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. 4737

Date: June 17, 2013
Customer copy

Received: #13-006 Antero Resources Appalachian $5,264.17

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

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Walter V & Lonard Davidson
Route 1, Box 287
Salem, WV 26426

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Diana Maxwell ☐ Agent ☐ Addressee

B. Received by (Printed Name) Diana Maxwell C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below:

JUN 20 2013

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7012 1010 0001 4282 8010

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

7012 1010 0001 4282 8010

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$ .46
Certified Fee	3.10
Return Receipt Fee (Endorsement Required)	2.55
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 6.11

WEST UNION WV Postmark Here JUN 17 2013 USPS 26456

Sent To: Walter V & Lonard Davidson
Street, Apt. No.; or PO Box No.: Route 1, Box 287
City, State, ZIP+4: Salem, WV 26426

PS Form 3800, August 2006 See Reverse for Instructions

7012 1010 0001 4282 8027

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$ .46
Certified Fee	3.10
Return Receipt Fee (Endorsement Required)	2.55
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 6.11

WEST UNION WV Postmark Here JUN 17 2013 USPS 26456

Sent To: Randy & Happy Plaugher
Street, Apt. No.; or PO Box No.: Rt. 1, Box 407 A
City, State, ZIP+4: Salem, WV 26426

PS Form 3800, August 2006 See Reverse for Instructions

7012 1010 0001 4282 8003

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$ .46
Certified Fee	3.10
Return Receipt Fee (Endorsement Required)	2.55
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 6.11

WEST UNION WV Postmark Here JUN 17 2013 USPS 26456

Sent To: Haymond Plaugher
Street, Apt. No.; or PO Box No.: 271 Patterson St.
City, State, ZIP+4: Salem, WV 26426

PS Form 3800, August 2006 See Reverse for Instructions

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

BETH A. ROGERS
DODDRIDGE COUNTY CLERK
118 E. COURT ST., RM 102
WEST UNION, WV 26456

FILED
2013 JUN 19 AM 11:01
BETH A. ROGERS
COUNTY CLERK
DODDRIDGE COUNTY, WV

SENDER: COMPLETE THIS SECTION

- **Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.**
- **Print your name and address on the reverse so that we can return the card to you.**
- **Attach this card to the back of the mailpiece, or on the front if space permits.**

1. **Article Addressed to:**

Haymond Plaugher
271 Patterson St.
Salem, WV 26426

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X Carolyn Plaugher ☐ Agent ☒ Addressee

B. Received by (Printed Name) Carolyn Plaugher

C. Date of Delivery 6/18/13

D. Is delivery address different from item 1? ☐ Yes

If YES, enter delivery address below: ☒ No

New 911 Address - same location
28 Tabernacle Ln
Salem, WV 26426

3. Service Type

☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number
(Transfer from service label) 7012 1010 0001 4282 8003

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Randy & Happy Plaugher
Rt 1, Box 407 A
Salem, WV 26426

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Randy Plaugher ☐ Agent ☑ Addressee

B. Received by (Printed Name) Randy Plaugher
C. Date of Delivery 6/18/13

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☑ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number
(Transfer from service label) 7012 1010 0001 4282 8027

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

2013 JUN 19 AM 11:

BETH A. ROGERS
DODDRIDGE COUNTY CLERK
118 E COURT ST., RM 102
WEST UNION, WV 26456

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-13-2013	31685	$5,264.17

VOUCHER	VENDOR INV #	INV DATE	TOTAL AMOUNT	PRIOR PMTS & DISCOUNTS	NET AMOUNT
06-AP-6828	GHERNORTHPAD	06/13/13	5,264.17	0.00	5,264.17
PLAUGHER NORTH PAD - FLOODPLAINPRMTAPP					
TOTAL INVOICES PAID					5,264.17

DETACH AND RETAIN FOR TAX PURPOSES

Doddridge County Flood Plain Application Fee Calculator	
Estimated Construction Costs	752,833.20
Amount over $100,000	652,833.20
Drilling Oil and Gas Well Fee	1,000.00
Deposit for additional charges	1,000.00
$5 per $1,000 over $100,000	3,264.17
Amount Due with application	5,264.17

