FLOOD HAZARD AREA
(OWNER MUST RETAIN)

PERMIT NUMBER: 13-020
PERMIT DATE: 6/25/2013

PURPOSE –

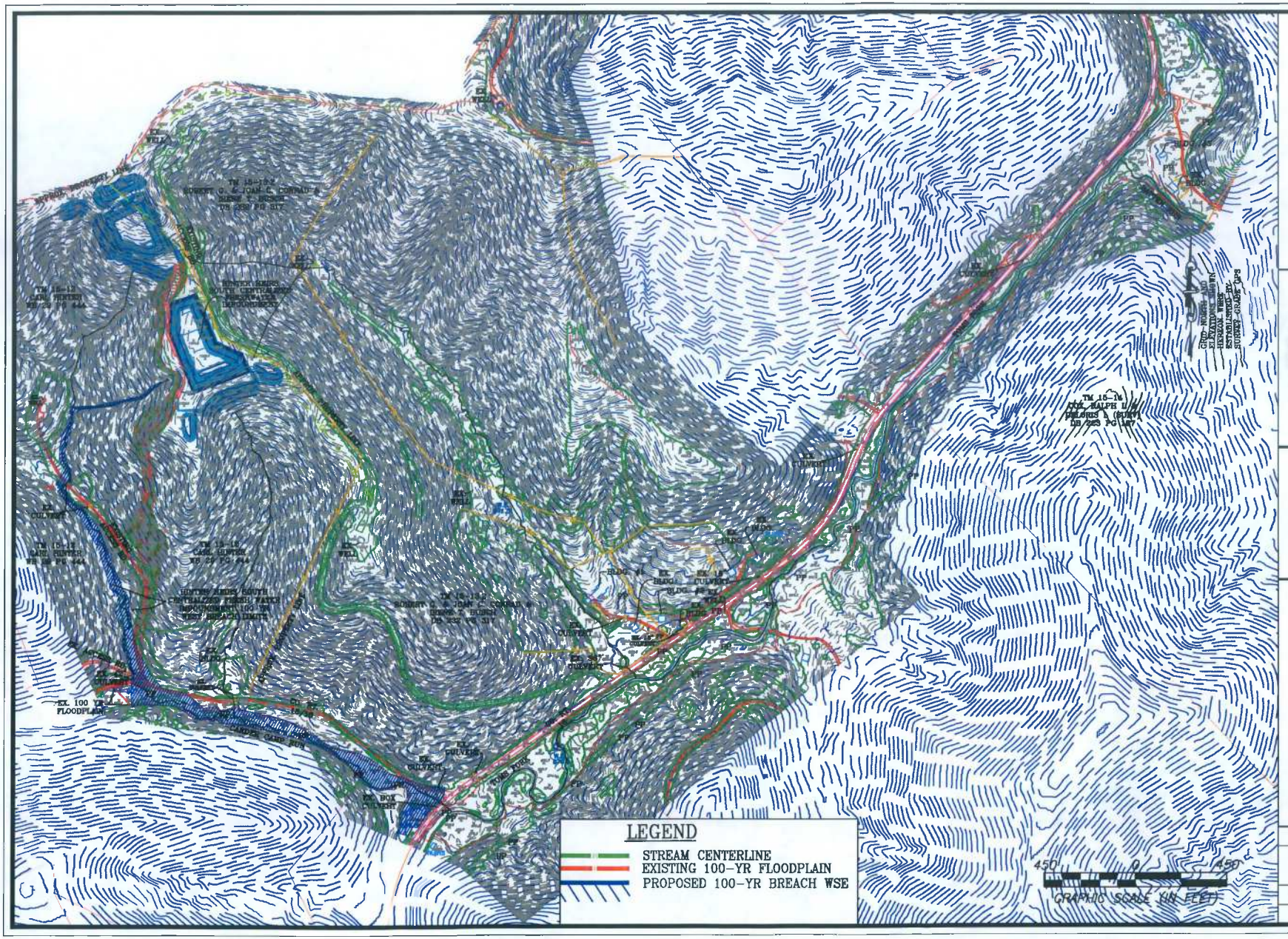
CONSTRUCTION LOCATION: _____

OWNER'S ADDRESS: _____
_____
_____

THE FOLLOWING MUST BE COMPLETED BY THE FLOODPLAIN ADMINISTRATOR/MANAGER OR HIS/HER AGENT.

COMPLIANCE IS HEREBY CERTIFIED WITH THE REQUIREMENT OF THE FLOODPLAIN ORDINANCE ADOPTED BY THE COUNTY COMMISSION OF DODDRIDGE COUNTY ON MAY 21, 2013.

SIGNED Dan Kellison **DATE** 06/25/2013



NAVITUS ENGINEERING INC.
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navituseng.com
Engineering • Survey • Environmental • GIS

CYRUS S. KUMP
REGISTERED
19578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
05/31/2013

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

SITE MAP
WEST BREACH
HINTER HEIRS
SOUTH CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WV

SCALE: 1" = 450'
HINTER HEIRS
JOB NO. ANT028
DATE: 05/31/2013
SHEET A.4

ANTERO RESOURCES APPALACHIAN CORPORATION
SCHEDULE OF QUANTITIES
HINTER HEIRS SOUTH
CENTRALIZED FRESHWATER IMPOUNDMENT

CLEARING & GRUBBING; EROSION & SEDIMENT CONTROLS				
	QUANTITY	UNIT		
MOBILIZATION	0.5	EA	$16,000.00	$8,000.00
CONSTRUCTION ENTRANCE	1.0	EA	$4,033.30	$4,033.30
CLEARING & GRUBBING (OPEN FIELD)	0.9	AC	$2,200.00	$1,958.00
CLEARING & GRUBBING (TREE REMOVAL)	12.6	AC	$4,333.30	$54,686.25
8" COMPOST FILTER SOCK	0.0	LF		$0.00
12" COMPOST FILTER SOCK	1347.7	LF	$4.30	$5,795.11
18" COMPOST FILTER SOCK	279.2	LF	$7.60	$2,121.92
24" COMPOST FILTER SOCK	1077.0	LF	$9.80	$10,554.60
32" COMPOST FILTER SOCK	553.8	LF	$14.50	$8,030.10
SUPER SILT FENCE	0.0	LF	$8.10	$0.00
9" STRAW WATTLES	0.0	LF		$0.00
TOTAL				**$95,179.28**
SITE				
	QUANTITY	**UNIT**		
DRILL PAD EXCAVATION	0.0	CY		$0.00
ACCESS ROADS EXCAVATION	8228.2	CY	$3.50	$28,798.70
TURNAROUND PAD and/or CENTRALIZED IMPOUNDMENT EXCAVATION	42782.6	CY	$3.50	$149,739.10
TOPSOIL	6567.4	CY	$3.30	$21,672.42
DIVERSION DITCH	0.0	LF	$2.00	$0.00
ROADSIDE DITCH	1690.8	LF	$3.70	$6,255.96
TOTAL				**$206,466.18**
SUMP(S) PER ANTERO RESOURCES STANDARD DETAIL				
	QUANTITY	**UNIT**		
INSTALL 102" x 78" x 44" PRE CAST SUMP	0.0	EA		$0.00
VALVE BOX HDPE PIPE (MINIMUM 12" DIAMETER x 48" HEIGHT)	0.0	EA		$0.00
4" PVC CONNECTIVE PIPE (ANTERO SUMP DRAIN DETAIL)	0.0	LF		$0.00
TOTAL				**$0.00**
AGGREGATE SURFACING - SPREADING, COMPACTION, and/or INSTALLATION				
	QUANTITY	**UNIT**		
DRILL PAD AASHTO #1 (6" THICK)	0.0	TON		$0.00
DRILL PAD 1 1/2" or 3/4" CRUSHER RUN STONE (2" THICK)	0.0	TON		$0.00
DRILL PAD GEOTEXTILE FABRIC (US 200)	0.0	SY		$0.00
ACCESS ROADS 2-3" AGGREGATE (6" THICK)	1558.2	TON	$9.40	$14,647.08
ACCESS ROADS GEOTEXTILE FABRIC (US 200)	2077.5	SY	$0.90	$1,869.75
*INSTALL TENSAR TX190 GEOGRID or EQUIVALENT	0.0	SY	$2.50	$0.00
TURNAROUND PAD 3" AGGREGATE (6" THICK)	300.3	TON	$2.60	$780.78
TURNAROUND PAD GEOTEXTILE FABRIC (US 200)	400.4	SY	$2.00	$800.80
*INSTALL TENSAR TX190 GEOGRID or EQUIVALENT	0.0	SY		$0.00
TOTAL				**$18,098.41**

ANTERO RESOURCES APPALACHIAN CORPORATION

SCHEDULE OF QUANTITIES

HINTER HEIRS SOUTH

CENTRALIZED FRESHWATER IMPOUNDMENT

ROAD CULVERTS				
	QUANTITY	**UNIT**		
15" HDPE	497.5	LF	$24.30	$12,089.25
18" HDPE	0.0	LF		$0.00
24" HDPE	0.0	LF		$0.00
30" HDPE	0.0	LF		$0.00
36" HDPE	0.0	LF		$0.00
42" HDPE	0.0	LF		$0.00
48" HDPE	0.0	LF		$0.00
60" HDPE	0.0	LF		$0.00
R4 RIP RAP (INLETS/OUTLETS)	425.1	TON	$9.00	$3,825.90
AASHTO #1 STONE (DITCH CHECKS)	13.5	TON	$48.30	$652.05
DITCH LINING - (ACCESS ROAD) SYNTHETIC MATTING (TRM)	0.0	SY		$0.00
DITCH LINING - (ACCESS ROAD)	0.0	SY		$0.00
DITCH LINING - (ACCESS ROAD) R4 RIP-RAP	314.0	TON	$21.70	$0.00
TOTAL				**$16,567.20**
LINER SYSTEM*				
	QUANTITY	**UNIT**		
60 MIL TEXTURED PRIMARY LINER	11559.2	SY		$0.00
16 OZ. NON-WOVEN GEOTEXTILE FABRIC CUSHION	11559.2	SY		$0.00
TOTAL				**$0.00**
***THE SQUARE YARDAGE FOR THE LINER SYSTEM DOES NOT ACCOUNT FOR MATERIAL OVERLAP AND WASTE.**				
FENCING/GATES				
	QUANTITY	**UNIT**		
4 FT WOVEN WIRE FARM FENCE w/MINIMUM 10 FT POST SPACING (WOODEN and/or "T" POST	1382.8	LF	$16.80	$23,231.04
16 FT DOUBLE GATE	1.0	EA	$650.00	$650.00
TOTAL				**$23,881.04**
SEEDING				
	QUANTITY	**UNIT**		
SITE SEEDING (LIME, FERTILIZER, SEEDING, AND HYDRO-MULCH w/TACK (HYC-2 OR EQUAL))	12.8	AC	$3,400.00	$43,520.00
TOTAL				**$43,520.00**
UNFORESEEN SITE CONDITIONS				
	QUANTITY	**UNIT**		
*ROCK CLAUSE - BLASTING	0.0	CY	$5.20	$0.00
*ROCK CLAUSE - HOE RAMMING	0.0	CY	$75.80	$0.00
*FRENCH DRAINS	0.0	FT	$10.00	$0.00
*ORANGE SAFETY FENCE w/"T" POST (10FT CENTERS) - WETLAND PROTECTION	0.0	LF	$9.40	$0.00
*STEEL PANELS w/"T" POST (10 FT CENTERS) - WETLAND PROTECTION	0.0	LF	$9.50	$0.00
*SILT FENCE	0.0	LF	$4.00	$0.00
*TEMPORARY SEEDING	4.7	AC	$1,900.00	$8,913.01
*CONSTRUCTION STAKEOUT	0.0	HOUR	$171.00	$0.00
* JUTE MATTING - SLOPE MATTING	27868.0	SY	$1.60	$44,588.76
TOTAL				**$53,501.78**
				$457,213.88

west virginia department of environmental protection

Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304
Telephone: (304) 926-0499
Fax: (304) 926-0456

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

Date 19 April 2013

CERTIFICATE OF APPROVAL
CENTRALIZED FRESHWATER IMPOUNDMENT

This certificate of approval, number **017-FWC-00002**, issued to **Antero Resources Appalachian Corp for the Hinter Heirs South Fresh Water Centralized Impoundment**, is evidence of permission granted to construct a centralized freshwater impoundment pursuant to conditions described in W.Va Code §22-6A. The term of certificate of approval is for one year. The certificate of approval may be extended annually with the submission of an annual registration fee, provided the Office of Oil and Gas has on file an up-to-date inspection report, monitoring and emergency plan, maintenance plan, and no outstanding violations of certificate requirements exist. Construction of the impoundment will be located as described in the application. Design, construction, inspection and as-built certification will be the responsibility of, and under the supervision of, a professional engineer, registered in West Virginia.

Please be advised that notification to the landowner is required per W.Va Code §22-6A-10(h) within 7 days but no less than 2 days prior to commencement of construction. The Office of Oil and Gas as well as the oil and gas inspector must be notified. The filling of the impoundment with waters of the state will be subject to conditions of an approved Water Management Plan. Any deviation from conditions of the Water Management Plan will require prior approval from the Division of Water and Waste Management. Only freshwater may be stored in this impoundment. Addition of any wastewater will be in violation of the terms of this approval and may result in revocation of the certificate of approval. Any plans to enlarge, alter, repair, remove or abandon this structure will require a Certificate of Approval from the Office of Oil and Gas. An as built certification (IMP-3) must be submitted and received by the Office of Oil Gas prior to placing any fluids in this structure. Additional conditions as provide for in West Virginia Code §22-6A-9(h) are attached.

James Martin
Chief

Promoting a healthy environment.

Certificate of Approval
CONDITIONS

West Virginia Code § 22-6A-9(h) allows the Office of Oil and Gas to place specific conditions upon this Certificate of Approval and have the same effect as law. Failure to adhere to the specified conditions may result in enforcement action.

CONDITIONS

1. The impoundment shall be monitored continuously during the initial filling operation.

2. Impoundment will be inspected every two weeks for the life of the impoundment and within 24 hours of a rainfall of two inches or greater in a six hour period. The attached form shall be used to document all inspections performed on the structure.

IR-12B
11/08/2012

IMPOUNDMENT/PIT INSPECTION CHECKLIST

API#_____

COMPANY_____ INSPECTOR_____

WELL PAD_____ IMPOUNDMENT/PIT_____ (NAME)

DATE_____ ASSOCIATED_____ CENTRALIZED_____

WEATHER CONDITIONS_____ COMPANY PERSONNEL AT SITE_____

CURRENT FREEBOARD(FT.)_____ _____

GATED--YES_____ NO_____ FENCING INTACT--YES_____ NO_____ IS VEGETATION ADEQUATE--YES_____ NO_____

STANDING WATER ON CREST--YES_____ NO_____ SIGNS & SAFETY--YES_____ NO_____

ANY CRACKS/SLUMPS/DEPRESSIONS ON CREST--YES_____ NO_____ SLOPE EROSION--YES_____ NO_____

ANY SLIPS, BULGES OR SLOPE MOVEMENTS ON FILL SLOPES--YES_____ NO_____

ANY SEEPAGE EVIDENT ON FILL SLOPES--YES_____ NO_____; IF YES, ESTIMATE FLOW_____

DOES LINER APPEAR INTACT--YES_____ NO_____

FOR ANY ANSWERS ABOVE, PROVIDE EXPLANATION AND ATTACH SKETCH OR COPY OF STRUCTURE FROM PLANS AND SHOW APPROXIMATE LOCATION OF FEATURES INDENTIFIED ABOVE. TAKE PHOTOS OF ANY FEATURES IDENTIFIED ABOVE, AND ATTACH THEM TO THIS INSPECTION REPORT.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

WVDEP/OOG INSPECTOR

Water Management Plan:
Primary Water Sources

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Important:

For each proposed primary water source (including source intakes for purchased water sources) identified in your water management plan, and summarized herein, DEP has made an evaluation concerning water availability over the specified date range. DEP's assessment is based on the following considerations:

- Statistical analysis of historical USGS stream gauge data (transferred to un-gauged locations as necessary);
- Identification of sensitive aquatic life (endangered species, mussels, etc.);
- Quantification of known existing demands on the water supply (Large Quantity Users);
- Minimum flows required by the Army Corps of Engineers; and
- Designated stream uses.

Based on these factors, DEP has provided, for each intake location (and origination point for purchased water), a reference gauge location and discharge flow reading which must be surpassed prior to withdrawals. Additionally, DEP has established a minimum passby flow at the withdrawal location which must also be surpassed prior to withdrawals. These thresholds are considered terms of the permit and are enforceable as such.

DEP is aware that some intake points will be used for mutiple wells and well sites. In these cases, the thresholds set by the Water Management Plan are to be interepreted as total withdrawal limits for each location over the specified date range regardless of how many wells are supported by that intake.

For all purchased water intakes, determinations of water availability are made at the original source intake location. It is the responsibility of the Oil and Gas Operator, not the seller, to cease withdrawal of water from the seller when flows are less than the minimum gauge reading at the stream gauge referenced by the Water Management Plan in order to protect stream uses.

Note that the determinations made herein are based on the best available data, but it is impossible to predict water availability in the future. While the DEP has carefully established these minimum withdrawal thresholds, it remains the operator's responsibility to protect aquatic life at all times. Approval to withdrawal is contingent upon permission from the land owner. It is the responsibility of the operator to secure and maintain permission prior to any withdrawals.

The operator is reminded that 24-48 hours prior to withdrawing (or purchasing) water, DEP must be notified by email at DEP.water.use@wv.gov.

APPROVED APR 0 2 2013

Source Summary

WMP-01080 API Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Stream/River

o Source **West Fork River @ JCP Withdrawal** Owner: **James & Brenda Raines**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.320913	-80.337572

☑ Regulated Stream? Stonewall Jackson Dam Ref. Gauge ID: 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Max. Pump rate (gpm): 2,000 **Min. Gauge Reading (cfs): 175.00** **Min. Passby (cfs) 146.25**

DEP Comments:

o Source **West Fork River @ McDonald Withdrawal** Owner: **David Shrieves**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.16761	-80.45069

☑ Regulated Stream? Stonewall Jackson Dam Ref. Gauge ID: 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Max. Pump rate (gpm): 3,000 **Min. Gauge Reading (cfs): 175.00** **Min. Passby (cfs) 106.30**

DEP Comments:

o Source **West Fork River @ GAL Withdrawal** Owner: **David Shrieves**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.16422	-80.45173

☑ Regulated Stream? Stonewall Jackson Dam Ref. Gauge ID: 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Max. Pump rate (gpm): 2,000 **Min. Gauge Reading (cfs): 175.00** **Min. Passby (cfs) 106.30**

DEP Comments:

APPROVED APR 0 2 2013

● Source **Middle Island Creek @ Dawson Withdrawal** Owner: **Gary D. and Rella A. Dawson**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.379292	-80.867803

☐ Regulated Stream? Ref. Gauge ID: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Max. Pump rate (gpm): 3,000 **Min. Gauge Reading (cfs): 76.03** **Min. Passby (cfs) 28.83**

DEP Comments:

● Source **McElroy Creek @ Forest Withdrawal** Owner: **Forest C. & Brenda L. Moore**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.39675	-80.738197

☐ Regulated Stream? Ref. Gauge ID: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 74.77** **Min. Passby (cfs) 13.10**

DEP Comments:

● Source **McElroy Creek @ Sweeney Withdrawal** Owner: **Bill Sweeney**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.398123	-80.656808

☐ Regulated Stream? Ref. Gauge ID: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 69.73** **Min. Passby (cfs) 6.66**

DEP Comments:

Source **Meathouse Fork @ Gagnon Withdrawal** Owner: **George L. Gagnon and Susan C. Gagnon**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.26054	-80.720998

☐ Regulated Stream? Ref. Gauge ID: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 71.96** **Min. Passby (cfs) 13.10**

DEP Comments:

Source **Meathouse Fork @ Whitehair Withdrawal** Owner: **Elton Whitehair**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.211317	-80.679592

☐ Regulated Stream? Ref. Gauge ID: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 69.73** **Min. Passby (cfs) 7.28**

DEP Comments:

Source **Tom's Fork @ Erwin Withdrawal** Owner: **John F. Erwin and Sandra E. Erwin**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.174306	-80.702992

☐ Regulated Stream? Ref. Gauge ID: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 69.73** **Min. Passby (cfs) 0.59**

DEP Comments:

Source **Arnold Creek @ Davis Withdrawal** Owner: **Jonathon Davis**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.302006	-80.824561

☐ Regulated Stream? Ref. Gauge ID: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 69.73** **Min. Passby (cfs) 3.08**

DEP Comments:

Source **Buckeye Creek @ Powell Withdrawal** Owner: **Dennis Powell**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.277142	-80.690386

☐ Regulated Stream? Ref. Gauge ID: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 69.73** **Min. Passby (cfs) 4.59**

DEP Comments:

Source **South Fork of Hughes River @ Knight Withdrawal** Owner: **Tracy C. Knight & Stephanie C. Knight**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.198369	-80.870969

☐ Regulated Stream? Ref. Gauge ID: 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

Max. Pump rate (gpm): 3,000 **Min. Gauge Reading (cfs): 39.80** **Min. Passby (cfs) 1.95**

DEP Comments:

o Source **North Fork of Hughes River @ Davis Withdrawal** Owner: **Lewis P. Davis and Normal J. Davis**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015			39.322363	-80.936771

☐ Regulated Stream? Ref. Gauge ID: 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 35.23** **Min. Passby (cfs) 2.19**

DEP Comments:

Source Summary

WMP-01080 API Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Purchased Water

o Source **Middle Island Creek @ Solo Construction** Owner: **Solo Construction, LLC**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015		1,000,000	39.399094	-81.185548

☑ Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): **Min. Gauge Reading (cfs): 6,468.00** **Min. Passby (cfs)**

DEP Comments: Elevation analysis indicates that this location has the same elevation as Middle Island Creek's pour point into the Ohio River. As such, it is deemed that water flow at this location is heavily influenced by the Ohio River.

o Source **Sun Valley Public Service District** Owner: **Sun Valley PSD**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/29/2013	3/29/2015		200,000	-	-

☑ Regulated Stream? Stonewall Jackson Dam Ref. Gauge ID: 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Max. Pump rate (gpm): **Min. Gauge Reading (cfs): 171.48** **Min. Passby (cfs)**

DEP Comments:

Source Detail

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13881 Source Name Middle Island Creek @ Solo Construction
Solo Construction, LLC

Source Latitude: 39.399094
Source Longitude: -81.185548

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 25000 County: Pleasants

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015

☐ Endangered Species? ☑ Mussel Stream?
☐ Trout Stream? ☐ Tier 3?
☑ Regulated Stream? Ohio River Min. Flow
☑ Proximate PSD? City of St. Marys
☑ Gauged Stream?

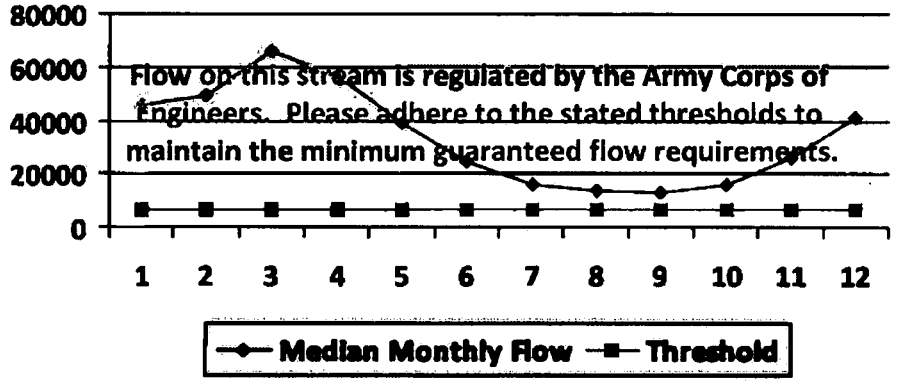
Total Volume from Source (gal):
Max. Pump rate (gpm):
Max. Simultaneous Trucks:
Max. Truck pump rate (gpm) 0

Reference Gaug 9999999 Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.) 25,000.00 Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13882 Source Name: Sun Valley Public Service District
Sun Valley PSD

Source Latitude: -
Source Longitude: -

HUC-8 Code: 5020002

Drainage Area (sq. mi.): 391.85 County: Harrison

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015
Total Volume from Source (gal):
Max. Pump rate (gpm):
Max. Simultaneous Trucks:
Max. Truck pump rate (gpm)

- ☐ Endangered Species?
- ☐ Trout Stream?
- ☑ Regulated Stream?
- ☐ Proximate PSD?
- ☑ Gauged Stream?
- ☑ Mussel Stream?
- ☐ Tier 3?

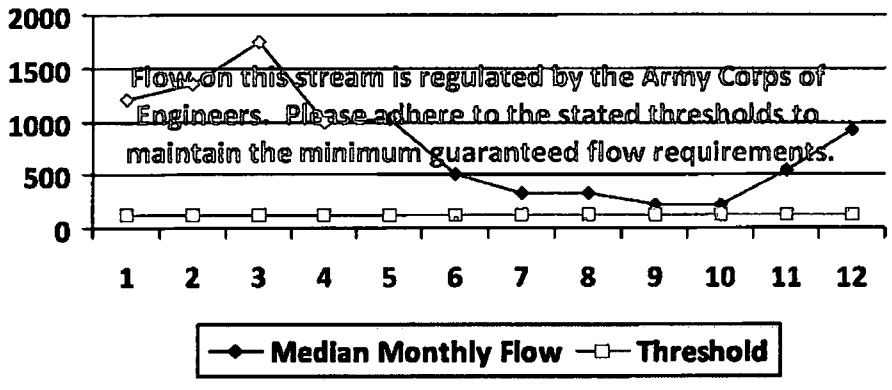
Stonewall Jackson Dam

Reference Gaug 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.) 759.00 Gauge Threshold (cfs): 234

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	1,200.75	-	-
2	1,351.92	-	-
3	1,741.33	-	-
4	995.89	-	-
5	1,022.23	-	-
6	512.21	-	-
7	331.86	-	-
8	316.87	-	-
9	220.48	-	-
10	216.17	-	-
11	542.45	-	-
12	926.12	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	
Downstream Demand (cfs):	
Pump rate (cfs):	
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13868 Source Name West Fork River @ JCP Withdrawal
James & Brenda Raines

Source Latitude: 39.320913
Source Longitude: -80.337572

HUC-8 Code: 5020002

Drainage Area (sq. mi.): 532.2 County: Harrison

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015
Total Volume from Source (gal):

- ☐ Endangered Species?
- ☑ Mussel Stream?
- ☐ Trout Stream?
- ☐ Tier 3?
- ☑ Regulated Stream? Stonewall Jackson Dam
- ☐ Proximate PSD?
- ☑ Gauged Stream?

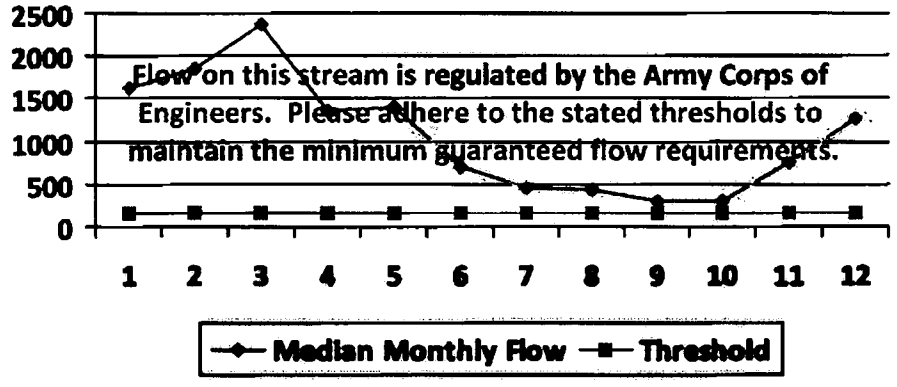
Max. Pump rate (gpm): 2,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

Reference Gaug 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.) 759.00 Gauge Threshold (cfs): 234

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	1,630.82	-	-
2	1,836.14	-	-
3	2,365.03	-	-
4	1,352.59	-	-
5	1,388.37	-	-
6	695.67	-	-
7	450.73	-	-
8	430.37	-	-
9	299.45	-	-
10	293.59	-	-
11	736.74	-	-
12	1,257.84	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	24.29
Downstream Demand (cfs):	0.00
Pump rate (cfs):	4.46
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13869 Source Name West Fork River @ McDonald Withdrawal
David Shrieves

Source Latitude: 39.16761
Source Longitude: -80.45069

HUC-8 Code: 5020002

Drainage Area (sq. mi.): 314.91 County: Harrison

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015
Total Volume from Source (gal):

- ☐ Endangered Species?
- ☑ Mussel Stream?
- ☐ Trout Stream?
- ☐ Tier 3?
- ☑ Regulated Stream? Stonewall Jackson Dam
- ☐ Proximate PSD?
- ☑ Gauged Stream?

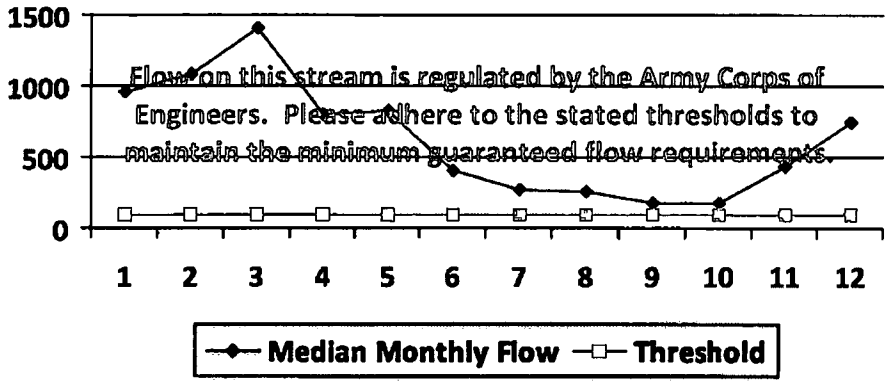
Max. Pump rate (gpm): 3,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

Reference Gaug 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.) 759.00 Gauge Threshold (cfs): 234

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	964.98	-	-
2	1,086.47	-	-
3	1,399.42	-	-
4	800.34	-	-
5	821.52	-	-
6	411.64	-	-
7	266.70	-	-
8	254.66	-	-
9	177.19	-	-
10	173.72	-	-
11	435.94	-	-
12	744.28	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	24.29
Downstream Demand (cfs):	0.00
Pump rate (cfs):	6.68
Headwater Safety (cfs):	24.27
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13870 Source Name West Fork River @ GAL Withdrawal
David Shrieves

Source Latitude: 39.16422
Source Longitude: -80.45173

HUC-8 Code: 5020002

Drainage Area (sq. mi.): 313.67 County: Harrison

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015

☐ Endangered Species? ☑ Mussel Stream?
☐ Trout Stream? ☐ Tier 3?
☑ Regulated Stream? Stonewall Jackson Dam
☐ Proximate PSD?
☑ Gauged Stream?

Total Volume from Source (gal):
Max. Pump rate (gpm): 2,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

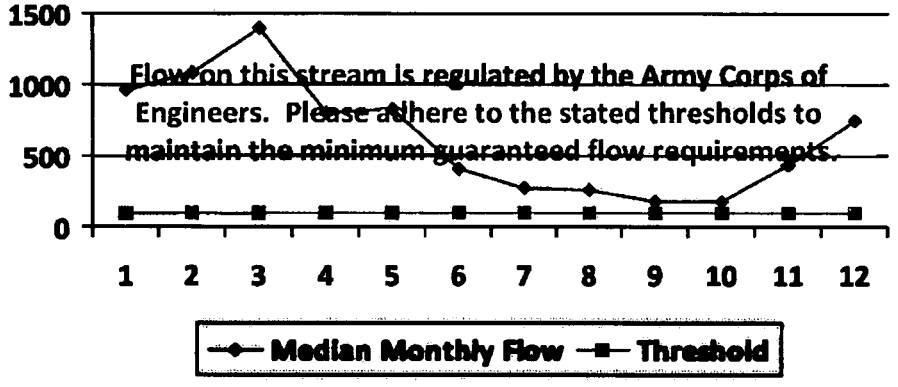
Reference Gaug 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.) 759.00

Gauge Threshold (cfs): 234

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	961.18	-	-
2	1,082.19	-	-
3	1,393.91	-	-
4	797.19	-	-
5	818.28	-	-
6	410.02	-	-
7	265.65	-	-
8	253.65	-	-
9	176.49	-	-
10	173.04	-	-
11	434.22	-	-
12	741.35	-	-

Water Availability Profile



Flow on this stream is regulated by the Army Corps of Engineers. Please adhere to the stated thresholds to maintain the minimum guaranteed flow requirements.

Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	24.29
Downstream Demand (cfs):	0.00
Pump rate (cfs):	4.46
Headwater Safety (cfs):	24.18
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 | API/ID Number: 017-FWC-00002 | Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13871 Source Name: Middle Island Creek @ Dawson Withdrawal
Gary D. and Rella A. Dawson

Source Latitude: 39.379292
Source Longitude: -80.867803

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 181.34 County: Tyler

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015
Total Volume from Source (gal):

- ☐ Endangered Species?
- ☑ Mussel Stream?
- ☐ Trout Stream?
- ☐ Tier 3?
- ☐ Regulated Stream?
- ☐ Proximate PSD?
- ☑ Gauged Stream?

Max. Pump rate (gpm): 3,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

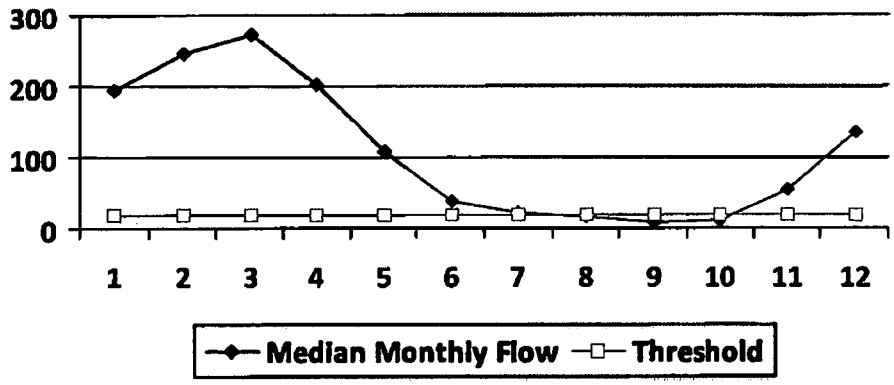
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	194.47	42.06	152.68
2	244.62	42.06	202.83
3	273.72	42.06	231.93
4	203.26	42.06	161.47
5	107.22	42.06	65.43
6	37.44	42.06	-4.35
7	21.19	42.06	-20.60
8	17.45	42.06	-24.34
9	8.94	42.06	-32.85
10	11.23	42.06	-30.56
11	54.82	42.06	13.04
12	133.96	42.06	92.17

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	17.82
Upstream Demand (cfs):	13.10
Downstream Demand (cfs):	6.55
Pump rate (cfs):	6.68
Headwater Safety (cfs):	4.45
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	**76.03**
Passby at Location (cfs):	**28.82**

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13872 Source Name McElroy Creek @ Forest Withdrawal
Forest C. & Brenda L. Moore

Source Latitude: 39.39675
Source Longitude: -80.738197

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 88.85 County: Tyler

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015
Total Volume from Source (gal):

☐ Endangered Species? ☐ Mussel Stream?
☐ Trout Stream? ☐ Tier 3?
☐ Regulated Stream?
☐ Proximate PSD?
☐ Gauged Stream?

Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

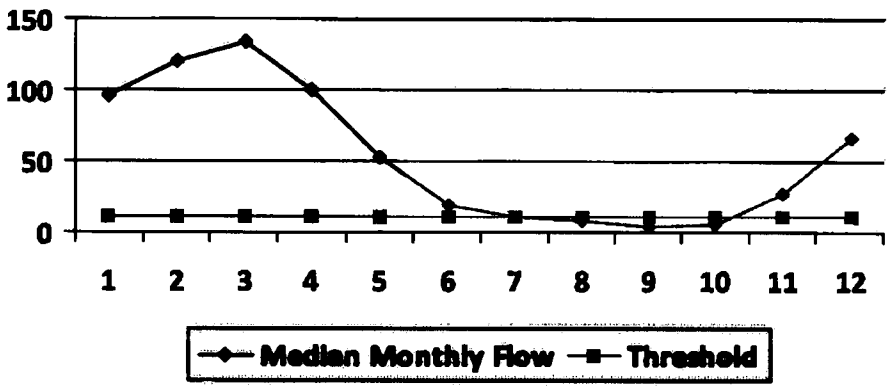
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	95.28	19.78	75.68
2	119.86	19.78	100.25
3	134.11	19.78	114.51
4	99.59	19.78	79.99
5	52.54	19.78	32.93
6	18.35	19.78	-1.26
7	10.38	19.78	-9.22
8	8.55	19.78	-11.05
9	4.38	19.78	-15.23
10	5.50	19.78	-14.10
11	26.86	19.78	7.26
12	65.63	19.78	46.03

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	8.73
Upstream Demand (cfs):	4.46
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	2.18
Ungauged Stream Safety (cfs):	2.18
Min. Gauge Reading (cfs):	**74.19**
Passby at Location (cfs):	**13.09**

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13873 Source Name McElroy Creek @ Sweeney Withdrawal
Bill Sweeney

Source Latitude: 39.398123
Source Longitude: -80.656808

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 45.16 County: Doddridge

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015
Total Volume from Source (gal):

- [x] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [ ] Gauged Stream?

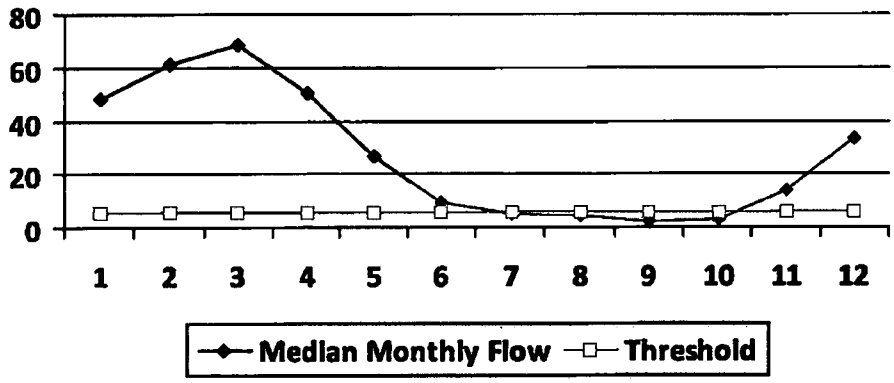
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00 Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	48.43	8.88	39.93
2	60.92	8.88	52.42
3	68.17	8.88	59.67
4	50.62	8.88	42.12
5	26.70	8.88	18.21
6	9.32	8.88	0.83
7	5.28	8.88	-3.22
8	4.34	8.88	-4.15
9	2.23	8.88	-6.27
10	2.80	8.88	-5.70
11	13.65	8.88	5.16
12	33.36	8.88	24.86

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	4.44
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	1.11
Ungauged Stream Safety (cfs):	1.11
Min. Gauge Reading (cfs):	**69.73**
Passby at Location (cfs):	**6.66**

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13874 Source Name Meathouse Fork @ Gagnon Withdrawal
George L. Gagnon and Susan C. Gagnon

Source Latitude: 39.26054
Source Longitude: -80.720998

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 60.6 County: Doddridge

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015
Total Volume from Source (gal):

- [x] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [ ] Gauged Stream?

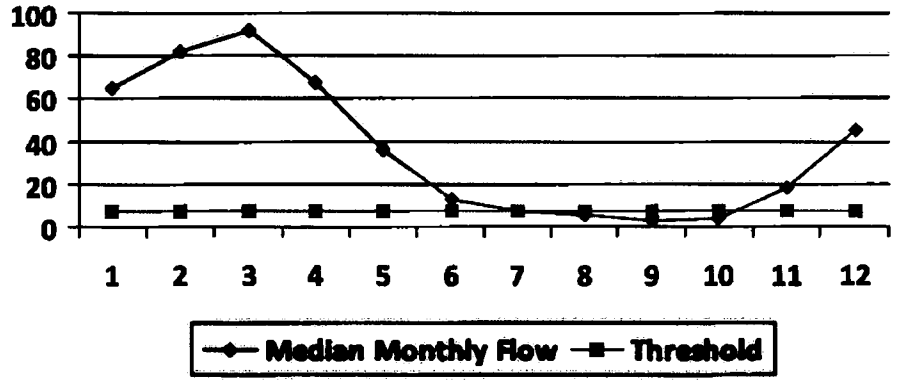
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00 Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	64.99	13.39	51.70
2	81.75	13.39	68.46
3	91.47	13.39	78.19
4	67.93	13.39	54.64
5	35.83	13.39	22.55
6	12.51	13.39	-0.77
7	7.08	13.39	-6.20
8	5.83	13.39	-7.45
9	2.99	13.39	-10.30
10	3.75	13.39	-9.53
11	18.32	13.39	5.04
12	44.76	13.39	31.48

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	5.95
Upstream Demand (cfs):	2.23
Downstream Demand (cfs):	2.81
Pump rate (cfs):	2.23
Headwater Safety (cfs):	1.49
Ungauged Stream Safety (cfs):	1.49
Min. Gauge Reading (cfs):	**71.96**
Passby at Location (cfs):	**11.74**

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13875 Source Name Meathouse Fork @ Whitehair Withdrawal
Elton Whitehair

Source Latitude: 39.211317
Source Longitude: -80.679592

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 30.37 County: Doddridge

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015
Total Volume from Source (gal):

- [x] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [ ] Gauged Stream?

Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

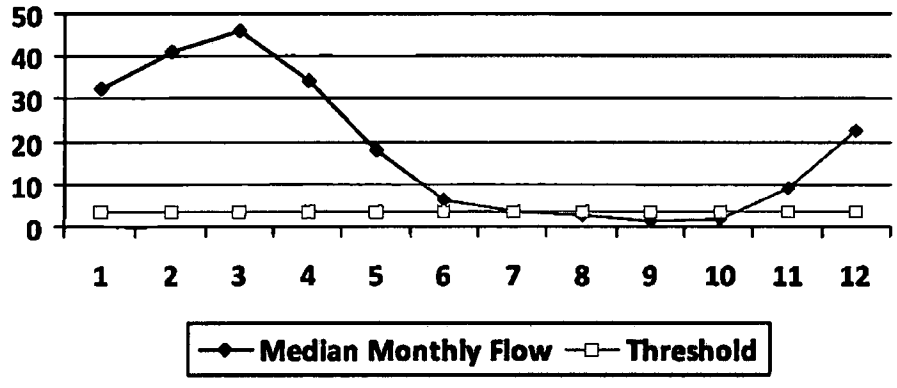
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	32.57	6.70	26.15
2	40.97	6.70	34.55
3	45.84	6.70	39.42
4	34.04	6.70	27.62
5	17.96	6.70	11.54
6	6.27	6.70	-0.15
7	3.55	6.70	-2.87
8	2.92	6.70	-3.50
9	1.50	6.70	-4.92
10	1.88	6.70	-4.54
11	9.18	6.70	2.76
12	22.43	6.70	16.01

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	2.98
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	2.81
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.75
Ungauged Stream Safety (cfs):	0.75
Min. Gauge Reading (cfs):	**69.73**
Passby at Location (cfs):	**7.29**

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13876 Source Name Tom's Fork @ Erwin Withdrawal
John F. Erwin and Sandra E. Erwin

Source Latitude: 39.174306
Source Longitude: -80.702992

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 4.01 County: Doddridge

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015

☐ Endangered Species? ☑ Mussel Stream?
☐ Trout Stream? ☐ Tier 3?
☐ Regulated Stream?
☐ Proximate PSD?
☐ Gauged Stream?