LOCATION PERMIT FEES

Accessory Building and/or Structures . . . . . $ 5.00
(examples: garage, storage or farm building, carport)

Additions and/or Renovations to Single Family Residential of Manufacture Homes
UP TO $50,000.00 . . . . . $10.00

Additions and/or Renovations to Single Family Residential or Manufacture Homes
OVER $50,000.00 . . . . . $10.00

Single Family Residential UP TO $50,000.00 . . . . . $25.00

Manufactured Homes – described as having permanent axle and frame. NONE

Multi-Family $25.00
Residential and other buildings and structures, including additions and renovations to existing structures.

New Commercial Structures or Renovations to existing Commercial Structures, Commercial Land Use Changes and Land Altering Activities $250.00
(Includes buildings used for business purposes the total costs of which do not exceed $50,000.00.)

New commercial Structures or Additions or Renovations to Existing Commercial Structures, Commercial Land Use Changes and Land Altering Activities $350.00
(the total costs of which exceed $50,000.00 plus $2.00 per $1,000.00 to cover costs over $50,000.00)

New Industrial Structures or Additions or Renovations to Existing Industrial Structures, changes in Land Use and Land Altering Activities for Industrial purposes. . . . . $500.00 *(the total costs of which do not exceed $100,000.00)*

New Industrial Structures or Additions or Renovations to Existing Industrial Structures, changes in Land Use and Land Altering Activities for Industrial purposes. . . . . $1,000.00 *(the total costs of which exceed $100,000.00 plus $5.00 per $1,000.00 in costs over $100,000.00.)*

FEE FOR DRILLING OIL & GAS WELL. $1,000.00

Maximum Fee: In no event shall any Location Permit Fee charged under this Ordinance exceed the sum of $100,000.00.

Legal Advertisement:

Doddridge County

Floodplain Permit Application

Please take notice that on the 14th day of June, 2013

ANTERO RESOURCES APPALACHIAN filed an application for a Floodplain Permit to develop land located at or about: **CAROLYN N. PLAUGHER SURFACE OWNER, 328.92 ACRES BUFFALO CALF, TAX MAP 4, PARCEL 6**

The Application is on file with the Clerk of the County Court and may be inspected or copied during regular business hours.

Any interested persons who desire to comment shall present the same in writing by **July 4, 2013.**

Delivered to the:

Clerk of the County Court

118 E. Court Street, West Union, WV 26456.

Beth A Rogers, Doddridge County Clerk

Dan Wellings, Doddridge County Flood Plain Manager

PERMIT APPLICATION INSTRUCTIONS FOR OIL AND GAS DEVELOPMENT IN THE FLOODPLAIN

No development can occur in the floodplain until a Location Improvement Permit is issued.

Fill out and sign the Location Improvement Permit application form.
Include with permit application:

- Detailed set of plans and specifications, including flood-proofing measures **signed and sealed by a WV licensed professional engineer.**
- Copies of other required permits including WVDEP Well Permit, WVDOH road entrance permit, and 404 permit from US Army Corps of Engineers (if needed.)
- Copy of Spill Prevention Plan.

All structures and equipment located in the regulatory (100 yr.) floodplain must be flood-proofed (designed in a manner to reduce or eliminate flood damage) or elevated. Flood-proofing certificates must be signed and sealed by a WV licensed professional engineer. Elevation certificates must be signed and sealed by a WV licensed surveyor.

If the elevation method is to be used, a base flood elevation (BFE) must be established and elevation of structures and/or equipment must be at or above the BFE.

Flood-proofing measures must include the following: 1. Equipment and piping installed in the floodplain must be anchored to prevent flotation and lateral movement. 2. Any vulnerable equipment, such as the well head, must be protected from damage caused by floating debris, which could release the product into floodwaters or send equipment floating downstream.

Any material stored on the site that is highly volatile, flammable, explosive, toxic, or water reactive must be protected to at least the BFE.