Total Volume from Source (gal):

Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

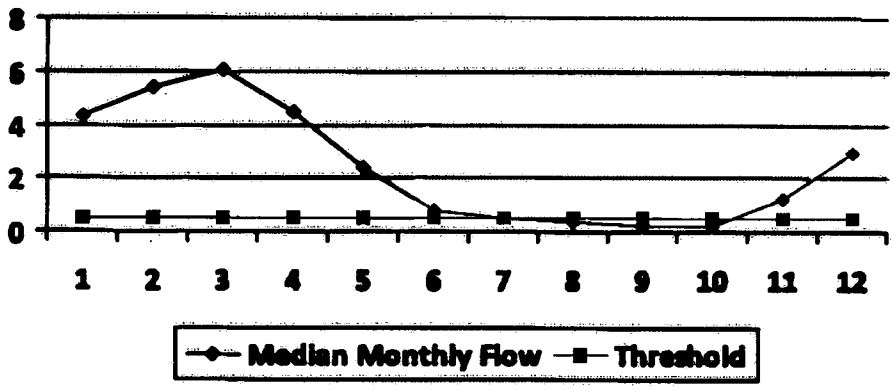
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	4.30	2.82	1.88
2	5.41	2.82	2.98
3	6.05	2.82	3.63
4	4.49	2.82	2.07
5	2.37	2.82	-0.05
6	0.83	2.82	-1.60
7	0.47	2.82	-1.96
8	0.39	2.82	-2.04
9	0.20	2.82	-2.23
10	0.25	2.82	-2.18
11	1.21	2.82	-1.21
12	2.96	2.82	0.54

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	0.39
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.10
Ungauged Stream Safety (cfs):	0.10
Min. Gauge Reading (cfs):	**69.73**
Passby at Location (cfs):	**0.59**

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13877 Source Name: Arnold Creek @ Davis Withdrawal
Jonathon Davis

Source Latitude: 39.302006
Source Longitude: -80.824561

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 20.83 County: Doddridge

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015
Total Volume from Source (gal):

☐ Endangered Species? ☑ Mussel Stream?
☐ Trout Stream? ☐ Tier 3?
☐ Regulated Stream?
☐ Proximate PSD?
☐ Gauged Stream?

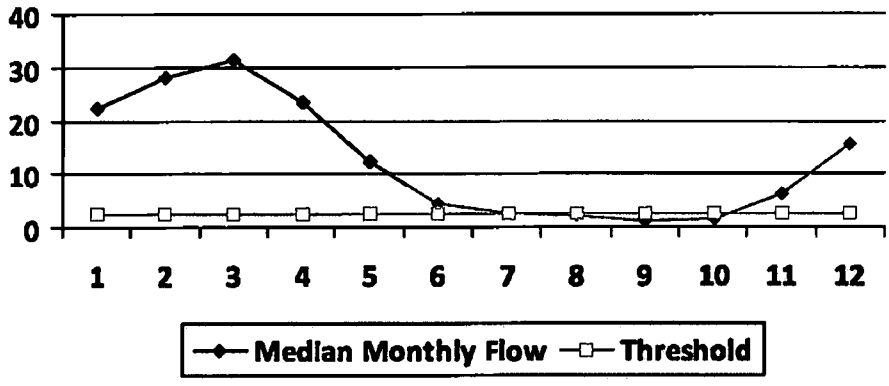
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00 Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	22.34	5.30	17.29
2	28.10	5.30	23.05
3	31.44	5.30	26.39
4	23.35	5.30	18.30
5	12.32	5.30	7.26
6	4.30	5.30	-0.75
7	2.43	5.30	-2.62
8	2.00	5.30	-3.05
9	1.03	5.30	-4.03
10	1.29	5.30	-3.76
11	6.30	5.30	1.25
12	15.39	5.30	10.34

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	2.05
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.51
Ungauged Stream Safety (cfs):	0.51
Min. Gauge Reading (cfs):	**69.73**
Passby at Location (cfs):	**3.07**

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13878 Source Name Buckeye Creek @ Powell Withdrawal
Dennis Powell

Source Latitude: 39.277142
Source Longitude: -80.690386

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 31.15 County: Doddridge

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015
Total Volume from Source (gal):

☐ Endangered Species? ☑ Mussel Stream?
☐ Trout Stream? ☐ Tier 3?
☐ Regulated Stream?
☐ Proximate PSD?
☐ Gauged Stream?

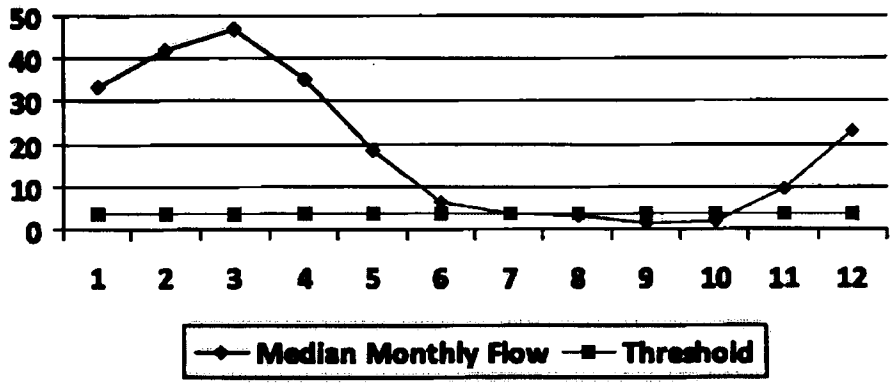
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00 Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	33.41	6.82	26.95
2	42.02	6.82	35.56
3	47.02	6.82	40.56
4	34.92	6.82	28.46
5	18.42	6.82	11.96
6	6.43	6.82	-0.03
7	3.64	6.82	-2.82
8	3.00	6.82	-3.46
9	1.53	6.82	-4.92
10	1.93	6.82	-4.53
11	9.42	6.82	2.96
12	23.01	6.82	16.55

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	3.06
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.77
Ungauged Stream Safety (cfs):	0.77
Min. Gauge Reading (cfs):	**69.73**
Passby at Location (cfs):	**4.59**

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP-01080 | API/ID Number: 017-FWC-00002 | Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13879 Source Name South Fork of Hughes River @ Knight Withdrawal
Tracy C. Knight & Stephanie C. Knight

Source Latitude: 39.198369
Source Longitude: -80.870969

HUC-8 Code: 5030203

Drainage Area (sq. mi.): 16.26 County: Ritchie

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015
Total Volume from Source (gal):
Max. Pump rate (gpm): 3,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

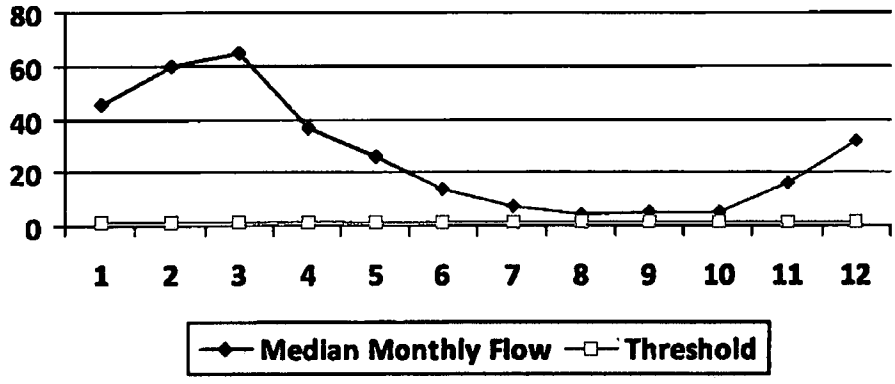
- [x] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [x] Gauged Stream?

Reference Gaug 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

Drainage Area (sq. mi.) 229.00 Gauge Threshold (cfs): 22

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	45.67	14.26	31.44
2	59.55	14.26	45.31
3	65.21	14.26	50.97
4	36.87	14.26	22.63
5	25.86	14.26	11.63
6	13.90	14.26	-0.33
7	6.89	14.26	-7.34
8	3.98	14.26	-10.25
9	4.79	14.26	-9.45
10	5.20	14.26	-9.04
11	15.54	14.26	1.30
12	32.06	14.26	17.82

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	1.56
Upstream Demand (cfs):	5.62
Downstream Demand (cfs):	0.00
Pump rate (cfs):	6.68
Headwater Safety (cfs):	0.39
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	**39.80**
Passby at Location (cfs):	**1.95**

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

Source Detail

WMP- 01080 API/ID Number: 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impoundment

Source ID: 13880 Source Name North Fork of Hughes River @ Davis Withdrawal
Lewis P. Davis and Normal J. Davis

Source Latitude: 39.322363
Source Longitude: -80.936771

HUC-8 Code: 5030203

Drainage Area (sq. mi.): 15.18 County: Ritchie

Anticipated withdrawal start date: 3/29/2013
Anticipated withdrawal end date: 3/29/2015

☑ Endangered Species? ☑ Mussel Stream?
☐ Trout Stream? ☐ Tier 3?
☐ Regulated Stream?
☐ Proximate PSD?
☐ Gauged Stream?

Total Volume from Source (gal):

Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

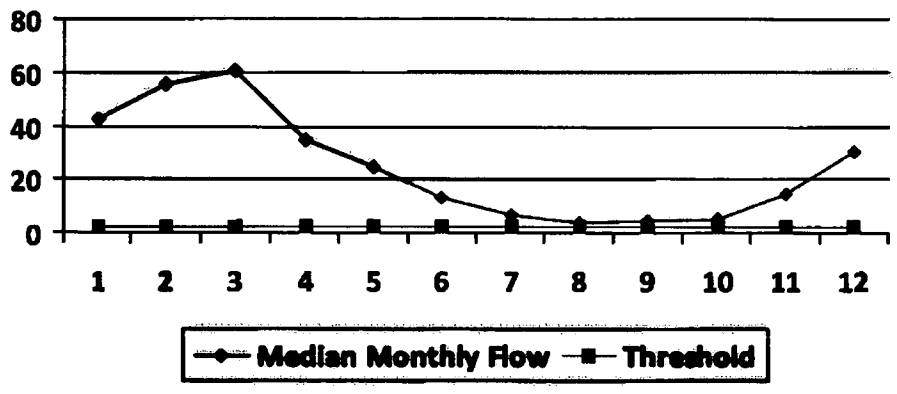
Reference Gaug 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

Drainage Area (sq. mi.) 229.00

Gauge Threshold (cfs): 22

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	42.64	4.42	38.36
2	55.59	4.42	51.32
3	60.88	4.42	56.60
4	34.42	4.42	30.14
5	24.15	4.42	19.87
6	12.98	4.42	8.70
7	6.44	4.42	2.16
8	3.72	4.42	-0.56
9	4.47	4.42	0.19
10	4.85	4.42	0.57
11	14.50	4.42	10.23
12	29.93	4.42	25.65

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	1.46
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.36
Ungauged Stream Safety (cfs):	0.36
Min. Gauge Reading (cfs):	**35.23**
Passby at Location (cfs):	**2.19**

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

west virginia department of environmental protection

Water Management Plan:
Secondary Water Sources

WMP-01080 API/ID Number 017-FWC-00002 Operator: Antero Resources

Hinter Heirs South Centralized Freshwater Impou

Important:

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- **For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.**
- **For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.**

Lake/Reservior

Source ID: 13883 Source Name City of Salem Reservior (Lower Dog Run)
Public Water Provider

Source start date: 3/29/2013
Source end date: 3/29/2015

Source Lat: 39.28834 Source Long: -80.54966 County Harrison

Max. Daily Purchase (gal) 1,000,000 Total Volume from Source (gal):

DEP Comments:

APPROVED APR 0 2 2013

Important:

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

Source ID: 13884 Source Name Pennsboro Lake
Source start date: 3/29/2013
Source end date: 3/29/2015

Source Lat: 39.281689 Source Long: -80.925526 County Ritchie

Max. Daily Purchase (gal) Total Volume from Source (gal):

DEP Comments:

Source ID: 13885 Source Name Powers Lake (Wilderness Water Park Dam)
Private Owner
Source start date: 3/29/2013
Source end date: 3/29/2015

Source Lat: 39.255752 Source Long: -80.463262 County Harrison

Max. Daily Purchase (gal) Total Volume from Source (gal):

DEP Comments:

APPROVED APR 0 2 2013

Important:

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

Source ID: 13886 Source Name Powers Lake Two

Source start date: 3/29/2013
Source end date: 3/29/2015

Source Lat: 39.247604 Source Long: -80.466642 County Harrison

Max. Daily Purchase (gal)

Total Volume from Source (gal):

DEP Comments:

APPROVED Apr 3 - 2013

Important:

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

Other

Source ID: 13887 Source Name Poth Lake (Landowner Pond)
Private Owner
Source start date: 3/29/2013
Source end date: 3/29/2015

Source Lat: 39.221306 Source Long: -80.463028 County Harrison

Max. Daily Purchase (gal) Total Volume from Source (gal):

DEP Comments:

Source ID: 13888 Source Name Williamson Pond (Landowner Pond)
Source start date: 3/29/2013
Source end date: 3/29/2015

Source Lat: 39.19924 Source Long: -80.886161 County Ritchie

Max. Daily Purchase (gal) Total Volume from Source (gal):

DEP Comments:

Important:

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

Source ID: 13889 Source Name Eddy Pond (Landowner Pond)
Source start date: 3/29/2013
Source end date: 3/29/2015

Source Lat: 39.19924 Source Long: -80.886161 County Ritchie

Max. Daily Purchase (gal) Total Volume from Source (gal):

DEP Comments:

Source ID: 13890 Source Name Hog Lick Quarry
Industrial Facility
Source start date: 3/29/2013
Source end date: 3/29/2015

Source Lat: 39.419272 Source Long: -80.217941 County Marion

Max. Daily Purchase (gal) 1,000,000 Total Volume from Source (gal):

DEP Comments:

Important:

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

Source ID: 13891 Source Name Glade Fork Mine Industrial Facility

Source start date: 3/29/2013
Source end date: 3/29/2015

Source Lat: 38.965767 Source Long: -80.299313 County Upshur

Max. Daily Purchase (gal) 1,000,000 Total Volume from Source (gal):

DEP Comments:

WMP#: 61080

west virginia department of environmental protection
601 57th Street SE
Charleston, WV 25304-2345

DEP Office Use only
Date Received by Oil & Gas:
Administratively Complete – Oil & Gas: ☐ Yes ☐ No
Date Received by Water Use:
Complete – Water Use: ☑ Yes ☐ No

WATER MANAGEMENT PLAN/ WATER ADDENDUM

Centralized Impoundments and Pits

Office of Oil and Gas
Phone: (304) 926-0450

Section I - Operator Information

Identifier (assigned by Oil & Gas): 015-FWC-00002
☐ Modification?

Operator Name: Antero Resources Appalachian Corporation	
Operator ID: 49448855	*Registered in the Frac Water Reporting Website? Yes ☑ No ☐
Mailing Address: 1625 17th Street Denver CO 80202	Contact Name/Title (Water Resources Manager): Amanda Fernley/Environmental and Regulatory Analyst
Contact Phone: (303) 357- 6736	Contact Email: afernley@anteroresources.com

Received
MAR 26 2013
WVDEP
Water Use Section

*If no, the operator will be required to register with the WVDEP Water Use Section; contact dep.water.use@wv.gov

Section II – Impoundment/Pit Overview

Impoundment/Pit Name: Hinter Heirs South Centralized Freshwater Impoundment

	Location (decimal degrees, NAD 83)		
☑ Centralized Impoundment (Freshwater) ☐ Centralized Waste Pit	Latitude: 39.18601094	Longitude: -80.70620636	County: Doddridge
Landowner name and address: David Burton and Vivian Burton 1094 Williamstown Pike, Williamstown, WV. 26187		Phone:	

Section III – Source Water Overview (check all that apply)

☑ Streams/Rivers	☑ Lakes/Reservoirs/Pond	☑ Ground Water	☑ Purchased Water (PSD)
☐ Purchased Water (Private)	☐ Recycled Frac Water	Other (describe):	
Total impoundment/pit capacity (gal): 7,716,128.7			

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: West Fork River at JCP Withdrawal		
Location (decimal degrees, NAD 83)		
Latitude: 39.3209139	Longitude: -80.3375722	County: Harrison
Landowner name and address: James & Brenda Raines PO Box 446, Lumberport WV 26386; Clarence Mutschelknaus 107 E. Main St, Salem WV 26426; Patrick Deem, Jr. 623 Rivendell Dr, Bridgeport WV 26330	Phone: James Raines (304) 641- 9594	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000 gpm
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☒ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between surface water sources.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream : ☐	Stream Final Code:	Regulated by:	
Trout? ☐	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐		Upstream Drainage Area?	

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: West Fork River at McDonald		
Location (decimal degrees, NAD 83)		
Latitude: 39.16761	Longitude: 80.45069	County: Harrison
Landowner name and address: William M McDonald RR2 Box 215A, Jane lew, WV, 26378	Phone: 304-677-5944	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 3000
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☒ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between the withdrawal locations.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream ☐	Stream Final Code:	Regulated by:	
Trout? ☐	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐	Upstream Drainage Area?		

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: West Fork River at GAL Withdrawal		
Location (decimal degrees, NAD 83)		
Latitude: 39.16422	Longitude: -80.45173	County: Harrison
Landowner name and address: David Shrieves PO Box 215Z Jane Lew WV 26378	Phone: 304-745-3546	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000 gpm
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☒ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between surface water sources.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream ☐	Stream Final Code:	Regulated by:	
Trout? ☐	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐		Upstream Drainage Area?	

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: Middle Island Creek at Dawson Withdrawal		
Location (decimal degrees, NAD 83)		
Latitude: 39.379292	Longitude: -80.867803	County: Tyler
Landowner name and address: Gary D Dawson and Rella A Dawson HC 69, Box 31A, Alma, West Virginia, 26320	Phone: (304)-758-0160	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 3000
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☒ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between surface water sources.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream ☐	Stream Final Code:	Regulated by:	
Trout? ☐	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐		Upstream Drainage Area?	

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: McElroy Creek at Forest Withdrawal		
Location (decimal degrees, NAD 83)		
Latitude: 39.39675	Longitude: 80.738197	County: Tyler
Landowner name and address: Forest C. Moore, Jr. and Brenda L. Moore HC 67 Box 157 West Union, WV 26456	Phone: (304) 758-5127	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000 gpm
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☒ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between surface water sources.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream ☐	Stream Final Code.	Regulated by:	
Trout? ☐	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐		Upstream Drainage Area?	

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: McElroy Creek at Sweeney Withdrawal		
Location (decimal degrees, NAD 83)		
Latitude: 39.398123	Longitude: -80.656808	County: Doddridge
Landowner name and address: Bill Sweeney PO Box 126 Mannington, WV 26582	Phone: 304-986-1432	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000 gpm
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☒ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between surface water sources.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream : ☐	Stream Final Code:	Regulated by:	
Trout? ☐	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐		Upstream Drainage Area?	

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: Meathouse Fork at Gagnon Withdrawal		
Location (decimal degrees, NAD 83)		
Latitude: 39.260540	Longitude: -80.720998	County: Doddridge
Landowner name and address: George L. Gagnon and Susan C. Gagnon Rt.1 Box 312, West Union, West Virginia	Phone: 304-709-4029	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☒ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between surface water sources.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream ☐	Stream Final Code:	Regulated by:	
Trout? ☐	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐		Upstream Drainage Area?	

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: Meathouse Creek at Whitehair Withdrawal		
Location (decimal degrees, NAD 83)		
Latitude: 39.211317	Longitude: -80.679592	County: Doddridge
Landowner name and address: Elton Whitehair 3108 Meathouse Fork Road New Milton WV 26411	Phone: 304-873-1351	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☒ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between surface water sources.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream ☐	Stream Final Code:	Regulated by:	
Trout? ☐	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐		Upstream Drainage Area?	

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: Tom's Fork at Erwin		
Location (decimal degrees, NAD 83)		
Latitude: 39.174306	Longitude: -80.702992	County: Doddridge
Landowner name and address: John F. Erwin and Sandra E. Erwin 12222 WV Rt. 18 South, New Milton, WV 26411	Phone: (304) 873-1885	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000 gpm
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☐ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between surface water sources.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream: ☐	Stream Final Code:	Regulated by:	
Trout? ☐	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐		Upstream Drainage Area?	

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: Arnold Creek at Davis Withdrawal		
Location (decimal degrees, NAD 83)		
Latitude: 39.300625	Longitude: -80.823622	County: Doddridge
Landowner name and address: Jonathan Davis Rt. 1 Box 271 West Union WV 26456	Phone: (304)873-1916	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000 gpm
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☒ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between the withdrawal locations.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream ☐	Stream Final Code:	Regulated by:	
Trout? ☐	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐	Upstream Drainage Area?		

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: Buckeye Creek at Powell Withdrawal		
Location (decimal degrees, NAD 83)		
Latitude: 39.277142	Longitude: -80.690386	County: Doddridge
Landowner name and address: Dennis Powell Grant District Doddridge county, WV	Phone:	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☒ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between surface water sources.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream ☐	Stream Final Code:	Regulated by:	
Trout? ☐	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐	Upstream Drainage Area?		

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: South Fork at Knight Withdrawal		
Location (decimal degrees, NAD 83)		
Latitude: 39.198369	Longitude: -80.870969	County: Ritchie
Landowner name and address: Tracy C. Knight and Stephanie C. Knight P.O. Box 138 Pullman, WV 26421	Phone: 303-349-2121	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 3000 gpm
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☒ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between the withdrawal locations.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream ☐	Stream Final Code:	Regulated by:	
Trout? ☒	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐	Upstream Drainage Area?		

Section III(a) - Surface Water Source (to be completed for each surface water withdrawal location, print additional pages as necessary)

Source Name: North Fork Hughes at Davis Withdrawal		
Location (decimal degrees, NAD 83)		
Latitude: 39.322363	Longitude: -80.936771	County: Ritchie
Landowner name and address: Lewis P. Davis and Norma J. Davis 4146 Mountain Dr., Pennsboro, WV 26415	Phone: 304-659-2249	
Obtained Landowner Permission? Yes ☒ No ☐		

Proposed Withdrawal Details

Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000
No. of Pump Trucks: N/A	Max. Pump Rate per Truck (gpm): N/A	No. Trucks Simultaneously Pumping: N/A	

Determination that sufficient flow is available downstream from proposed intake point

Allow passby to be calculated by the DEP (Preferred)? Yes ☐ No ☐
(If no, advance written authorization by DEP is required. Attach authorization and details.)

Aquatic Life Protection

Describe Entrainment and Impingement Prevention Plan:

Fish screens will be installed on the water withdrawal intake hoses to prevent losses of resident fresh water fish with a minimum fork length of 5 mm (approx. 1 inch). The sizing of the fish screens will also afford protection of mussels. The water withdrawal hoses will be installed a minimum of 300 mm (12 in)above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the streambed.

Describe Invasive Species Transfer Prevention Plan:

Water withdrawal trucks and intake hoses will be disinfected on a routine basis. Withdrawal trucks will be blown out at the conclusion of each day. In addition, individual trucking companies will be assigned to a specific withdrawal point to prevent the transfer of aquatic life between surface water sources.

Stream details

DEP Office Use Only			
Contact Recreation ☐	Aquatic Life-Trout Water ☐	Aquatic Life-Warm Water ☐	Drinking Water Supply ☐
Industrial ☐	Agriculture ☐	Irrigation ☐	Reference Gauge:
Gauged Stream ☐	Stream Final Code:	Regulated by:	
Trout? ☐	Sensitive Aquatic Species? ☐	Tier 3 Stream? ☐	Within 1 mile upstream of a PSD? Yes ☐ No ☐
Mussels? ☐		Upstream Drainage Area?	

Section III(b) - Ground Water Source (to be completed for each groundwater withdrawal location, print additional pages as necessary)

Well Permit # (if applicable):	Well name:	
Location (decimal degrees, NAD 83)		
Latitude:	Longitude:	County:
Aquifer: (if known)		
Landowner name and address:	Phone:	
Obtained Landowner Permission? Yes ☐ No ☐	☐ *New well (Drill date: _____) ☐ Existing well	

*If drilling a new well, please submit well logs to DEP's Water Use Section; Wells must be drilled and plugged in accordance with DHHR regulations

Total Depth:	Type of Casing:	Casing Diameter:	Screen Interval:	Screen Size:
Static Water Elevation:	Top of Casing Elevation:	Surface Elevation:	Type of Well Cap:	
Withdrawal Details				
			Max. Pump Rate (gpm):	

Analysis of potential groundwater impacts

Static Water Level Prior to Test: _____ feet below grade
Drawdown (Water Level/Elevation During Pump Test): _____ feet
Duration of Pump Test: _____ hours
Gallons Per Minute During Pump Test: _____ gpm
Time to Return to Static Water Level After Pump Test: _____ hours

Section III(c) - Purchased Water Source (to be completed for each water supplier, print additional pages as necessary)

Supplier Name and Contact Information:		
Sun Valley Withdrawal Jeff Sperry, 234 Power Road Salem, WV, 26426		
Location(decimal degrees, NAD 83)		
Latitude: 39.290626	Longitude: -80.518586	County: Harrison
Public Water Provider ☒	Waste Water Treatment Plant ☐	Industrial (intake locations must be provided) ☐
Commercial Supplier (intake locations must be provided) ☐	Private (intake locations must be provided) ☐	

Purchase Details			
Start Date:	End Date:	Total Purchase from Source (gal):	Max. daily purchase (gal): 200,000
Supplier intake details:			

Section III(d) - Lake/Reservoir Water Source (to be completed for each lake/reservoir)

Lake/Reservoir Name:		
Location (decimal degrees, NAD 83)		
Latitude:	Longitude	County:
Landowner name and address:		
Permission to withdraw obtained from owner: Yes ☐ No ☐	Minimum release (cfs):	

Withdrawal Details			
Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm):

Section III(c) - Purchased Water Source (to be completed for each water supplier, print additional pages as necessary)

Supplier Name and Contact Information:		
The City of Salem 229 West Main Street Salem WV 26428		
Location(decimal degrees, NAD 83)		
Latitude: 39.28593	Longitude: -80.54605	County: Harrison
Public Water Provider ☒	Waste Water Treatment Plant ☐	Industrial (intake locations must be provided) ☐
Commercial Supplier (intake locations must be provided) ☐	Private (intake locations must be provided) ☐	
Purchase Details		
Start Date:	End Date:	Total Purchase from Source (gal): / Max. daily purchase (gal): 1000000
Supplier intake details:		

Section III(d) - Lake/Reservoir Water Source (to be completed for each lake/reservoir)

Lake/Reservoir Name: Poth Lake		
Location (decimal degrees, NAD 83)		
Latitude: 39.21945	Longitude -80.886161	County: Harrison
Landowner name and address: Kevin J. Poth, RR1 Box 199, Lost Creek, West Virginia 26385-9742		
Permission to withdraw obtained from owner: Yes ☒ No ☐	Minimum release (cfs): N/A	
Withdrawal Details		
Start Date:	End Date:	Total Withdrawal from Source (gal): / Max. Pump Rate (gpm): 1000

Section III(c) - Purchased Water Source (to be completed for each water supplier, print additional pages as necessary)

Supplier Name and Contact Information:			
Location(decimal degrees, NAD 83)			
Latitude:	Longitude:	County:	
Public Water Provider ☐	Waste Water Treatment Plant ☐	Industrial (intake locations must be provided) ☐	
Commercial Supplier (intake locations must be provided) ☐	Private (intake locations must be provided) ☐		
Purchase Details			
Start Date:	End Date:	Total Purchase from Source (gal):	Max. daily purchase (gal):
Supplier intake details:			

Section III(d) - Lake/Reservoir Water Source (to be completed for each lake/reservoir)

Lake/Reservoir Name: City of Pennsboro Lake		
Location (decimal degrees, NAD 83)		
Latitude: 39.28347	Longitude -80.92477	County: Ritchie
Landowner name and address: Nancy J. 422 Main Street Pennsboro, WV 26415		
Permission to withdraw obtained from owner: Yes ☒ No ☐	Minimum release (cfs): N/A	
Withdrawal Details		
Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000

Section III(c) - Purchased Water Source (to be completed for each water supplier, print additional pages as necessary)

Supplier Name and Contact Information:			
Location(decimal degrees, NAD 83)			
Latitude:	Longitude:	County:	
Public Water Provider ☐	Waste Water Treatment Plant ☐	Industrial (intake locations must be provided) ☐	
Commercial Supplier (intake locations must be provided) ☐	Private (intake locations must be provided) ☐		
Purchase Details			
Start Date:	End Date:	Total Purchase from Source (gal):	Max. daily purchase (gal):
Supplier intake details:			

Section III(d) - Lake/Reservoir Water Source (to be completed for each lake/reservoir)

Lake/Reservoir Name: Powers Lake		
Location (decimal degrees, NAD 83)		
Latitude: 39.25575	Longitude -80.463262	County: Harrison
Landowner name and address: Nancy J. Powers RR-4 Box 854 Salem West Virginia 26426-8915		
Permission to withdraw obtained from owner: Yes ☑ No ☐	Minimum release (cfs): N/A	
Withdrawal Details		
Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000

Section III(c) - Purchased Water Source (to be completed for each water supplier, print additional pages as necessary)

Supplier Name and Contact Information:		
Location(decimal degrees, NAD 83)		
Latitude:	Longitude:	County:
Public Water Provider ☐	Waste Water Treatment Plant ☐	Industrial (intake locations must be provided) ☐
Commercial Supplier (intake locations must be provided) ☐	Private (intake locations must be provided) ☐	
Purchase Details		
Start Date:	End Date:	Total Purchase from Source (gal): / Max. daily purchase (gal):
Supplier intake details:		

Section III(d) - Lake/Reservoir Water Source (to be completed for each lake/reservoir)

Lake/Reservoir Name: Powers Lake Two		
Location (decimal degrees, NAD 83)		
Latitude:	Longitude	County:
39.2476045	-80.4666424	Harrison
Landowner name and address:		
Nancy J. Powers RR-4 Box 854 Salem West Virginia 26426-8915		
Permission to withdraw obtained from owner: Yes ☑ No ☐	Minimum release (cfs): N/A	
Withdrawal Details		
Start Date:	End Date:	Total Withdrawal from Source (gal): / Max. Pump Rate (gpm):
		1000

Section III(c) - Purchased Water Source (to be completed for each water supplier, print additional pages as necessary)

Supplier Name and Contact Information:			
Location(decimal degrees, NAD 83)			
Latitude:	Longitude:	County:	
Public Water Provider ☐	Waste Water Treatment Plant ☐	Industrial (intake locations must be provided) ☐	
Commercial Supplier (intake locations must be provided) ☐	Private (intake locations must be provided) ☐		
Purchase Details			
Start Date:	End Date:	Total Purchase from Source (gal):	Max. daily purchase (gal):
Supplier intake details:			

Section III(d) - Lake/Reservoir Water Source (to be completed for each lake/reservoir)

Lake/Reservoir Name: Williamson Pond		
Location (decimal degrees, NAD 83)		
Latitude: 39.199379	Longitude -80.884347	County: Ritchie
Landowner name and address: Andrew and Yolanda Williamson 783 4-Mile Creek Road Branchland, WV 25506		
Permission to withdraw obtained from owner: Yes ☒ No ☐	Minimum release (cfs): N/A	
Withdrawal Details		
Start Date:	End Date:	Total Withdrawal from Source (gal):	Max. Pump Rate (gpm): 1000

Section III(c) - Purchased Water Source (to be completed for each water supplier, print additional pages as necessary)

Supplier Name and Contact Information:		
Location(decimal degrees, NAD 83)		
Latitude:	Longitude:	County:
Public Water Provider ☐	Waste Water Treatment Plant ☐	Industrial (intake locations must be provided) ☐
Commercial Supplier (intake locations must be provided) ☐	Private (intake locations must be provided) ☐	
Purchase Details		
Start Date:	End Date:	Total Purchase from Source (gal): / Max. daily purchase (gal):
Supplier intake details:		

Section III(d) - Lake/Reservoir Water Source (to be completed for each lake/reservoir)

Lake/Reservoir Name: Eddy Pad Pond		
Location (decimal degrees, NAD 83)		
Latitude:	Longitude	County:
39.3352604	-80.9275531	Ritchie
Landowner name and address: Annie B Haymond, 4884 Mountain Dr, Pennsboro, WV 26415		
Permission to withdraw obtained from owner: Yes ☒ No ☐	Minimum release (cfs): N/A	
Withdrawal Details		
Start Date:	End Date:	Total Withdrawal from Source (gal): / Max. Pump Rate (gpm):
		1000

Section III(c) - Purchased Water Source (to be completed for each water supplier, print additional pages as necessary)

Supplier Name and Contact Information:		
Hog Lick Quarry Arthur J. Rockwell PO Box 970 Bridgeport, WV 26330		
Location(decimal degrees, NAD 83)		
Latitude: 39.4192725	Longitude: -80.2179413	County: Marion County
Public Water Provider ☐	Waste Water Treatment Plant ☐	Industrial (intake locations must be provided) ☐
Commercial Supplier (intake locations must be provided) ☐	Private (intake locations must be provided) ☒	
Purchase Details		
Start Date:	End Date:	Total Purchase from Source (gal): / Max. daily purchase (gal): 1000000
Supplier intake details:		

Section III(d) - Lake/Reservoir Water Source (to be completed for each lake/reservoir)

Lake/Reservoir Name:		
Location (decimal degrees, NAD 83)		
Latitude:	Longitude	County:
Landowner name and address:		
Permission to withdraw obtained from owner: Yes ☐ No ☐	Minimum release (cfs):	
Withdrawal Details		
Start Date:	End Date:	Total Withdrawal from Source (gal): / Max. Pump Rate (gpm):

Section III(c) - Purchased Water Source (to be completed for each water supplier, print additional pages as necessary)

Supplier Name and Contact Information:		
Glade Fork Mine Larry Alderman Rt. 3 Box 312-3 Buckannon, WV 26201		
Location(decimal degrees, NAD 83)		
Latitude: 38.9657673	Longitude: -80.2993132	County: Upshur
Public Water Provider ☐	Waste Water Treatment Plant ☐	Industrial (intake locations must be provided) ☐
Commercial Supplier (intake locations must be provided) ☐	Private (intake locations must be provided) ☒	
Purchase Details		
Start Date:	End Date:	Total Purchase from Source (gal): / Max. daily purchase (gal): 1000000
Supplier intake details:		

Section III(d) - Lake/Reservoir Water Source (to be completed for each lake/reservoir)

Lake/Reservoir Name:		
Location (decimal degrees, NAD 83)		
Latitude:	Longitude	County:
Landowner name and address:		
Permission to withdraw obtained from owner: Yes ☐ No ☐	Minimum release (cfs):	
Withdrawal Details		
Start Date:	End Date:	Total Withdrawal from Source (gal): / Max. Pump Rate (gpm):

Section III(c) - Purchased Water Source (to be completed for each water supplier, print additional pages as necessary)

Supplier Name and Contact Information:		
Mr. Clifford E. Smith Solo Construction, LLC PO Box 544 St. Marys, WV 26170		
Location(decimal degrees, NAD 83)		
Latitude: 39.399094	Longitude: -81.185548	County: Pleasants
Public Water Provider ☐	Waste Water Treatment Plant ☐	Industrial (intake locations must be provided) ☒
Commercial Supplier (intake locations must be provided) ☐	Private (intake locations must be provided) ☐	
Purchase Details		
Start Date:	End Date:	Total Purchase from Source (gal): / Max. daily purchase (gal): 1000000
Supplier intake details: Middle Island Creek - 39.399094 -81.185548		

Section III(d) - Lake/Reservoir Water Source (to be completed for each lake/reservoir)

Lake/Reservoir Name:		
Location (decimal degrees, NAD 83)		
Latitude:	Longitude	County:
Landowner name and address:		
Permission to withdraw obtained from owner: Yes ☐ No ☐	Minimum release (cfs):	
Withdrawal Details		
Start Date:	End Date:	Total Withdrawal from Source (gal): / Max. Pump Rate (gpm):

Section III(f) - Recycled Frac Water (to be completed for each source, print additional pages as necessary)

API # of Previous Well (or other descriptor):	Total volume from source (gal):
Date of Water Transfer	
Start Date:	End Date:

API # of Previous Well (or other descriptor):	Total volume from source (gal):
Date of Water Transfer	
Start Date:	End Date:

API # of Previous Well (or other descriptor):	Total volume from source (gal):
Date of Water Transfer	
Start Date:	End Date:

API # of Previous Well (or other descriptor):	Total volume from source (gal):
Date of Water Transfer	
Start Date:	End Date:

API # of Previous Well (or other descriptor):	Total volume from source (gal):
Date of Water Transfer	
Start Date:	End Date:

Section VI - Operator Comments

Section VII – Plan Reviewed By

DEP Office Use only

API # 017-Fwc-00002

Name	Signature	Date
Jack Hamm		3/28/13

Comments

6.2 Mud Mixing Units

The drilling rig is equipped with 2 mud tanks with agitators and jets such that it can make two pills.

6.3 Kill Procedures

The following paragraph describes the methodology and type of kill procedures that will be used if needed. These procedures are recognized by the IADC.

Once a Kick is detected a prompt shut in of the well is essential. The exact shut in method will be dictated by the operation being performed at the time of the kick, available equipment, plus other extenuating circumstance. The following types of kill operations may be performed to bring the well back under control. The different methods listed below to be used will be determined by the operation being performed at the time of the kick.

Kill Procedures

1.) Drillers Method

2.) Wait and Weight Method

3.) Circulate and Weight Method

4.) Concurrent Method

5.) Reverse Circulation Method

6.) Dynamic Kill Method

7.) Bullheading Method

8.) Volumetric Method

7.0 Hydrogen Sulfide Operations

7.1 H2S Monitoring

The equipment and method used for the monitoring, detection and warning of the presence of hydrogen sulfide gas during drilling, completions and work-over operations will be portable electronic gas detection such as BW gas detectors or equivalent. These detectors will be

typically located near the well bore on the drilling rig, outside the data van or on the drillers stand.

7.2 H2S Training

All personnel that will be involved in the drilling operations will be trained in H2S in drilling operations to a minimum of the awareness level. Additional training will be given to the Drilling Supervisors both in H2S and emergency response duties related specifically to air toxins. All of the aforementioned training will be completed prior to spudding the well. These records may be kept separate from this plan.

7.3 Personal Protection Equipment

The following personal protection equipment will be available and in use as needed on location:

- Fire Retardant Clothing (FRC),
- Hardhats,
- safety shoes,
- safety glasses and/or safety goggles/face shields,
- hearing protection earplugs,
- cotton and chemical resistant work gloves, and
- dust mask respirators.

In the event that other hazards are identified or presented during the drilling operation, we will attempt to eliminate the hazard, and if not practical, additional PPE will be provided to mitigate the risk to the worker. In the event that H2S is detected, a hazard assessment will be performed for this exposure along with risk mitigation.

7.4 H2S Notification and Control

The emergency alarm will be audible or visual type which will be detectable by all personnel on location. If dangerous levels of H2S are detected, we will immediately implement our Emergency Response Plan which will provide for site control and evacuation as needed. Generally, the site will be secured such that access is allowed only for trained emergency response personnel. Site security will be accomplished by trained workers stationed at safe points on the perimeter and access road to the site.

If H2S is detected and confirmed, a telephonic notification will be made to the local oil and gas inspector.

8.0 Notification and Protection Zone Standards

8.1 Method of Notification

In an emergency which requires the notification of residents and emergency personnel that may be affected during drilling such as release of H2S, flaring, etc., the emergency response plan will be immediately implemented. This plan specifies the roles and responsibilities of on-site personnel in case of emergency and addresses emergency notification of potentially affected residents and public emergency response personnel.

In general under the situation presently described, after the activation of the emergency alarm, the on-site personnel will muster for a headcount by the On-Scene Incident Commander which is usually the Drilling Supervisor or Toolpusher. After initial assessment of the situation, the OSIC will notify the public emergency response agency from which direction will be taken. If the agency directs, on-site personnel will notify all local impacted residents of the incident by dispatching a worker by truck to each potentially affected residence. If the public emergency responder does not direct this notification to be made by the operator, then the public response agency will be responsible for this notification. The local emergency responders have, in general, stated that emergency notification of local residents will be accomplished by their means including television and radio announcement as well as public address systems on patrol vehicles. Antero safety coordinators who are located in the field may assist with the notification of local residents.

8.2 Established Protection Zones

Protection zones will be established and maintained based on the nature, extent and severity of the event. These protection zones will be based on those safe distances outlined in the applicable portions of the DOT Emergency Response Guidebook.

Appendix A: Safety Meeting Log, Personnel and Visitor Log & Emergency Contacts

Safety Meeting Log

Date:_____ Location(Pad):_____ Well Name:_____

	Name	Organization	Job Title
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			

Appendix B.

Daily Personal and Visitor Log

DATE	TIME IN	TIME OUT	NAME	ORGANIZATION

Appendix C.

EMERGENCY CONTACT LIST AND PHONE NUMBERS

Contact	Phone Number
Designated Person and Incident Commander:	
John Kawcak, *Operations Manager*	817.368.1553 John
Tim Culberson, Midstream Construction Manager	918.916.0116 Tim
Terry Wyckoff, Midstream Production Manager	304.991.0720 Terry
Designated Backup Person Incident Commander/Response Coordinator:	
Mike Ward	580.276.7484 Mike
Ricky Jones	580.927.6276 Ricky
Norman Wood	903.353.4429 Norman
Stanley Dudley	970.618.7602 Stanley
Jeff Partridge	940.577.2288 Jeff
Landon West	940.389.0602 Landon
Tim Henrich	720.530.3059 Tim H.
Mike Alcorn	304.627.7070 Mike
James Harvey	918.916.4340 James
Tim Murrell	903.256.6040 Tim
Delf Martinez	970.629.0055 Delf
Ralph Ybarra	580.927.5606 Ralph
Virgil Gaither	580.504.2366 Virgil
James Neal	607.644.8701 James
Frontier #3	832.487.7965 Rig Sat Phone
Frontier #14	713.758.0662 Rig Sat Phone
Frontier #17	713,758.0730 Rig Sat Phone
Frontier #8	832.531.7014 Rig Sat Phone
Frontier #22	713.758.0893 Rig Sat Phone
Hall Drilling #3	713.758.0881 Rig Sat Phone
Antero Resources Denver Office 1625 17th Street, Suite 300 Denver, CO 80202	Office: (303) 357-7310 Fax: 303-357-7315
Environmental Manager Jerry Alberts	Direct: (303) 357-7341 Cell: 720-201-0160 24hr

Contact	Phone Number
Safety Manager Rick Blankenship	Direct: (303) 357-7378 Cell: (720) 235-2775 24hr
Vice President Production Kevin Kilstrom	Direct: (303) 357-7335 Cell: (303) 808-0254 24hr
Federal and State Agencies	
National Response Center	(800) 424-8802
West Virginia Office of Water Resources' Emergency Notification Number, Oil Spill Response	1-800-642-3074
West Virginia Office of Oil and Gas Tristan Jenkins, WVDEP Inspector – Harrison County Joe Taylor, WVDEP Inspector – Tyler County David Cowan, WVDEP Inspector – Ritchie County Sam Ward, WVDEP Inspector – Doddridge County	 (304) 552-3874 cell Tristan Jenkins (304) 380-7469 cell Joe Taylor (304) 389-3509 cell David Cowan (304) 389-7583 cell Sam Ward
Environmental Protection Agency (EPA) Region 3	Phone: 215-814-3231 Fax: 215-814-3163
West Virginia Worker's Compensation	1-888-4WVCOMP 1-304-926-3400
West Virginia Fish and Wildlife Service, Field Office, Elkins, WV	**Phone:** 304-636-6586 **Fax:** 304-636-7824
US OSHA Charles Green	1-800-321-OSHA (1-800-321-6742) 304.347.5937
Local Agencies and Responders	
Sheriff/Police/Fire Department	911
Harrison County LEPC	304.624.9700 John Keeling
Hospital- United Hospital Center--Clarksburg	304. 624.2121
Harrison County Emergency and Dispatch Business Office	911 304.623.6559

Contact	Phone Number
Doddridge County Emergency	911 304.873.3253
Doddridge County LEPC	304.782.2124 Roland W. Kniceley
WV Highway Patrol	304,782,2124 doddridgeoes@dishmail.net
Public Water Intakes (see App G for add'l points)	to be determined
Waste Removal	
TK Stanley—Waste Removal, Vac Truck	304.622.6677
Stallion	330.760.4248
Waste Management	
Contractors	
Hall Drilling Services MT Hall	304588 3368
TK Stanley	304.622.6677
Cleanup Crews	
Ryan Environmental	304.641.0244
Water Haulers	
TK Stanley	**304.476.0396**
Hall Drilling	**304.483.8125**
Frac Tank Suppliers	
TK Stanley—Frac Tank Rental	**304.622.6677**
Stallion	330.760.4248
Winch Trucks	
TK Stanley	304.476.9588

Contact	Phone Number
Water Moving/Pumping	
TK Stanley	304.476.0396
Pumping Services—Kill Fluids	
Halliburton—Jane Lew	724.743.6601 Central Dispatch
Light Plants	254.434.1469 Hot Lights- Josh
Wolfpack	304-623-1199.
BOPs	
Blue Dot	304.290.7399
Snubbing Services	Basic Energy- 724-825-2548 Bryan Berlison
Cudd Well Control	713.849.2769 Houston
Wild Well Control	281.353.5481
Roustabout Crews	740.473-1305 Hall Drilling Office 304.588.66474 Hall Drilling- Jack 601.410.7440- TK Stanley Office 724.984.7626- TK Stanley- Brett

WV Emergency Reporting

In the event of a hazardous waste or hazardous material release or emergency, please contact: 1-800-642-3074.

Additional Contact Information

1-800-424-8802 National Response Center
1-304-558-5938 DEP Elkview Emergency Response Unit

Email Contacts:

Mike Dorsey Mike.H.Dorsey@wv.gov
Rusty Joins Rusty.T.Joins@wv.gov

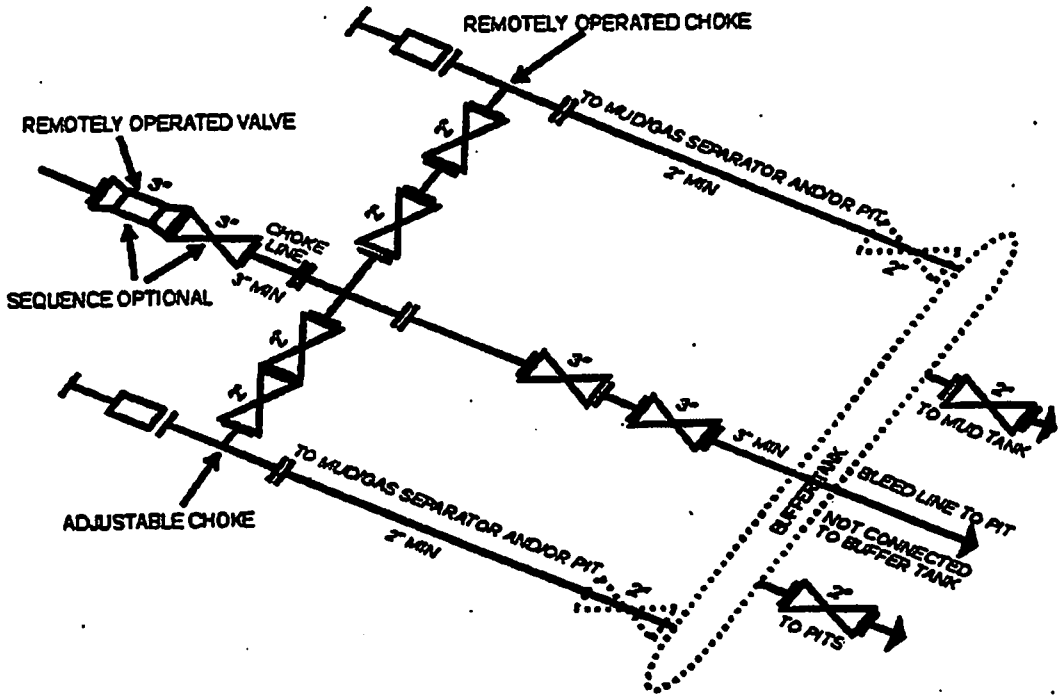
WHERE TO FIND HELP

Doddridge County:

Ambulance, Fire, Law Enforcement Emergencies Call 911
Poison Control Center....1-304-388-4211 or 1-800-222-1222
Emergency Alert System Radio WFBY-FM 106.5

FIRE:	
Doddridge County Ambulance Authority	304-838-5718
Greenwood V.F.D	304-873-3669
McClellan V.F.D	304-782-2774
Smithburg V.F.D	304-873-1493
West Union V.F.D	304-873-1391
B.A.N.C.S V.F.D	304-873-3722
EMS:	
Doddridge County Office of Emergency Service	304-782-2124
Doddridge County EMS	304-873-3330
LAW ENFOREMENT:	
Doddridge County Sheriff Department	304-873-1000
West Union Police Department	304-873-1107
West Virginia State Police Doddridge County Detachment	304-873-2101
OTHER IMPORTANT NUMBERS:	
W.V. Dept. of Health & Human Resources	304-627-2295
National Response Center (Chemical, Oil Spills & Chemical/Biological Terrorism) (State Emergency Spill Notification)	1-800-424-8802 1-800-642-3074
Allegheny Power	1-800-255-3443
WV State Fire Marshal (Arson Hotline)	304-588-2191 1-800-233-3473
Dominion Hope Gas	1-800-688-4673

Appendix D: Choke Manifold Schematic



5M CHOKE MANIFOLD EQUIPMENT - CONFIGURATION OF CHOKES MAY VARY

Although not required for any of the choke manifold systems, buffer tanks are sometimes installed downstream of the choke assemblies for the purpose of manifolding the bleed lines together. When buffer tanks are employed, valves shall be installed upstream to isolate a failure or malfunction without interrupting flow control. Though not shown on 2M, 3M, 10M, OR 15M drawings, it would also be applicable to those situations.

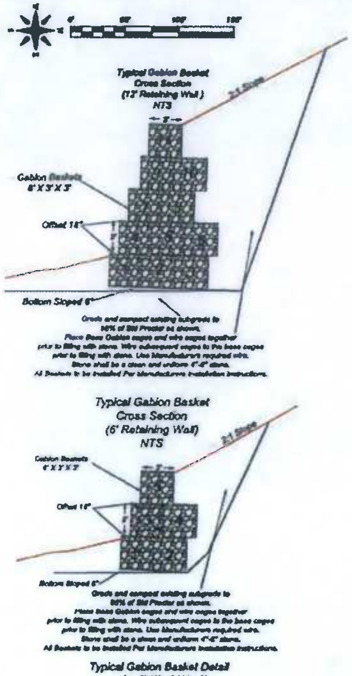
[54 FR 39528, Sept. 27, 1989]

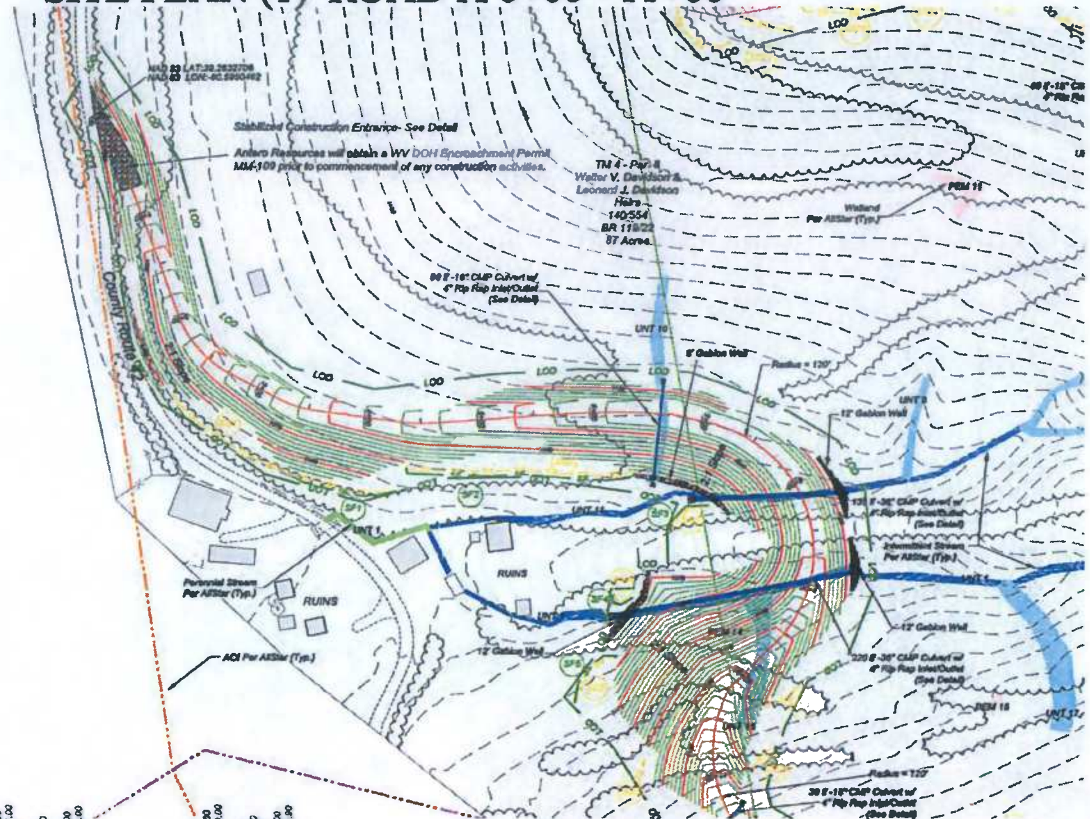
Appendix E. **List of Well Control Trained Personnel**

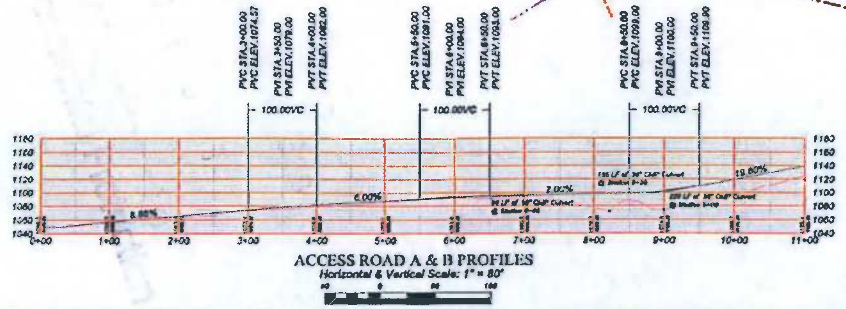
1. John Kawcak- Antero
2. Mike Ward- Drilling Consultant
3. Ricky Jones- Drilling Superintendent
4. Mike Alcorn- Drilling Superintendent
5. Landon West- Completion Consultant
6. Jeff Partridge-Completion Consultant
7. Norman Wood- Drilling Consultant
8. Delf Martinez- Drilling Consultant
9. James Harvey- Drilling Consultant
10. Steve Guffey- Drilling Consultant
11. Tim Murell- Drilling Consultant
12. James Neal-Drilling Consultant
13. Virgil Gaither-Drilling Consultant
14. Ralph Ybarra- Drilling Consultant
15. Bob Belcher- Completion Consultant (Willowbend)
16. Kris Humpert- Completion Consultant (Willowbend)
17. Ronnie Fuller- Completion Consultant (Willowbend)
18. Trevor Lively- Completion Consultant (Willowbend)
19. Trey Armstrong- Completion Consultant (Willowbend)
20. Gary Linn- Completion Consultant (Willowbend)
21. Justin Bowers- Completion Consultant (Willowbend)
22. Michael Petitt- Completion Consultant (Willowbend)
23. Stephen Sanders- Completion Consultant (Willowbend)

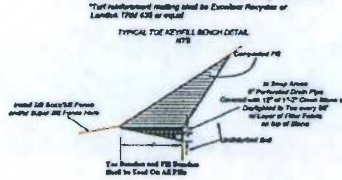
EXHIBIT 1, PAGE 1

SITE PLAN (1) ROAD A 0+00 - 11+00









Legend

Existing 2' Contour	Proposed Check Dam
Existing 10' Contour	Proposed Culvert W/ Inlet & Outlet Protection
Existing Tree Line	Proposed Straw Wattles
Existing Utility Line / Pole	Proposed Silt Sock/Silt Fence
Surface Owner Property Line	Proposed 2' Contour
Existing Gas Line CL	Proposed 10' Contour
Limits of Disturbance	Proposed Rip-Rap
Proposed Diversion Ditch	
Proposed 2' Contour	
Proposed 10' Contour	
Proposed Super Silt Fence	

DATE	REVISIONS
11/9/12	Updated per Antero/DEP comments

Allegheny Surveys, Inc.
172 Thompson Drive
Bridgeport, WV 26330
(304) 848-5035

L&W ENTERPRISES, INC.

ANTERO

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

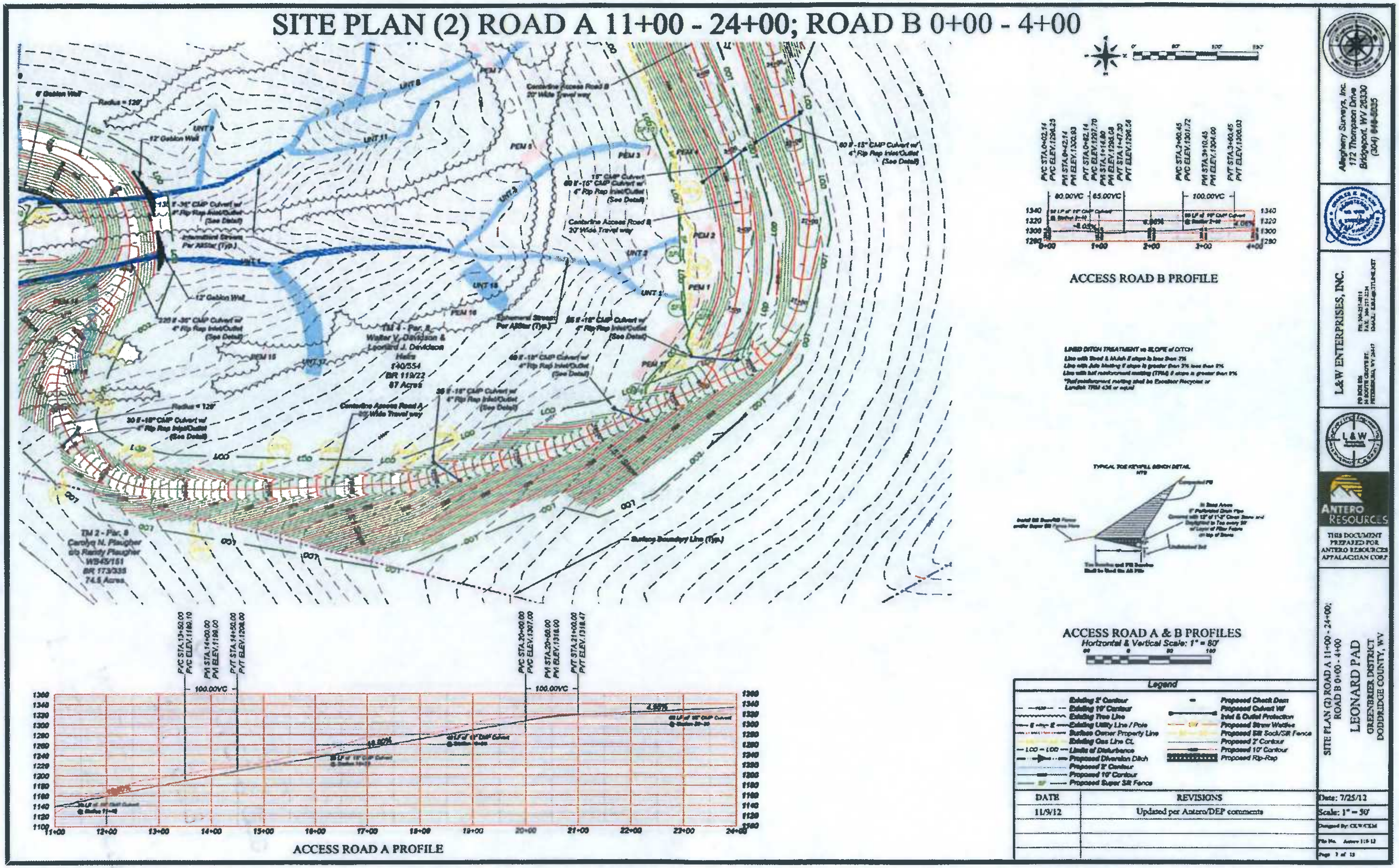
SITE PLAN (1) ROAD A 0+00 - 11+00

LEONARD PAD

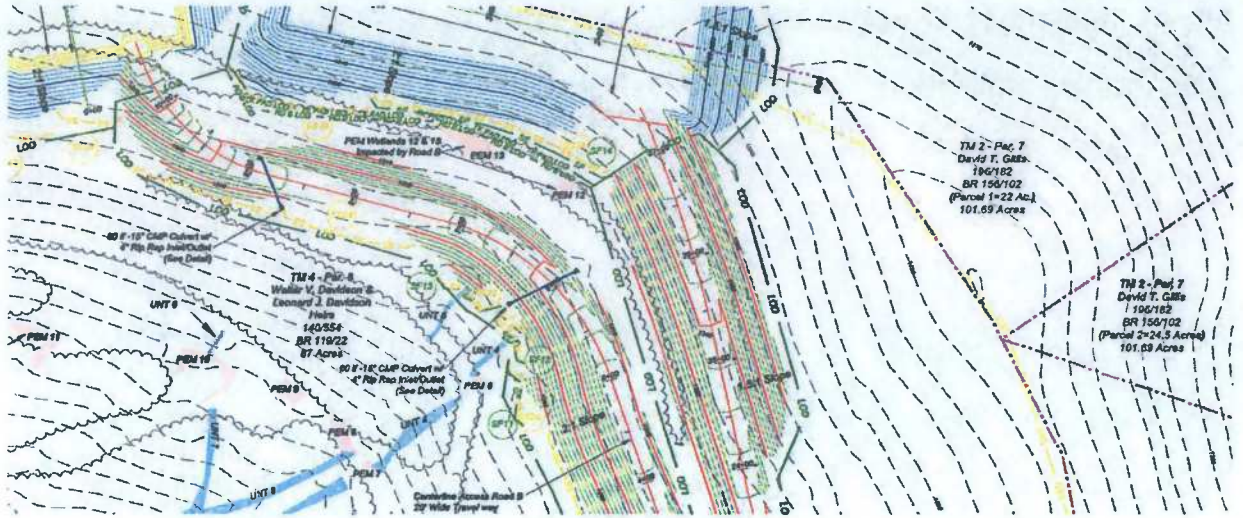
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

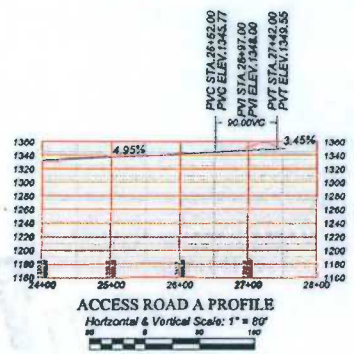
Date: 7/25/12
Scale: 1" = 50'

EXHIBIT 1, PAGE 2

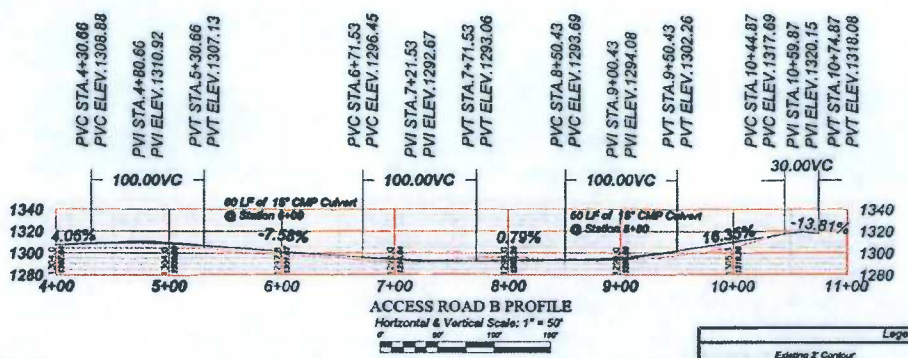


SITE PLAN (3) ROAD A 24+00 - 28+00 & ROAD B 4+00 - 11+00



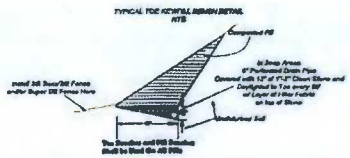


ACCESS ROAD A PROFILE
Horizontal & Vertical Scale: 1" = 80'



ACCESS ROAD B PROFILE
Horizontal & Vertical Scale: 1" = 50'

LINED DITCH TREATMENT vs SLOPE of DITCH
Line with Seed & Mulch if slope is less than 3%
Line with Jute Matting if slope is greater than 3% less than 8%
Line with turf reinforcement matting (TRM) if slope is greater than 8%
*Turf reinforcement matting shall be Excelsior Recyclex or
Landlok TRM 435 or equal



Legend

Existing 2' Contour	Proposed Check Dam
Existing 10' Contour	Proposed Culvert W/ Inlet & Outlet Protection
Existing Tree Line	Proposed Straw Wattles
Existing Utility Line / Pole	Proposed Silt Sock/Silt Fence
Surface Owner Property Line	Proposed 2' Contour
Existing Gas Line CL	Proposed 10' Contour
Limits of Disturbance	Proposed Rip-Rap
Proposed Diversion Ditch	
Proposed 2' Contour	
Proposed 10' Contour	
Proposed Super Silt Fence	

DATE	REVISIONS
11/9/12	Updated per Antero/DEP comments

Mattney Surveys, Inc.
732 Thompson Drive
Bridgeport, WV 26330
(304) 848-5035

L&W ENTERPRISES, INC.

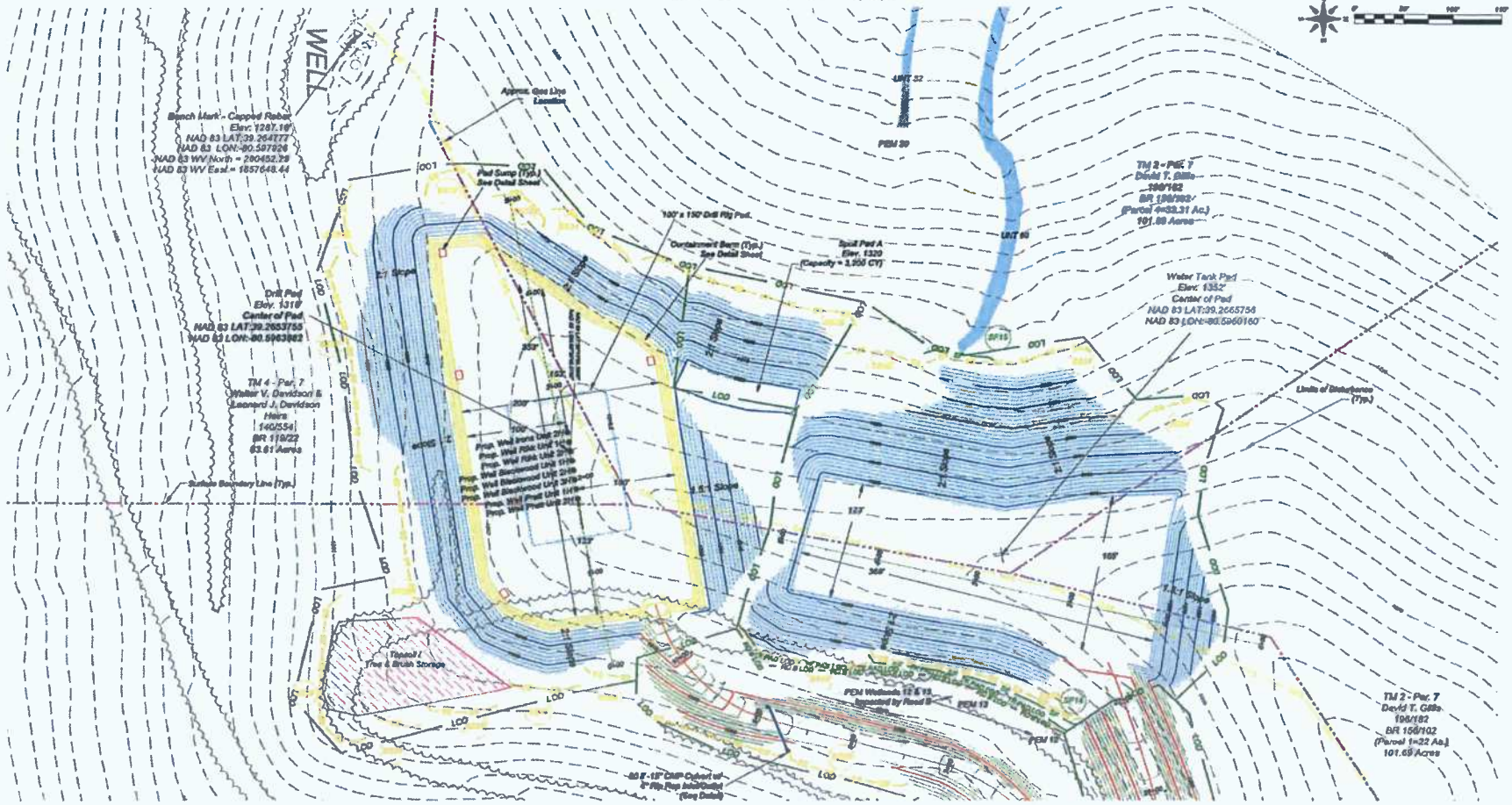
THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

SITE PLAN (3) ROAD A 24+00 - 28+00 &
ROAD B 4+00 - 11+00
LEONARD PAD
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 7/25/12
Scale: 1" = 50'
Designed By: CEW/CEM
File No. Antero 116-12
Page 8 of 15

EXHIBIT 1, PAGE 3

SITE PLAN (4)



Legend

- Existing 2' Contour
- Existing 10' Contour
- Existing Tree Line
- Existing Utility Line / Pole
- Surface Owner Property Line
- Existing Geo Line CL
- LOD – LOD – Limits of Disturbance
- Proposed Diversion Ditch
- Proposed 2' Contour
- Proposed 10' Contour
- SF —— Proposed Super Silt Fence
- Proposed Check Dam
- Proposed CuVert W/ Inlet & Outlet Protection
- Proposed Straw Wattles
- Proposed Silt Sock/Silt Fence
- Proposed 5' Contour
- Proposed 10' Contour
- Proposed Rip-Rap

DATE	REVISIONS
8-9-12	Well Layout Changes

Date: 7/25/12
Scale: 1" = 50'
Designed By: CEW/CEM
File No. Antero 110-03
Page 9 of 13

Allegheny Surveys, Inc.
172 Thompson Drive
Bridgeport, WV 26330
(304) 848-5035

L&W ENTERPRISES, INC.

ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR: ANTERO RESOURCES APPALACHIAN CORP.

SITE PLAN (4)
LEONARD PAD
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

EXHIBIT 1, PAGE 4

NORTH

PREVAILING WIND DIRECTION NNE

ANTERO RESOURCES

EXHIBIT 1
LEONARD PAD

EXHIBIT 1, PAGE 5

DRILLING LAYOUT/FLARE LINES/PREVAILING WINDS

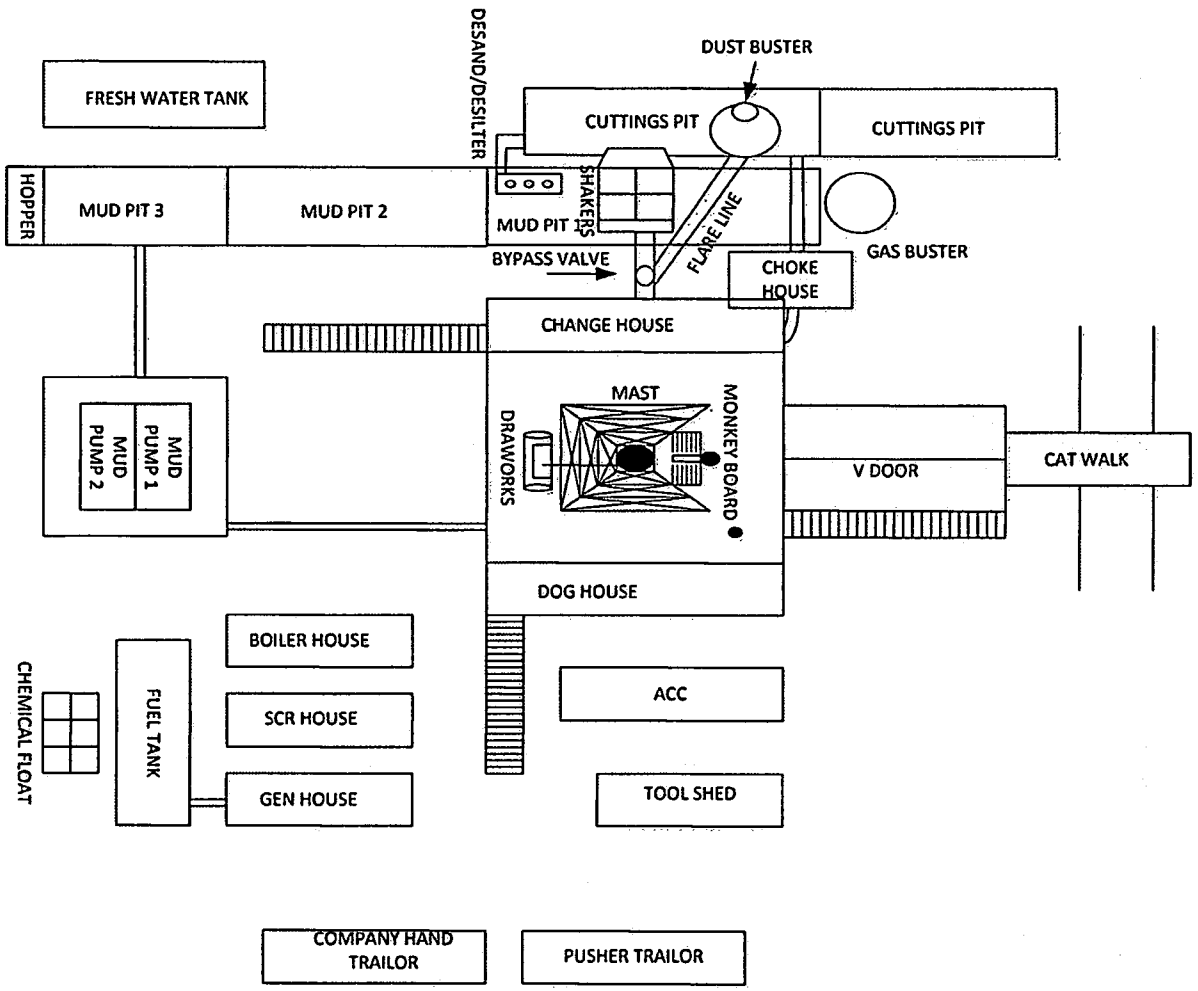
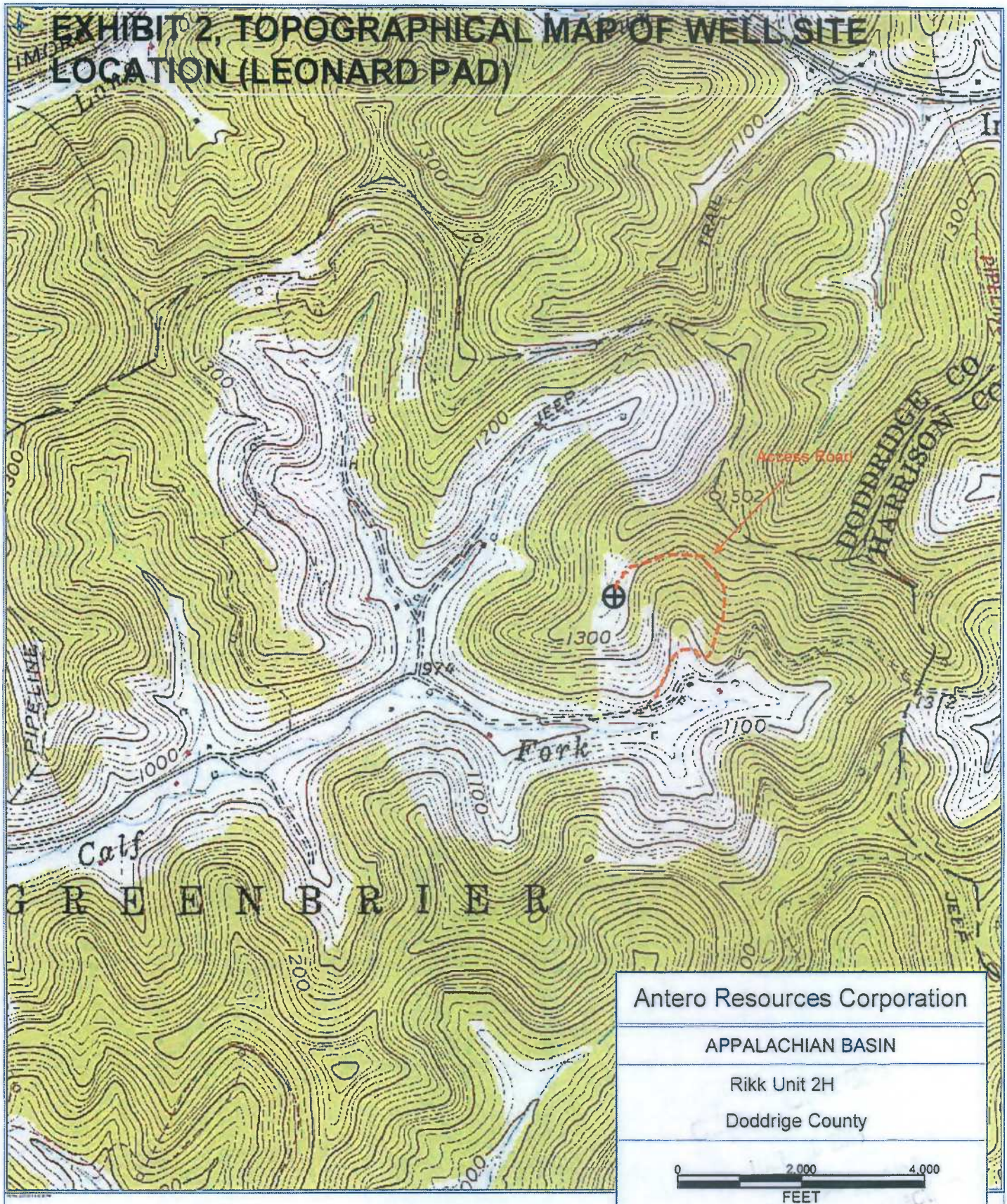


EXHIBIT 2, TOPOGRAPHICAL MAP OF WELL SITE LOCATION (LEONARD PAD)



Antero Resources Corporation
APPALACHIAN BASIN
Rikk Unit 2H
Doddrige County
0 2,000 4,000 FEET
REMARKS QUADRANGLE: SALEM & BIG ISAAC WATERSHED: BUFFALO CALF FORK DISTRICT: GREENBRIER
January 9, 2009

EXHIBIT 3: LIST OF ALL SCHOOLS & PUBLIC FACILITIES WITHIN A ONE-MILE RADIUS OF PROPOSED WELL SITE								
Map	Parcel	Name	Address	City	State	Zip	Phone	Deed Book/Page
321	20	Miracle Meadows School	RR 1 Box 289-B	Salem	WV	26426	304-782-3628	1200/633

WW - 6B
(1/12)

EXHIBIT 4. to SSP- WW-6B FORM

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
W.VA. CODE §22-6A - WELL WORK PERMIT APPLICATION

1) Well Operator: Antero Resources Appalachian Corporation | 494488557 (Operator ID) | Doddridge (County) | Greenbrier (District) | Salem (Quadrangle)

2) Operator's Well Number: Rikk Unit 2H Well Pad Name: Leonard Pad

3 Elevation, current ground: ~1325' Elevation, proposed post-construction: 1318'

4) Well Type: (a) Gas ■ Oil _____
Other _____
(b) If Gas: Shallow ■ Deep _____
Horizontal ■

5) Existing Pad? Yes or No: No

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
Marcellus Shale: 7650' TVD, Anticipated Thickness- 50 Feet, Associated Pressure- 3200#

7) Proposed Total Vertical Depth: 7650' TVD
8) Formation at Total Vertical Depth: Marcellus
9) Proposed Total Measured Depth: 17,450' MD
10) Approximate Fresh Water Strata Depths: 67', 230'
11) Method to Determine Fresh Water Depth: Offset well records. Depths have been adjusted according to surface elevations.
12) Approximate Saltwater Depths: 842', 1789', 2051'
13) Approximate Coal Seam Depths: 293', 960', 1726'
14) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated
15) Does land contain coal seams tributary or adjacent to, active mine? No
16) Describe proposed well work: Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale

17) Describe fracturing/stimulating methods in detail:
Antero plans to pump Slickwater into the Marcellus Shale formation in order to ready the well for production. The fluid will be comprised of approximately 99 percent water and sand, with less than 1 percent special-purpose additives as shown in the attached "List of Anticipated Additives Used for Fracturing or Stimulating Well."

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 18.18 acres

19) Area to be disturbed for well pad only, less access road (acres): 4.81 acres

20) **CASING AND TUBING PROGRAM**

TYPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill -up (Cu. Ft.)
Conductor	20"	New	H-40	94#	40'	40'	CTS, 38 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/ 48#	305'	305'	CTS, 424 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2570'	2570'	CTS, 1046 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	17,450'	17,450'	4364 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7200'	
Liners							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield
Conductor	20"	24"	0.438"	1530	Class A	1.18
Fresh Water	13-3/8"	17-1/2"	0.38"/0.33"	2730/1730	Class A	1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	Class A	1.18
Intermediate						
Production	5-1/2"	8-3/4" & 8-1/2"	0.361"	12630	Lead-H/POZ & Tail - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11200		
Liners						

PACKERS

Kind:	N/A			
Sizes:	N/A			
Depths Set:	N/A			

21) Describe centralizer placement for each casing string. Conductor: no centralizers

Surface Casing: one centralizer 10' above the float shoe, one on the insert float collar and one every 4th joint spaced up the hole to surface.

Intermediate Casing: one centralizer above float joint, one centralizer 5' above float collar and one every 4th collar to surface.

Production Casing: one centralizer at shoe joint and one every 3 joints to top of cement in intermediate casing.

22) Describe all cement additives associated with each cement type.

Conductor: no additives, Class A cement.

Surface: Class A cement with 2% calcium and 1/4 lb flake, 5 gallons of clay treat

Intermediate: Class A cement with 1/4 lb of flake, 5 gallons of clay treat

Production: Lead cement- 50/50 Class H/Poz + 1.5% salt + 1% C-45 + 0.5% C-16a + 0.2% C-12 + 0.45% C-20 + 0.05% C-51

Production: Tail cement- Class H + 45 PPS Calcium Carbonate + 1.0% FL-160 + 0.2% ACGB-47 + 0.05% ACSA-51 + 0.2% ACR-20

23) Proposed borehole conditioning procedures. Conductor: blowhole clean with air, run casing, 10 bbls fresh water.

Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.

Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water.

Production: circulate with 14 lb/gal NaCl mud, trip to middle of lateral, circulate, pump high viscosity sweep, trip to base of curve, pump high viscosity sweep, trip to top of curve, trip to bottom, circulate, pump high viscosity sweep, trip out, run casing, circulate 10 bbls fresh water, pump 48 bbls barite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water.

*Note: Attach additional sheets as needed.

Antero Resources Appalachian Corporation Erosion and Sediment Control Plan for Leonard Pad

Antero Resources Appalachian Corporation (Antero) is submitting the following narrative and set of drawings in compliance with §35-8-5.4. This plan is submitted in conjunction with the Leonard Pad Site Design, Construction Plan, & Erosion & Sediment Control Plans prepared in accordance with the West Virginia Code of State Rules, Division of Environmental Protection and Office of Oil and Gas, and certified by L&W Enterprises, Inc., a West Virginia registered professional engineer.

Requirement §5.4.b.1. *A general sequence of events that describe in relative terms how and when each construction phase (i.e. clearing and grubbing, mass grading, stabilization) will occur and when each erosion and sediment control best management practice ("BMP") will be installed;*

Antero Response:
The following includes a general sequence of events that describe in relative terms how and when each construction phase is anticipated to occur and erosion and sediment control BMPs to be installed. Please refer to the Leonard Pad Site Design, Construction Plan, and Erosion & Sediment Control Plans (Site Design) prepared and certified by L&W Enterprises, Inc. for specific construction measures. Compliance with the measures outlined in the Site Construction Plan (§35-8-5.4) submitted in conjunction with this plan will also be maintained.

1. A pre-construction conference will be held on site with contractor to review the construction drawings and provide any requested guidance.
2. Construct the construction entrance.
3. Construct all proposed sediment control devices as soon as clearing and grubbing operations allow. Diversions and sediment basins shall be seeded and mulched immediately.
4. Clear and grub, remove topsoil and place at an area determined in the field where erosion will not take place. Topsoil stockpile to be seeded and mulched. Silt fence shall be constructed around topsoil stockpiles.
5. Grading operations as required. Cut slopes and fill slopes shall be topsoiled if needed. Ditch lines shall be cleaned. All ditches will have at least grass lining protection or greater based on ditch slope with the following determination; 0 to 3% - Grass Lined; 3 to 9%- jute matting; and 9% or Greater - TRM.
6. Culvert inlet and outlet protection shall be constructed immediately upon placement of inlets and culverts. Installation of matting and/or rip rap to occur once ditches are constructed.
7. When final grade is achieved, topsoil to be placed on all disturbed areas not lined. Seed all disturbed areas as required. A soil sample should be taken and tested to determine recommended rates. If no soils sample is taken the following rates should be applied as a minimum: Lime at a rate of 4 tons per acre. Fertilize at a rate of 500 lbs of 10-20-10 per acre. Seed with 45 lbs per acre of tall fescue and 20 lbs per acre of perennial rye grass.
8. Lime, fertilizer and seed will be applied by hand or using a hydro-seeder. Hydro-mulch products shall be installed in accordance with manufacturer's specifications.
9. Final seeding must occur within 7 days of final grading.

10. When site is stabilized, all erosion and sediment control measures can be removed and repair/stabilize those areas in accordance with state standards.
11. Make modifications for permanent storm water management.
12. Final site inspection.

Requirement §5.4.b.2. *A description of the stabilization methods to be used, including the application rates for temporary and permanent seeding and mulching, and provide the timeframes for establishing stabilization*

Antero Response:
Stabilization methods used include seeding and mulching of disturbed areas as well as the implementation of erosion and sediment control BMPs. Please refer to Construction, Erosion and Sediment Notes on page 3 as well as "Details" on page 14 for detailed descriptions of the different stabilization methods to be used. Seeding and mulching is to be in accordance with the WVDOT Standard Specifications unless specified otherwise in the plans or unless specified otherwise by the construction engineer or Antero representative. Please refer to number 11 under Erosion Control Notes on page 3 of the Site Design for more specific information regarding application, liming, and mulching rates.

Erosion and sediment BMPs will be constructed, stabilized, and functional before site disturbance begins within the tributary areas of those BMPs. In a timely manner after earth disturbance activities cease, Antero shall stabilize any areas disturbed by the activities. During non-germination periods, mulch must be applied at the specified rates. Disturbed areas which are not at finish grade and which will be re-disturbed within 1 year will be stabilized in accordance with the temporary vegetative stabilization and specifications. Disturbed areas which are finished grade or which will not be re-disturbed within 1 year will be stabilized in accordance with the permanent vegetative stabilization specification. Please refer to "Construction, General and E&S Notes" on page 3 for more information regarding timeframes for establishing stabilization and erosion and sediment BMPs.

The site shall be considered to have achieved full stabilization when it has a minimum uniform 70% perennial vegetative cover or other permanent non-vegetative cover with a density sufficient to resist accelerated surface erosion and subsurface characteristics to resist sliding and other movements. Until the site achieves final stabilization, Antero will assure that the best management practices (BMPs) are implemented, inspected, operated, and maintained. As such, Antero will maintain written inspection logs. All maintenance work, including cleaning, repair, replacement, regarding, and re-stabilization shall be performed immediately upon discovery of deficiency. After final stabilization has been achieved, temporary erosion and sediment BMPs controls will be removed. Areas disturbed during removal of the BMPs will be stabilized immediately.

Requirement §5.4.b.3. *Details of specifications for the erosion and sediment control BMPs employed on the project.*

Antero Response:
Please refer to the "Construction, General and E&S Notes" on page 3 and "Details" on page 14 in the Site Design for specifications including instructions for installation, inspection, and maintenance for erosion and sediment control BMPs employed at this site.

Requirement §5.4.b.3. *A vicinity map locating the site in relation to the surrounding area and roads;*

Antero Response:
A "Vicinity Map" locating the site in relation to the surrounding area and roads is included on page 1 the Site Design.

Requirement §5.4.c.2 *A plan view site map at a scale of one inch equal to one hundred feet (1"=100') or greater, showing appropriate detail of all site features, including the identification of site access that provides for a stabilized construction entrance and exit to reduce tracking of sediment onto public or private roads; and*

Antero Response:
"Site Design" maps are included on pages 6-9 of the Site Design. Specific design and layout and inspection and maintenance notes for a stabilized construction entrance are included in the "Construction, General and E&S Notes" verbiage on page 3.

Requirement §5.4.c.3. *The location of all proposed erosion and sediment control BMPs*

Antero Response:
"Erosion and Sediment Control Plan" and "Final Site Design" maps included on pages 3 and 6-9 of the Site Design locate all proposed erosion and sediment control BMPs.

Antero Resources Appalachian Corporation Site Construction Plan for Leonard Pad

Antero Resources Appalachian Corporation (Antero) is submitting the following Site Construction Plan in compliance with §35-8-5.5. This plan is submitted in conjunction with the Leonard Pad Site Design, Construction Plan, & Erosion and Sediment Control Plans prepared in accordance with the West Virginia Code of State Rules, Division of Environmental Protection and Office of Oil and Gas, and certified by L&W Enterprises, Inc., a West Virginia registered professional engineer.