Drill site pad and road to well do not need to be elevated.

IMPROVEMENT LOCATION PERMIT APPLICATION
DODDRIDGE COUNTY, WEST VIRGINIA

DODDRIDGE COUNTY COMMISSION
WEST UNION, WEST VIRGINIA 26456 PHONE: (304) 873-2631

A. COVERED ACTIVITIES

This application must be completed and submitted to the Doddridge County Commission if you intend to do one or more of the following activities in Doddridge County, outside of a municipality.

1. Erect or relocate a structure valued at more than $1,000.00.
2. Alter a building or structure in a way which enlarges the exterior dimensions of the building or structure.
3. Engage in land-altering activities in a flood-prone area.

B. IDENTIFICATION OF PROPERTY OWNER AND BUILDER

1. Property Owner (s)
   Name: CAROLYN N. PLAUGHER Phone: 304-782-4108 (Randy Plaugher)
   Address: C/O RANDY PLAUGHER, RT 1, Box 407A, Salem, WV 26426
2. Builder or Contractor
   Name: ANTERO RESOURCES Phone: 304-869-3105

C. IDENTIFICATION OF PROPERTY

1. District: GREENBRIER
2. Date/From Whom Property Purchased: 8/22/11 (BY WILL)
3. Land Book Description: BUFFALO CALF, 328.92 ACRES
4. Deed Book Reference: WB 45/PG 151, DB 195/PG 95 (First)
5. Tax Map Reference: TAX MAP 04, GREENBRIER DISTRICT, PARCEL 6
6. Existing Buildings/Uses of Property: WOODS AND PASTURE

D. IDENTIFICATION OF INTENDED CONSTRUCTION OR LAND USE

1. Briefly describe the intended construction or land use. CONSTRUCT A WATER TANK AND PAD
2. Sketch on a separate 8 ½ x 11 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 sketch.
4. Estimated cost of building or structure: $ 13,182.00
5. Estimated completion date: _____

E. NOTES

1. The information on this application is true and accurate to the knowledge of the applicant.

2. The intended construction or land use identified on this application must be started no later than six (6) months from the date the application is approved.

3. In signing this application, it is understood that the Land Development Coordinator or his representative may inspect the property and/or activities identified on this application.

4. If the intended construction or land use identified on this application required Health Department's approval, evidence of such approval from the County and/or State must be submitted to the Doddridge County Commission in order to complete this application.

PUBLIC SEWAGE ( ) YES ( ) NO IF NO, SEPTIC TANK PERMIT # _____

5. Duplicates of this application will be transmitted to:

Doddridge County Assessor's Office

6. The County Commission suggests all applicants call and advise local utility companies of your construction plans in order to avoid damage to underground utility lines.

7. Does your construction or renovation come within the floodplain area?

(X) YES ( ) NO

If your answer is yes, you will be required to have an elevation certificate with your application.

SEE HEC-RAS FLOODPLAIN ANALYSIS

F. I (we), the owner(s) of the property on which the intended improvement is to be constructed, hereby insure that this construction and intended use complies with all restrictive covenants applying to the subject real estate. And, I (we) agree, understand and acknowledge that I (we) assume full responsibility for compliance with any such private land use covenants and that a violation thereof may result in legal sanctions by court injunction and damages irrespective of the issuance of this permit by the Doddridge County Commission.

SIGNED: _____ _____

Property Owner Property Owner

DO NOT WRITE BELOW THIS LINE – FOR OFFICIAL USE ONLY

Completed Application Received: _____

Subdivision Ordinance:

( ) Complies ( ) Does Not Comply ( ) Not Applicable

Floodplain Management Ordinance:

( ) Complies ( ) Does Not Comply ( ) Not Applicable

Flood – Prone:

( ) Yes ( ) No FIRM Panel No. _____

Aerial No. _____

Application Approved. Permit Issued: _____

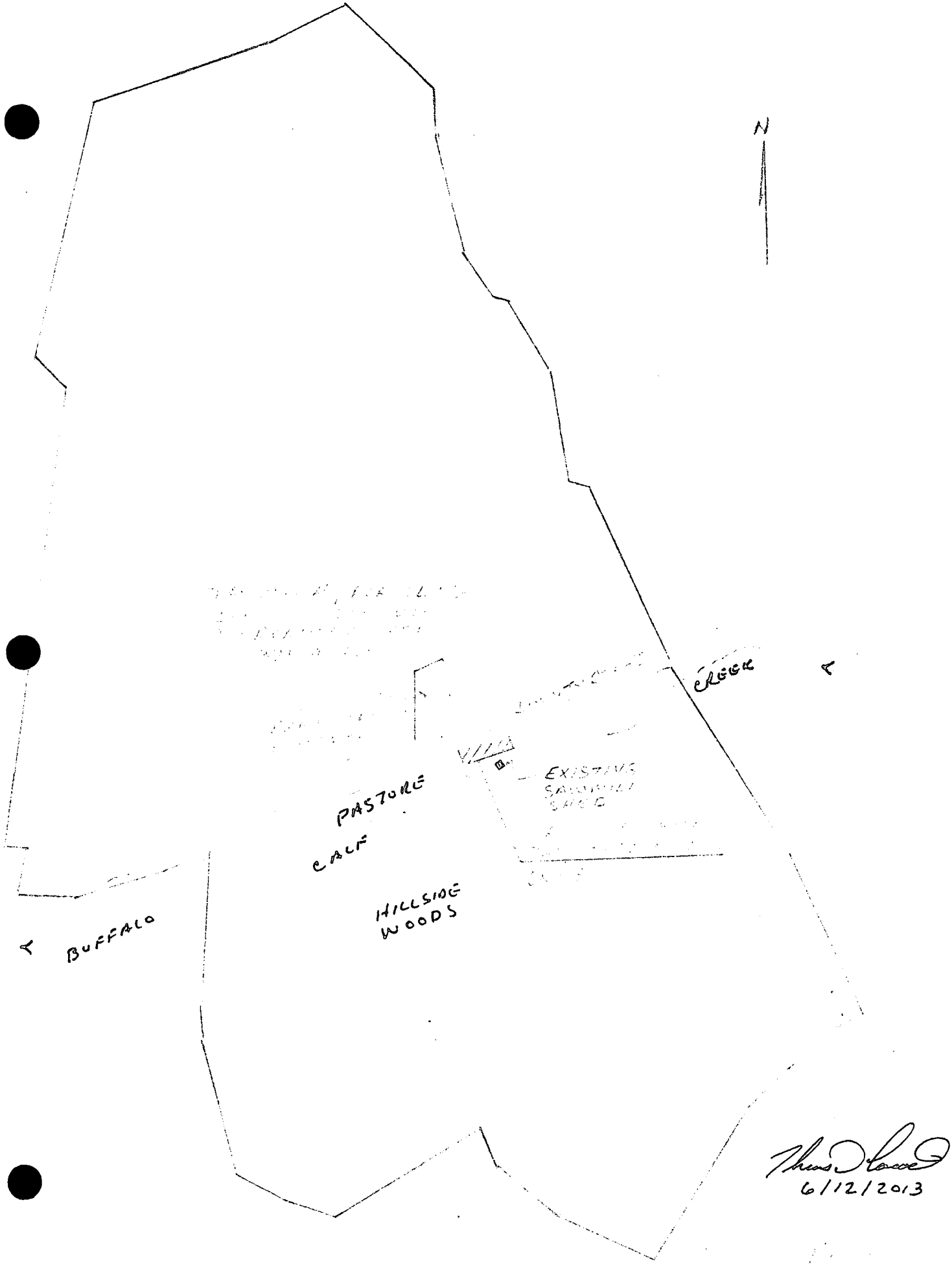
Permit No. _____ Permit Expires: _____