Requirement §5.5.a. *The plan should describe the nature and purpose of the construction project and identify the procedures for construction that will be used to achieve site stability. The plan shall be considered conditions of the permit and be enforceable as such.*

Antero Response
The nature and purpose of the subject project is to perforate, fracture, and complete one or more horizontal shallow wells. Procedures to achieve site stability include seeding and mulching of earth disturbed areas and implementation of erosion and sediment best management practices (BMPs). Details of seeding and mulching rates as well as procedures for installation and maintenance of erosion and sediment BMPs are outlined on page 3 of "Leonard Pad Site Design, Construction Plan, & Erosion and Sediment Control Plans" (Site Design) prepared and certified by L&W Enterprises, Inc. of West Virginia.

These procedures will be considered as conditions of the permit and shall be inspected and maintained for continual compliance measures outlined in §35-8-5.5.

Requirement §5.5.b.1. *A vicinity map location the site in relation to the surrounding area and roads;*

Antero Response
Please refer to the vicinity map on page 1 for the location the site in relation to the surrounding area and roads.

Requirement §5.5.b.2. *A plan view site map at a scale of one inch equal to one hundred feet (1"=100') or greater that shows appropriate detail of all site features and:*

> ***Requirement §5.5.b.A..*** *Clearly identifies the limit of disturbance for the project;*

Antero Response
The limit of disturbance for the Leonard Pad can be found on "Site Design" on pages 6-9 of the Site Design.

> ***Requirement §5.5.b.2.B.*** *Provides existing topographic information on a contour interval that affords sufficient detail to illustrate site terrain conditions*

Antero Response

Please refer to the "Existing Conditions Plan" maps on page 4 of the Site Design for the current topographic conditions for the constructed pad on a contour interval that affords sufficient detail to illustrate site terrain conditions.

> ***Requirement §5.5.b.2.C.*** *Identifies proposed cut and fill areas with grading contours at an interval that provides sufficient detail to accurately depict slope ratios, indicating top and bottom of slopes; and*

Antero Response
Please refer to the "Site Design" on page 6-9 as well as the "Drill Pad Baseline Profile & Cross Sections," "Water Tank Pad Baseline Profile & Cross Sections," "Access Roads A Cross Sections," and "Access Roads A & B Cross Sections" on page 10-13 of the Site Design for proposed cut and fill areas with grading contours.

> ***Requirement §5.5.b.2.D.*** *Identifies any existing structures, roads, water bodies, and other critical areas within the area that would most likely be affected by the construction.*

Antero Response
Please refer to "Site Design" of the Site Design on page 6-9 for the map identifying any structures, roads, water bodies, and other critical areas within the area of interest that would be most likely affected by construction.

> ***Requirement §5.5.b.3.*** *A cross-section of the length and width of the location, providing cut and fill volumes; and*

Antero Response
Please refer to the "Site Design" on page 6-9 as well as the "Drill Pad Baseline Profile & Cross Sections," "Water Tank Pad Baseline Profile & Cross Sections," "Access Roads A Cross Sections," and "Access Roads A & B Cross Sections" on page 10-13 for a cross-section of the location. The cut and fill volumes can be found in "Schedule of Quantities" on page 2.

> ***Requirement §5.5.b.4.*** *Any other engineering designs or drawings necessary to construct the project.*

Antero Response
All other engineering designs and drawings necessary to construct this project are included in the Site Design.

> ***Requirement §5.5.c.*** *At a minimum, site construction shall be conducted in accordance with the following criteria:*

Antero Response
All Antero contractors shall be notified of and comply with the measures outlined in Section 5.5.c. of §35-8.

> ***Requirement §5.5.c.1.*** *All woody material, brush, and trees shall be cleared from the site area and kept to the minimum necessary for proper construction, including the installation of*

necessary sediment controls. Trees six inches in diameter and larger shall be cut and logs stacked;

Antero Response
The Site Design outlines measures to maintain compliance with Section 201 of the WVDOH Specifications which outlines clearing and grubbing measures. Please refer to "Construction Specifications" on page 3 of the Site Design.

Requirement §5.5.c.2. *Topsoil shall be removed from construction areas and stockpiled for reuse during reclamation. In woodland areas, tree stumps, large roots, large rocks, tree and leaf debris, and ground vegetation shall be removed prior to actual site constructions;*

Antero Response
The Site Design outlines procedures for stripping and stocking topsoil. Please refer to "Construction Specifications" on page 3 of the Site Design. In addition, soil for stockpiling and use as fill shall be further compliant with measures outlined in Section 5.5.c.2. of §35-8-5.5.

Requirement §5.5.c.3. *No embankment fill shall be placed on frozen material;*

Antero Response
All Antero contractors shall be notified of and comply with measures outlined in Section 5.5.c.3. of §35-8-5.5.

Requirement §5.5.c.4. *The fill material shall be clean mineral soil, free of roots, woody vegetation, stumps, sod, large rocks, frozen soil or other objectionable material;*

Antero Response
The Site Design outlines procedures for stripping and stocking topsoil. Please refer to Construction Specifications on page 3 of the Site Design. In addition, soil shall be further defined to the measures outlined in Section 5.5.c.4. of §35-8-5.5.

Requirement §3.2.b.5. *Embankment material shall exhibit adequate soil strength and contain the proper amount of moisture to ensure that compaction will be achieved;*

Antero Response
All Antero contractors shall be notified of and comply with measures outlined in Section 5.5.c.5. of §35-8-5.5.

Requirement §5.5.c.6 *Earthen fill slopes should be constructed with slopes no steeper than a ratio of two to one (2:1);*

Antero Response
The Site Design outlines all earthen fill slopes to be constructed with slopes no steeper than a ratio of two to one (2:1).

Requirement §5.5.c.7. *Fill material will be placed in lifts or layers over the length of the fill. Lift thickness of soil shall be as thin as the suitable random excavated material will permit, typically from six to twelve (12) inches; and*

Antero Response
Please refer to the "Construction Specifications" on page 3 of the Site Design. Fill shall be placed in horizontal lifts of maximum loose depth of 12 inches. Compaction will be performed with a compactor with a minimum of five ton static drum weight vibratory roller or five ton static drum weight sheeps footed compactor as appropriate for the type of soil material at the site or other compactor approved by the Engineer.

> ***Requirement §5.5.c.8.*** *The size of rock lifts shall not exceed thirty-six (36) inches. The rock shall not be greater in any dimension than thirty-six (36) inches;*

Antero Response
All Antero contractors shall be notified of and comply with measures outlined in Section 5.5.c.8. of §35-8-5.5.

> ***Requirement §5.5.c.9.*** *Compaction shall be obtained by compaction equipment or by routing the hauling equipment over the fill so that the entire surface of each fill lift is compacted by at least one wheel or tread track of equipment or by a compactor. Each lift shall be compacted before beginning the next lift;*

Antero Response
Compaction compliance measures are outlined in the "Construction Specifications" on page 3. Compaction is required with a compactor with a minimum of five ton static drum weight vibratory roller or five ton static drum weight sheeps footed compactor as appropriate for the type of soil material at the site or other compactor approved by the Engineer.

> ***Requirement §5.5.c.10.*** *Surface water diversion ditches shall be constructed above the disturbed area to intercept water and to divert surface water runoff around the site; and*

Antero Response
"Construction, General and E&S Notes" on page 3 of the Site Design identifies the surface diversions used to prevent surface water and subsurface water from flowing on to the well pad and coming into contact with the stormwater associated with the well pad. Additional Erosion & Sediment BMPs will be used to prevent sediment discharges from the project.

> ***Requirement §5.5.c.11.*** *In areas of steep terrain, a terraced bench shall be constructed at the base of the slope where fill is to be placed, creating a toe foundation and aid in holding fill material. Additional terracing shall be constructed from each additional fifty (50) vertical feet of slope and shall be a minimum of ten (10) feet wide.*

Antero Response
All Antero contractors shall be notified of and comply with the measures outlined in Section 5.5.c.11.. of §35-8-5.5.

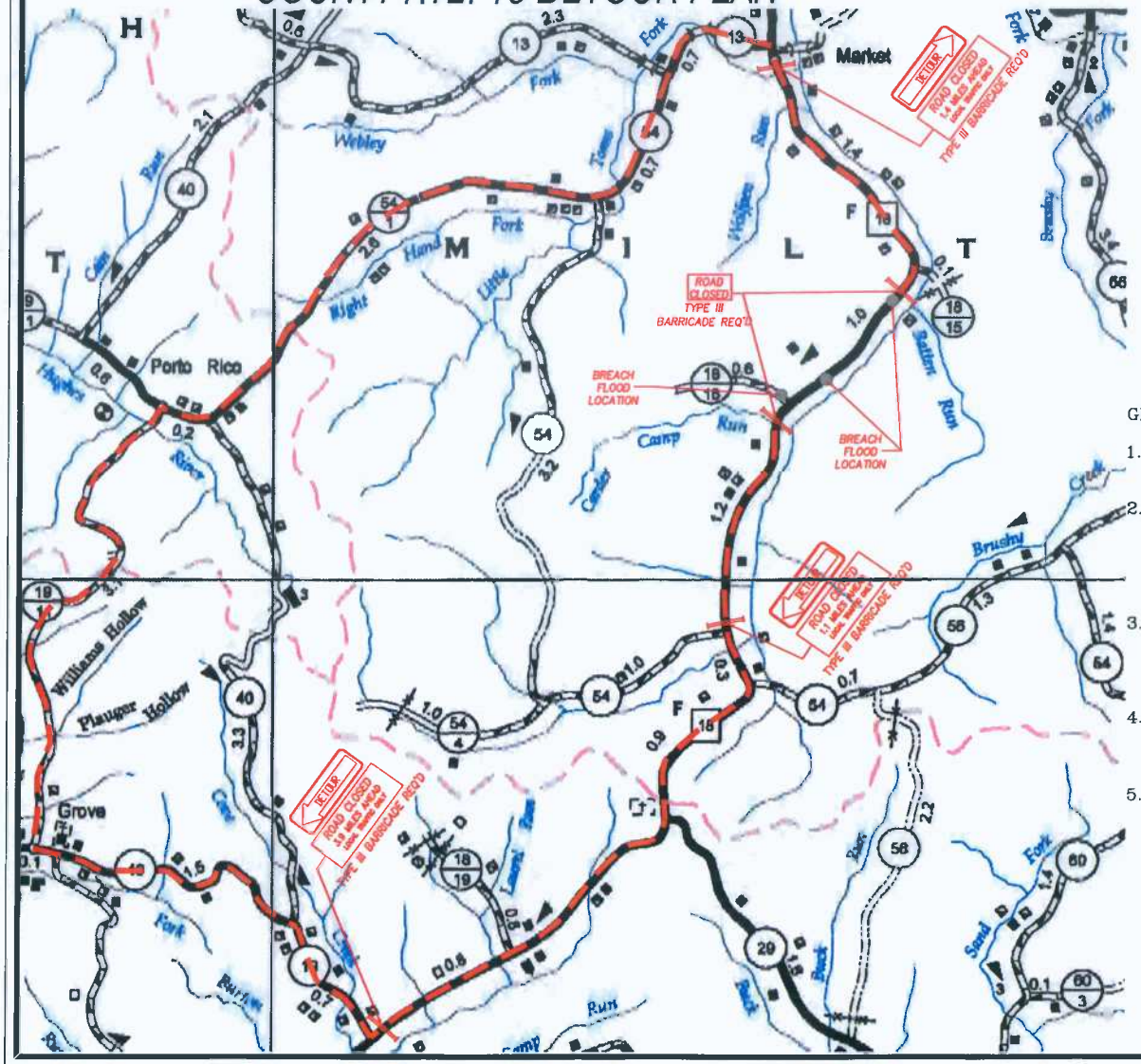
Appendix B - Residence and Neighboring Property Survey

Residence and Neighboring Property Survey Legend

KEY	PROPERTY OWNER	ADDRESS	EX 100 YEAR EVENT INUNDATION	SOUTH BREACH 100 YR INUNDATION	EAST BREACH 100 YR INUNDATION	WEST BREACH 100 YR INUNDATION	Evacuation Necessary for Breach Alarm
1	Robert G. and Joan C. Conrad & Irene T. Busch	Rt. 1 Box 72 New Milton, WV 26411	Structure is not within 100 YR Flood Event Limits	No Effect	No Effect	No Effect	N
2	Johnnie & Amye Cline	Box 217 Baisdan, WV 25608	Structure is not within 100 YR Flood Event Limits	No Effect	No Effect	No Effect	N
3	Ralph L & Deloris L Cox	103 Walnut St. West Union, WV 26456	Structure is not within 100 YR Flood Event Limits	No Effect	No Effect	No Effect	N

Appendix C- Road Closure and Detour Plans

HINTER HEIRS SOUTH CENTRALIZED FRESHWATER IMPOUNDMENT
COUNTY RTE. 18 DETOUR PLAN



WEST VIRGINIA STATE PLANE
COORDINATE SYSTEM
NORTH ZONE, NAD83
ELEVATION BASED ON NAVD88
ESTABLISHED BY SURVEY GRADE GPS
& OPUS POST-PROCESSING

GENERAL NOTES:

1. ALL SIGNS ARE TO BE POST MOUNTED IF THE CLOSURE TIME EXCEEDS SEVEN DAYS.
2. FOR NIGHT OPERATION FLASHING LIGHTS SHALL BE INSTALLED ABOVE THE FIRST SIGN ON EACH APPROACH EXCEPT THE ROAD CLOSED SIGN SHALL HAVE FLASHERS AN BOTH ADVANCE SIGNS. (TYPE "B").
3. A ROUTE MARKER DIRECTIONAL ASSEMBLY MAY BE PLACED ON THE FAR LEFT CORNER OF THE INTERSECTION TO AUGMENT OR REPLACE THE ONE SHOWN ON THE NEAR RIGHT CORNER.
4. OTHER SPECIAL DESTINATION SIGNS MAY BE NECESSARY AND SHOULD BE IN ACCORDANCE WITH THE CONTRAST PLANS.
5. ADDITIONAL FLASHING WARNING LIGHTS AND/OR FLAGS MAY BE USED TO CALL ATTENTION TO THE ADVANCE WARNING SIGNS AS NOTED ON THE PLANS, AND/OR AS DIRECTED BY THE WVDOH.

3000 0 3000
GRAPHIC SCALE (IN FEET)

NAVITUS ENGINEERING INC.
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 602-4185
www.navituseng.com
Engineering • Survey • Environmental • GIS

CYRUS B. KUMP
REGISTERED
19578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
05/31/2013

ANTERO RESOURCES

THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

COUNTY RTE. 18 DETOUR PLAN

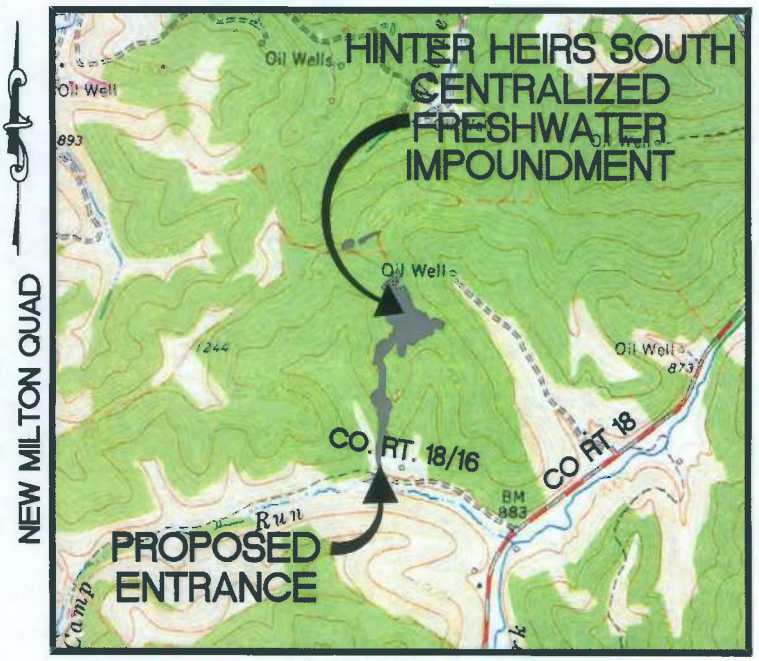
HINTER HEIRS
SOUTH CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WV

SCALE: 1" = 3000'
HINTER HEIRS
JOB NO. ANT028
DATE: 05/31/2013
SHEET C.1

MAINTENANCE, MONITORING, AND EMERGENCY ACTION PLAN

HINTER HEIRS SOUTH CENTRALIZED FRESHWATER IMPOUNDMENT

ID# _____



VICINITY MAP
1" = 2,000'

NAVITUS
ENGINEERING INC.

151 Windy Hill Lane
Winchester, VA 22602
Telephone: (888) 662-4185
www.navituseng.com

Engineering • Survey • Environmental • GIS

Prepared For:

ANTERO RESOURCES
981 East Washington Avenue
Ellenboro, WV 26346
(304) 869-3405

Contacts:
Aaron Kunzler, Construction Supervisor
(405) 227-8344
Anthony Smith, Field Engineer
(304) 673-6196
Jack Bell, Land Agent
(304) 376-9682
Chris Brown, Water Resources
(304) 877-8233

CYRUS S. KUMP REGISTERED 19578 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

Revised: May 31, 2013
Date: January 21, 2013

Designed By:
Navitus Engineering Inc.

Project Manager:
Cyrus Kump, PE
ckump@navituseng.com

Surface Owner (s)
Carl Hinter Heirs

Tax Parcel:
Map 15 Parcel 12

Location:
New Milton District, Doddridge County
West Virginia

FN# ANT028

TABLE OF CONTENTS

INTRODUCTION **2**

Road Map 3

Site Plan 4

PART I - MONITORING PLAN AND INSPECTION SCHEDULE **5**

Section A – Normal Conditions: 5

Section B – Dangerous Conditions: 6

Section C – Standby Alert: 7

PART II- EMERGENCY ACTION AND EVACUATION PLAN **9**

Section A - Notification of Agencies: 9

PART III- POST EVACAUATION/ROAD CLOSURE PLAN **10**

Section A - Should No Failure Occur: 10

PART IV - ADMINISTRATION AND RECORD KEEPING **11**

Section A - Distribution: 11

Section B – Maintenance Plan: 12

Section C – Inspection Record 13

PART V – HAZARD EVALUATION AND BREACH CALCULATIONS **14**

Section A - Introduction 14

A.1. Background 14

Section B - Hydrologic and Hydraulic Analysis 16

B.1. General 16

B.2. Base Map 16

B.3. Hydrologic Analysis 16

B.4. Hydraulic Analysis 17

B.5. Results 18

Section C - Results 19

C.1. 100 year/24 hour Design Storm Routing 19

C.2. 100 year/24 hour Design Storm Routing with Breach 19

C.3. Summary of Results 19

C.4. Reach Length Analysis 19

PART VI – EVACUATION PLAN AND PROCEDURES **20**

Section A – Evacuation Plan 20

Section B – Road Closure Procedures 20

APPENDICES **21**

Appendix A - Site Maps 21

Appendix B - Residence and Neighboring Property Survey 22

Appendix C- Road Closure and Detour Plans 23

INTRODUCTION

Purpose of Plan:

The purpose of this document is to provide for monitoring of the Hinter Heirs South Centralized Freshwater Impoundment under various conditions so that an emergency situation at the impoundment will be observed promptly and reported to agencies and persons who may be affected. This document also provides a plan for the orderly notification and evacuation of downstream residents to a place of safety in the event of a potential or actual impoundment failure.

Brief Overview of Impoundment:

The Hinter Heirs South Centralized Freshwater Impoundment is an earthen structure on a ridge adjacent to Carder Camp Run. The centralized freshwater impoundment has a maximum exterior embankment height of 46.0 feet and impounds a maximum water volume of 23.67 acre-feet with 9.69 acre-feet being contained within the incised portion of the impoundment (non-incised water storage volume to embankment top is 13.98 acre-feet). The impoundment was designed by a WV registered professional engineer and its construction shall be certified by a West Virginia registered professional engineer prior to filling. The impoundment will be constructed with an impervious 60 mil. HDPE geo-membrane and a 16 oz. non-woven geotextile layer. The impoundment will be filled using a waterline pumping Freshwater from various sources per the approved Water Management Plan (WMP). The inflow and outflow of water will be controlled by portable pumps to maintain a normal freeboard of 2 feet.

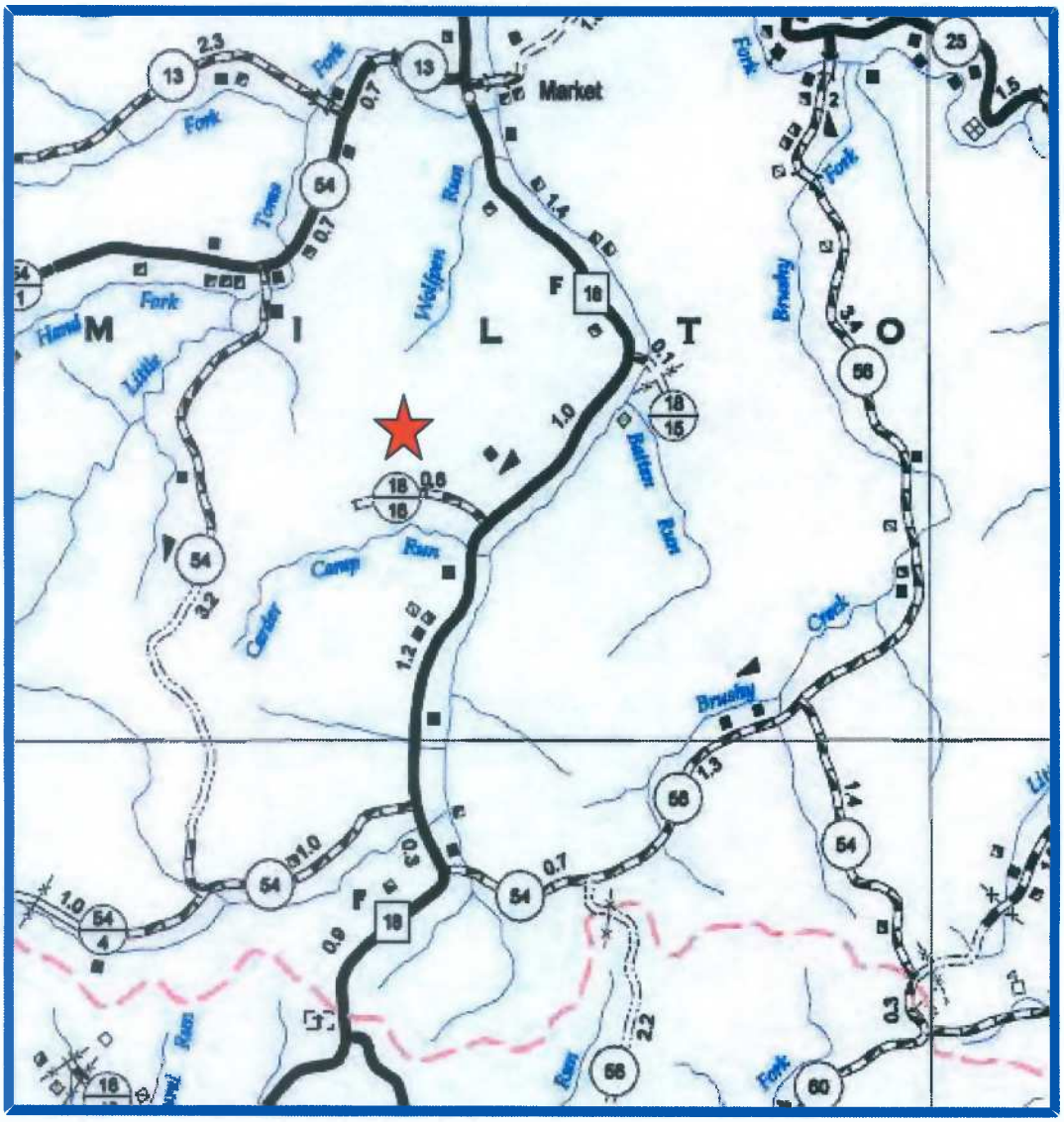
Impoundment Location:

The Hinter Heirs South Centralized Freshwater Impoundment is located on a ridge north of the intersection of WV Rt. 18 and Co. Rt. 18/16 (Carder Camp Road). The access road for the site is approximately 0.31 miles northwest of the intersection along Carder Camp Road. The site is adjacent to Carder Camp Run and is located south of New Milton in the Central District of Doddridge County, WV. The impoundment is approximately 1,600 feet from Co. Rt. 18/16 (Carder Camp Road) on a private access road.

How to Use This Document:

Persons using this plan will find a sequence of actions to be taken depending on rainfall and site conditions. A summary of where to find specific monitoring, reporting, and evacuation requirements can be found on the Table of Contents (See Previous Page).

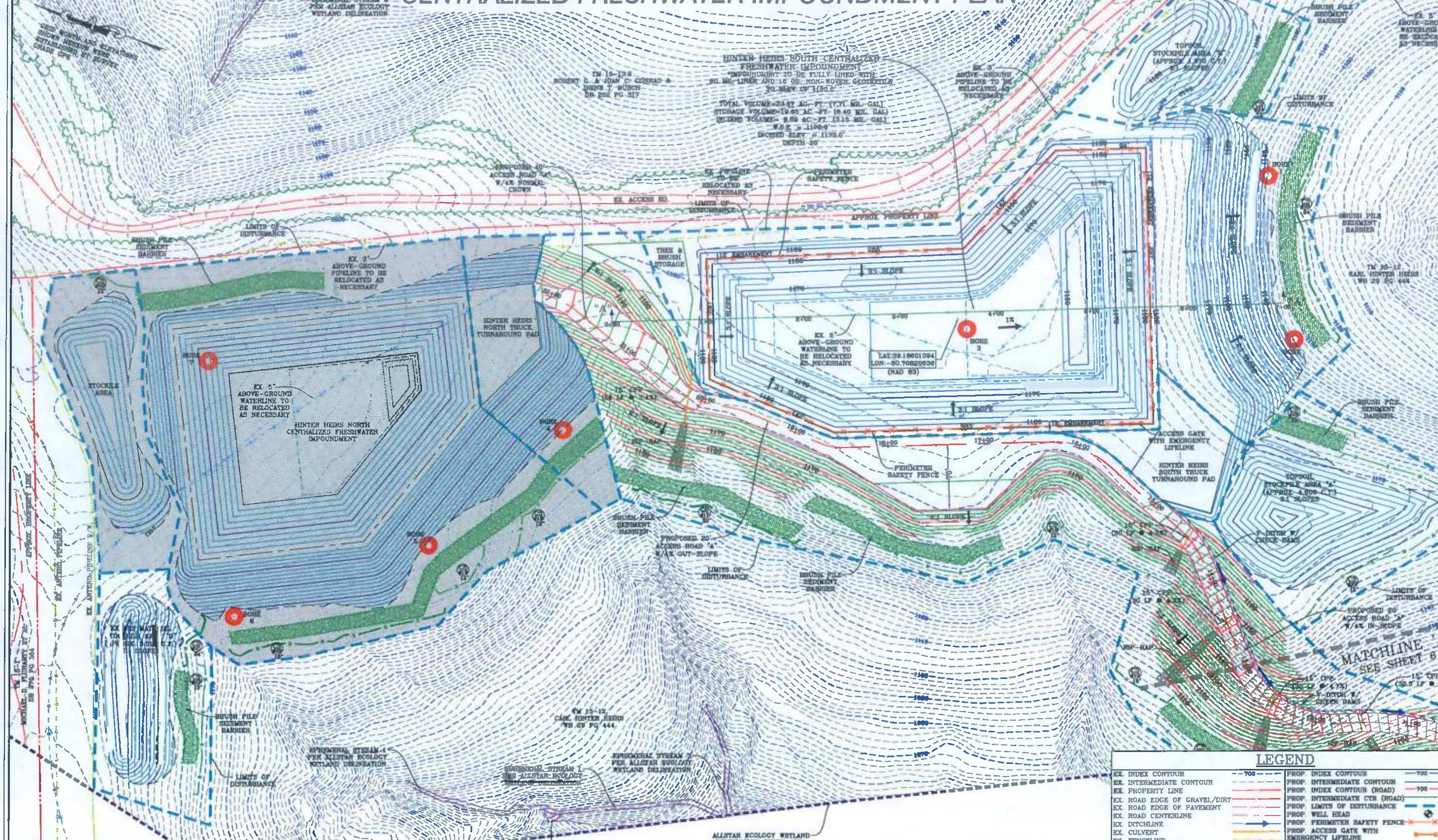
Road Map



Source: West Virginia Department of Transportation Program Planning and Administration Division General Highway Map for Doddridge County, West Virginia Last Revision Date February 22, 2011 Sheet 2 of 2.

Site Plan

CENTRALIZED FRESHWATER IMPOUNDMENT PLAN



NOTES:

1. ALL PROPOSED DITCH RELIEF AND DRAINAGE CULVERTS SHALL HAVE ADEQUATE OUTLET PROTECTION (4" RIP-RAP) AS SHOWN ON THESE PLANS.

2. ALL FILL AREAS SHALL BE "KEYED IN" AND COMPACTED IN 8" (MAXIMUM) LOOSE LIFT THICKNESS WITH A VIBRATING SHEEPSFOOT ROLLER TO 95% COMPACTION PER STANDARD PROCTOR.

GRAPHIC SCALE (IN FEET)

LEGEND

EX. INDEX CONTOUR	PROP. INDEX CONTOUR
EX. INTERMEDIATE CONTOUR	PROP. INTERMEDIATE CONTOUR
EX. PROPERTY LINE	PROP. INDEX CONTOUR (ROAD)
EX. ROAD EDGE OF GRAVEL/DIRT	PROP. INTERMEDIATE CTR (ROAD)
EX. ROAD EDGE OF PAVEMENT	PROP. LIMITS OF DISTURBANCE
EX. ROAD CENTERLINE	PROP. WELL HEAD
EX. DITCHLINE	PROP. PERIMETER SAFETY FENCE
EX. CULVERT	PROP. ACCESS GATE WITH EMERGENCY LIFELINE
EX. FENCELINE	PROP. ROAD EDGE OF GRAVEL
EX. OVERHEAD UTILITY	PROP. ROAD CENTERLINE
EX. POWER POLE/GUY WIRE	PROP. V-DITCH W/ CHECK DAMS
EX. GASLINE	PROP. CULVERT W/ RIP-RAP
EX. TREELINE	PROP. COMPOST FILTER SOCK
EX. DELINEATED STREAM	PROP. SUPER SILT FENCE
EX. DELINEATED WETLAND	MATCHLINE
EX. BUILDING	
100' WETLAND/STREAM BUFFER	BRUSH PILE SEDIMENT BARRIER
DELINEATION STUDY AREA	

NAVITUS ENGINEERING INC.
Engineering • Survey • Environmental • GIS

DATE	REVISION
5/02/2013	REVISE PER PIPELINE LOCATION

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR: ANTERO RESOURCES APPALACHIAN CORP

CENTRALIZED FRESHWATER IMPOUNDMENT PLAN

HINTER HEIRS SOUTH

CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

DATE: 01/21/2013

SCALE: 1" = 50'

SHEET 10 OF 18

PART I - MONITORING PLAN AND INSPECTION SCHEDULE

Section A – Normal Conditions:

During initial filling of the impoundment, visual inspection of the surrounding embankment slopes will be performed by field personnel for every 2 feet of depth increase or every 3 hours of time lapse until the impoundment is full to storage depth, providing 2 feet of freeboard. Once the impoundment is full it will be visually observed by field personnel once every 12 hours for the first week of operation. Following the first week of operation normal inspection frequency shall follow the requirements of W. Va Code §35-4-21 and consist of inspections at a minimum of once every two weeks under normal weather conditions. Upon notice of any change in the embankment condition, filling will immediately cease and the Registered Professional Engineer for that structure will be consulted.

Action	***Responsibility***	
1. Inspect biweekly (once every other week) as appropriate to the condition of the impoundment. If a serious problem is found proceed immediately to Section B or C as appropriate. Inspections shall include the following:	Primary Person	Alternate Person
	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Chris Brown PH: 304-622-3842 Cell: 304-877-8233
• Inspect the condition of the exposed / visible geo-membrane liner for deterioration and potential weakening.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Chris Brown PH: 304-622-3842 Cell: 304-877-8233
• Verify the water level is consistent with the scheduled input and withdrawal of water.	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436	Chris Brown PH: 304-622-3842 Cell: 304-877-8233
• Verify embankments show no signs of movement or instability.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436
• Remove debris (tree branches, leaves, trash, etc.) from the impoundment area.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436
• Verify the integrity of the security fence and gate.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Chris Brown PH: 304-622-3842 Cell: 304-877-8233
• Inspect the inflow and outflow pumping systems for degradation to the geomembrane liner and / or berm.	Chris Brown PH: 304-622-3842 Cell: 304-877-8233	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770
• Look for signs of erosion along the entire face of the berm.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436
• Check for potential seeps or piping through the berm.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436
• Other:	Aaron T Kunzler Cell: 405-227-8344	Chris Brown PH: 304-622-3842 Cell: 304-877-8233

Section B – Dangerous Conditions:

The following monitoring and inspection schedule will be used for heavy or extended rainfall, flash flood warnings, earthquake, snow-melt, or serious new problems found under normal conditions such as slips, sinkholes, or piping. Inspection will occur within 24 hours of a heavy rain event, defined as two (2) inches of rain or more in a six (6) hour period. If a problem is observed which could lead to failure, proceed immediately to Section C.

Occurrence of an earthquake of sufficient magnitude to cause structural damage to buildings or property in the general area of the impoundment shall be considered an "adverse condition". Damage from an earthquake may be internal to the impoundment and problems may not appear for days or weeks after the event. The impoundment shall be inspected immediately after the quake and daily for several weeks thereafter. Attention should be directed to looking for cracks, slips, new wet or seepage areas and leakage, both on the face of the berm and in the natural ground areas downstream.

If possible, the impoundment water level shall be decreased prior to forecast extended rainfall or immediately after concerns are observed.

Action	***Responsibility***	
1. Adverse conditions inspections shall be performed daily or more often as necessary and shall include the following:	Primary Person Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Alternate Person Chris Brown PH: 304-622-3842 Cell: 304-877-8233
• Inspect the condition of the exposed / visible geo-membrane liner for deterioration and potential weakening.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Chris Brown PH: 304-622-3842 Cell: 304-877-8233
• Verify the water level is consistent with the scheduled input and withdrawal of water.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436
• Verify embankments show no signs of movement or instability.	Aaron T Kunzler Cell: 405-227-8344	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770
• Remove debris (tree branches, leaves, trash, etc.) from the impoundment area.	Aaron T Kunzler Cell: 405-227-8344	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770
• Verify the integrity of the security fence and gate.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Chris Brown PH: 304-622-3842 Cell: 304-877-8233
• Inspect the integrity of surface berms and surface runoff water to ensure no uncontrolled or excessive erosion.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Chris Brown PH: 304-622-3842 Cell: 304-877-8233
• Inspect surface berms and up gradient drainage, ensure no surface water flow into impoundment.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Chris Brown PH: 304-622-3842 Cell: 304-877-8233
• Inspect the inflow and outflow pumping systems for degradation to the geomembrane liner and / or berm.	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770
• Look for signs of erosion along the entire face of the berm.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Chris Brown PH: 304-622-3842 Cell: 304-877-8233
• Check for potential seeps or piping through the berm.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Chris Brown PH: 304-622-3842 Cell: 304-877-8233
2. If problem is observed which could lead to failure, proceed immediately to Section C	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436

Section C – Standby Alert:

The following procedure will be used when the condition of impoundment has deteriorated and has been determined to be threatening to the integrity of structure, or the water surface rises to the predetermined critical level of 1 foot above freeboard elevations.

If possible, the impoundment water level shall be decreased as soon as possible after standby alert concerns are observed. The impoundment shall be drawn down to freeboard elevations.

Action	***Responsibility***	
1. Constant surveillance; decrease impoundment or pit volume, if possible.	Primary Person	Alternate Person
	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770
• Monitor the surface elevation of the water and the 2 foot of freeboard.	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770
• Inspect the condition of the exposed / visible geo-membrane liner for deterioration and potential weakening	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770
• Look for signs of erosion along the entire face of the berm.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Chris Brown PH: 304-622-3842 Cell: 304-877-8233
• Inspect the inflow and outflow pumping systems for degradation to the geomembrane liner and / or berm.	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770
• Check for potential seeps or piping through the berm.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Dusty Wood PH: 304-622-3842 Cell: 817-771-1436
2. Alert potential affect parties of the danger.	Eli Wagoner PH: 304-622-3842 Cell: 304-476-9770	Chris Brown PH: 304-622-3842 Cell: 304-877-8233

Notify agencies according to checklist in the following tables:

AGENCIES TO BE NOTIFIED

Check When Completed		Phone
____	Local 911	911
____	WVDEP Office of Oil and Gas	304-926-0450
____	Local Oil and Gas Inspector - Douglas Newlon	304-932-8049
____	Spill Reporting Number	1-800-642-3074
____	Doddridge County Office of Emergency Services	1-800-782-2124

AGENCY NOTIFICATION CHECKLIST

Check When Completed

____ Identify yourself

____ Refer to the Impoundments as the Hinter Heirs South Centralized Freshwater Impoundment

____ State WVDEP Oil and Gas Impoundment ID #_____.

____ Advise the person that you are calling as required by the emergency action plan.

____ State the condition of the impoundment.

____ State that a standby alert has been declared.

____ Advise the person contacted of any requested assistance or action.

____ Describe the conditions that warranted the standby alert.

____ Describe the immediate danger and risks to surrounding people and property.

____ Describe the immediate actions being conducted to avert further danger.

____ Answer any questions.

____ Document the time and with whom you speak at the notified agencies (Name / title)

If failure of the structure is deemed to be imminent, immediately begin notification and evaluation procedures, as described in Part II, Emergency and Evacuation Plan

PART II- EMERGENCY ACTION AND EVACUATION PLAN

Section A - Notification of Agencies:

Notify the following agencies of an evacuation notice if not already on-site.

AGENCIES TO BE NOTIFIED

Check When Completed		Phone
____	Local 911	911
____	WVDEP Office of Oil and Gas	304-926-0450
____	Local Oil and Gas Inspector - Douglas Newlon	304-932-8049
____	Spill Reporting Number	1-800-642-3074
____	Doddridge County Office of Emergency Services	1-800-782-2124

Section B – Emergency Evacuation

Working with emergency response personnel and any available company representatives, begin emergency notification of potentially affected surrounding people, residences and businesses, with the objective of moving all people out of harm's way.

Based on Hazard Evaluation and survey, contact the people and organizations on downstream of impoundment that may be impacted by a failure. Inform them of the potential for impending danger and assist them with evacuation to a safe location, if needed.

PART III- POST EVACAUATION/ROAD CLOSURE PLAN

Section A - Should No Failure Occur:

ACTION

1. Notify agencies according on checklist below to cancel evacuation order (if not already onsite).

AGENCIES TO BE NOTIFIED

Check When Completed		Phone
____	Local 911	911
____	WVDEP Office of Oil and Gas	304-926-0450
____	Local Oil and Gas Inspector - Douglas Newlon	304-932-8049
____	Spill Reporting Number	1-800-642-3074
____	West Virginia Department of Highways, County Supervisor	1-304-842-1550
____	Doddridge County Office of Emergency Services	1-800-782-2124

2. Inform affected parties that the emergency has past and it is safe to return.

3. Immediately begin any efforts to stabilize the structure and/or reduce water volume. An engineering analysis and evaluation will begin to determine root cause of problems and corrective actions.

See Appendix C for Road Closure and Detour Plans.

PART IV - ADMINISTRATION AND RECORD KEEPING

Antero Resources will distribute copies of the Monitoring and Emergency Plan for the Hinter Heirs South Centralized Impoundment within fifteen days (15) after receipt of the WVDEP Office of Oil and Gas approval to the persons named in the distribution list below.

The undersigned states that he/she will distribute a copy of the Monitoring and Emergency Plan for the Hinter Heirs South Centralized Freshwater Impoundment within fifteen days of the WVDEP Office of Oil and Gas approval to the persons named in the Section A – Distribution List below.

Name (Amanda Fernley) **Title** **Date**

Section A - Distribution:

Names and Addresses of all persons or agencies retaining a copy of this plan:

NAME	COMPLETE MAILING ADDRESS
Gene Smith Regulatory Compliance Manager 304-926-0452 ext. 1652	DEP Division of Oil and Gas 601 57th Street, SE Charleston, WV 25304-2345
Douglas Newlon Local Oil and Gas Inspector 304-932-8049, 304-573-5834	DEP Division of Oil and Gas 4060 Dutchman Road Macfarlan, WV 26248
Mike Headley Doddridge County Sheriff 304-873-1944	Doddridge County Sheriff PO Box 219 West Union, WV 26456
Chris Brown Water Resources 304-877-8233	Antero Resources 175-D Elk Creek Road Mt. Clare, WV 26408
Pat Heaster Director 304-782-2124	Doddridge County Office of Emergency Services 108 Court St. West Union, WV 26456

Section B – Maintenance Plan:

MAINTENANCE PLAN FOR _____ **Impoundment ID#** _____ **20__**

Type of Maintenance	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Monitoring Plan Inspection	X	X	X	X	X	X	X	X	X	X	X	X
Bi-weekly Facility Inspection	X	X	X	X	X	X	X	X	X	X	X	X
Monthly Inspection Certification Submitted to Office of Oil and Gas	X	X	X	X	X	X	X	X	X	X	X	X
Embankment												
Mow Embankment					X		X		X			
Repair Erosion Gullies			X*	X*	X*	X*	X*	X*	X*	X*	X*	
Revegetate Bare Areas				X			X			X		
Clean Embankment Outlet Pipe			X*	X*	X*	X*	X*	X*	X*	X*	X*	
Repair All Animal Burrows			X*	X*	X*	X*	X*	X*	X*	X*	X*	
Remove Trees/Brush				X			X			X		
Inspect perimeter fencing, ensure access is restricted	X	X	X	X	X	X	X	X	X	X	X	X
Access Gate with Emergency Lifeline	X	X	X	X	X	X	X	X	X	X	X	X

Comments:

* After inspection repair/replace as needed

Section C – Inspection Record

(Monitor's copies must contain all on-going reports. Owner's copy to be updated monthly)

Date Inspected	Inspector	Comments

PART V - HAZARD EVALUATION AND BREACH CALCULATIONS

Section A - Introduction

A.1. Background

Navitus Engineering, Inc. (Navitus) has performed this Impoundment Breach Analysis for the Hinter Heirs South Centralized Freshwater Impoundment as requested by Antero Resources Appalachian Corporation (Antero). In order to construct and operate the facility, a Certificate of Approval for the Centralized Impoundment is required to be obtained through the West Virginia Department of Environmental Protection (WVDEP) Office of Oil and Gas. The centralized impoundment application requires that the proposed impoundment be analyzed in order to determine if a potential impoundment breach would cause serious damage to property, inhabited structures, or roads. Per WVDEP nomenclature, the facility will be referred to as a centralized freshwater impoundment since there is no potential for waste materials to be present. The breach study was completed in accordance with the WVDEP Division of Water Resources, Title 47 Series 34, Dam Safety Rule, dated June 1, 2009. The WVDEP Division of Water Resources Dam Safety Rule suggests the centralized freshwater impoundment is not classified as a dam. A Hydrologic and Hydraulic analysis was performed for the 100-year/24-hour design storm. The downstream reach length was established as the point at which the design storm breach water surface elevation (WSE) is attenuated to have less than 1 foot of impact when compared to the design storm WSE.

The proposed impoundment is located in Doddridge County, West Virginia about 3.5 miles south of New Milton, West Virginia along the northwest side of WV Route 18 and County Route 18/16 (Carder Camp Rd). The centralized freshwater impoundment is located at the top of a ridgeline and has no contributing offsite drainage area. Carder Camp Run is located about 1,600 feet southwest of the proposed impoundment. A site location map depicting the proposed impoundment location in relation to Carder Camp Run and associated tributaries is provided in Appendix A.

To qualify for the WVDEP Oil and Gas Certificate of Approval, the Centralized Impoundment structure shall satisfy the WVDEP Dam Safety requirements. WVDEP Dam Safety definition of an impoundment is as follows:

- An embankment height of 25 feet above natural streambed at the downstream toe to the impoundment crest and impound 15 or more acre-feet of water volume; or
- An embankment rise of 6 feet from natural streambed or at downstream toe to embankment crest and impound 50 or more acre-feet.

Based on the WVDEP Dam Safety Rule, the impoundment height is defined as the vertical height from natural streambed at downstream toe to crest of impoundment. The proposed Hinter

Heirs South Centralized Freshwater Impoundment is partially incised; therefore the maximum impoundment height of 8 feet was measured from the existing ground to impoundment crest.

The impoundment is located along a ridgeline and has a east, south and west breach scenario. The impoundment height was measured utilizing the crest elevation to the existing grade elevation with 24 inch toe bench/ key in. The east breach impoundment height is 4 feet measured from crest elevation of 1,180 to existing ground minus key in at elevation equal to 1176. The south breach impoundment height is 8 feet measured from crest elevation of 1,180 to existing ground minus key in elevation equal to 1,172. The west breach impoundment height is 5 feet measured from crest elevation of 1,180 to existing ground minus key in elevation equal to 1,175. All elevation references are in feet.

The total impoundment storage volume is approximately 23.67 acre-feet at the crest elevation, the incised volume below the existing grade level is 9.69 acre-feet. No discharge or outlet structures are proposed for the impoundment. The maximum operating water surface elevation (WSE) of the impoundment is 1,178, which will provide 2 feet of freeboard. As such, the impoundment appears to be non-jurisdictional under the Dam Safety Rule (WV Code 47-CSR34).

Section B - Hydrologic and Hydraulic Analysis

B.1. General

A hydrologic and hydraulic analysis was prepared to determine if a potential impoundment breach would inundate existing structures or roadways. For this study, two separate scenarios were analyzed:

1. The 100-year/24-hour storm event without impoundment breach
2. The 100-year/24-hour event with impoundment breach

B.2. Base Map

The Site Maps (Appendix A) depict the topography used for the breach study. Topography was derived from aerial mapped 2-foot interval topography by Blue Mountain Aerial Mapping in March 2012 and 10-foot interval topography converted from 3 meter West Virginia GIS Technical Center DEM data. Stream locations were mapped by AllStar Ecology, LLC. This topographic information and stream data were utilized for the base mapping.

B.3. Hydrologic Analysis

The hydrologic analysis utilized USDA soil surveys for computation of drainage shed curve numbers, aerial topography and 3 meter West Virginia GIS Technical Center DEM to determine the drainage area(s) and time of concentration path(s). The peak 100-year discharge within the inundation area was determined through TR-55 SCS methodology. Time of concentration paths were calculated utilizing the SCS lag method. The hydrologic calculations for the drainage area were performed using HEC-HMS. The breaches were modeled within HEC-HMS utilizing a reservoir and dam breach scenario. The breaches utilized a specific time trigger, with the time set at the peak hour found at the downstream junction of Toms Fork. With the peak times matching, this created the worst case scenario for downstream drainage sheds. The breach widths and development times were modeled using Froelich's Dam Break Predictor Equations. The calculated peak flows for the upstream sections to downstream sections are found in the *Miscellaneous Attachments and Design Computations*. The table below is a summary of the drainage computations for the breach flows.

Stream	Computed Flow (cfs)	Average Breach Width (ft)	Time of Failure (hrs)
East Breach	246.5	22.5	0.44
South Breach	642.3	31	0.31
West Breach	335.3	25	0.39

The proposed Hinter Heirs South Centralized Freshwater Impoundment will be constructed by a combination of excavation and the construction of fill embankments. The proposed fill embankments will be constructed on the south, east and west sides of the facility. The

impoundment height of the east embankment will be 4 feet, the south side will be 8 feet and the west side impoundment height will be 5 feet.

The potential breach from the east embankment of the proposed impoundment would travel in a southeasterly direction for approximately 3,500 feet before flowing into Toms Fork. The potential breach from the west embankment of the proposed impoundment would travel in a southwesterly direction for approximately 2,300 feet before flowing into Carder Camp Run. The potential breach from the south embankment of the proposed impoundment would travel in a southerly direction for approximately 700 feet before flowing into Carder Camp Run.

B.4. Hydraulic Analysis

HEC-RAS was used to analyze the downstream flood wave and model the potential impoundment breach. The base map data was utilized to generate the geometry of each cross section. The cross sections were employed at significant changes in site features. This includes major bends in the stream channel, areas of major contraction and expansion of the floodplain area, upstream and downstream of existing culverts, and at building obstructions (cross sections were compiled using Aerial Mapping by Blue Mountain Aerial Mapping). The Overall Site Map (Appendix A) depicts the locations of the critical sections used for the breach study.

A Steady flow analysis was utilized to model the flood wave, and calculate base flood elevations at critical determined cross sections downstream of the breach analysis based upon Hydrologic Data from HEC-HMS. Downstream reach boundary conditions were modeled utilizing the slope of the normal water surface. The proposed site is located in Flood Zone X per FEMA Flood Map #54017C0250C. Two models were prepared: 1. 100 Year-24 Hour Design Storm, 2. 100 Year-24 Hour Design Storm with Breach. The breach flows were modeled in flow change locations. Breach flows were determined using manning's equation, with maximum volumes generated at the incised volume of the breach location. See the *Miscellaneous Attachments and Design Computations* for complete Drainage Computations.

The channel and overbank areas were assigned manning's n-values based on photographs and close inspection of existing aerial photography. The chart below describes the manning's n values used in this study taken from Table 3-1 of the HEC-RAS River Analysis System Hydraulic Reference Manual Version 4.1, January 2010.

Manning's n value	Description	Portion Used
.1	Heavy stand of timber, few down trees, little undergrowth, flow below branches	Floodplains
.035	Clean, straight, full, no rifts or deep pools with more stones and weeds	Main Channel
.04	Clean, winding, some pools and shoals	Main Channel
.035	High grass	Floodplains
.06	Light brush and trees, in summer	Floodplains
.05	Scattered brush, heavy weeds	Floodplains

B.5. Results

A summary of the hydrologic and hydraulic calculations is provided in the *Miscellaneous Attachments and Design Computations*. Further information from the HEC-RAS or HEC-HMS analysis can be provided upon request.

Section C - Results

C.1. 100 year/24 hour Design Storm Routing

During the 100-year/24-hour design storm, flooding is expected to roads along the drainage shed. County Route 18/16 in the study area is inundated between sections 28+06 and 26+80. Flooding also occurs to County Route 18 between sections 15+65 and -6+30. There is no flooding expected to structures in the design model. The proposed drainage model is located in Flood Zone X per FEMA Flood Map #54017C0250C

C.2. 100 year/24 hour Design Storm Routing with Breach

Additional flooding is expected to roads during the 100-year/24-hour design storm with an impoundment breach. County Routes 18/16 and 18 are already inundated in the 100-year/24-hour design, see Part VI for necessary road closure measures and signage required in the case of a breach in the impoundment.

C.3. Summary of Results

For each of the evaluated scenarios the summary of results included with the *Miscellaneous Attachments and Design Computations* provides the following information:

- Peak water surface elevations for the East Breach at Section 10+81, section 23+09 for the south beach and section 28+06;

Based on the results of the analysis, flooding on County Route 18/16 will occur under the 100 year flood scenario near stations 28+06 to 26+80 and to County Route 18 near stations 15+65 to -6+30. Water surface elevations will raise across Routes 18/16 and 18 with breach flows. A summary table of the hydrologic and hydraulic calculations is provided in the *Miscellaneous Attachments and Design Computations.*

C.4. Reach Length Analysis

The HEC-RAS summary results provide the WSEs at the critical downstream sections resulting from the various scenarios that were evaluated. Comparing the results of the no breach versus impoundment breach scenarios for the 100-year storm, the resulting WSE in section -18+44 of Toms Fork is less than 1-foot of elevation between the 100-year/24-hour design and the breach scenarios . Therefore, the stations represent the downstream terminus of the flood wave routing, and any further downstream impacts from the breach are a negligible threat to human health or the environment.

PART VI - EVACUATION PLAN AND PROCEDURES

Section A – Evacuation Plan

The results of this analysis are based on the "worst case scenario" for the breach events, or the 100 year/24 hour Design Storm Routing with Breach. All breach events that occur in **any** event less than that of the aforementioned design are required to follow the same procedures set forth in the sections below.

Section B – Road Closure Procedures

Based on the results of the analysis, flooding on County Routes 18/16 and 18 will occur under the 100-year/24-hour design scenario and flood waters already inundate the route along the breach route, the additional breach flows will only further inundate the roadway. The road will be closed with detour routes as shown in the Road Closure and Detour Plans found in Appendix C.

All traffic control devices shall be placed in accordance with the West Virginia Manual on Temporary Traffic Control for Streets and Highways, March 2006. The closure of Co. Rt. 25 and 48 shall only occur after authorization by West Virginia Department of Highways. A WVDOH representative shall be onsite during closure activities. All signage along the detour route shall be in accordance with the West Virginia Manual on Temporary Traffic Control for Streets and Highways, March 2006. A WVDOH representative may require other traffic control signs as necessary.

APPENDICES

Appendix A - Site Maps

OVERALL
SITE MAP

HINTER HEIRS

SOUTH CENTRALIZED
FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WV

SCALE: 1" = 500'

HINTER HEIRS
JOB NO. ANT028

DATE: 05/31/2013

SHEET A.1

ANTERO RESOURCES

THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

CYRUS S. KAMD
REGISTERED
15678
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER

05/31/2013

NAVITUS
ENGINEERING INC.
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navituseng.com
Engineering • Survey • Environmental • GIS

NAVITUS ENGINEERING INC.
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navitusengr.com
Engineering • Survey • Environmental • GIS

CYRUS S. KUMP
REGISTERED
19578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
05/31/2013

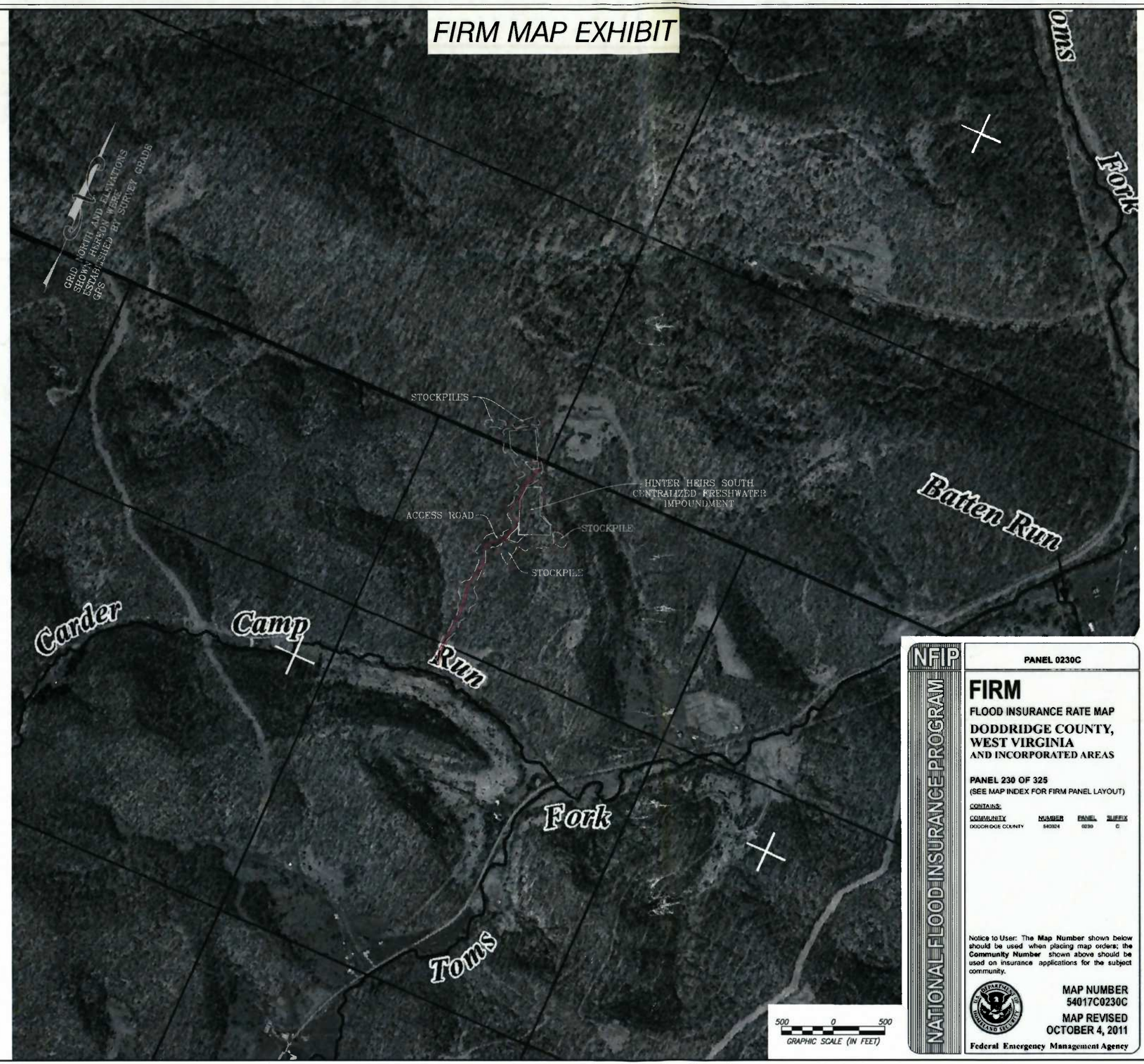
ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

SITE MAP
EAST BREACH
HINTER HEIRS
SOUTH CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WV

SCALE:	1" = 450'
HINTER HEIRS	
JOB NO.	ANT028
DATE:	05/31/2013
SHEET	A.2

LEGEND
STREAM CENTERLINE
EXISTING 100-YR FLOODPLAIN
PROPOSED 100-YR BREACH WSE
450' 0 450'
GRAPHIC SCALE IN FEET
NAVITUS ENGINEERING INC.
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navituseng.com
Engineering • Survey • Environmental • GIS
CYRUS B. KUMP
REGISTERED
19578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
05/31/2013
ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP
SITE MAP
SOUTH BREACH
HINTER HEIRS
SOUTH CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WV
SCALE: 1" = 450'
HINTER HEIRS
JOB NO. ANT028
DATE: 05/31/2013
SHEET A.3

FIRM MAP EXHIBIT



FLOODPLAIN NOTE
THE PROPOSED SITE IS LOCATED IN FLOOD ZONE "X" PER FEMA FLOOD MAP #54017C0250C.

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0230C

FIRM
FLOOD INSURANCE RATE MAP
DODDRIDGE COUNTY, WEST VIRGINIA
AND INCORPORATED AREAS

PANEL 230 OF 325
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DODDRIDGE COUNTY	540024	0230	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
54017C0230C
MAP REVISED
OCTOBER 4, 2011

Federal Emergency Management Agency

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0250C

FIRM
FLOOD INSURANCE RATE MAP
DODDRIDGE COUNTY, WEST VIRGINIA
AND INCORPORATED AREAS

PANEL 250 OF 325
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DODDRIDGE COUNTY	540024	0250	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
54017C0250C
MAP REVISED
OCTOBER 4, 2011

Federal Emergency Management Agency

NAVITUS ENGINEERING INC.
Engineering Survey Environmental GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navitusesg.com

DATE	REVISION

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

FIRM MAP EXHIBIT

HINTER HEIRS SOUTH

NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

DATE: 06/14/2013
SCALE: 1" =500'
SHEET 1 OF 1

HINTER HEIRS SOUTH
CENTRALIZED FRESHWATER IMPOUNDMENT
SITE DESIGN & CONSTRUCTION PLAN, EROSION & SEDIMENT CONTROL PLANS

NEW MILTON DISTRICT, DODDRIDGE COUNTY, WEST VIRGINIA
TOM'S FORK WATERSHED

LOCATION COORDINATES
ACCESS ROAD ENTRANCE
LATITUDE: 39.1813803 LONGITUDE: -80.70717132 (NAD 83)
N 4336945.70 E 525291.71 (UTM, NAD 83, ZONE 17 METERS)

CENTER OF CENTRALIZED FRESHWATER IMPOUNDMENT
LATITUDE: 39.18601094 LONGITUDE: -80.70620636 (NAD 83)
N 4337459.85 E 525373.38 (UTM, NAD 83, ZONE 17 METERS)

GENERAL DESCRIPTION
THE ACCESS ROAD(S) AND CENTRALIZED FRESHWATER IMPOUNDMENT ARE BEING CONSTRUCTED TO AID IN THE DEVELOPMENT OF INDIVIDUAL MARCELLUS SHALE GAS WELLS.

FLOODPLAIN NOTE
THE PROPOSED SITE IS LOCATED IN FLOODZONE "X" PER FEMA FLOOD MAP #54017C0250C.

MISS UTILITY STATEMENT
ANTERO RESOURCES APPALACHIAN CORPORATION WILL NOTIFY MISS UTILITY OF WEST VIRGINIA FOR THE LOCATING OF UTILITIES PRIOR TO THIS PROJECT DESIGN; TICKET #1301401948.
IN ADDITION, MISS UTILITY WILL BE CONTACTED PRIOR TO START OF THE PROJECT.

ENTRANCE PERMIT
ANTERO RESOURCES APPALACHIAN CORPORATION WILL OBTAIN AN ENCROACHMENT PERMIT (FORM MM-109) FROM THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS, PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.

ENVIRONMENTAL NOTES
WETLAND DELINEATIONS WERE PERFORMED ON OCTOBER 2012 BY ALLSTAR ECOLOGY, LLC TO REVIEW THE SITE FOR WATERS AND WETLANDS THAT ARE MOST LIKELY WITHIN THE REGULATORY PURVIEW OF THE U.S. ARMY CORPS OF ENGINEERS (USACE) AND/OR THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (WVDEP). THE NOVEMBER 29, 2012 WETLAND DELINEATION AND STREAM DELINEATION REPORT WAS PREPARED BY ALLSTAR ECOLOGY, LLC AND SUMMARIZES THE RESULTS OF THE FIELD DELINEATION. THE EXHIBIT DOES NOT, IN ANY WAY, REPRESENT A JURISDICTIONAL DETERMINATION OF THE LANDWARD LIMITS OF WATERS AND WETLANDS WHICH MAY BE REGULATED BY THE USACE OR THE WVDEP. IT IS STRONGLY RECOMMENDED THAT THE AFOREMENTIONED AGENCIES BE CONSULTED IN AN EFFORT TO GAIN WRITTEN CONFIRMATION OF THE DELINEATION SHOWN ON THIS EXHIBIT PRIOR TO ENGAGING CONSTRUCTION ON THE PROPERTY DESCRIBED HEREIN. THE DEVELOPER SHALL OBTAIN THE APPROPRIATE PERMITS FROM THE FEDERAL AND/OR STATE REGULATORY AGENCIES PRIOR TO ANY PROPOSED IMPACTS TO WATERS OF THE U.S., INCLUDING WETLAND FILLS AND STREAM CROSSINGS.

PROJECT CONTACTS

OPERATOR:
ANTERO RESOURCES APPALACHIAN CORPORATION
981 EAST WASHINGTON AVENUE
ELLENBORO, WV 26346
PHONE: (304) 869-3405
FAX: (304) 869-3408

ELI WAGONER - ENVIRONMENTAL ENGINEER
OFFICE: (304) 622-3842, EXT. 311 CELL: (304) 476-9770

CHRIS BROWN - WATER RESOURCES
OFFICE: (304) 622-3842 CELL: (304) 877-8233

JOHN KAWCAK - OPERATIONS SUPERINTENDENT
CELL: (817) 368-1553

AARON KUNZLER - CONSTRUCTION SUPERVISOR
CELL: (405) 227-8344

ANTHONY SMITH - FIELD ENGINEER
OFFICE: (304) 869-3405 CELL: (304) 673-6196

JACK BELL - LAND AGENT
CELL: (304) 376-9682

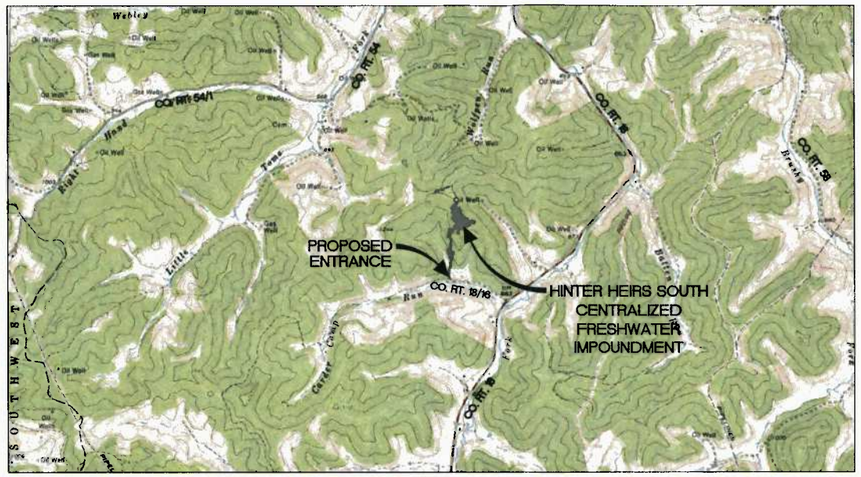
ENGINEER/SURVEYOR:
NAVITUS ENGINEERING, INC.
CYRUS S. KUMP, PE - PROJECT MANAGER/ENGINEER
OFFICE: (888) 662-4185 CELL: (540) 686-6747

ENVIRONMENTAL:
ALLSTAR ECOLOGY
RYAN WARD - ENVIRONMENTAL SPECIALIST
OFFICE: (304) 692-7477

RESTRICTIONS NOTES:
1. THERE ARE NO PERENNIAL STREAMS, LAKES, PONDS, OR RESERVOIRS WITHIN 100 FEET OF THE CENTRALIZED FRESHWATER IMPOUNDMENT. THERE IS A WETLAND ADJACENT TO THE ACCESS ROAD WHICH WILL REMAIN UNDISTURBED.
2. THERE ARE NO NATURALLY PRODUCING TROUT STREAMS WITHIN 300 FEET OF THE CENTRALIZED FRESHWATER IMPOUNDMENT.
3. THERE ARE NO GROUNDWATER INTAKE OR PUBLIC WATER SUPPLY FACILITIES WITHIN 1000 FEET OF THE CENTRALIZED FRESHWATER IMPOUNDMENT.
4. THERE ARE NO EXISTING WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF THE CENTRALIZED FRESHWATER IMPOUNDMENT.
5. THERE ARE NO OCCUPIED DWELLING STRUCTURES WITHIN 625 FEET OF THE CENTER OF THE CENTRALIZED FRESHWATER IMPOUNDMENT.
6. THERE ARE NO AGRICULTURAL BUILDINGS LARGER THAN 2,500 SQUARE FEET WITHIN 625 FEET OF THE CENTER OF THE CENTRALIZED FRESHWATER IMPOUNDMENT.

GEOTECHNICAL NOTES
A SUBSURFACE INVESTIGATION OF THE PROPOSED SITE WAS PERFORMED BY G.A. COVEY ENGINEERING, PLLC ON DECEMBER 17, 18, & 19, 2012. THE REPORT PREPARED BY G.A. COVEY ENGINEERING, PLLC, DATED JANUARY, 2013, REFLECTS THE RESULTS OF THE SUBSURFACE INVESTIGATION. THE INFORMATION AND RECOMMENDATIONS CONTAINED IN THIS REPORT WAS USED IN THE PREPARATION OF THESE PLANS. PLEASE REFER TO THE SUBSURFACE INVESTIGATION REPORT BY G.A. COVEY ENGINEERING, PLLC FOR ADDITIONAL INFORMATION, AS NEEDED.

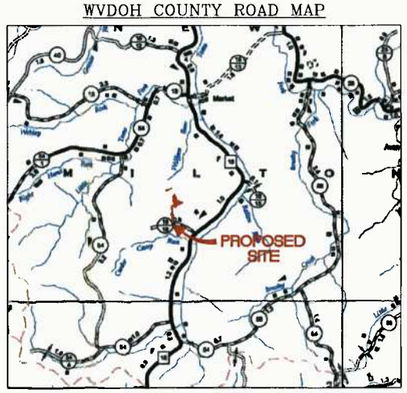
USGS 7.5 NEW MILTON QUAD MAP



WEST VIRGINIA COUNTY MAP

(NOT TO SCALE)

WVDOH COUNTY ROAD MAP



MISS Utility of West Virginia
1-800-245-4848
West Virginia State Law
(Section XIV: Chapter 24-C)
Requires that you call two business days before you dig in the state of West Virginia.
IT'S THE LAW!!

WEST VIRGINIA STATE PLANE COORDINATE SYSTEM
NORTH ZONE, NAD83
ELEVATION BASED ON NAVD88
ESTABLISHED BY SURVEY GRADE GPS & OPUS POST-PROCESSING

SHEET INDEX

01 - COVER SHEET
02 - CONSTRUCTION AND E&S CONTROL NOTES
03 - MATERIAL QUANTITIES
04 - EXISTING CONDITIONS
05 - OVERALL PLAN SHEET INDEX & VOLUMES
06 - ACCESS ROAD PLAN
07 - ACCESS ROAD PROFILES
08-09 - ACCESS ROAD SECTIONS
10 - CENTRALIZED FRESHWATER IMPOUNDMENT PLAN
11 - CENTRALIZED FRESHWATER IMPOUNDMENT SECTIONS
12-16 - CONSTRUCTION DETAILS
17-18 - RECLAMATION PLAN

Limits Of Disturbance Area (ac)	
Impacts to Carl Hinter Heirs TM 15-12	
Access Road "A" (2,218')	7.02
Truck Turnaround Pad	0.28
Centralized Freshwater Impoundment	4.18
Excess/Topsoil Material Stockpiles	2.68
Total Affected Area	14.16
Total Wooded Acres Disturbed	13.28

NOTE:
1. THE HINTER LOCATION CONSISTS OF TWO(2) CENTRALIZED FRESHWATER IMPOUNDMENTS. SEPARATE PLAN SETS HAVE BEEN PREPARED FOR EACH FACILITY.

NAVITUS ENGINEERING INC.
Engineering Survey Environmental GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navituseng.com

REVISION
DATE

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

COVER SHEET

HINTER HEIRS SOUTH
CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CYRUS S. KUMP
REGISTERED
PROFESSIONAL ENGINEER
STATE OF WEST VIRGINIA
01/21/2013

DATE: 01/21/2013
SCALE: AS SHOWN
SHEET 1 OF 18

CONSTRUCTION AND E&S CONTROL NOTES

CONSTRUCTION NOTES:

1. THE CONTRACTOR IS TO VERIFY FIELD CONDITIONS PRIOR TO AND DURING CONSTRUCTION AND WILL NOTIFY NAVITUS ENGINEERING AT (888) 662-4185 IMMEDIATELY OF ANY DISCREPANCIES BETWEEN ACTUAL FIELD CONDITIONS AND THE APPROVED PLAN. ANY WORK PERFORMED BY THE CONTRACTOR AFTER THE FINDING OF SUCH DISCREPANCIES, SHALL BE DONE AT THE CONTRACTOR'S RISK.
2. METHODS AND MATERIALS USED IN THE CONSTRUCTION OF THE IMPROVEMENTS HEREIN SHALL CONFORM TO THE CURRENT COUNTY CONSTRUCTION STANDARDS AND SPECIFICATIONS AND/OR CURRENT WV DEP EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL STANDARDS AND SPECIFICATIONS. SHOULD A CONFLICT BETWEEN THE DESIGN, SPECIFICATIONS, AND PLANS OCCUR, THE MOST STRINGENT REQUIREMENT WILL APPLY. THE APPROVAL OF THESE PLANS IN NO WAY RELIEVES THE DEVELOPER OR HIS AGENT OF THE RESPONSIBILITIES CONTAINED IN THE WV DEP EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL.
3. AN APPROVED SET OF PLANS AND ALL APPLICABLE PERMITS MUST BE AVAILABLE AT THE CONSTRUCTION SITE. ALSO, A REPRESENTATIVE OF THE DEVELOPER MUST BE AVAILABLE AT ALL TIMES.
4. THE CONTRACTOR SHALL PROVIDE ADEQUATE MEANS OF CLEANING MUD FROM TRUCKS AND/OR OTHER EQUIPMENT PRIOR TO ENTERING PUBLIC STREETS, AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO CLEAN STREETS, ALLAY DUST, AND TO TAKE WHATEVER MEASURES ARE NECESSARY TO INSURE THAT THE STREETS ARE MAINTAINED IN A CLEAN, MUD AND DUST FREE CONDITION AT ALL TIMES.
5. THE LOCATION OF EXISTING UTILITIES SHOWN IN THESE PLANS ARE FROM FIELD LOCATIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UTILITIES AS NEEDED PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL INFORM THE ENGINEER OF ANY CONFLICTS ARISING FROM HIS EXISTING UTILITY VERIFICATION AND THE PROPOSED CONSTRUCTION.
6. THE CONTRACTOR SHALL PROVIDE NOTIFICATION TO THE APPROPRIATE UTILITY COMPANY PRIOR TO CONSTRUCTION OF WATER AND/OR GAS PIPE LINES. INFORMATION SHOULD ALSO BE OBTAINED FROM THE APPROPRIATE AUTHORITY CONCERNING PERMITS, CUT SHEETS, AND CONNECTIONS TO EXISTING LINES.
7. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REPAIR OF ANY DAMAGES TO THE EXISTING STREETS AND UTILITIES WHICH OCCURS AS A RESULT OF HIS CONSTRUCTION PROJECT WITHIN OR CONTIGUOUS TO THE EXISTING RIGHT-OF-WAY.
8. WHEN GRADING IS PROPOSED WITHIN EASEMENTS OF UTILITIES, LETTERS OF PERMISSION FROM ALL INVOLVED COMPANIES MUST BE OBTAINED PRIOR TO GRADING AND/OR SITE DEVELOPMENT.
9. THE DEVELOPER WILL BE RESPONSIBLE FOR THE RELOCATION OF ANY UTILITIES WHICH IS REQUIRED AS A RESULT OF HIS PROJECT. THE RELOCATION SHOULD BE DONE PRIOR TO CONSTRUCTION.
10. THESE PLANS IDENTIFY THE LOCATION OF ALL KNOWN GRAVESITES. GRAVESITES SHOWN ON THIS PLAN WILL BE PROTECTED IN ACCORDANCE WITH STATE LAW. IN THE EVENT GRAVESITES ARE DISCOVERED DURING CONSTRUCTION, THE OWNER AND ENGINEER MUST BE NOTIFIED IMMEDIATELY.
11. THE CONTRACTOR(S) SHALL NOTIFY OPERATORS WHO MAINTAIN UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATING OR BLASTING AT LEAST TWO (2) WORKING DAYS, BUT NOT MORE THAN TEN (10) WORKING DAYS, PRIOR TO COMMENCEMENT OF EXCAVATION OR DEMOLITION.
12. CONTRACTOR TO CONTACT OPERATOR AND ENGINEER IF GROUNDWATER IS ENCOUNTERED DURING CONSTRUCTION.
13. THE CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH THE EROSION AND SEDIMENT CONTROL INSPECTOR, 2 DAYS PRIOR TO THE START OF CONSTRUCTION.
14. THE CONTRACTOR IS RESPONSIBLE FOR ALL FILL MATERIAL TESTING REQUIRED DURING THE CONSTRUCTION OF THIS PROJECT. ALL MATERIAL TEST SHALL BE CONDUCTED BY A CERTIFIED MATERIALS TESTING LABORATORY AND A CERTIFICATION OF THE MATERIALS TESTED SHALL BE PROVIDED BY A LICENSED PROFESSIONAL ENGINEER REPRESENTING THE LABORATORY. ALL TEST RESULTS SHALL BE SUBMITTED TO THE ENGINEER CERTIFYING THE CONSTRUCTED FACILITY. FAILURE TO CONDUCT THE DENSITY TEST SHALL BE CAUSE FOR NON-ACCEPTANCE OF THE CONSTRUCTED FACILITY.
15. THE CONTRACTOR IS RESPONSIBLE FOR CONSTRUCTING THE SITE IN ACCORDANCE WITH THE DESIGN PLANS AND CONSTRUCTION DOCUMENTS AND THE SCOPE OF WORK SHALL CONFORM WITH THE GRADES, BERMS, DEPTHS, DIMENSIONS, ETC. SHOWN HEREON.

SITE CLEANUP & RECYCLE PROGRAM

1. GARBAGE, FUELS OR ANY SUBSTANCE HARMFUL TO HUMAN, AQUATIC OR FISH LIFE, WILL BE PREVENTED FROM ENTERING SPRINGS, STREAMS, PONDS, LAKES, WETLANDS OR ANY WATER COURSE OR WATER BODY.
2. OILS, FUELS, LUBRICANTS AND COOLANTS WILL BE PLACED IN SUITABLE CONTAINERS AND DISPOSED PROPERLY.
3. ALL TRASH AND GARBAGE WILL BE COLLECTED AND DISPOSED PROPERLY.
4. ALL SEDIMENT REMOVED FROM SEDIMENT CAPTURING DEVICES SHALL BE PLACED ON THE TOPSOIL STOCKPILE, THEN SEEDED AND MULCHED, AS NECESSARY. ALTERNATIVELY, THE REMOVED SEDIMENT CAN BE TRANSPORTED TO A SITE WITH AN APPROVED PERMIT.
5. ALL POLLUTION AND EMERGENCY SPILLS SHALL BE IMMEDIATELY REPORTED TO THE WVDEP OFFICE OF OIL AND GAS. (EMERGENCY #1-800-642-3074).

EROSION AND SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION: THE PURPOSE OF THIS PROJECT IS TO CONSTRUCT A CENTRALIZED FRESHWATER IMPOUNDMENT AND ACCESS ROAD TO AID IN THE DEVELOPMENT OF INDIVIDUAL GAS WELLS. THE ACCESS ROAD TO THE PROPOSED SITE IS LOCATED ON THE NORTH SIDE OF CO RT. 18/16, 0.33 MILES WEST OF THE INTERSECTION OF CO RT. 18/16 & CO. RT. 18 IN NEW MILTON DISTRICT, DODDRIDGE COUNTY, WEST VIRGINIA. THE TOTAL APPROXIMATE LAND DISTURBANCE ASSOCIATED WITH THIS PROJECT IS 14.16 ACRES.

EXISTING SITE CONDITIONS: THE EXISTING SITE IS MOSTLY FOREST WITH APPROXIMATELY 6% BEING OPEN PASTURE. THE TOPOGRAPHY RANGES FROM MODERATE TO STEEP TERRAIN (2% TO 60% SLOPES). PRESENT ON SITE ARE THREE EXISTING GAS WELLS AND ONE EXISTING GAS PIPELINE. ALSO PRESENT ARE ACCESS ROADS, STRUCTURES, OVERHEAD UTILITIES, ONE PERENNIAL STREAM, TEN EPHEMERAL STREAMS AND ONE INTERMITTENT STREAM. THE SITE IS LOCATED ON A RIDGE AND DRAINS TO TOM'S FORK.

ADJACENT PROPERTY: THE SITE IS BORDERED BY FORESTED LANDS ON ALL SIDES. NEARBY STREAMS INCLUDE CARDER CAMP RUN TO THE SOUTH AND TOMS FORK TO THE SOUTHEAST. THE SITE IS BORDERED BY CO RT. 18/16 TO THE SOUTH (LOCATION OF ACCESS ROAD ENTRANCE).

CRITICAL AREAS: THE AREA(S) SHOWN ALONG THE FIELD DELINEATED STREAMS, WETLANDS, AND PONDS, AS SHOWN ON THE PLANS, ARE DESIGNATED AS CRITICAL AREA(S), IF PRESENT. COMPOST FILTER SOCKS ARE TO BE USED TO PROTECT THESE FIELD DELINEATED AREA(S) FROM SEDIMENT LEAVING THE SITE. ADDITIONALLY, ORANGE SAFETY FENCE IS RECOMMENDED TO BE INSTALLED ABOVE/AROUND THESE AREA(S), TO SERVE AS A PHYSICAL BARRIER, ENSURING THE AREA(S) ARE NOT DISTURBED.

SOILS: A SUBSURFACE INVESTIGATION OF THE PROPOSED SITE WAS PERFORMED BY G.A. COVEY ENGINEERING, PLLC ON DECEMBER 17, 18, & 19, 2012. THE REPORT PREPARED BY G.A. COVEY ENGINEERING, PLLC, DATED JANUARY, 2013, REFLECTS THE RESULTS OF THE SUBSURFACE INVESTIGATION. THE INFORMATION AND RECOMMENDATIONS CONTAINED IN THIS REPORT WAS USED IN THE PREPARATION OF THESE PLANS. PLEASE REFER TO THE SUBSURFACE INVESTIGATION REPORT BY G.A. COVEY ENGINEERING, PLLC FOR ADDITIONAL INFORMATION, AS NEEDED.

OFF SITE AREAS: THERE ARE NO BORROW AREA(S) OR EXPORT STOCKPILE AREA(S) OUTSIDE OF THE PROPOSED LIMITS OF DISTURBANCE FOR THIS PROJECT.

EROSION AND SEDIMENT CONTROL MEASURES: UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE CURRENT WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL.

STRUCTURAL PRACTICES:

PHASE I:
1. INSTALL ORANGE SAFETY FENCE TO ENSURE NO DISTURBANCE TO THE DELINEATED AREA(S).
2. INSTALL TEMPORARY CONSTRUCTION ENTRANCE.
3. INSTALL COMPOST FILTER SOCKS AS SHOWN ON THE PLANS AS PHASE 1 CONTROL MEASURES TO REMOVE SEDIMENT FROM RUNOFF. SELECTIVELY REMOVE TREES REQUIRED TO INSTALL COMPOST FILTER SOCK IN WOODED AREAS. CLEARING AND GRUBBING SHALL BE KEPT AT A MINIMUM TO INSTALL E&S CONTROLS.
4. EROSION CONTROL BLANKETS SHALL BE PLACED ON ALL CRITICAL SLOPES (3:1 OR GREATER) AND AS NEEDED TO STABILIZE DISTURBED AREAS.

PHASE II:
1. ALL CONTROLS INSTALLED IN PHASE I SHALL REMAIN FOR THE DURATION OF THE PROJECT.
2. FILL SLOPE SURFACE SHALL BE LEFT IN A ROUGHENED CONDITION TO REDUCE EROSION. CONTRACTOR SHALL REDIRECT RUNOFF AWAY FROM THE FILL SLOPE BY INSTALLING EARTHEN DIVERSION BERMS AND DIVERTING THE RUNOFF TO SEDIMENT TRAPPING DEVICES.
3. INSTALL V-DITCHES, DITCH RELIEF CULVERTS, AND OUTLET PROTECTION (RIP-RAP APRONS) AS SHOWN ON THE PLANS.
4. EROSION CONTROL BLANKETS SHALL BE PLACED ON ALL CRITICAL SLOPES (3:1 OR GREATER) AND AS NEEDED TO STABILIZE DISTURBED AREAS.

DEVICES LISTED ABOVE ARE CONSIDERED MINIMUM EROSION AND SEDIMENT CONTROLS. ADDITIONAL CONTROL MEASURES MAY BE NECESSARY DUE TO CONTRACTOR PHASING OR OTHER UNFORESEEN CONDITIONS. IMMEDIATELY UPON DISCOVERING UNFORESEEN CIRCUMSTANCES POSING THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION, THE CONTRACTOR SHALL IMPLEMENT APPROPRIATE BMP'S TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENT POLLUTION. ALL MEASURES SHALL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE CURRENT WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL.

MAINTENANCE PROGRAM:
ALL CONTROL MEASURES SHALL BE INSPECTED DAILY BY THE SITE SUPERINTENDENT OR HIS REPRESENTATIVE AND WITHIN 24 HOURS AFTER ANY RUNOFF EVENT. ANY DAMAGED STRUCTURAL MEASURES ARE TO BE REPAIRED, BY THE END OF THE DAY, OR AT THE EARLIEST TIME IN WHICH IT IS SAFE TO DO SO. SEEDED AREAS SHALL BE CHECKED REGULARLY TO ENSURE THAT A GOOD STAND OF GRASS IS MAINTAINED. ALL AREAS SHALL BE FERTILIZED AND RESEEDED AS NEEDED UNTIL GRASS IS ESTABLISHED.

TRAPPED SEDIMENT IS TO BE REMOVED AS REQUIRED TO MAINTAIN 50% TRAP AND/OR SOCK EFFICIENCY AND DISPOSED OF BY SPREADING ON THE STOCKPILE.

INLET OF DITCH RELIEF CULVERTS SHALL BE CHECKED REGULARLY FOR SEDIMENT BUILD-UP. IF THE GRAVEL OUTLET IS CLOGGED BY SEDIMENT, IT SHALL BE REMOVED AND CLEANED OR REPLACED IMMEDIATELY.

SEDIMENT TRACKED ONTO ANY PUBLIC ROADWAY OR SIDEWALK SHALL BE RETURNED TO THE CONSTRUCTION SITE BY THE END OF EACH WORK DAY AND DISPOSED IN THE MANNER DESCRIBED IN THIS PLAN. IN NO CASE SHALL THE SEDIMENT BE WASHED, SHOVELED OR SWEPT INTO ANY ROADSIDE DITCH, CULVERT OR SURFACE WATER.

ANY DISTURBED AREAS ALONG THE ACCESS ROAD SHALL BE STABILIZED PRIOR TO THE END OF EACH DAY WITH EITHER ROCK STABILIZATION OR SEEDING AND MULCHING METHODS.

NOTE: THE WV DEP RETAINS THE RIGHT TO ADD AND/OR MODIFY THESE EROSION AND SEDIMENT CONTROL MEASURES DURING THE CONSTRUCTION PROCESS, WITHIN REASON, TO ENSURE ADEQUATE PROTECTION TO THE PUBLIC AND THE ENVIRONMENT.

SEEDING (SOIL STABILIZATION):
1. CONTRACTOR SHALL APPLY SEED AND STABILIZATION IN ACCORDANCE WITH THE WV DEP EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE (BMP) MANUAL, BASED UPON SITE SPECIFIC SOIL CHARACTERISTICS.
2. WHEREVER SEEDING IS TO BE APPLIED TO STEEP SLOPES (≥ 3H:1V), SEED MIXTURES SHOULD BE SELECTED THAT ARE APPROPRIATE FOR STEEP SLOPES.

DUST CONTROL:
1. TEMPORARY SEEDING SHALL BE APPLIED TO ALL DISTURBED AREAS SUBJECT TO LITTLE OR NO CONSTRUCTION TRAFFIC.
2. ALL HAUL ROADS AND OTHER HEAVY TRAFFIC ROUTES SHALL BE SPRINKLED WITH WATER UNTIL THE SURFACE IS WET AND REPEATED AS NEEDED TO CONTROL DUST.

CONSTRUCTION SEQUENCE

THE DEVELOPMENT OF THIS SITE SHALL BE CONSISTENT WITH THE FOLLOWING GENERAL SEQUENCE OF CONSTRUCTION. THE CONTRACTOR SHALL IMPLEMENT, MAINTAIN, AND OPERATE ALL PROPOSED EROSION AND SEDIMENT CONTROL MEASURES TO EFFECTIVELY MITIGATE THE HAZARD OF ACCELERATED EROSION AND SEDIMENTATION TO ACCEPTABLE LEVELS. MINOR DEVIATIONS FROM THIS SEQUENCE SHALL BE EXECUTED BY THE PROJECT'S SUPERINTENDENT AS NEEDED TO ELIMINATE ANY POTENTIAL EROSIVE CONDITION THAT MAY ARISE FOR THE DURATION OF THE PROJECT. THE WV DEP OFFICE OF OIL AND GAS SHALL BE NOTIFIED OF ANY AND ALL SUCH DEVIATIONS FROM THE APPROVED PLANS.