Signature of Floodplain Manager: _____

SCHEDULE OF QUANTITIES - PLAUGHER NORTH

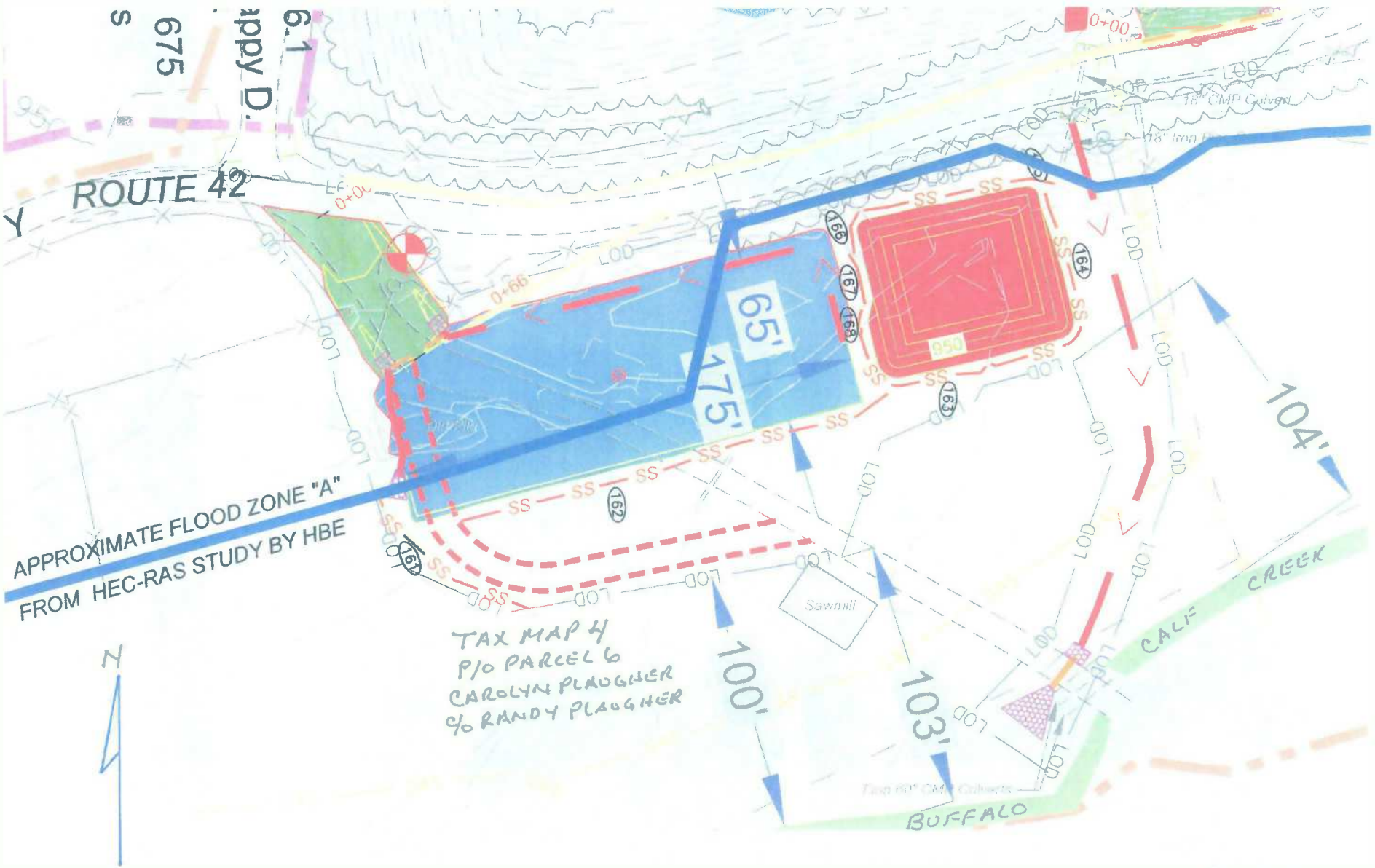
(For Construction Within the Flood Zone)

DESCRIPTION	QUANTITY		UNIT COST	TOTAL
24" Compost Filter Sock	524	LF	$ 10.00	$ 5,240.00
Cut Excavation	535	CY	$ 3.15	$ 1,685.25
Clear and Grub	0.65	AC	$ 4,800.00	$ 3,120.00
6" or 4" Minus Crusher Run (8" thick)	150	TONS	$ 2.00	$ 300.00
1 1/2" or 3/4" Minus Crusher Run (2" thick)	38	TONS	$ 2.00	$ 76.00
Geotextile Fabric (US 200)	670	SY	$ 1.50	$ 1,005.00
30" HDPE	15	LF	$ 60.00	$ 900.00
R4 Riprap (Inlets/Outlets)	4	TONS	$ 6.00	$ 21.00
Diversion Ditches	265	LF	$ 3.15	$ 834.75
CONSTRUCTION TOTAL				$ 13,182.00



6/12/2013

PARCEL SKETCH



FLOOD ZONE AREA OF DISTURBANCE

FILED

2013 JUN 14 PM 3:46

[illegible] A. ROGERS
COUNTY CLERK
DODDRIDGE COUNTY, WV

PERMIT NO. 13-006

DODDRIDGE COUNTY

FLOODPLAIN DEVELOPMENT

PERMIT

PURPOSE FOR PERMIT: ROAD & TANK PAD

ISSUED TO ANTERO RESOURCES

ADDRESS: 175-B ELK CREEK RD., MT. CLARE, WV 26408

PROJECT ADDRESS: RT 1 Box 407A
SALEM, WV 26426

ISSUED BY: Dan Wellings, PS

DATE: 07/18/2013

THIS PERMIT MUST BE POSTED ON THE PREMISES IN A CONSPICUOUS PLACE SO AS TO BE CLEARLY VISIBLE FROM THE STREET.

Antero - Plaugher Worth

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 Anthony Smith Antero Resources

DATE 6/14/2013 (304) 673-6196

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: _____

ADDRESS: _____

TELEPHONE NUMBER: _____

BUILDER'S NAME: Antero Resources
ADDRESS: 175-D Elk Creek Rd Mount Clare, WV 26408
TELEPHONE NUMBER:

ENGINEER'S NAME: Thomas D. Carathers Horner Brothers Engineering
ADDRESS: P.O. Box 386 Clarksburg, WV 26302
TELEHONE NUMBER: (304) 624-6445

PROJECT LOCATION:

NAME OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT) Carolyn N. Plaugher

ADDRESS OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT) C/O Randy Plaugher RT. 1 Box 407A Salem, WV 26426
DISTRICT: Greenbriar
DATE/FROM WHOM PROPERTY PURCHASED:
LAND BOOK DESCRIPTION: Buffalo Calf, 328.92 Acres
DEED BOOK REFERENCE: WB 45/Pg 151, DB 195/Pg 95
TAX MAP REFERENCE: Tax Map 4, Parcel 6
EXISTING BUILDINGS/USES OF PROPERTY: Residance / Farming
NAME OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE SUBJECT PROPERTY Randy Plaugher
ADDRESS OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE SUBJECT PROPERTY Same as above

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

- This is the Plaugher Work drill pad location. Site Visit with Dan Wellings has been completed.

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:

[] Fill [] Mining [] Drilling [] Pipelining
[] 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
[] Subdivision (including new expansion)
[] Individual Water or Sewer System
[X] Other (please specify)
Oil and Gas, Tank/staging pad to be constructed in Flood plain

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 $ 752,833.20

D. ADJACENT AND/OR AFFECTED LANDOWNERS:

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: Randy & Happy Plaugler
ADDRESS:
D.B. 262 PG 675
TxMP. 4 Parcel 6.1

NAME: Raymond Plaugler et
ADDRESS: 271 Patterson street
Salem WV 26426
Tx M'p 4 parcel 43.12

NAME: Walter V. & Leonard Davidson
ADDRESS: Route 1 Box 287
Salem, WV 26426
Tx map 4, Parcel 7

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: SAME As above
ADDRESS:

NAME: SAME As Above
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.

(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: [signature] **DATE:** 6/14/2013

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: 165

Dated: 10/04/2011

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

[X] Is located in Special Flood Hazard Area.