1. A PRE-CONSTRUCTION CONFERENCE WITH THE CONTRACTOR AND THE APPROPRIATE EROSION AND SEDIMENT CONTROL INSPECTOR 48 HOURS PRIOR TO BEGINNING WORK TO REVIEW THE CONSTRUCTION DRAWINGS AND PROVIDE ANY REQUESTED GUIDANCE.
2. STAKE THE LIMITS OF CONSTRUCTION AND MARK ALL IDENTIFIED WETLANDS, STREAMS, AND OTHER AREAS OF CONCERN FOR CONSTRUCTION ACTIVITIES.
3. CONSTRUCT THE ROCK CONSTRUCTION ENTRANCE. ALL VEHICLES ENTERING AND EXITING THE SITE SHALL DO SO VIA THE ROCK CONSTRUCTION ENTRANCE.
4. CONSTRUCT ALL BMP'S AS SOON AS CLEARING AND GRUBBING OPERATIONS ALLOW. DIVERSIONS AND SEDIMENT TRAP(S)/BASIN(S) SHALL BE SEEDED AND MULCHED IMMEDIATELY.
5. IF APPLICABLE, CONVEY UPSLOPE DRAINAGE AROUND THE ACCESS ROAD AND PAD/PIT AREA BY CONSTRUCTING ALL DIVERSION BERM(S) AND/OR COMPOST FILTER SOCK DIVERSION(S) AS SHOWN ON THE PLANS.
6. CLEAR AND GRUB THE SITE. ALL WOODY MATERIAL, BRUSH, TREES, STUMPS, LARGE ROOTS, BOULDERS, AND DEBRIS SHALL BE CLEARED FROM THE SITE AREA AND KEPT TO THE MINIMUM NECESSARY FOR PROPER CONSTRUCTION, INCLUDING THE INSTALLATION OF NECESSARY SEDIMENT CONTROLS. TREES SIX INCHES IN DIAMETER AND LARGER SHALL BE CUT AND LOGS STACKED. SMALLER TREES, BRUSH, & STUMPS SHALL BE CUT AND/OR GRUBBED AND WINDROWED IN APPROPRIATE AREAS FOR USE AS BRUSH PILE SEDIMENT BARRIERS (AS SHOWN ON THE PLANS), WILDLIFE HABITATS, BURNED (AS PER WV FOREST FIRE LAWS), REMOVED FROM SITE, OR DISPOSED OF BY OTHER METHODS APPROVED BY WV DEP.
7. IF APPLICABLE, INSTALL ALL WETLAND OR STREAM CROSSINGS AS SHOWN ON THE PLANS.
8. STRIP THE TOPSOIL FROM THE ACCESS ROAD, ALL STRIPPED TOPSOIL SHALL BE STOCKPILED IN AREAS SHOWN IN THE PLANS AND IMMEDIATELY STABILIZED. ADDITIONAL BMP MEASURES SHALL BE CONSTRUCTED AROUND TOPSOIL STOCKPILES, IF NECESSARY.
9. CONSTRUCT THE ACCESS ROAD. DITCH RELIEF CULVERTS SHALL BE INSTALLED AT A GRADE OF 1-8% TO MINIMIZE OUTLET VELOCITIES TO THE EXTENT POSSIBLE. INSTALL OUTLET PROTECTION ONCE DITCH RELIEF CULVERTS ARE INSTALLED, AS SHOWN ON PLANS. STABILIZE THE ROAD WITH GEOTEXTILE FABRIC & STONE AND SIDE SLOPES AS SPECIFIED WITH PERMANENT SEEDING. EXCESS MATERIAL SHALL BE STOCKPILED (IF NECESSARY) IN AREAS SHOWN IN THE PLANS AND IMMEDIATELY STABILIZED. ALL DITCH LINES SHALL BE CLEANED PRIOR TO INSTALLATION OF LINED PROTECTION.
10. STRIP THE TOPSOIL FROM THE CENTRALIZED FRESHWATER IMPOUNDMENT AREA. ALL STRIPPED TOPSOIL SHALL BE STOCKPILED IN AREAS SHOWN IN THE PLANS AND IMMEDIATELY STABILIZED. ADDITIONAL BMP MEASURES SHALL BE CONSTRUCTED AROUND TOPSOIL STOCKPILES, IF NECESSARY.
11. GRADE THE CENTRALIZED FRESHWATER IMPOUNDMENT AREA AS SHOWN ON THE PLANS. ALL FILL AREAS SHALL BE "KEYED IN" AND COMPACTED IN HORIZONTAL LIFTS WITH A MAXIMUM LOOSE LIFT THICKNESS OF 9" AND MAXIMUM PARTICLE SIZE OF LESS THAN 6". ALL FILL SHALL BE COMPACTED BY A VIBRATING SHEEPSFOOT ROLLER TO 95% PER THE STANDARD PROCTOR TEST (ASTM-D698).
12. IMMEDIATELY STABILIZE THE OUTER AREAS OF THE CENTRALIZED FRESHWATER IMPOUNDMENT AND TURNAROUND PAD(S). THE TURNAROUND PAD(S) SHALL BE STABILIZED WITH GEOTEXTILE FABRIC & STONE AND THE SIDE SLOPES WITH EROSION CONTROL BLANKETING WHEN SLOPES ARE 3:1 OR GREATER. APPLY SEED AND MULCH TO ALL DISTURBED AREAS. THIS SHALL INCLUDE ALL AREAS THAT WILL NOT BE SUBJECT TO REGULAR TRAFFIC ACTIVITY (TO BE STABILIZED WITH STONE), OR ANY DISTURBED AREA THAT WILL NOT BE RE-DISTURBED BEFORE SITE RECLAMATION BEGINS.
13. PRIOR TO THE INSTALLATION OF THE CENTRALIZED FRESHWATER IMPOUNDMENT LINER SYSTEM, THE CONTRACTOR SHALL CONTACT THE ENGINEER/SURVERYOR TO COMPLETE AN AS-BUILT SURVEY OF THE CONSTRUCTED CENTRALIZED FRESHWATER IMPOUNDMENT TO ENSURE CONFORMANCE WITH THIS DESIGN DRAWINGS. THE AS-BUILT WILL BE REVIEWED BY THE ENGINEER AND THE CONTRACTOR IS RESPONSIBLE FOR ANY CORRECTIVE ACTION DEEMED NECESSARY BY THE ENGINEER FOR ANY DEVIATION(S) FROM THE DESIGN DRAWINGS.
14. INSTALL THE CENTRALIZED FRESHWATER IMPOUNDMENT LINER SYSTEM AND PERIMETER SAFETY FENCE W/GATE AND EMERGENCY LIFE LINE AS SHOWN ON THE PLANS. SEE DETAILS FOR ADDITIONAL INFORMATION.
15. ONCE THE CENTRALIZED FRESHWATER IMPOUNDMENT HAS BEEN COMPLETED, SUBMIT THE AS-BUILT CERTIFICATION FOR THE CENTRALIZED FRESHWATER IMPOUNDMENT FACILITY TO THE WV DEP OFFICE OF OIL AND GAS, PRIOR TO PLACING FLUIDS IN THE STRUCTURE.
16. COMMENCE USE OF THE CENTRALIZED FRESHWATER IMPOUNDMENT FACILITY.
17. ALL BMP'S MUST REMAIN IN PLACE AND FUNCTIONAL UNTIL ALL AREAS WITHIN THE LIMIT OF DISTURBANCE ARE COMPLETE AND PERMANENTLY STABILIZED. MAINTENANCE MUST INCLUDE INSPECTION OF ALL EROSION AND SEDIMENT CONTROLS AFTER EACH RUNOFF EVENT IN EXCESS OF 0.5" AND ON A BIWEEKLY BASIS.
18. THE CONSTRUCTION SITE SHOULD BE STABILIZED AS SOON AS POSSIBLE AFTER COMPLETION. ESTABLISHMENT OF FINAL COVER MUST BE INITIATED NO LATER THAN 7 DAYS AFTER REACHING FINAL GRADE. A NOTICE OF TERMINATION MUST BE FILED WITH THE DEP WHEN THE SITE REACHED FINAL STABILIZATION. FINAL STABILIZATION MEANS THAT ALL SOIL-DISTURBING ACTIVITIES ARE COMPLETED, AND THAT EITHER A PERMANENT VEGETATIVE COVER WITH A DENSITY OF 70% OR GREATER HAS BEEN ESTABLISHED OR THAT THE SURFACE HAS BEEN STABILIZED BY HARD COVER SUCH AS PAVEMENT OR BUILDINGS. IT SHOULD BE NOTED THAT THE 70% REQUIREMENT REFERS TO THE TOTAL AREA VEGETATED AND NOT JUST A PERCENT OF THE SITE.
19. ALL PERMANENT SEDIMENT CONTROL MEASURES CAN BE REMOVED AFTER THE SITE IS PERMANENTLY STABILIZED AND APPROVAL IS RECEIVED FROM THE WVDEP.
20. ANY AREAS DISTURBED BY REMOVAL OF CONTROLS SHALL BE REPAIRED, STABILIZED, AND PERMANENTLY SEEDED.

CENTRALIZED FRESHWATER IMPOUNDMENT CONSTRUCTION STANDARDS

THE DESIGN, CONSTRUCTION, AND REMOVAL OF EMBANKMENTS ASSOCIATED WITH CENTRALIZED FRESHWATER IMPOUNDMENTS FOR OIL AND GAS WELLS MUST BE ACCOMPLISHED IN SUCH A MANNER AS TO PROTECT THE HEALTH AND SAFETY OF THE PEOPLE, THE NATURAL RESOURCES, AND ENVIRONMENT OF THE STATE. THE CENTRALIZED FRESHWATER IMPOUNDMENT EMBANKMENTS SHALL BE DESIGNED, CONSTRUCTED, AND MAINTAINED TO BE STRUCTURALLY SOUND AND REASONABLY PROTECTED FROM UNAUTHORIZED ACTS OF THIRD PARTIES.

1. THE FOUNDATION FOR A CENTRALIZED FRESHWATER IMPOUNDMENT EMBANKMENT MUST BE STRIPPED AND GRUBBED TO SOLID GROUND PRIOR TO THE PLACEMENT AND COMPACTION OF EARTHEN FILL MATERIAL. SHOULD SOLID GROUND NOT BE FOUND WITHIN A DEPTH OF 24", CONTRACTOR WILL NOTIFY NAVITUS ENGINEERING AT (888) 662-4185 IMMEDIATELY. NO EMBANKMENT FILL SHALL CONTAIN OR BE PLACED ON FROZEN MATERIAL.
2. ANY SPRINGS ENCOUNTERED WITHIN THE FOUNDATION AREA SHALL BE DRAINED TO THE OUTSIDE/DOWNSTREAM TOE OF EMBANKMENT. CONSTRUCTED DRAIN SECTION SHALL BE AN EXCAVATED 2' x 2' TRENCH AND BACK FILLED WITH TYPE A SAND, COMPACTED BY HAND TAMPER. NO GEOTEXTILES SHALL BE USED TO LINE TRENCH. THE LAST 3' OF DRAIN AT THE DOWNSTREAM END SHALL BE CONSTRUCTED WITH AASHTO #8 MATERIAL.
3. SOILS FOR EARTHEN EMBANKMENT CONSTRUCTION SHALL BE LIMITED TO TYPES GC, GM, SC, SM, CL, OR ML (ASTM-D2487 - UNIFIED SOILS CLASSIFICATION). SOILS MUST CONTAIN A MINIMUM OF 20% PLUS NO. 200 SIEVE AND BE "WELL GRADED" MATERIAL WITH NO COBBLES OR BOULDER SIZE MATERIAL MIXED WITH THE CLAY. A MINIMUM OF THREE SAMPLES SHALL BE CLASSIFIED.
4. ALL FILL AREAS SHALL BE "KEYED IN" AND COMPACTED IN HORIZONTAL LIFTS WITH A MAXIMUM LOOSE LIFT THICKNESS OF 9" AND MAXIMUM PARTICLE SIZE OF LESS THAN 6". ALL FILL SHALL BE COMPACTED BY A VIBRATING SHEEPSFOOT ROLLER TO 95% PER THE STANDARD PROCTOR TEST (ASTM-D698).
5. THE PLACEMENT OF ALL FILL MATERIAL SHALL BE FREE OF WOOD, STUMPS AND ROOTS, LARGE ROCKS AND BOULDERS, AND ANY OTHER NONCOMPACTABLE SOIL MATERIAL. THE EMBANKMENT SHALL BE COMPACTED TO A MINIMUM OF VISIBLE NON-MOVEMENT, HOWEVER, THE COMPACTION EFFORT SHALL NOT EXCEED THE OPTIMUM MOISTURE LIMITS.
6. THE EMBANKMENT TOP SHALL BE A MINIMUM OF 12' IN WIDTH.
7. THE MINIMUM INSIDE AND OUTSIDE EMBANKMENT (FILL) SLOPES SHALL BE 2H:1V, UNLESS OTHERWISE SPECIFIED. THE INSIDE AND OUTSIDE EMBANKMENT (FILL) SLOPES MUST ADD UP TO 5H:1V.
8. ALL EXPOSED EMBANKMENT SLOPES, NOT COVERED BY COMPACTED ROCKFILL OR RIP-RAP SHALL BE LIMED, FERTILIZED, SEEDED AND MULCHED. PERMANENT VEGETATIVE GROUND COVER IN COMPLIANCE WITH THE WV DEP EROSION AND SEDIMENT CONTROL FIELD MANUAL MUST BE ESTABLISHED UPON THE COMPLETION OF THE CENTRALIZED FRESHWATER IMPOUNDMENT CONSTRUCTION. EMBANKMENTS SHALL BE MAINTAINED WITH A GRASSY VEGETATIVE COVER AND FREE OF BRUSH AND/OR TREES.
9. A MINIMUM OF 2' OF FREEBOARD SHALL BE MAINTAINED AT ALL TIMES DURING THE OPERATION OF THE IMPOUNDMENT.
10. ALL EMBANKMENT CONSTRUCTION AND COMPACTION TESTING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

CENTRALIZED FRESHWATER IMPOUNDMENT LINER SYSTEM NOTES

THE DESIGNED CENTRALIZED FRESHWATER IMPOUNDMENT FACILITY SHALL BE FULLY LINED WITH A GEOSYNTHETIC LINER SYSTEM. LINERS SHALL BE INSTALLED IN ACCORDANCE TO MANUFACTURER'S SPECIFICATIONS.

1. THE SUB-BASE SHALL BEAR THE WEIGHT OF THE LINER SYSTEM, WATER, AND EQUIPMENT OPERATING ON THE CENTRALIZED FRESHWATER IMPOUNDMENT WITHOUT CAUSING OR ALLOWING A FAILURE OF THE LINER SYSTEM.
2. THE SUB-BASE SHALL BE COMPACTED TO ACCOMMODATE POTENTIAL SETTLEMENT WITHOUT DAMAGE TO THE LINER SYSTEM.
3. THE UPPER 6" OF THE SUB-BASE SHALL BE COMPACTED TO A STANDARD PROCTOR DENSITY OF AT LEAST 95%.
4. THE SUB-BASE SHALL BE HARD, UNIFORM, SMOOTH AND FREE OF DEBRIS, ROCK FRAGMENTS, PLANT MATERIAL, AND OTHER FOREIGN MATERIAL.
5. THE SUB-BASE SHALL BE COVERED WITH NON-WOVEN GEOTEXTILE FABRIC TO CUSHION THE PRIMARY LINER AND ALLOW FOR ADEQUATE VENTING BETWEEN THE PRIMARY LINER AND THE SUB-BASE TO PREVENT THE ENTRAPMENT OF GASES BENEATH THE LINER SYSTEM.
6. THE CENTRALIZED FRESHWATER IMPOUNDMENT AREA SHALL BE DRAINED AND COMPLETELY DRY PRIOR TO THE PLACEMENT OF THE PRIMARY LINER. THE PRIMARY LINER SHALL MEET ALL WV DEP GUIDELINES FOR MINIMUM THICKNESS AND SHALL PREVENT THE MIGRATION OF WATER THROUGH THE LINER TO THE GREATEST DEGREE THAT IS TECHNOLOGICALLY POSSIBLE.
7. THE PRIMARY LINER SHALL FULLY COVER THE BOTTOM, SIDEWALLS, AND ANCHORING TRENCH OF THE CENTRALIZED FRESHWATER IMPOUNDMENT. A TEXTURED LINER IS RECOMMENDED TO PROVIDE A SAFER WALKING SURFACE.
8. AN ANCHOR TRENCH SHALL BE EXCAVATED COMPLETELY AROUND THE PERIMETER OF THE CENTRALIZED FRESHWATER IMPOUNDMENT AREA AT THE PLANNED ELEVATION OF THE TOP OF THE LINING. THE TRENCH SHALL BE A MINIMUM 36 INCHES DEEP AND 24 INCHES WIDE.
9. ALL ELEMENTS OF THE LINER SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS. ALL SEAMS AND SEALS AROUND ANY PROJECTIONS SHALL BE SEALED AND TESTED IN A METHOD APPROVED BY THE MANUFACTURER.
10. GAS RELIEF VENTS SHALL BE PROVIDED ALONG THE TOP OF THE LINER AND WITHIN ONE FOOT OF THE PERIMETER OF THE CENTRALIZED FRESHWATER IMPOUNDMENT TO ALLOW GASES TO ESCAPE FROM UNDER THE GEOMEMBRANE. MAXIMUM SPACING FOR VENTS SHALL BE 30 FEET.
11. WATER LEVEL MARKINGS SHALL BE CLEARLY PAINTED (6" INCREMENTS) ON THE LINER SYSTEM TO IDENTIFY THE WATER SURFACE ELEVATION.

NAVITUS ENGINEERING INC.
Engineering Survey Environmental GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navitusengr.com

DATE	REVISION

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

CONSTRUCTION AND E&S CONTROL NOTES

HINTER HEIRS SOUTH

CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CHRIS G. KING
REGISTERED
9378
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
01/21/2013

DATE: 01/21/2013
SCALE: N/A
SHEET 2 OF 18

MATERIAL QUANTITIES

MATERIAL QUANTITIES				
HINTER HEIRS SOUTH CENTRALIZED FRESHWATER IMPOUNDMENT				
Item Description	Quantity	Unit	Unit Cost	Item Total
1.0 Mobilization				
(Limited to 10% of Total Base Bid)	1.0	LS	$	$
2.0 Erosion & Sediment Control				
2.1 Clearing and Grubbing				
2.1.1 Wooded	13.3	AC	$	$
2.1.2 Open Field	0.9	AC	$	$
2.2 Silt Fence		LF	$	$
2.3 Reinforced Silt Fence		LF	$	$
2.4 Super Silt Fence		LF	$	$
2.5 12" Compost Filter Sock	1,253.8	LF	$	$
2.6 18" Compost Filter Sock	279.2	LF	$	$
2.7 24" Compost Filter Sock	1,077.0	LF	$	$
2.8 32" Compost Filter Sock	553.8			
2.9 12" Straw Wattles		LF	$	$
2.10 Earthen Diversion Berms		LF	$	$
3.0 Unclassified Earthwork				
3.1 Access Road "A"				
3.1.1 Topsoil Removal to Stockpile (Assume 6" Depth)	3,502.3	CY	$	$
3.1.2 Excavation (Cut to Compact Fill)	8,228.2	CY	$	$
3.1.3 Excavation (Import from Stockpile)	18,964.7	CY	$	$
3.2 Hinter Heirs South Truck Turnaround Pad				
3.2.1 Topsoil Removal to Stockpile (Assume 6" Depth)	226.5	CY	$	$
3.2.2 Excavation (Cut to Compact Fill)	0.0	CY	$	$
3.2.3 Excavation (Import from Stockpile)	2,120.7	CY	$	$
3.3 Hinter Heirs South Centralized Freshwater Impoundment				
3.3.1 Topsoil Removal to Stockpile (Assume 6" Depth)	2,838.6	CY	$	$
3.3.2 Excavation (Cut to Compact Fill)	17,401.8	CY	$	$
3.3.3 Excavation (Export to Stockpile)	25,380.9	CY	$	$
3.4 Excavation/Undiggable Material (Hammering)		CY	$	$
3.5 Excavation/Undiggable Material (Blasting)		CY	$	$

4.0 Stone and Aggregate Surfacing				
4.1 Construction Entrance (3"-4" Stone) 6" Depth	35.8	TONS	$	$
4.1.1 Geotextile Fabric (US 200 or Equal)	1,289.7	SF	$	$
4.2 Access Road "A" (2"-3" Aggregate) 6" Depth	1,558.2	TONS	$	$
4.2.1 Geotextile Fabric (US 200 or Equal)	56,093.1	SF	$	$
4.3 Hinter Heirs South Truck Turnaround Pad (3" Clean Aggregate) 6" Depth	300.3	TONS	$	$
4.3.1 Geotextile Fabric (US 200 or Equal)	10,809.5	SF	$	$
4.5 4" Rip Rap (Outlets/Level Spreaders) 18" Depth	425.1	TONS	$	$
4.6 4" Rip Rap (Rock-Lined Ditches) 18" Depth		TONS	$	$
4.7 Rock Fill Check Dams (#3 Stone)	13.2	TONS	$	$
5.0 Ditch Relief and Drainage Culverts				
5.1 15" CPP (total)	497.5	LF	$	$
5.2 18" CPP (total)		LF	$	$
5.3 24" CPP (total)		LF	$	$
6.0 Liner System				
6.1 Hinter Heirs South Centralized Freshwater Impoundment				
6.1.1 Primary Liner (60 Mil Textured)	104,033.2	SF	$	$
6.1.2 Non-woven Geotextile Fabric Cushion (16 oz.)	104,033.2	SF	$	$
7.0 Miscellaneous				
7.1 Hinter Heirs South Centralized Freshwater Impoundment Perimeter Safety Fence				
7.1.1 Woven Wire Fence (4' height)	1,378.8	LF	$	$
7.1.2 Wood Treated Fence Post (7' length)	138	EA	$	$
7.1.3 Gate	1	EA	$	$
7.1.4 Emergency Lifeline	1	EA	$	$
7.2 Seeding and Mulching				
7.2.1 Temporary Seeding (Vegetation & Mulch)	5.0	AC	$	$
7.2.2 Permanent Seeding (Vegetation & Mulch / Fertilizer/ Lime)	13.5	AC	$	$
7.2.3 Lime, Fertilizer, Seeding, and Hydro-Mulch w/tack (HYC2 or Equal)		AC	$	$

NOTE:

1. THE SQUARE FOOTAGE FOR THE GEOTEXTILE FABRIC AND THE LINER SYSTEM DOES NOT ACCOUNT FOR MATERIAL OVERLAP AND WASTE.

HINTER HEIRS SOUTH CENTRALIZED FRESHWATER IMPOUNDMENT QUANTITIES						
Description	Cut (CY)	Fill (CY)	Spoil (CY)	Borrow (CY)	Max. Slope	Length of Slope
Access Road "A"	8228.2	27192.9	0.0	18964.7	20.0%	1,216 feet
Truck Turnaround Pad	0.0	2120.7	0.0	2120.7	n/a	n/a
Centralized Freshwater Impoundment	42782.6	17401.8	25380.8	0.0	n/a	n/a
Stripped Topsoil (6")	6567.4	0.0	6567.4	0.0	n/a	n/a
Material Stockpiles	0.0	10085.0	0.0	10085.0	n/a	n/a
Totals	57578.2	56800.4	31948.2	31170.4	n/a	n/a
	Total Spoil (CY) =		777.8			
	Note: Spoil material shown shall be exported for use in construction of Hinter Heirs North Centralized Freshwater Impoundment site.					

THE EARTHWORK QUANTITIES PROVIDED ARE AN ESTIMATE FOR CONSIDERATION. THE QUANTITIES SHOWN ARE CALCULATED USING A 1:1 CUT/SWELL & FILL SHRINK FACTOR. THE QUANTITIES SHOWN MAY BE GREATER OR LESSER THAN ACTUALLY EXCAVATED. THE ENGINEER IS NOT RESPONSIBLE FOR VARIANCES FROM THE ESTIMATED QUANTITIES AND DOES NOT CERTIFY TO THEIR ACCURACY.

NAVITUS ENGINEERING INC.
Engineering Survey Environmental GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navitusep.com

REVISION

DATE

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

MATERIAL QUANTITIES

HINTER HEIRS SOUTH
CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

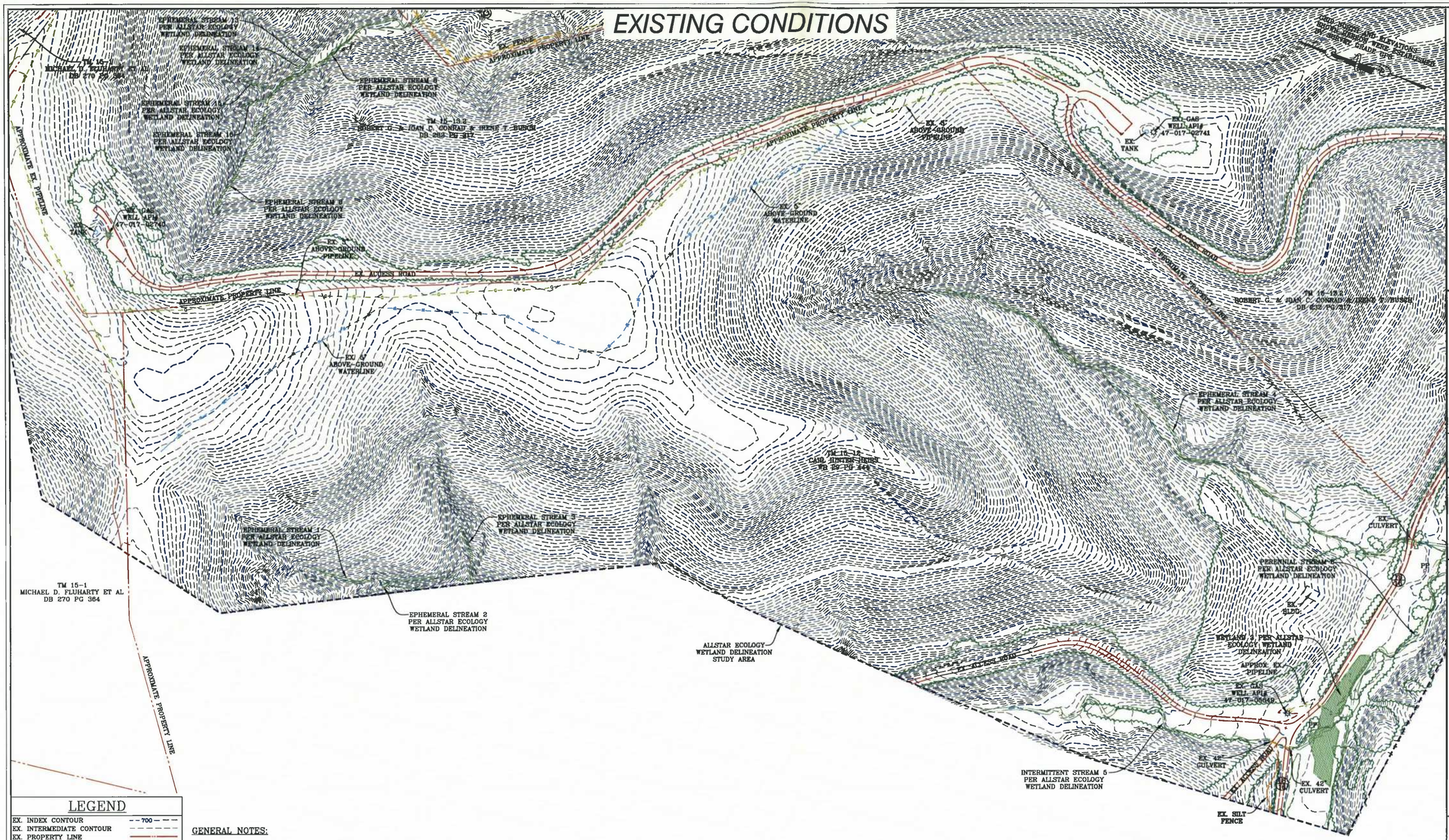
CRUIS E. KIMP
REGISTERED
15578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
01/21/2013

DATE: 01/21/2013

SCALE: N/A

SHEET 3 OF 18

EXISTING CONDITIONS



LEGEND

- EX. INDEX CONTOUR
- EX. INTERMEDIATE CONTOUR
- EX. PROPERTY LINE
- EX. ROAD EDGE OF GRAVEL/DIRT
- EX. ROAD EDGE OF PAVEMENT
- EX. ROAD CENTERLINE
- EX. DITCHLINE
- EX. CULVERT
- EX. FENCELINE
- EX. OVERHEAD UTILITY
- EX. POWER POLE/GUY WIRE
- EX. GASLINE
- EX. TREELINE
- EX. DELINEATED STREAM
- EX. DELINEATED WETLAND
- EX. BUILDING
- DELINEATION STUDY AREA

GENERAL NOTES:

1. THE TOPOGRAPHIC INFORMATION SHOWN HEREON IS BASED ON MARCH 21, 2012 AERIAL PHOTOGRAPHY COMPILED AUGUST, 2012 BY BLUE MOUNTAIN AERIAL MAPPING, BURTON, WEST VIRGINIA.
2. THE PROPERTY LINES SHOWN HEREON DO NOT REPRESENT A BOUNDARY SURVEY ON ANY OF THE PARCELS SHOWN. PROPERTY CORNERS AND LINES PERTINENT TO WELL LOCATION ARE BASED ON A FIELD SURVEY. THE REMAINDER OF THE PROPERTY LINES ARE BASED ON COUNTY REAL ESTATE TAX MAPS, GIS INFORMATION AND DEEDS OF RECORD.

100 0 100
GRAPHIC SCALE (IN FEET)

NAVITUS ENGINEERING INC.
Engineering Survey Environmental GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navitusengr.com

REVISION	DATE

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

EXISTING CONDITIONS

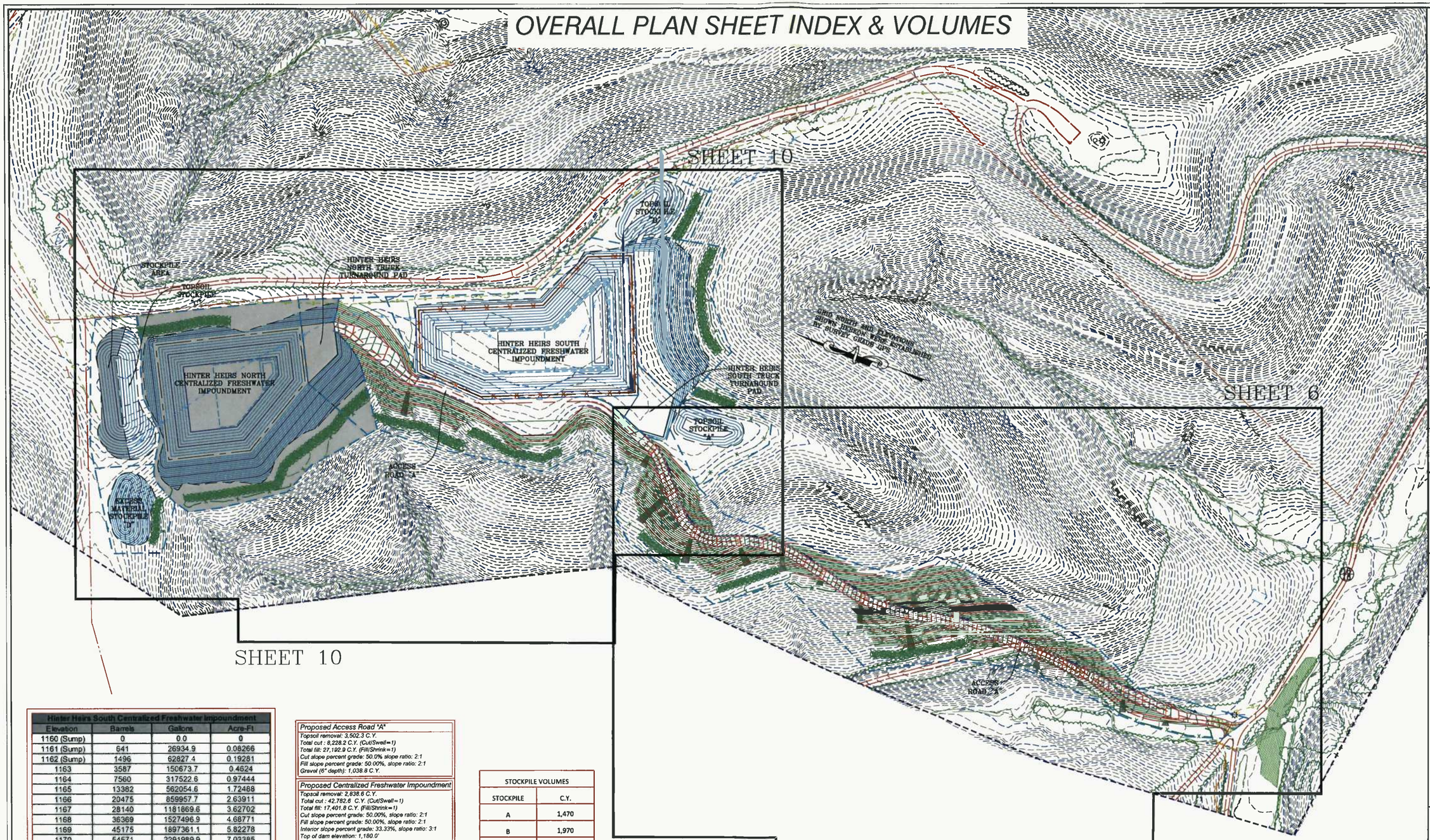
HINTER HEIRS SOUTH

CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CYRUS B. KEMP
REGISTERED
9578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
01/21/2013

DATE: 01/21/2013
SCALE: 1" = 100'
SHEET 4 OF 18

OVERALL PLAN SHEET INDEX & VOLUMES



SHEET 10

SHEET 6

Hinter Heirs South Centralized Freshwater Impoundment			
Elevation	Barrels	Gallons	Acre-Ft
1160 (Sump)	0	0.0	0
1161 (Sump)	641	26934.9	0.08266
1162 (Sump)	1496	62827.4	0.19281
1163	3587	150673.7	0.4624
1164	7560	317522.6	0.97444
1165	13382	562054.6	1.72488
1166	20475	859957.7	2.63911
1167	28140	1181869.6	3.62702
1168	36369	1527496.9	4.68771
1169	45175	1897361.1	5.82278
1170	54571	2291989.9	7.03385
1171	64569	2711904.9	8.32252
1172 (Incised)	75182	3157630.5	9.6904
1173	86421	3629684.9	11.13908
1174	98300	4128599.2	12.67019
1175	110831	4654894.9	14.28533
1176	124026	5209096.4	15.98611
1177	137898	5791722.0	17.77412
1178 (Storage)	152460	6403306.0	19.651
1179	167723	7044366.5	21.61834
1180 (Top)	183717	7716128.7	23.6799

Proposed Access Road "A"
Topsoil removal: 3,502.3 C.Y.
Total cut : 8,228.2 C.Y. (Cut/Swell=1)
Total fill: 27,192.9 C.Y. (Fill/Shrink=1)
Cut slope percent grade: 50.0% slope ratio: 2:1
Fill slope percent grade: 50.00%, slope ratio: 2:1
Gravel (6" depth): 1,038.8 C.Y.

Proposed Centralized Freshwater Impoundment
Topsoil removal: 2,838.6 C.Y.
Total cut : 42,782.6 C.Y. (Cut/Swell=1)
Total fill: 17,401.8 C.Y. (Fill/Shrink=1)
Cut slope percent grade: 50.00%, slope ratio: 2:1
Fill slope percent grade: 50.00%, slope ratio: 2:1
Interior slope percent grade: 33.33%, slope ratio: 3:1
Top of dam elevation: 1,180.0'
Bottom of pit elevation: 1,160.0'
Top of dam width: 12.0'

Proposed Truck Turnaround Pad
Topsoil removal: 226.5 C.Y.
Total cut : 0.0 C.Y. (Cut/Swell=1)
Total fill: 2,120.7 C.Y. (Fill/Shrink=1)
Cut slope percent grade: 50.00%, slope ratio: 2:1
Fill slope percent grade: 50.00%, slope ratio: 2:1
Top of Pad elevation: 1,178.0'
Gravel (6" depth): 200.2 C.Y.

STOCKPILE VOLUMES	
STOCKPILE	C.Y.
A	1,470
B	1,970
C	3,130
D	3,515

100 0 100
GRAPHIC SCALE (IN FEET)

NAVITUS ENGINEERING INC.
Engineering Survey Environmental GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navitusengr.com

REVISION

DATE

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

OVERALL PLAN SHEET INDEX & VOLUMES

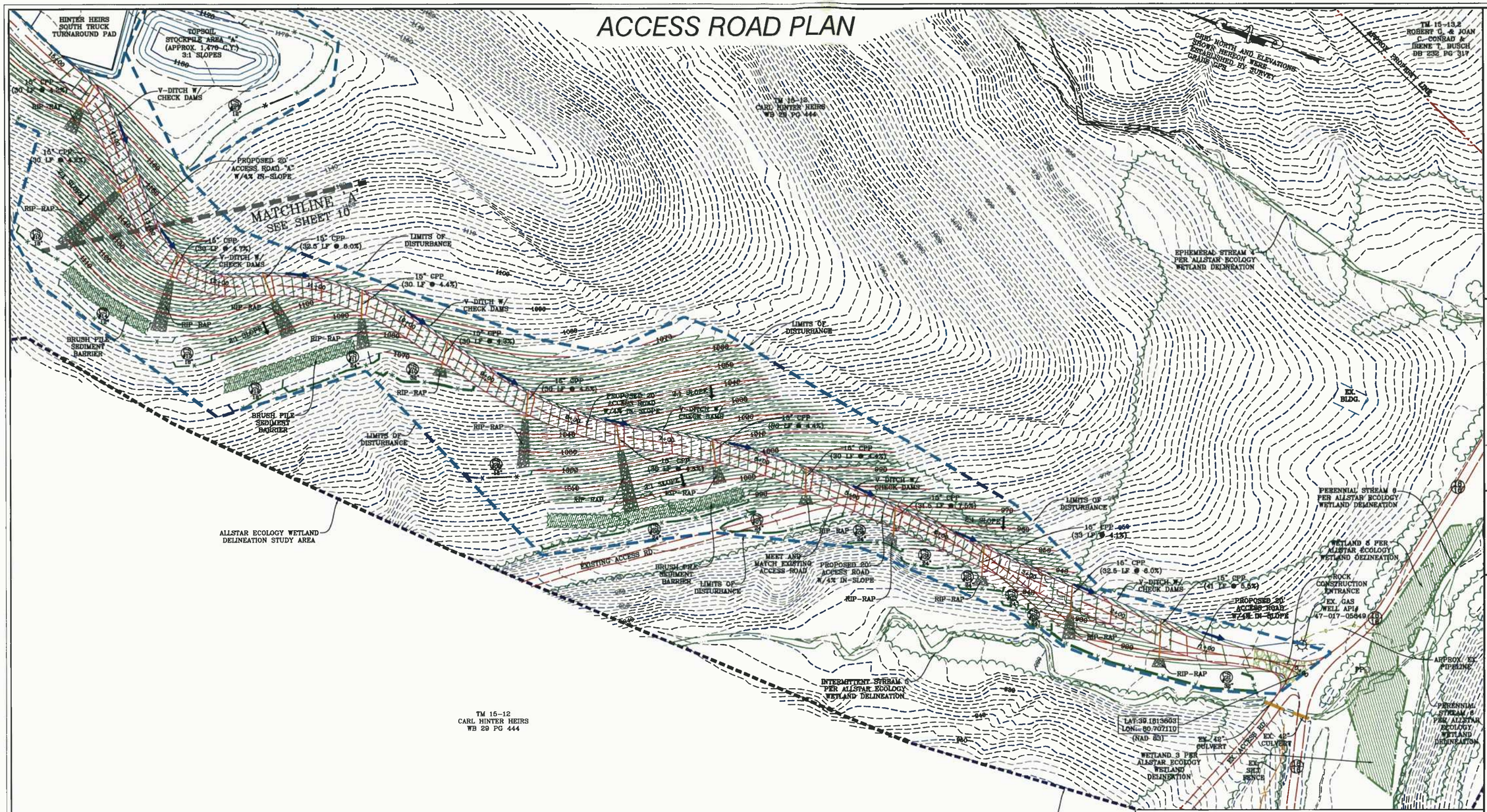
HINTER HEIRS SOUTH

CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CYRUS E. KUMP
REGISTERED
19578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
01/21/2013

DATE: 01/21/2013
SCALE: 1" = 100'
SHEET 5 OF 18

ACCESS ROAD PLAN



NOTES:
1. ALL PROPOSED DITCH RELIEF AND DRAINAGE CULVERTS SHALL HAVE ADEQUATE OUTLET PROTECTION (4" RIP-RAP) AS SHOWN ON THESE PLANS.

2. ALL FILL AREAS SHALL BE "KEYED IN" AND COMPACTED IN 9" (MAXIMUM) LOOSE LIFT THICKNESS WITH A VIBRATING SHEEPSFOOT ROLLER TO 95% COMPACTION PER STANDARD PROCTOR.

LEGEND

EX. INDEX CONTOUR	PROP. INDEX CONTOUR
EX. INTERMEDIATE CONTOUR	PROP. INTERMEDIATE CONTOUR
EX. PROPERTY LINE	PROP. INDEX CONTOUR (ROAD)
EX. ROAD EDGE OF GRAVEL/DIRT	PROP. INTERMEDIATE CTR (ROAD)
EX. ROAD EDGE OF PAVEMENT	PROP. LIMITS OF DISTURBANCE
EX. ROAD CENTERLINE	PROP. WELL HEAD
EX. DITCHLINE	PROP. PERIMETER SAFETY FENCE
EX. CULVERT	PROP. ACCESS GATE WITH EMERGENCY LIFELINE
EX. FENCELINE	PROP. ROAD EDGE OF GRAVEL
EX. OVERHEAD UTILITY	PROP. ROAD CENTERLINE
EX. POWER POLE/GUY WIRE	PROP. V-DITCH W/ CHECK DAMS
EX. GASLINE	PROP. CULVERT W/ RIP-RAP
EX. TREELINE	PROP. COMPOST FILTER SOCK
EX. DELINEATED STREAM	PROP. SUPER SILT FENCE
EX. DELINEATED WETLAND	MATCHLINE
EX. BUILDING	
100' WETLAND/STREAM BUFFER	BRUSH PILE SEDIMENT BARRIER
DELINEATION STUDY AREA	

NAVITUS ENGINEERING INC.
Engineering · Survey · Environmental · GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navitusEng.com

REVISION	DATE

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

ACCESS ROAD PLAN

HINTER HEIRS SOUTH

CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CRAIG S. KIME — 878 — REGISTERED — STATE OF WEST VIRGINIA — PROFESSIONAL ENGINEER
01/21/2013

DATE: 01/21/2013
SCALE: 1" = 50'
SHEET 6 OF 18

ACCESS ROAD PROFILES

ACCESS ROAD "A" PROFILE

SCALE: HORIZ. 1" = 50' VERT. 1" = 50'

ACCESS ROAD "A" PROFILE

SCALE: HORIZ. 1" = 50' VERT. 1" = 50'

LEGEND

X-SECTION GRID INDEX	———
X-SECTION GRID INTERMEDIATE	———
X-SECTION PROPOSED GRADE	———
X-SECTION EXISTING GRADE	— — —
X-SECTION WATER SURFACE	— — —
MATCHLINE	■ ■ ■

NAVITUS ENGINEERING INC.
Engineering ♦ Survey ♦ Environmental ♦ GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navituseng.com

DATE	REVISION

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR: ANTERO RESOURCES APPALACHIAN CORP

ACCESS ROAD PROFILES

HINTER HEIRS SOUTH

CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CHRIS S. KING
REGISTERED
9578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
01/21/2013

DATE: 01/21/2013

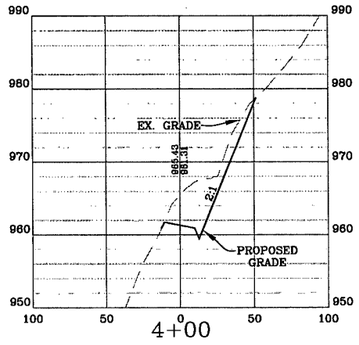
SCALE: AS SHOWN

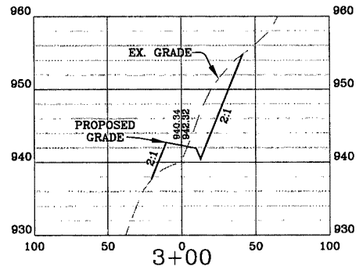
SHEET 7 OF 18

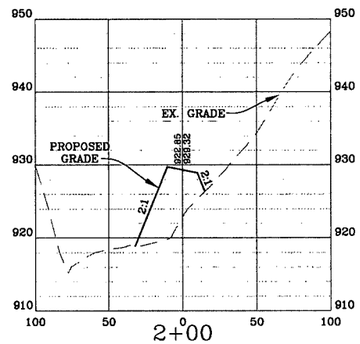
ACCESS ROAD SECTIONS

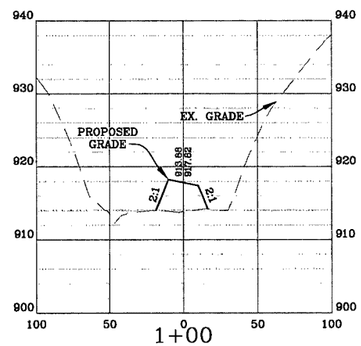
ACCESS ROAD "A" CROSS-SECTIONS

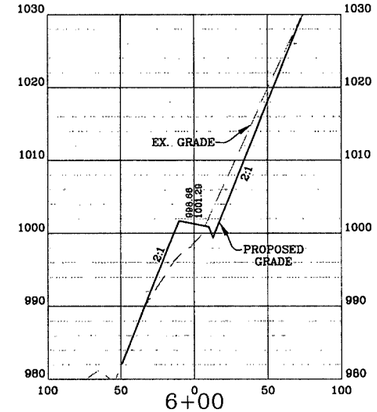
SCALE: HORIZ. 1" = 50' VERT. 1" = 10'

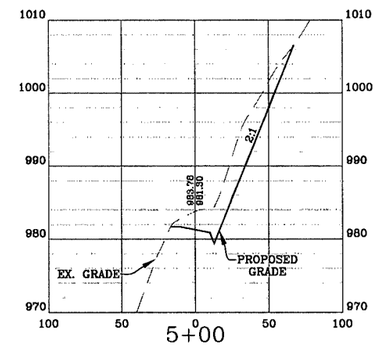


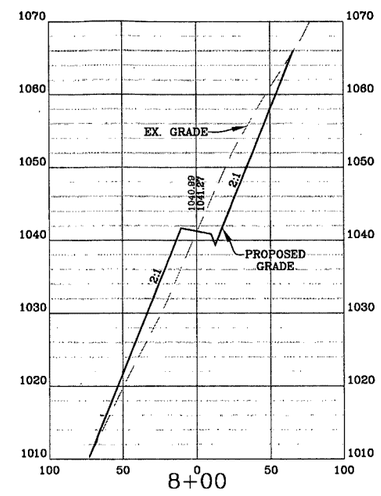


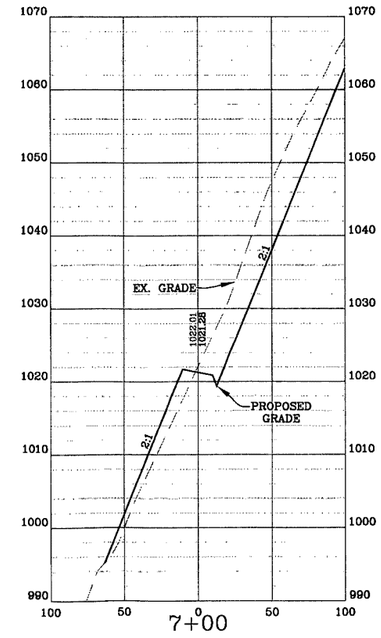


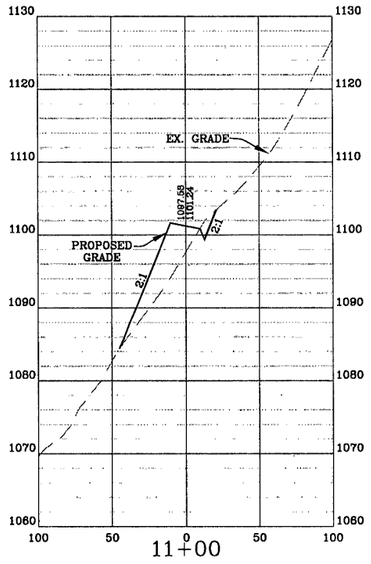


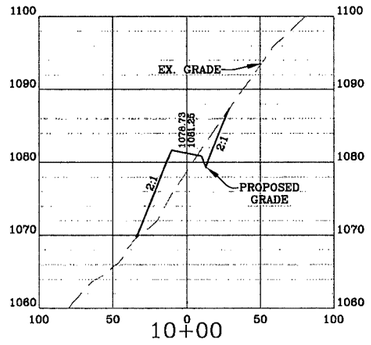


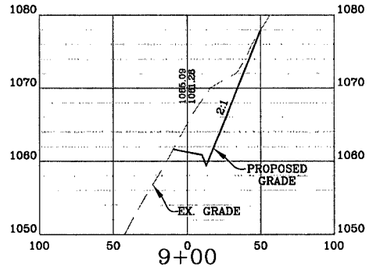












NOTE:
1. ALL CUT & FILL SLOPES ALONG THE ACCESS ROAD SHALL BE 2:1 UNLESS STATED OTHERWISE.

LEGEND

X-SECTION GRID INDEX	
X-SECTION GRID INTERMEDIATE	
X-SECTION PROPOSED GRADE	
X-SECTION EXISTING GRADE	
X-SECTION WATER SURFACE	
MATCHLINE	

NAVITUS ENGINEERING INC.
Engineering Survey Environmental GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navituseng.com

REVISION | DATE

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

ACCESS ROAD SECTIONS

HINTER HEIRS SOUTH

CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

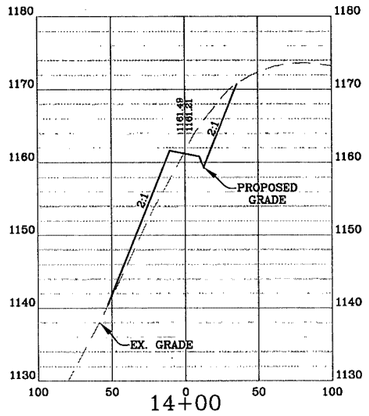
CHRIS G. KING
REGISTERED
13578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
01/21/2013

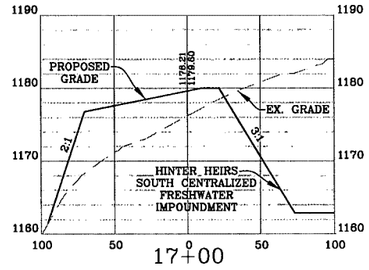
DATE: 01/21/2013
SCALE: AS SHOWN
SHEET 8 OF 18

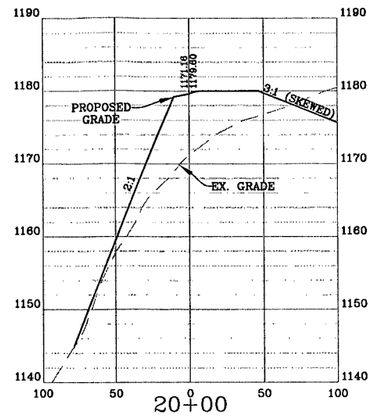
ACCESS ROAD SECTIONS

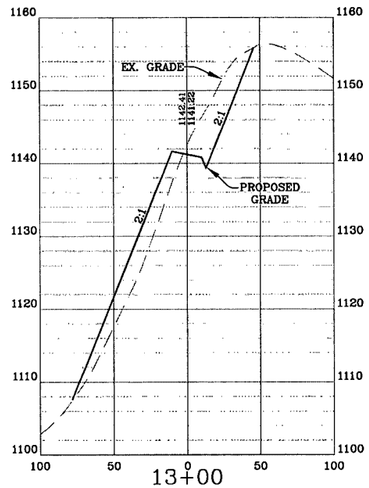
ACCESS ROAD "A" CROSS-SECTIONS

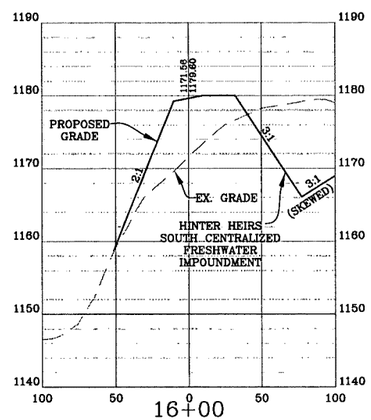
SCALE: HORIZ. 1" = 50' VERT. 1" = 10'

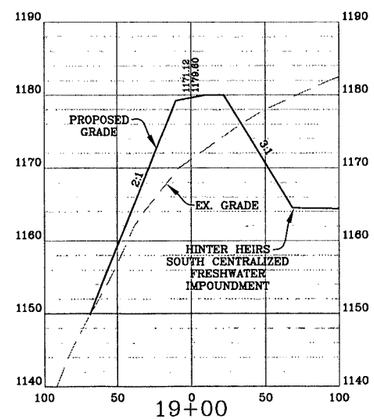


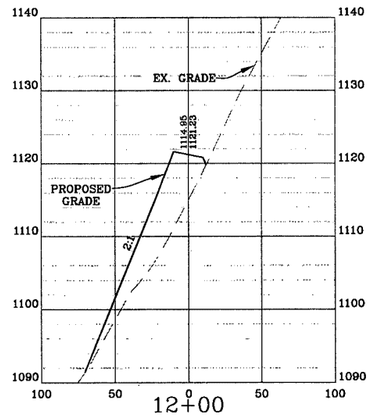


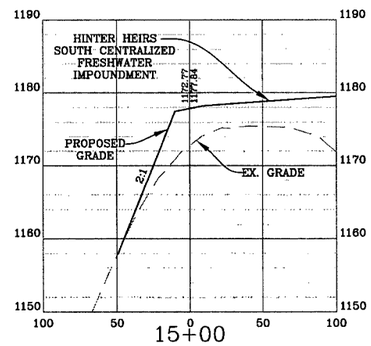


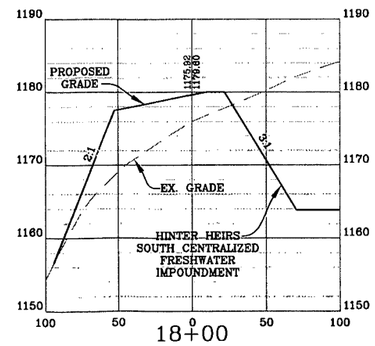


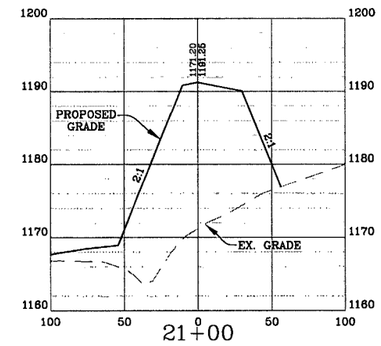












NOTE:
1. ALL CUT & FILL SLOPES ALONG THE ACCESS ROAD SHALL BE 2:1 UNLESS STATED OTHERWISE.

LEGEND

X-SECTION GRID INDEX	
X-SECTION GRID INTERMEDIATE	
X-SECTION PROPOSED GRADE	
X-SECTION EXISTING GRADE	
X-SECTION WATER SURFACE	
MATCHLINE	

NAVITUS ENGINEERING INC.
Engineering Survey Environmental GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navitusengr.com

REVISION | DATE

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

ACCESS ROAD SECTIONS

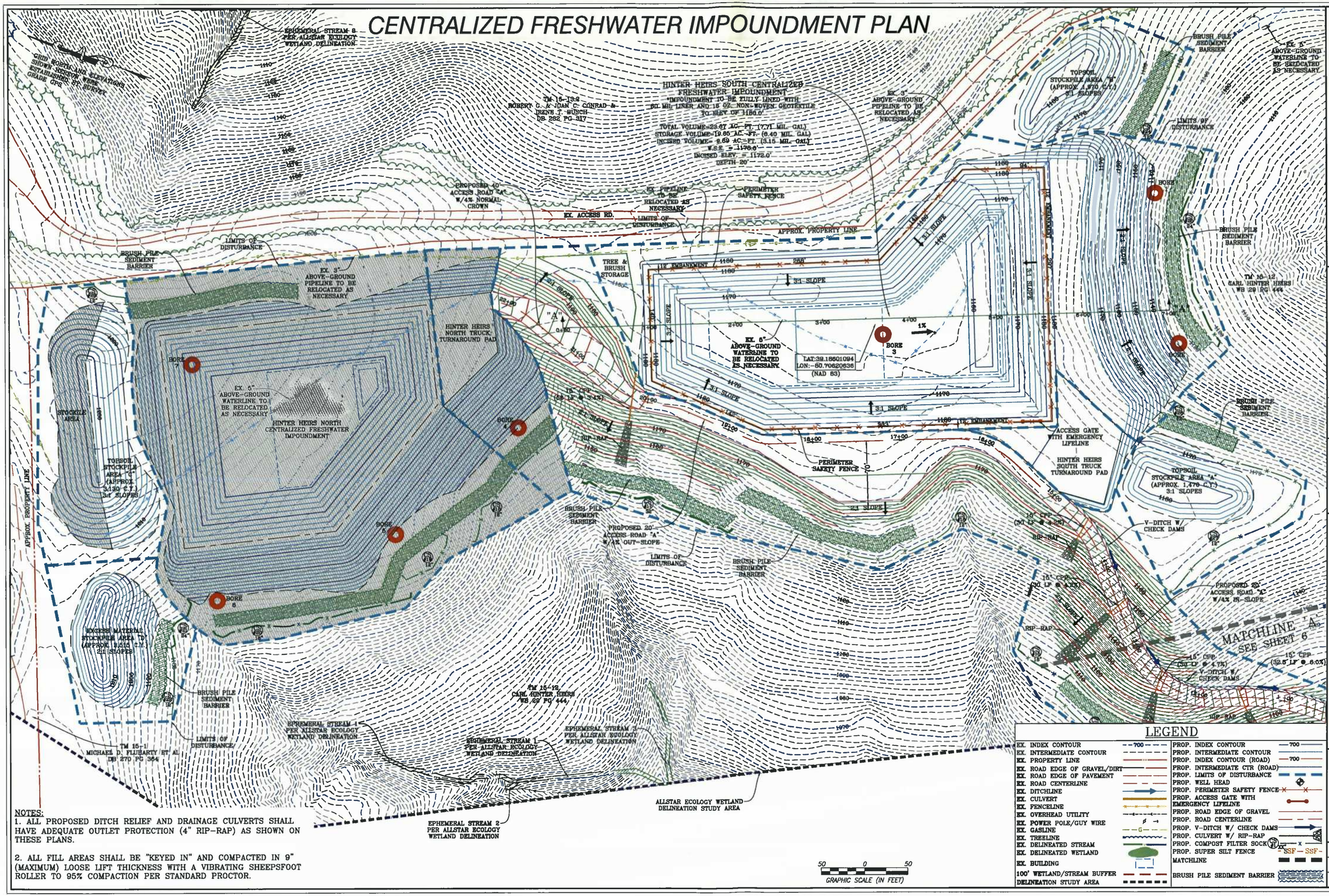
HINTER HEIRS SOUTH

CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CHRIS B. KIME
REGISTERED
8578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
01/21/2013

DATE: 01/21/2013
SCALE: AS SHOWN
SHEET 9 OF 18

CENTRALIZED FRESHWATER IMPOUNDMENT PLAN



NOTES:
1. ALL PROPOSED DITCH RELIEF AND DRAINAGE CULVERTS SHALL HAVE ADEQUATE OUTLET PROTECTION (4" RIP-RAP) AS SHOWN ON THESE PLANS.

2. ALL FILL AREAS SHALL BE "KEYED IN" AND COMPACTED IN 9" (MAXIMUM) LOOSE LIFT THICKNESS WITH A VIBRATING SHEEPSFOOT ROLLER TO 95% COMPACTION PER STANDARD PROCTOR.

LEGEND

EX. INDEX CONTOUR	PROP. INDEX CONTOUR
EX. INTERMEDIATE CONTOUR	PROP. INTERMEDIATE CONTOUR
EX. PROPERTY LINE	PROP. INDEX CONTOUR (ROAD)
EX. ROAD EDGE OF GRAVEL/DIRT	PROP. INTERMEDIATE CTR (ROAD)
EX. ROAD EDGE OF PAVEMENT	PROP. LIMITS OF DISTURBANCE
EX. ROAD CENTERLINE	PROP. WELL HEAD
EX. DITCHLINE	PROP. PERIMETER SAFETY FENCE
EX. CULVERT	PROP. ACCESS GATE WITH EMERGENCY LIFELINE
EX. FENCELINE	PROP. ROAD EDGE OF GRAVEL
EX. OVERHEAD UTILITY	PROP. ROAD CENTERLINE
EX. POWER POLE/GUY WIRE	PROP. V-DITCH W/ CHECK DAMS
EX. GASLINE	PROP. CULVERT W/ RIP-RAP
EX. TREELINE	PROP. COMPOST FILTER SOCK
EX. DELINEATED STREAM	PROP. SUPER SILT FENCE
EX. DELINEATED WETLAND	MATCHLINE
EX. BUILDING	
100' WETLAND/STREAM BUFFER	BRUSH PILE SEDIMENT BARRIER
DELINEATION STUDY AREA	

NAVITUS ENGINEERING INC.
Engineering Survey Environmental GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navitusengineering.com

DATE	REVISION

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

CENTRALIZED FRESHWATER IMPOUNDMENT PLAN

HINTER HEIRS SOUTH

CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

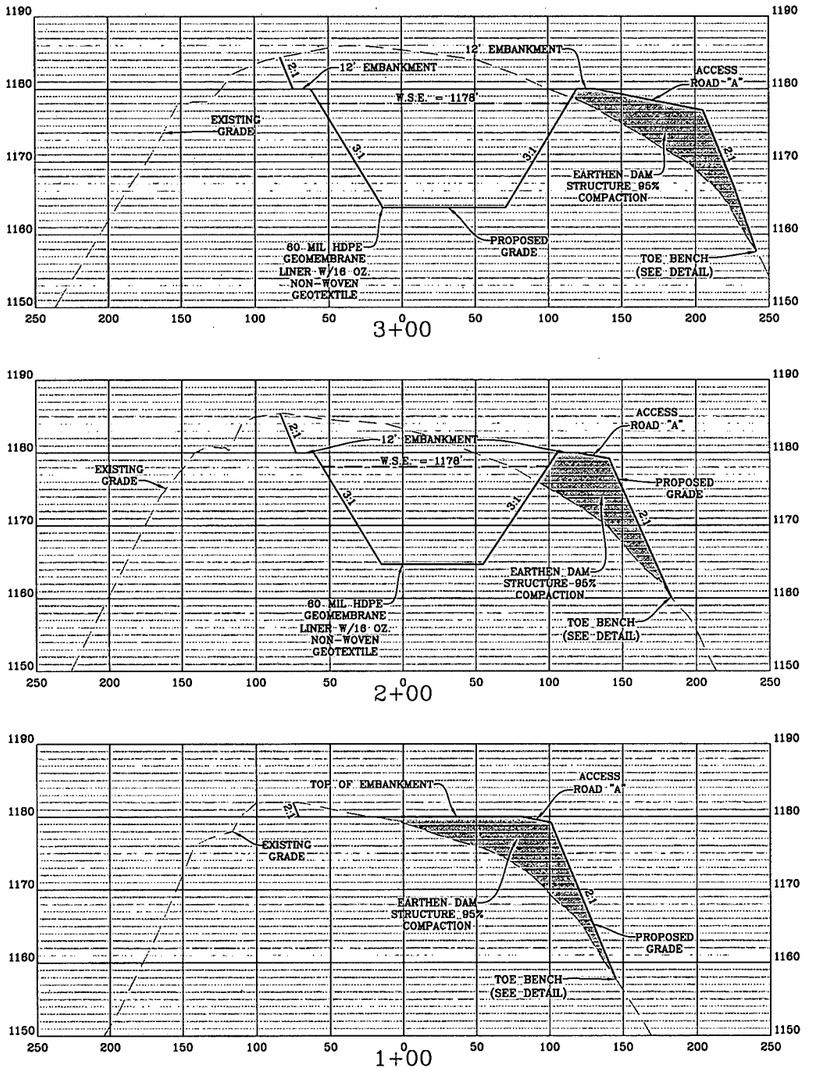
CHRIS C. KUHN — REGISTERED — 2570 STATE OF — PROFESSIONAL ENGINEER — WEST VIRGINIA
01/21/2013

DATE: 01/21/2013
SCALE: 1" = 50'
SHEET 10 OF 18

CENTRALIZED FRESHWATER IMPOUNDMENT SECTIONS

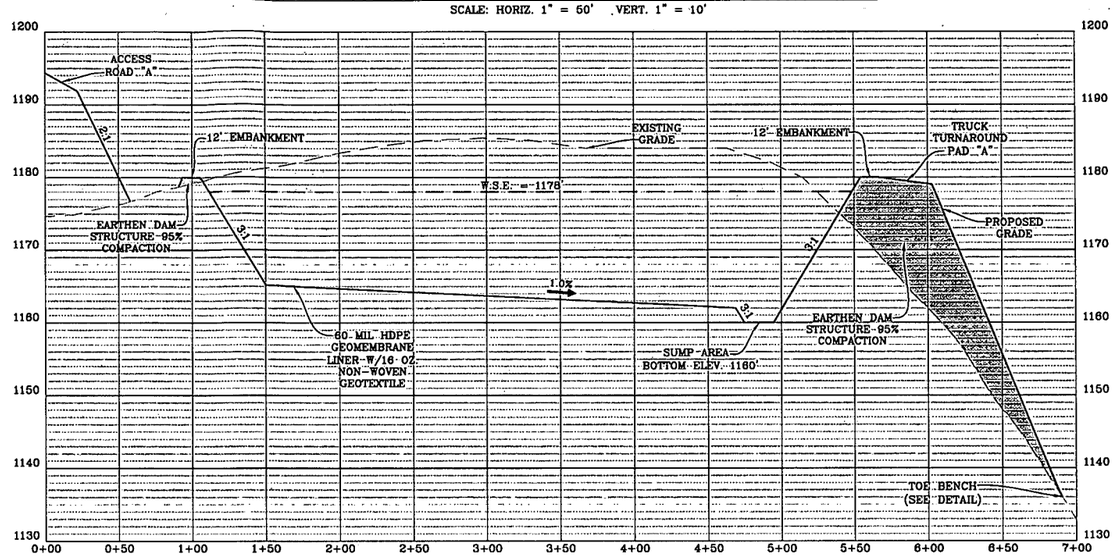
CENTRALIZED FRESHWATER IMPOUNDMENT CROSS-SECTIONS ALONG BASELINE "A-A"

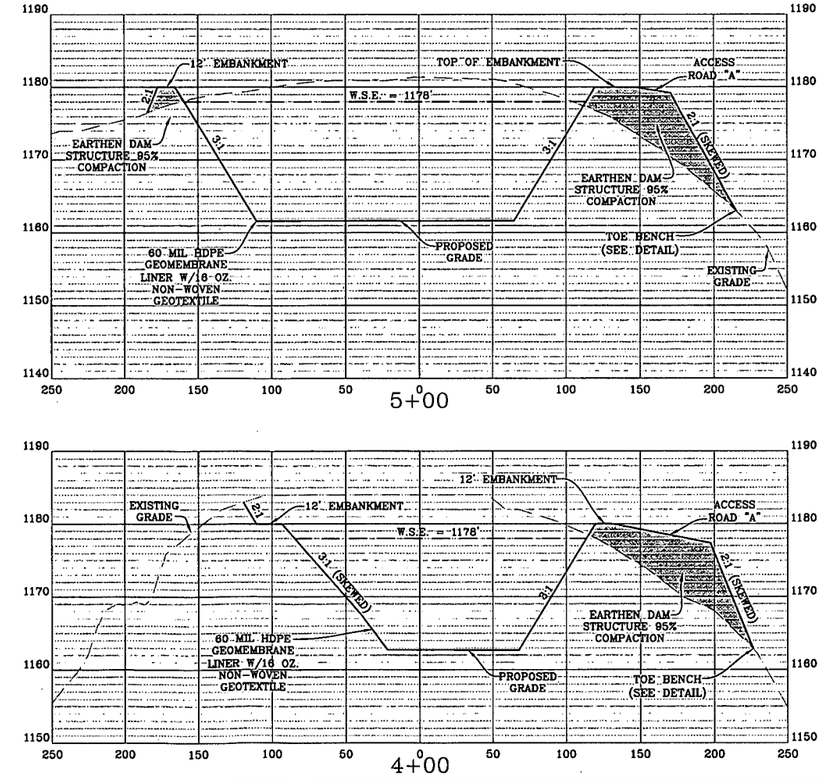
SCALE: HORIZ. 1" = 50' VERT. 1" = 10'



CENTRALIZED FRESHWATER IMPOUNDMENT CROSS-SECTION "A-A"

SCALE: HORIZ. 1" = 50' VERT. 1" = 10'





NOTE:
1. ALL FILL AREAS SHALL BE "KEYED IN" AND COMPACTED IN 9" (MAXIMUM) LOOSE LIFT THICKNESS WITH A VIBRATING SHEEPSFOOT ROLLER TO 95% COMPACTION PER STANDARD PROCTOR.

LEGEND

- X-SECTION GRID INDEX
- X-SECTION GRID INTERMEDIATE
- X-SECTION PROPOSED GRADE
- X-SECTION EXISTING GRADE
- X-SECTION WATER SURFACE
- MATCHLINE

NAVITUS ENGINEERING INC.
Engineering Survey Environmental GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 502-2485
www.navituseng.com

REVISION | DATE

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

CENTRALIZED FRESHWATER IMPOUNDMENT SECTIONS

HINTER HEIRS SOUTH

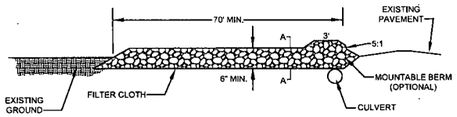
CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CHRIS S. KING — REGISTERED — 15276 — STATE OF WEST VIRGINIA — PROFESSIONAL ENGINEER
01/21/2013

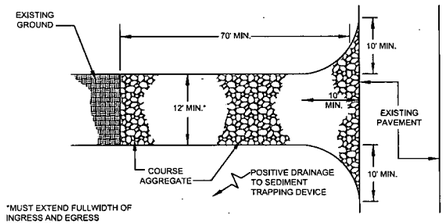
DATE: 01/21/2013
SCALE: AS SHOWN
SHEET 11 OF 18

FIGURE 3.02.1

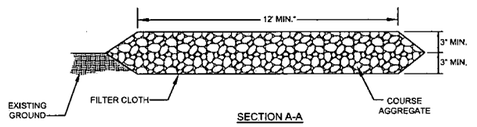
STONE CONSTRUCTION ENTRANCE



SIDE ELEVATION



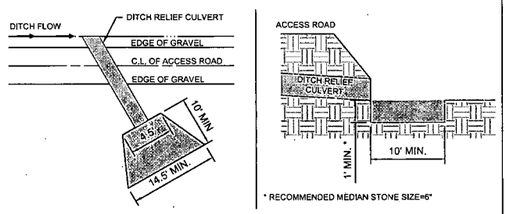
PLAN VIEW



SECTION A-A

SOURCE: ADAPTED from the 1993 Maryland Standards for Soil Erosion and Sediment Control and Va. DSWC

TYPICAL DITCH RELIEF CULVERT OUTLET TREATMENT



PLAN VIEW
NTS

SECTION VIEW
NTS

NOTE:
ALL DITCH LINE PROTECTION SHALL BE INSTALLED AS RECOMMENDED IN THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE (BMP) MANUAL. DITCH LINE PROTECTION SHALL BE BASED ON THE FOLLOWING GRADES:

1. **LESS THAN 3% – GRASSED**
2. **3–8% – GRASS WITH ROLLED EROSION CONTROL PRODUCTS (RECP)**
3. **GREATER THAN 8% – RIPRAP OR EQUIVALENT GEOTEXTILE**

IF HIGH EROSIVE SOILS ARE ENCOUNTERED DURING CONSTRUCTION, THE ENGINEER SHOULD BE CONTACTED FOR FURTHER EVALUATION.

Modified Figure 3.1 – Typical Roadside Ditch Section
Sump at Ditch Relief Culvert

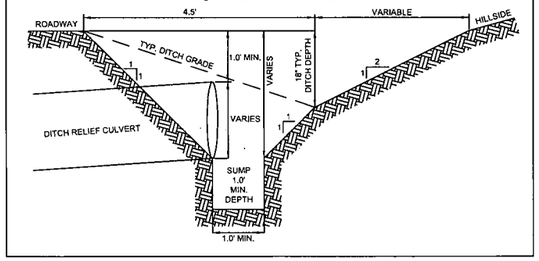
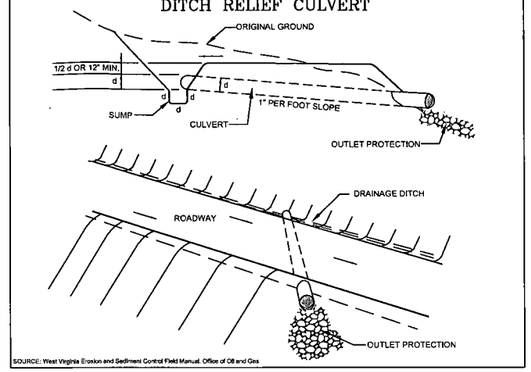


FIGURE II-4

DITCH RELIEF CULVERT



SOURCE: West Virginia Erosion and Sediment Control Field Manual, Office of Oil and Gas

Table II-5

Pipe Sizes for Culverts Across Roads

Drainage Area (Ac)	Pipe Diameter (In)	Pipe Capacity (Cfs)
10	15	5
20	18	9
30	21	12
50	24	18
80	27	24
100	30	29
300	36	60
500	42	85

Table II-6

Spacing of Culverts

Road Grade %	Distance (Ft)
2-5	500-300
6-10	300-200
11-15	200-100
16-20	100

TURNOUT

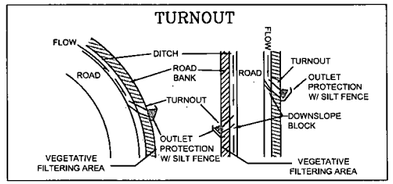
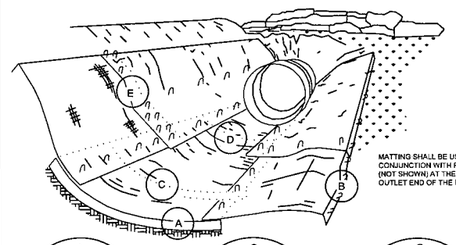
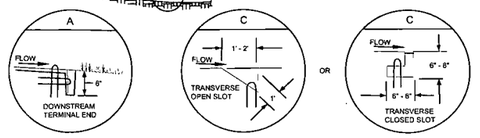


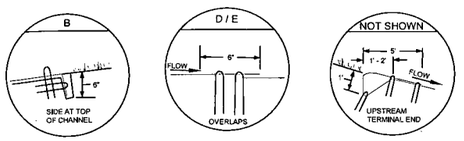
FIGURE 3.13.1

TYPICAL RECP CHANNEL INSTALLATION





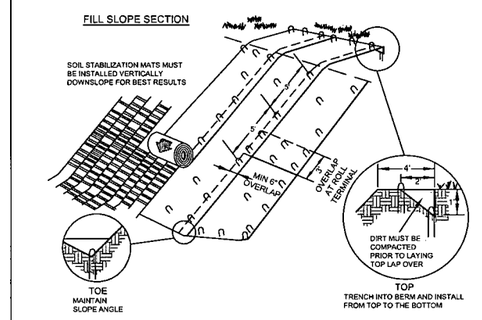
THESE CONFIGURATIONS ARE EXAMPLES ONLY ALWAYS INSTALL PER MANUFACTURER'S RECOMMENDATIONS



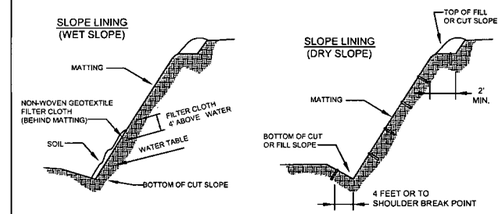
SOURCE: VA DCR-DSWC AND NORTH AMERICAN GREEN

FIGURE 3.13.2

ROLLED EROSION CONTROL PRODUCTS



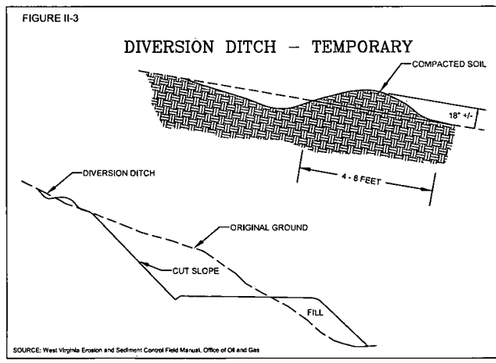
NOTE: SLOPE SURFACE MUST BE SMOOTH AND FREE OF ROCKS, LUMPS, GRASS AND STICKS, MATS MUST BE PLACED FLAT ON SURFACE FOR PROPER SOIL CONTACT.



SOURCE: VDOT STANDARDS AND VA DCR-DSWC

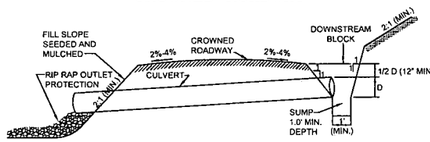
FIGURE II-3

DIVERSION DITCH – TEMPORARY

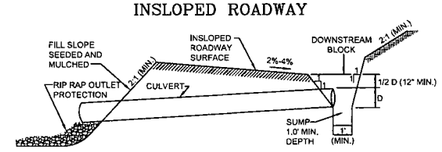


SOURCE: West Virginia Erosion and Sediment Control Field Manual, Office of Oil and Gas

CROWNED ROADWAY



INSLOPED ROADWAY



Cut and fill slopes shall be stabilized immediately upon completion of roadway grading. Those areas shall be blanketed wherever they are located within 50 feet of a surface water or within 100 feet of a surface water where a suitable vegetative filter strip does not exist.

A durable top dressing shall be provided for soils having low strength.

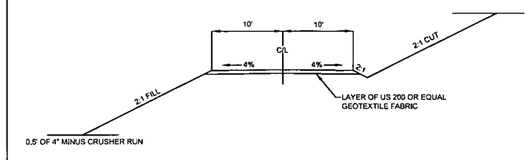
Roadside ditches shall be provided with adequate protective lining.

Adequately sized culverts or other suitable cross drains shall be provided at all seeps, springs, and drainageways.

Roadway shall be inspected weekly and after each runoff event. Damaged roadways, ditches, or cross drains shall be repaired immediately.

SOURCE: THE DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF OIL AND GAS MANAGEMENT 5800-FM-OG0111 APPENDIX A BMP CONSTRUCTION DETAILS (MODIFIED)

TYPICAL ROAD CROSS SECTION DETAIL



NAVITUS ENGINEERING INC.
Engineering · Survey · Environmental · GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navitusengr.com

DATE	REVISION

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

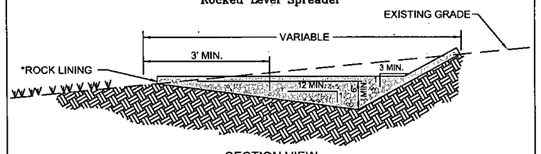
CONSTRUCTION DETAILS

HINTER HEIRS SOUTH
CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CRAIG B. KAMP
REGISTERED
5578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
01/21/2013

DATE: 01/21/2013
SCALE: N/A
SHEET 12 OF 18

STANDARD CONSTRUCTION DETAIL
Rocked Level Spreader

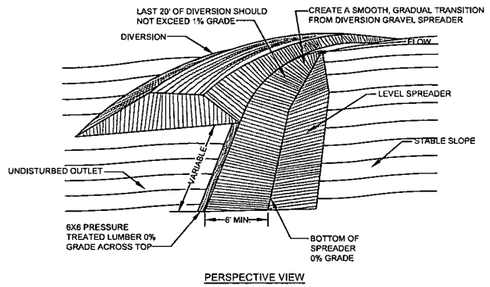


SECTION VIEW
NTS

*All Level Spreader rock shall be a minimum of R4.

FIGURE 3.02.1

LEVEL SPREADER



PERSPECTIVE VIEW

NOTE: ALL TEMPORARY BERMS, SWALES AND LEVEL SPREADER DITCHES MUST RECEIVE TEMPORARY SEEDING AND MULCHING AFTER INSTALLATION

SOURCE: ADAPTED FROM N.C. E&S Control Planning and Design Manual and VA DESCI

FIGURE II-10

BRUSH PILE SEDIMENT BARRIER

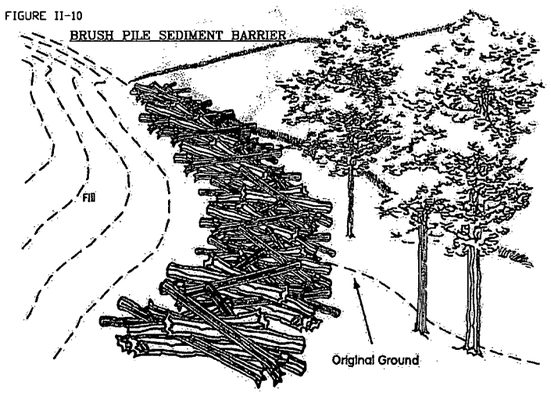


Table 4.1
Compost Sock Fabric Minimum Specifications

Material Type	3 mil HDPE	5 mil HDPE	6 mil HDPE	Multi-Filament Polypropylene (MFPP)	Heavy Duty Multi-Filament Polypropylene (HDMFPP)
Material Characteristics	Photo-degradable	Photo-degradable	Bio-degradable	Photo-degradable	Photo-degradable
Sock Diameters	12" 18"	12" 18" 24" 32"	12" 18" 24" 32"	12" 18" 24" 32"	12" 18" 24" 32"
Mesh Opening	3/8"	3/8"	3/8"	3/8"	1/8"
Textile Strength		26 psi	26 psi	44 psi	203 psi
Ultraviolet Stability % Original Strength (ASTM G-155)	23% at 1000 hr.	23% at 1000 hr.		100% at 1000 hr.	100% at 1000 hr.
Minimum Functional Longevity	6 months	9 months	6 months	1 year	2 years
Two-ply systems					
Inner Containment Netting	HDPE biaxial net Continuously wound Fusion-welded junctures 3/4" x 3/4" Max. aperture size				
Outer Filtration Mesh	Composite Polypropylene Fabric (Woven layer & non-woven fleece mechanically fused via needle punch) 3/16" Max. aperture size				
Sock fabrics composed of burlap may be used on projects lasting 6 months or less.					

FIGURE 3.05.1

ROCK CHECK DAM

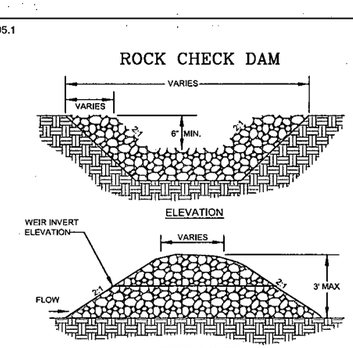
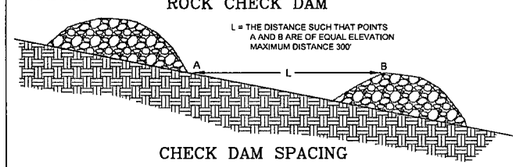
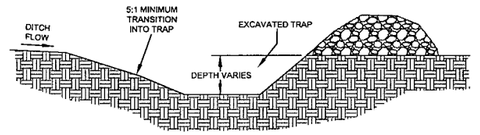


FIGURE 3.05.2

ROCK CHECK DAM



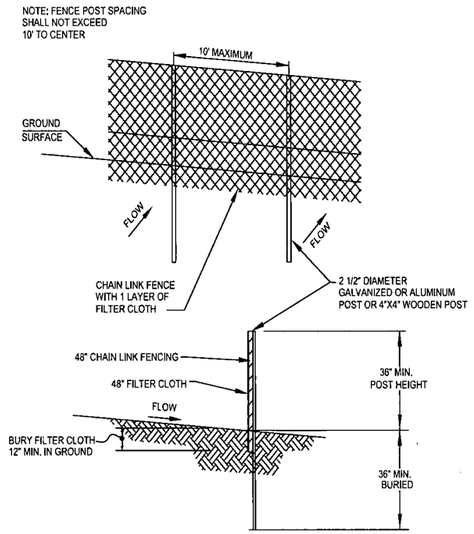
CHECK DAM SPACING



CHECK DAM WITH SUMP

FIGURE II-11c

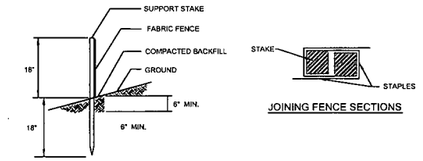
SUPER SILT FENCE



A SUPER SILT FENCE IS A TEMPORARY BARRIER OF GEOTEXTILE FABRIC OVER CHAIN LINK FENCE. SUPER SILT FENCE SHOULD BE PLACED AS CLOSE TO THE CONTOUR AS POSSIBLE. NO SECTION OF SUPER SILT FENCE SHOULD EXCEED A GRADE OF 5 PERCENT FOR MORE THAN A DISTANCE OF 20 FEET. CHAIN LINK FENCE SHALL BE FASTENED SECURELY TO THE FENCE POSTS WITH WIRE TIES OR STAPLES. GEOTEXTILE FABRIC SHALL BE FASTENED SECURELY TO THE CHAIN LINK FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP AND MID-SECTIONS. GEOTEXTILE FABRIC SHALL BE EMBEDDED A MINIMUM OF 12 INCHES INTO THE GROUND. WHEN 2 SECTIONS OF GEOTEXTILE FABRIC ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 6 INCHES AND FOLDED. METAL POSTS AS SPECIFIED BY WV DOT CAN BE REPLACED BY PRESSURE-TREATED 4" X 4" POSTS. SUPER SILT FENCE SHOULD BE INSPECTED AT A MINIMUM ONCE EVERY 7 CALENDAR DAYS OR WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCHES OF RAIN PER 24 HOUR PERIOD. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

FIGURE II-11

SILT FENCE SEDIMENT BARRIER



JOINING FENCE SECTIONS

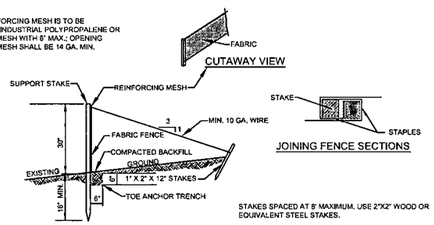
STANDARD FILTER FABRIC FENCE MUST BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER MUST BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE GROUND HEIGHT OF THE FENCE.

SOURCE: West Virginia Erosion and Sediment Control Field Manual, Office of Oil and Gas

FIGURE II-11b

REINFORCED SILT FENCE SEDIMENT BARRIER

** REINFORCING MESH IS TO BE EITHER INDUSTRIAL POLYPROPALENE OR STEEL MESH WITH 6" MAX.; OPENING STEEL MESH SHALL BE 14 GA. MIN.



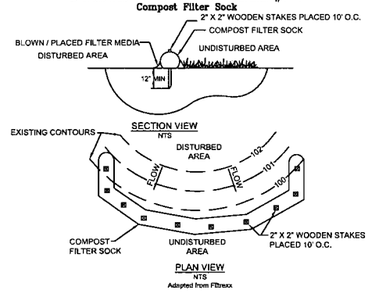
JOINING FENCE SECTIONS

STAKES SPACED AT 8' MAXIMUM. USE 2"X2" WOOD OR EQUIVALENT STEEL STAKES.

STANDARD FILTER FABRIC FENCE MUST BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER MUST BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE GROUND HEIGHT OF THE FENCE.

SOURCE: West Virginia Erosion and Sediment Control Field Manual, Office of Oil and Gas

STANDARD CONSTRUCTION DETAIL #4-1
Compost Filter Sock



Sock fabric shall meet standards of Table 4.1. Compost shall meet the following standards:

Organic Matter Content	80% -100% (dry weight basis)
Organic Portion	Fibrous and elongated
pH	5.5-8.0
Moisture Content	35%-55%
Particle Size	98% pass through 1" screen
Soluble Salt Concentration	5.0 dS Maximum

Compost Filter Sock shall be placed at existing level grade. Both ends of the sock shall be extended at least 8 feet up the slope at 45 degrees to the main sock alignment (see figure 4.1). Maximum slope above any sock shall not exceed that shown on figure 4.2.

Traffic shall not be permitted to cross filter socks.

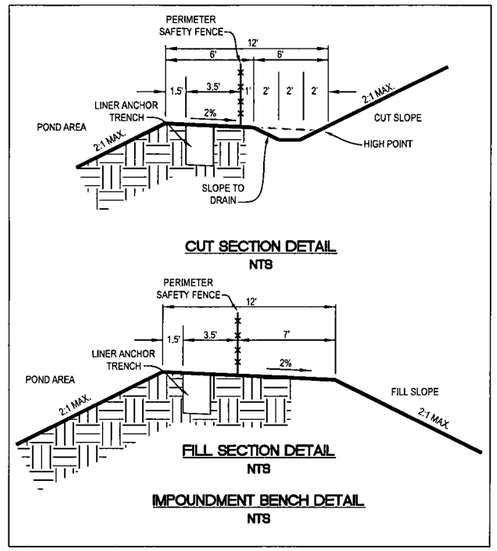
Accumulated Sediment shall be removed when it reaches 1/2 the above ground height of the sock and disposed in the manner described elsewhere in the plan.

Socks shall be inspected weekly and after each runoff event. Damaged socks shall be repaired according to manufacturer's specifications or replaced within 24 hours of inspection.

Biodegradable filter socks shall be replaced after 8 months; photodegradable socks after 1 year. Polypropylene socks shall be replaced according to manufacturer's recommendations.

Upon stabilization of the area tributary to the sock, stakes shall be removed. The sock may be left in place and vegetated or removed. In the latter case, the mesh shall be cut open and the mulch spread as a soil supplement.

In the event the ground is frozen, #5 rebar with safety caps shall be used instead of wooden stakes to anchor the filter sock. Once the ground thaws the rebar anchors shall be removed and replaced with 2" x 2" wooden stakes and installed as shown in the detail above.



CUT SECTION DETAIL
NTS

FILL SECTION DETAIL
NTS

IMPOUNDMENT BENCH DETAIL
NTS

NAVITUS ENGINEERING INC.
Engineering Survey Environmental GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 962-4185
www.navitusenglinc.com

REVISION

DATE

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

CONSTRUCTION DETAILS

HINTER HEIRS SOUTH
CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CHRIS S. KUHL
REGISTERED
9878
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
01/21/2013

DATE: 01/21/2013
SCALE: N/A
SHEET 13 OF 18

REVEGETATION

Taken from the
West Virginia Erosion and Sediment Control Field Manual
West Virginia Division of Environmental Protection Office of Oil and Gas
Charleston, W.Va.
Section IV

Temporary Seeding

a. General Conditions Where Practice Applies
Where exposed soil surfaces are not to be fine-graded or worked for periods longer than 21 days. Temporary vegetative cover with sediment controls must be established where runoff will go directly into a stream. Immediately upon construction of the site (site includes road and location), vegetation must be established on road bank and location slopes. A permanent vegetative cover shall be applied to areas that will be left un-worked for a period of more than six months.

b. Seed Mixtures and Planting Dates
Refer to Tables 2 through 4 for recommended dates to establish vegetative cover and the approved lists of temporary and permanent plant species, and planting rates. Table 3 gives recommended types of temporary vegetation, rates of application, and optimum seeding dates. In situations where another cover is desired, contact the local soil conservation district for seeding recommendations.

c. Seed Application
Apply seed by broadcasting, drilling, or by hydroseed according to the rates indicates in Table IV-3. Perform all planting operations at right angles to the slope. Necessary site preparation and roughening of the soil surface should be done just prior to seeding. Seedbed preparation may not be required on newly disturbed areas.

Permanent Seeding

a. General
Permanent vegetative cover will be established where no further soil disturbance is anticipated or needed. Soil fertility and pH level should be tested and adjusted according to seed species planted. Planting of permanent vegetative covers must be performed on all disturbed areas after completion of the drilling process. Any site that contains significant amounts of topsoil shall have the topsoil removed and stockpiled when feasible. Topsoil should not be added to slopes steeper than 2:1 unless a good bonding to the sub-layer can be achieved. After proper grading and seedbed preparation, the vegetation will reestablish ground cover for the control of surface water runoff erosion.
All required seedbed preparation and loosening of soil by disking or dozer tracking should be performed just prior to seeding. If seedbed preparation is not feasible, 50% more seed shall be added to the recommended rates shown in Tables IV-3 and IV-4.
When hydroseeding, seedbed preparation may not be necessary if adequate site preparation was performed. Incorporate the appropriate amount of lime and/or fertilizer in the slurry mix when hydroseeding.
When hydroseeding, first mix the lime, fertilizer, and hydro-mulch in the recommended amount of water. Mix the seed and inoculants together within one hour prior to planting, and add to the slurry just before seeding. Apply the slurry uniformly over the prepared site. Assure that agitation is continuous throughout the seeding operation and the mix is applied within one hour of initial mixing.

b. Lime and Fertilizer
1. Lime shall be applied to all permanent seedings. The pH of the soil is to be determined and lime applied accordingly. Once the pH is known, select the amount of lime to be applied from Table IV-5.
2. Fertilizer shall be applied in all permanent seedings. Apply the equivalent for 500 lbs. minimum 10-20-20 fertilizer per acre or use the amount of fertilizer and lime recommended by a certified soil test.
3. Application: For best results and maximum benefits, the lime and fertilizer are to be applied at the time of seedbed preparation.

c. Permanent Seed Mixtures
Planners should take into consideration the species makeup of the existing pasture and the landowner's future pasture management plans when recommending seed mixtures. Selection: From Tables IV 4a and b, Permanent Seeding Mixtures Suitable for Establishment in West Virginia.
Notes:
1. All legumes must be planted with the proper inoculants prior to seeding.
2. 'Lathco' Flatpea is potentially poisonous to some livestock.
3. Only endophyte free varieties of Tall Fescue should be used. Tall Fescue and Crownvetch are also very invasive species, non-native to WV.
4. For unprepared seedbeds or seeding outside the optimum timeframes, add 50% more seed to the specified rate. Mixtures in Table 4b are more wildlife and farm friendly; those listed in bold are suitable for use in shaded woodland settings. Mixtures in italic are suitable for use in filter strips.

d. Seeding for Wildlife Habitat
Consider the use of the native plants or locally adapted plants when selecting cover types and species for wildlife habitat. Wildlife friendly species or mixes that have multiple values should be considered. See wildlife friendly species/mixtures in Table IV-4b. Consider selecting no or low maintenance long-lived plants adaptable to sites which may be difficult to maintain with equipment.

Mulching

a. General Organic Mulches
The application of straw, hay or other suitable materials to the soil surface to prevent erosion. Straw made from wheat or oats is the preferred mulch, the use of hay is permissible, but not encouraged due to the risk of spreading invasive species. Mulch must be applied to all temporary and permanent seeding on all disturbed areas. Depending on site conditions, in critical areas such as waterways or steep slopes, additional or substitute soil protective measures may be used if deemed necessary. Examples include jute mesh and soil stabilization blankets or erosion control matting.
Areas that have been temporarily or permanently seeded should be mulched immediately following seeding. Mulches conserve desirable soil properties, reduce soil moisture loss, prevent crusting and sealing of the soil surface and provide a suitable microclimate for seed germination.
Areas that cannot be seeded because of the season should be mulched to provide some protection to the soil surface. An organic mulch, straw or hay should be used and the area then seeded as soon as weather or seasonal conditions permit. Do not use fiber mulch (cellulose-hydroseed) alone for this practice; at normal application rates it will not give the soil protection of other types of mulch.
Wood cellulose fiber mulch is used in hydroseeding operations and applied as part of the slurry. It creates the best seed-soil contact when applied over the top of (as a separate operation) newly seeded areas. Fiber mulch does not alone provide sufficient protection on highly erodible soils, or during less than favorable growing conditions. Fiber mulch should not be used alone during the dry summer months or when used for late fall mulch cover. Use straw mulch during these periods and fiber mulch may be used to tack (anchor) the straw mulch. Fiber mulch is well suited for steep slopes, critical areas and areas susceptible to wind.

b. Chemical Mulches, Soil Binders and Tackifiers
A wide range of synthetic spray on materials are marketed to stabilize and protect the soil surface. These are mixed with water and sprayed over the mulch and to the soil. They may be used alone in some cases as temporary stabilizers, or in conjunction with fiber mulch, straw or hay.
When used alone most chemical mulches do not have the capability to insulate the soil or retain soil moisture that organic mulches have.

c. Specifications
From Table IV-6 select the type of mulch and rate of application that will best suit the conditions at the site.

d. Anchoring
Depending on the field situation, mulch may not stay in place because of wind action or rapid water runoff. In such cases, mulch is to be anchored mechanically or with mulch netting.
1. Mechanical Anchoring
Apply mulch and pull mulch anchoring tool over the mulch. When a disk is used set the disk straight and pull across slope. Mulch material should be tucked into the soil about three inches.
2. Mulch netting
Follow manufacturer's recommendation when positioning and stapling the mulch netting in the soil.

Table IV-1
Recommended Seeding Dates

Planting Dates	Suitability
March 1 - April 15 and August 1 - October 1	Best Seeding Periods
April 15 - August 1	HIGH RISK : moisture stress likely
October 1 - December 1	HIGH RISK - freeze damage to young seedlings
December 1 - March 1	Good seeding period. Dormant seeding

Table 2
Acceptable Fertilization Recommendation

Species	N (lbs/ac)	P2O5 (lbs/ac)	Example Rec. (per acre)
Cool Season Grass	40	80	400 lbs. 10-20-20
CS Grass & Legume	30	60	300 lbs. 10-20-20
Temporary Cover	40	40	200 lbs. 19-19-19

Table 3
Temporary Cover

Species	Seeding Rate (lbs/acre)	Optimum Seeding Dates	Drainage	pH Range
Annual Ryegrass	40	3/1 - 6/15 or 8/15 - 9/15	Well - Poorly	5.5 - 7.5
Field Bromegrass	40	3/1 - 6/15 or 8/15 - 9/15	Well - Mod. Well	6.0 - 7.0
Spring Oats	96	3/1 - 6/15	Well - Poorly	5.5 - 7.0
Sundangrass	40	5/15 - 8/15	Well - Poorly	5.5 - 7.5
Winter Rye	168	8/15 - 10/15	Well - Poorly	5.5 - 7.5
Winter Wheat	180	8/15 - 11/15	Well - Mod. Well	5.5 - 7.0
Japanese Millet	30	6/15 - 8/15	Well	4.5 - 7.0
Redtop	5	3/1 - 6/15	Well	4.0 - 7.5
Annual Ryegrass	26	3/1 - 6/15	Well - Poorly	5.5 - 7.5
Spring Oats	64	3/1 - 6/15	Well - Poorly	5.5 - 7.5

NOTE: *These rates should be increased by 50% if planted April 15 - August 1 and October 1 - March 1.*

Tables IV 1-4 taken from Natural Resources Conservation Service Manual 'Critical Area Planting'

Table 4a
Permanent Seeding Mixture

Species/Mixture	Seeding Rate (lbs/acre)	Soil Drainage preference	pH Range
Crownvetch / Tall Fescue	10 - 15 / 30	Well - Mod. Well	5.0 - 7.5
Crownvetch / Perennial Ryegrass	10 - 15 / 20	Well - Mod. Well	5.0 - 7.5
Flatpea or Perennial Pea / Tall Fescue	20 / 15	Well - Mod. Well	4.0 - 8.0
Ladino Clover / Sericia Lespedeza / Tall Fescue	30 / 25 / 2	Well - Mod. Well	4.5 - 7.5
Tall Fescue / Ladino Clover / Redtop	*40 / 3 / 3*	*Well - Mod. Well*	*5.0 - 7.5*
Crownvetch / Tall Fescue / Redtop	10 / 20 / 3	Well - Mod. Well	5.0 - 7.5
Tall Fescue / Birdsfoot Trefoil / Redtop	40 / 10 / 3	Well - Mod. Well	5.0 - 7.5
Sericia Lespedeza / Tall Fescue / Redtop	25 / 30 / 3	Well - Mod. Well	4.5 - 7.5
Redtop / Tall Fescue / Creeping Red	30 / 3 / 50	Well - Mod. Well	5.0 - 7.5
Tall Fescue	*50*	*Well - Poorly*	*4.5 - 7.5*
Perennial Ryegrass / Tall Fescue / Lathco Flatpea *	10 / 18 / 20	Well - Poorly	5.8 - 8.0

** 'Lathco' Flatpea is potentially poisonous to some livestock. All legumes should be planted with proper inoculants prior to seeding. For unprepared seedbeds or seeding outside the optimum timeframe, add 50% more seed to the specified rate.*
Mixtures listed in bold are suitable for use in shaded woodland settings; those in Italics are suitable for use in filter strips.

Table 4b
Wildlife and Farm Friendly Seed Mixtures

Species/Mixture	Seeding Rate (lbs/acre)	Soil Drainage preference	pH Range
KY Bluegrass / Redtop / Ladino Clover or Birdsfoot Trefoil	20 / 3 / 2 / 10	Well - Mod. Well	5.5 - 7.5
Timothy / Alfalfa	5 / 12	Well - Mod. Well	6.5 - 8.0
Timothy / Birdsfoot Trefoil	5 / 8	Well - Poorly	5.5 - 7.5
Orchardgrass / Ladino Clover / Redtop	*10 / 2 / 3*	*Well - Mod. Well*	*5.5 - 7.5*
Orchardgrass / Ladino Clover	*10 / 2*	*Well - Mod. Well*	*5.5 - 7.5*
Orchardgrass / Perennial Ryegrass	*20 / 10*	*Well - Mod. Well*	*5.5 - 7.5*
Creeping Red Fescue / Perennial Ryegrass	30 / 10	Well - Mod. Well	5.5 - 7.5
Orchardgrass or KY Bluegrass	20	Well - Mod. Well	6.0 - 7.5
Birdsfoot Trefoil / Redtop / Orchardgrass	10 / 5 / 20	Well - Mod. Well	5.5 - 7.5
Lathco Flatpea */ Perennial Ryegrass	30 / 20	Well - Mod. Well	5.5 - 7.5
Lathco Flatpea */ Orchardgrass	30 / 20	Well - Mod. Well	5.5 - 7.5

** 'Lathco' Flatpea is potentially poisonous to some livestock. All legumes should be planted with proper inoculants prior to seeding. For unprepared seedbeds or seeding outside the optimum timeframe, add 50% more seed to the specified rate.*
Mixtures listed in bold are suitable for use in shaded woodland settings; those in Italics are suitable for use in filter strips.

Table IV-5
Lime and Fertilizer Application Table

pH of Soil	Lime in Tons per Acre	Fertilizer, Lbs. per Acre (10-20-20 or Equivalent)
Above 6.0	2	500
5.0 to 6.0	3	500
Below 5.0	4	500

The pH can be determined with a portable pH testing kit or by sending the soil samples to a soil testing laboratory. When 4 tons of lime per acre are applied it must be incorporated into the soil by disking, backblading or tracking up and down the slope.

Table IV-6
Mulch Materials Rates and Uses

Material	Minimum Rates per acre	Coverage	Remarks
Hay or Straw	2 to 3 Tons 100 to 150 bales	Cover 75% to 90% of Surface	Subject to wind blowing or washing unless tied down
Wood Fiber Pulp Fiber Wood - Cellulose Recirculated Paper	1000 to 1500 lbs	Cover all Disturbed Areas	For hydroseeding

NAVITUS ENGINEERING INC.
Engineering · Survey · Environmental · GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 662-4185
www.navitusenp.com

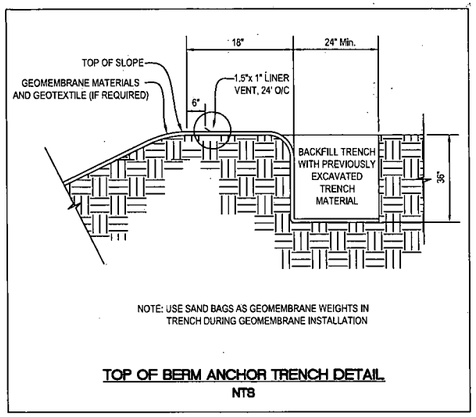
DATE | REVISION

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR: ANTERO RESOURCES APPALACHIAN CORP

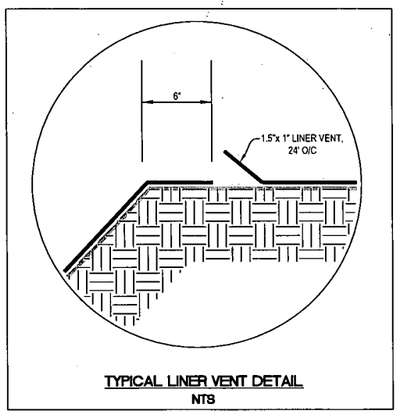
CONSTRUCTION DETAILS
HINTER HEIRS SOUTH
CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CHRIS E. KING — REGISTERED — STATE OF WEST VIRGINIA — PROFESSIONAL ENGINEER
01/21/2013

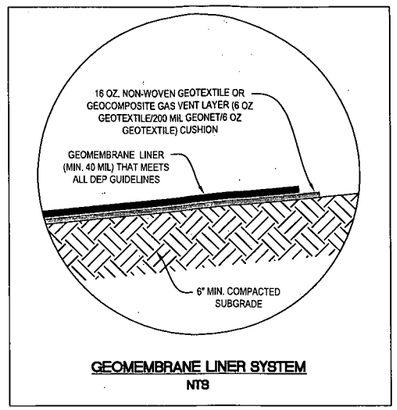
DATE: 01/21/2013
SCALE: N/A
SHEET 14 OF 18



TOP OF BERM ANCHOR TRENCH DETAIL
NTS



TYPICAL LINER VENT DETAIL
NTS

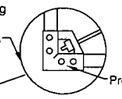


GEOMEMBRANE LINER SYSTEM
NTS

CONSTRUCTION DETAIL
TYPICAL FENCE SECTION

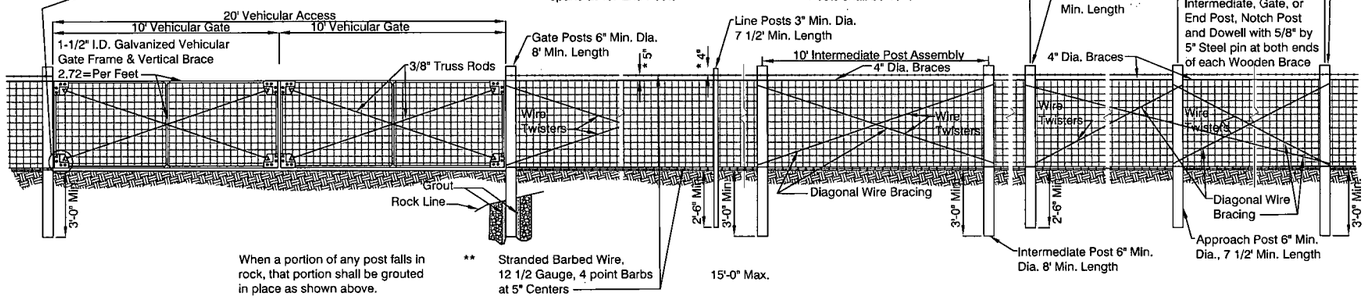
PEDESTRIAN AND VEHICULAR GATE CORNER ATTACHMENT

Similar designs meeting the approval of the Engineer may be used.

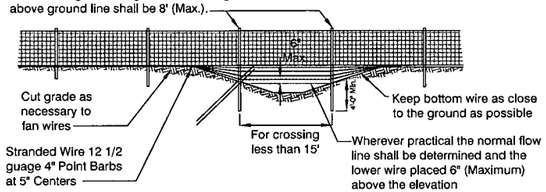


* Applies on level terrain, may be adjusted for slope construction

** Barbed wire shall not be used, when so restricted by local ordinances or regulations and the posts shall accordingly be set deeper in to the ground



Line Posts: 3" Min. Dia. to and including heights 6.5' above ground line. 4" Min. Dia. 6.5' to 8' height above ground line. Height above ground line shall be 8' (Max.).



DETAIL SHOWING TYPICAL SECTION AT MINOR DEPRESSIONS AND WET WEATHER CROSSINGS

NOTES:

Posts and braces may be either round or square shaped. Dimensions shown on the plans are for round posts and braces only. When square posts are used, line posts shall be 3" square (min.);braces 4" square (min.); corner, end, pull, gate, approach, and intermediate posts 6" square (min.).
The positioning of the fence fabric and barbed wire on the posts, as shown on the "Typical Fence Section" detail, applies for level and gentle sloping terrain. For fence erected on slopes, the positioning may be adjusted to meet the slope conditions as long as the adjustment is continued from post to post in a uniform manner. Trenching on slopes may be warranted. On slopes, posts will continue to be erected vertically, unless otherwise directed, and the ends of the fencing fabric shall be cut on a skew as may be necessary for proper connection to the posts.

Dumped rock channel protection will be used at channel crossings when called for on the plans.

Install drainage structure terminal installation as called for on the plans and/or as shown on typical fence details.

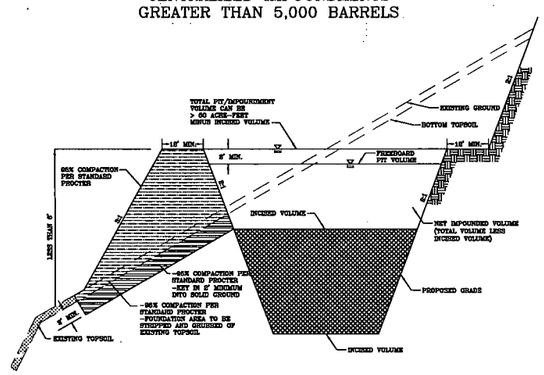
Unless otherwise specified, or directed by the Engineer, the farm field fence may be installed with the fence fabric and barbed wire positioned on either side of the fence posts.

Hardware and miscellaneous fittings, not specifically designated herein as to type or dimensions, shall conform to the applicable requirements of Section 608 of the Specifications and shall be of good quality commerical design acceptable to the Engineer.

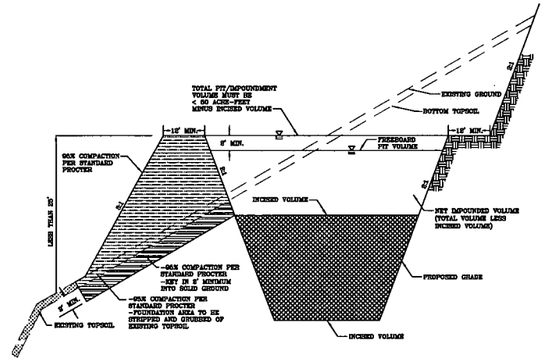
In lieu of the barbed wire detailed herein, the following additional types are acceptable, provided they retain the "4-point barb at 5-inch centers" requirement and provided they meet or exceed the strength and coating requirements for the standard, 12 1/2 gauge, barbed wire as called for in 712.10 of the Specifications.
(a) stranded, 15 1/2 gauge, high carbon steel barbed wire
(b) one strand, 12 gauge, steel barbed wire

Vehicular gate frames (and vertical braces) may be either galvanized steel pipe members as shown herein or may be triple-coated steel pipe members meeting the requirements specified on Standard Sheet F2. All other metal components of the gate shall be galvanized, with the exception of the die-cast aluminum corner fittings, or pressed steel corner fittings.

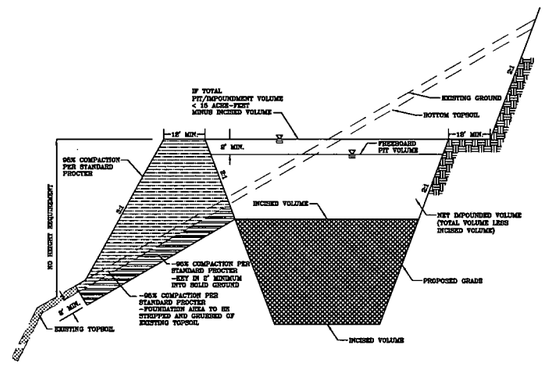
WEST VIRGINIA CODE 35 CSR 4
DESIGN AND CONSTRUCTION REQUIREMENTS
FOR ASSOCIATED PITS, ASSOCIATED IMPOUNDMENTS, & CENTRALIZED IMPOUNDMENTS
GREATER THAN 5,000 BARRELS



SECTION VIEW



SECTION VIEW



SECTION VIEW

NOTES:
1. ALL FILL SHOULD BE KEYED IN TO ORIGINAL GROUND EVERY 2-5 VERTICAL FEET DEPENDING ON EXISTING GROUND SLOPE

2. MINIMUM OUTSIDE AND INSIDE EMBANKMENT (FILL) SLOPES SHALL BE 2H:1V. THE INSIDE AND OUTSIDE SLOPES MUST ADD UP TO 5H:1V.

NTS

NAVITUS ENGINEERING INC.
Engineering Survey Environmental GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (540) 662-4185
www.navitusengineering.com

DATE	REVISION

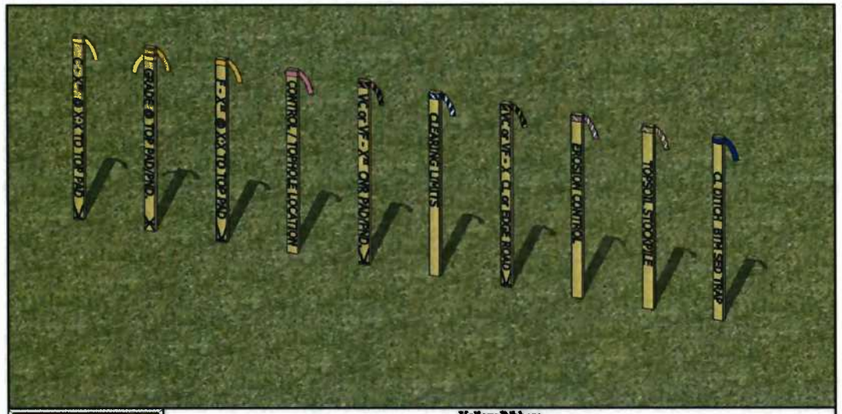
ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

CONSTRUCTION DETAILS

HINTER HEIRS SOUTH
CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CYRUS B. KING
REGISTERED
13570
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
01/21/2013

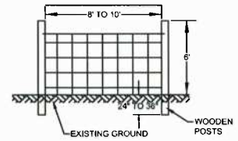
DATE: 01/21/2013
SCALE: N/A
SHEET 15 OF 18



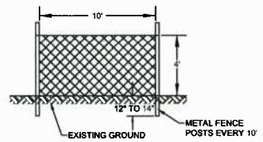
	Yellow Ribbon: Yellow Ribbon used to indicate top of Cuts (C) Cut to be determined at time of stakeout Slope determined by site design
	Yellow & Orange Ribbon: Yellow and Orange Ribbon used to indicate Grade at Top of Pad/Pond/Pit
	Orange Ribbon: Orange Ribbon used to indicate toes of Fills (F) Fill to be determined at time of stakeout Slope determined by site design
	Pink Ribbon: Pink Ribbon used to indicate Top Hole Location Pink Ribbon used to indicate Survey Control Location
	Pink & Black Stripe Ribbon: Pink & Black Stripe Ribbon used to indicate Vertical Cut (VC) at Pad/Pond/Pit corner or edge Pink & Black Stripe Ribbon used to indicate Vertical Fill (VF) at Pad/Pond/Pit corner or edge Vertical Cut/Vertical Fill to be determined at time of stakeout
	Blue & White Stripe Ribbon: Blue & White Stripe Ribbon used to indicate clearing limits/construction limits
	Orange & Black Stripe Ribbon: Orange & Black Stripe Ribbon used to indicate Vertical Cut (VC) at Centerline or edge of access road Orange & Black Stripe Ribbon used to indicate Vertical Fill (VF) at centerline or edge of access road
	Pink & White Stripe Ribbon: Pink & White Stripe Ribbon used to indicate Erosion and Sediment Control Structures Silt Fence (SF) Reinforced Filter Fence (RFF) Super Silt Fence (SSF) Filter Sock (FS)
	Orange & White Stripe Ribbon: Orange & White Stripe Ribbon used to indicate Topsoil Stockpile Locations
	Blue Ribbon: Blue Ribbon used to indicate Centerline (℄) Ditch Blue Ribbon used to indicate Bottom (BTM) Sediment Traps

ANTERO RESOURCES APPALACHIAN CORPORATION STANDARD RIBBON COLOR SCHEME
PROVIDED BY ANTERO RESOURCES APPALACHIAN CORPORATION

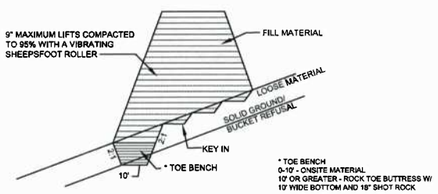
TYPICAL WOVEN WIRE FENCE DETAIL



TYPICAL CONSTRUCTION FENCE DETAIL



TOE BENCH DETAIL



NAVITUS ENGINEERING INC.
Engineering · Survey · Environmental · GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (540) 723-4185
www.navitusengineering.com

REVISION
DATE

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

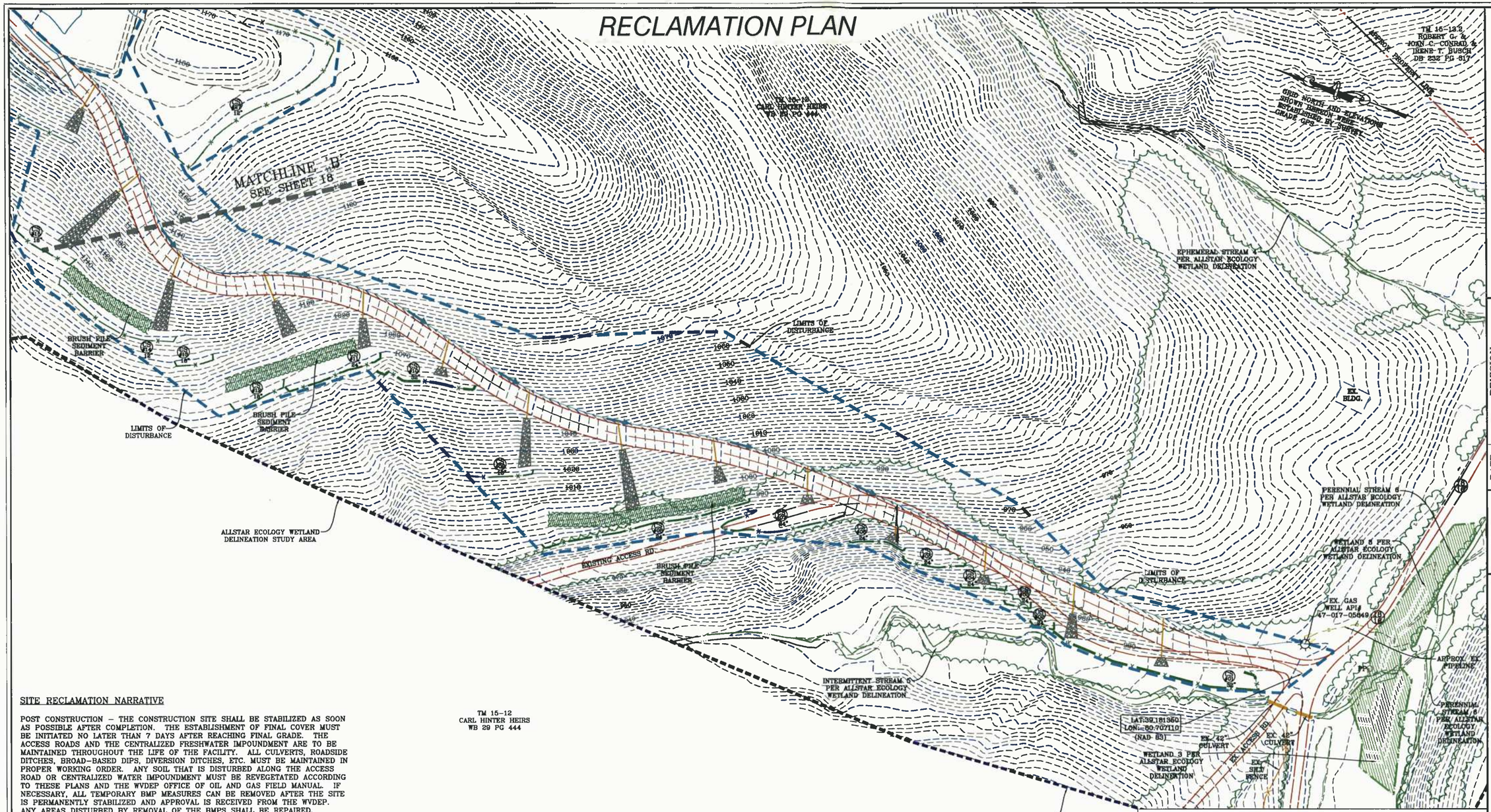
CONSTRUCTION DETAILS

HINTER HEIRS SOUTH
CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CHRIS S. KING
REGISTERED
P.S.
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
01/21/2013

DATE: 01/21/2013
SCALE: N/A
SHEET 16 OF 18

RECLAMATION PLAN



SITE RECLAMATION NARRATIVE

POST CONSTRUCTION – THE CONSTRUCTION SITE SHALL BE STABILIZED AS SOON AS POSSIBLE AFTER COMPLETION. THE ESTABLISHMENT OF FINAL COVER MUST BE INITIATED NO LATER THAN 7 DAYS AFTER REACHING FINAL GRADE. THE ACCESS ROADS AND THE CENTRALIZED FRESHWATER IMPOUNDMENT ARE TO BE MAINTAINED THROUGHOUT THE LIFE OF THE FACILITY. ALL CULVERTS, ROADSIDE DITCHES, BROAD-BASED DIPS, DIVERSION DITCHES, ETC. MUST BE MAINTAINED IN PROPER WORKING ORDER. ANY SOIL THAT IS DISTURBED ALONG THE ACCESS ROAD OR CENTRALIZED WATER IMPOUNDMENT MUST BE REVEGETATED ACCORDING TO THESE PLANS AND THE WVDEP OFFICE OF OIL AND GAS FIELD MANUAL. IF NECESSARY, ALL TEMPORARY BMP MEASURES CAN BE REMOVED AFTER THE SITE IS PERMANENTLY STABILIZED AND APPROVAL IS RECEIVED FROM THE WVDEP. ANY AREAS DISTURBED BY REMOVAL OF THE BMPS SHALL BE REPAIRED, STABILIZED, AND PERMANENTLY SEEDED.

POST USE – WITHIN 6 MONTHS OF THE EXPIRATION OF THE CERTIFICATE OF APPROVAL OF THE CENTRALIZED FRESHWATER IMPOUNDMENT FACILITY, THE SITE SHALL BE CLOSED AND RESTORED TO A PRE-CONSTRUCTION CONDITION. THE LINER SYSTEM SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED RECYCLING OR WASTE DISPOSAL FACILITY. ALL PIPING FOR THE GROUNDWATER DEWATERING SYSTEM, WATER LINES, AND ASSOCIATED STRUCTURES SHALL BE REMOVED. ALL EXISTING BMP'S SHOWN SHALL BE INSPECTED FOR DAMAGE AND REPLACED AS NECESSARY BEFORE RECLAMATION CAN BEGIN. THE SITE SHALL BE REGRADED AS INDICATED ON THE PLANS TO PRE-CONSTRUCTION GRADES. UPON COMPLETION OF THE GRADING, THE SITE SHALL BE SEEDED AND MULCHED PER THE REVEGETATION DETAILS. A NOTICE OF TERMINATION MUST BE FILED WITH THE DEP WHEN THE SITE REACHES FINAL STABILIZATION. FINAL STABILIZATION MEANS THAT ALL SOIL-DISTURBING ACTIVITIES ARE COMPLETED, AND THAT EITHER A PERMANENT VEGETATIVE COVER WITH A DENSITY OF 70% OR GREATER HAS BEEN ESTABLISHED OR THAT THE SURFACE HAS BEEN STABILIZED BY HARD COVER SUCH AS GRAVEL AND PAVEMENT ACCESS ROADS OR BUILDINGS. IT SHOULD BE NOTED THAT THE 70% REQUIREMENT REFERS TO THE TOTAL AREA VEGETATED AND NOT JUST A PERCENT OF THE SITE.

LEGEND

EX. INDEX CONTOUR	PROP. INDEX CONTOUR
EX. INTERMEDIATE CONTOUR	PROP. INTERMEDIATE CONTOUR
EX. PROPERTY LINE	PROP. INDEX CONTOUR (ROAD)
EX. ROAD EDGE OF GRAVEL/DIRT	PROP. INTERMEDIATE CTR (ROAD)
EX. ROAD EDGE OF PAVEMENT	PROP. LIMITS OF DISTURBANCE
EX. ROAD CENTERLINE	PROP. WELL HEAD
EX. DITCHLINE	PROP. PERIMETER SAFETY FENCE
EX. CULVERT	PROP. ACCESS GATE WITH EMERGENCY LIFELINE
EX. FENCELINE	PROP. ROAD EDGE OF GRAVEL
EX. OVERHEAD UTILITY	PROP. ROAD CENTERLINE
EX. POWER POLE/GUY WIRE	PROP. V-DITCH W/ CHECK DAMS
EX. GASLINE	PROP. CULVERT W/ RIP-RAP
EX. TREELINE	PROP. COMPOST FILTER SOCK
EX. DELINEATED STREAM	PROP. SUPER SILT FENCE
EX. DELINEATED WETLAND	MATCHLINE
EX. BUILDING	BRUSH PILE SEDIMENT BARRIER
100' WETLAND/STREAM BUFFER	
DELINEATION STUDY AREA	

NAVITUS ENGINEERING INC.
Engineering · Survey · Environmental · GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (877) 289-2485
www.navitusengineering.com

REVISION

DATE

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

RECLAMATION PLAN

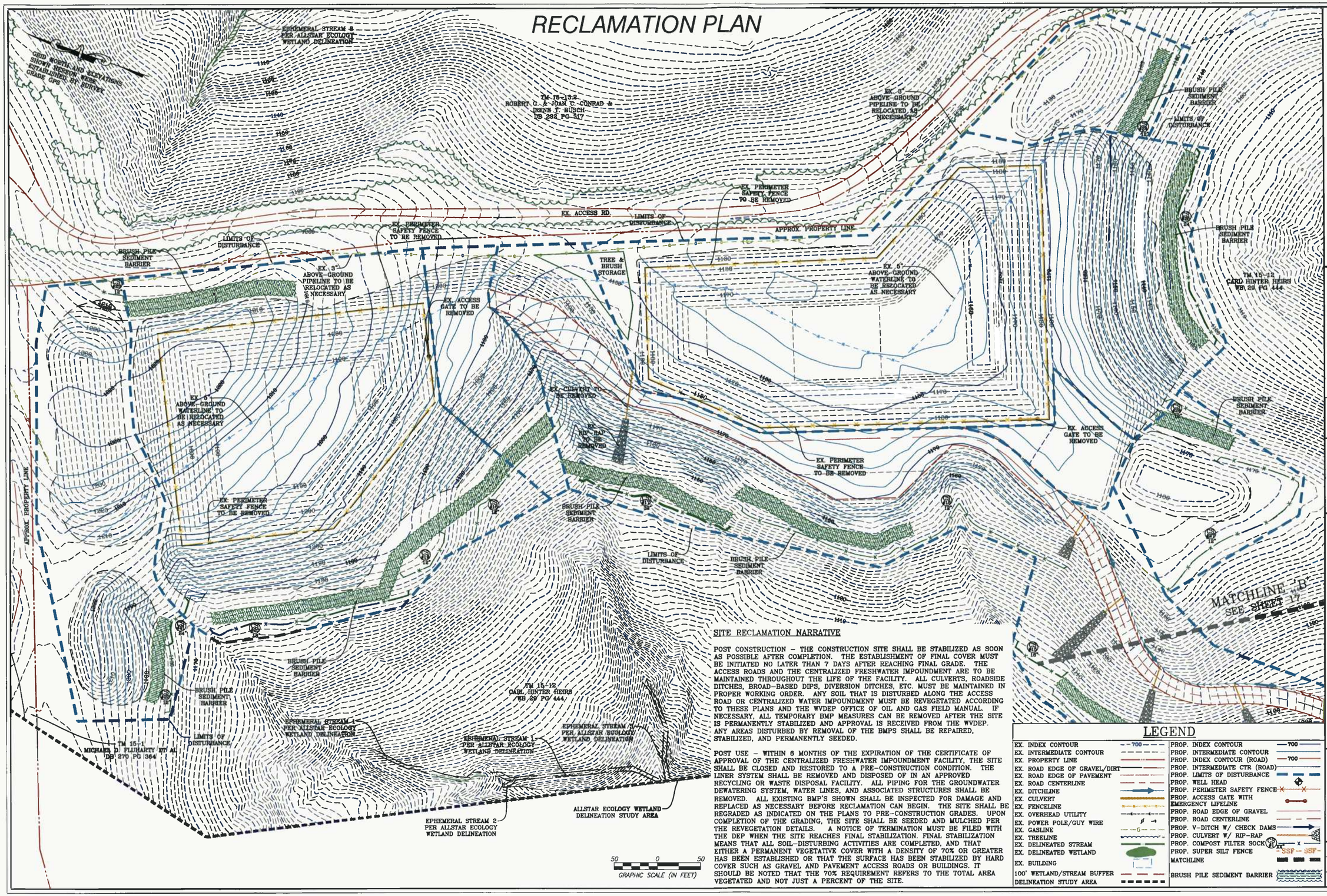
HINTER HEIRS SOUTH

CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CHRIS S. KUHN
REGISTERED
19578
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER
01/21/2013

DATE: 01/21/2013
SCALE: 1" = 50'
SHEET 17 OF 18

RECLAMATION PLAN



SITE RECLAMATION NARRATIVE

POST CONSTRUCTION – THE CONSTRUCTION SITE SHALL BE STABILIZED AS SOON AS POSSIBLE AFTER COMPLETION. THE ESTABLISHMENT OF FINAL COVER MUST BE INITIATED NO LATER THAN 7 DAYS AFTER REACHING FINAL GRADE. THE ACCESS ROADS AND THE CENTRALIZED FRESHWATER IMPOUNDMENT ARE TO BE MAINTAINED THROUGHOUT THE LIFE OF THE FACILITY. ALL CULVERTS, ROADSIDE DITCHES, BROAD-BASED DIPS, DIVERSION DITCHES, ETC. MUST BE MAINTAINED IN PROPER WORKING ORDER. ANY SOIL THAT IS DISTURBED ALONG THE ACCESS ROAD OR CENTRALIZED WATER IMPOUNDMENT MUST BE REVEGETATED ACCORDING TO THESE PLANS AND THE WVDEP OFFICE OF OIL AND GAS FIELD MANUAL. IF NECESSARY, ALL TEMPORARY BMP MEASURES CAN BE REMOVED AFTER THE SITE IS PERMANENTLY STABILIZED AND APPROVAL IS RECEIVED FROM THE WVDEP. ANY AREAS DISTURBED BY REMOVAL OF THE BMPS SHALL BE REPAIRED, STABILIZED, AND PERMANENTLY SEEDED.

POST USE – WITHIN 6 MONTHS OF THE EXPIRATION OF THE CERTIFICATE OF APPROVAL OF THE CENTRALIZED FRESHWATER IMPOUNDMENT FACILITY, THE SITE SHALL BE CLOSED AND RESTORED TO A PRE-CONSTRUCTION CONDITION. THE LINER SYSTEM SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED RECYCLING OR WASTE DISPOSAL FACILITY. ALL PIPING FOR THE GROUNDWATER DEWATERING SYSTEM, WATER LINES, AND ASSOCIATED STRUCTURES SHALL BE REMOVED. ALL EXISTING BMP'S SHOWN SHALL BE INSPECTED FOR DAMAGE AND REPLACED AS NECESSARY BEFORE RECLAMATION CAN BEGIN. THE SITE SHALL BE REGRADED AS INDICATED ON THE PLANS TO PRE-CONSTRUCTION GRADES. UPON COMPLETION OF THE GRADING, THE SITE SHALL BE SEEDED AND MULCHED PER THE REVEGETATION DETAILS. A NOTICE OF TERMINATION MUST BE FILED WITH THE DEP WHEN THE SITE REACHES FINAL STABILIZATION. FINAL STABILIZATION MEANS THAT ALL SOIL-DISTURBING ACTIVITIES ARE COMPLETED, AND THAT EITHER A PERMANENT VEGETATIVE COVER WITH A DENSITY OF 70% OR GREATER HAS BEEN ESTABLISHED OR THAT THE SURFACE HAS BEEN STABILIZED BY HARD COVER SUCH AS GRAVEL AND PAVEMENT ACCESS ROADS OR BUILDINGS. IT SHOULD BE NOTED THAT THE 70% REQUIREMENT REFERS TO THE TOTAL AREA VEGETATED AND NOT JUST A PERCENT OF THE SITE.

LEGEND

EX. INDEX CONTOUR	700	PROP. INDEX CONTOUR	700
EX. INTERMEDIATE CONTOUR		PROP. INTERMEDIATE CONTOUR	
EX. PROPERTY LINE		PROP. INDEX CONTOUR (ROAD)	700
EX. ROAD EDGE OF GRAVEL/DIRT		PROP. INTERMEDIATE CTR (ROAD)	
EX. ROAD EDGE OF PAVEMENT		PROP. LIMITS OF DISTURBANCE	
EX. ROAD CENTERLINE		PROP. WELL HEAD	
EX. DITCHLINE		PROP. PERIMETER SAFETY FENCE	X X
EX. CULVERT		PROP. ACCESS GATE WITH EMERGENCY LIFELINE	
EX. FENCELINE		PROP. ROAD EDGE OF GRAVEL	
EX. OVERHEAD UTILITY		PROP. ROAD CENTERLINE	
EX. POWER POLE/GUY WIRE		PROP. V-DITCH W/ CHECK DAMS	
EX. GASLINE	G	PROP. CULVERT W/ RIP-RAP	
EX. TREELINE		PROP. COMPOST FILTER SOCK	X
EX. DELINEATED STREAM		PROP. SUPER SILT FENCE	SSF SSF
EX. DELINEATED WETLAND		MATCHLINE	
EX. BUILDING			
100' WETLAND/STREAM BUFFER		BRUSH PILE SEDIMENT BARRIER	
DELINEATION STUDY AREA			

NAVITUS ENGINEERING INC.
Engineering · Survey · Environmental · GIS
151 Windy Hill Lane
Winchester, Virginia 22602
Telephone: (888) 628-4485
www.navitusengineering.com

REVISION | DATE

ANTERO RESOURCES
THIS DOCUMENT WAS PREPARED FOR:
ANTERO RESOURCES APPALACHIAN CORP

RECLAMATION PLAN

HINTER HEIRS SOUTH

CENTRALIZED FRESHWATER IMPOUNDMENT
NEW MILTON DISTRICT
DODDRIDGE COUNTY, WEST VIRGINIA

CRUG B. KUHL — REGISTERED — 19578 — STATE OF WEST VIRGINIA — PROFESSIONAL ENGINEER
01/21/2013

DATE: 01/21/2013
SCALE: 1" = 50'
SHEET 18 OF 18