FIRM zone designation A

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 Wellings DATE 07/18/2013

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 07/18/2013

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:_____
PERMIT DATE:_____

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_____**DATE**_____

ANTERO
RESOURCES

Well Site Safety Plan
Antero Resources

Well Name: **Irons Unit 1H, Gainer Unit 1H, and Gainer Unit 2H**

Pad Location: **PLAUGHER NORTH PAD**
Doddridge County/ Greenbrier District

GPS Coordinates: Lat 39°16'14.81"/Long 80°36'31.82" (NAD83)

Driving Directions:

From the intersection of US-50 and Co Route 50/1 near the town of Salem head south on Co Route 50/1 for 0.7 miles. Turn right onto County Rd 50/73/E Main St and continue to follow County Rd 50/73/E Main St for 0.5 miles. Continue onto South St for 0.2 miles. Continue onto Patterson Rd for 0.2 miles. Continue onto Co Route 29/Patterson Fork Rd 0.2 miles. Turn right to follow Buffalo-Calf Rd (Co Route 42) for 3.3 miles, access road will be on the right.

Approval Sheet

The West Virginia Department of Environmental Protection Office of Oil and Gas has set forth minimum requirements for a Well Site Safety Plan which shall be submitted with each horizontal well application. A horizontal well shall be any well which meets the definition as provided for in Title 35, Series 8, Section 2.2 of the West Virginia Department of Environmental Protection Office of Oil and Gas.

Approved Safety Plans should be maintained and available at the drilling rig at all times and provided to the local emergency planning committee for the emergency planning district in which the well work will occur or to the county office of emergency services at least seven days before commencement of well work or site preparation work that involves any disturbance of land.

The Safety Plan, once approved, may only be modified upon approval by the West Virginia Department of Environmental Protection Office of Oil and Gas ("Office").

This plan has met the requirements of the West Virginia Department of Environmental Protection Office of Oil and Gas Well Site Safety Plan Standards.

Approved this day _____of month_____, 20__ by

_____ Date: _____

_____ Date: _____

Plan Modification*

Revision No.	Description of Revision	Antero Preparer	Antero Reviewer/Approver	Agency Approval	Date

*The Office of Oil and Gas must approve all changes and modifications to previously approved plans.

Site Specific Safety Plan
Antero Resources

1.0 Siting Requirements

1.1. Exhibit 1 provides a plan view map showing the well location, access road, pits, flare lines, dwellings, and noting the north and prevailing wind directions.

1.2. Exhibit 2 also provides an area topographical map showing the well site location

2.0 Site Safety Plan

2.1. Safety Meeting

Safety meetings will be conducted as follows:

- Pre-Drilling,
- Pre-Completion,
- Pre-Workover
- Post Accident/Near Miss, and
- As-Needed.

Safety meetings should be held on-site weekly, at a minimum, prior to the beginning of operations, and:

- Includes personnel employed and involved in the operations, and
- Includes the District Oil and Gas Inspector (or other designated Office of Oil and Gas representative, for the pre-spud meeting only).

Typically, contractor of the operator will conduct these safety meetings with Antero Resources personnel participating as needed. Please list the above personnel as a record of attendance using the form found in Appendix A, or one similar. These records may be maintained separate from this plan.

2.2 Personnel and Visitor Log

This log is intended to provide a current headcount of all persons present at the site at any given time. All personnel and visitors must sign in upon entering the site and sign out upon departure. This log, or one similar, is provided in Appendix B and will be maintained at all times by the Drilling Supervisor or Toolpusher.

2.3 Evacuation Plan

The Drilling Supervisor or Toolpusher will establish a muster point at which all persons on site will assemble for personnel safety and verification of headcount. This point will be located at the entrance to the site.

In the event of an emergency requiring the evacuation of personnel, an audible or visual alarm will be sounded. The Drilling Supervisor and/or the Toolpusher will determine if local residents should be evacuated at this time depending on the outcome of their assessment of the situation.

If local resident evacuation is indicated, the Drilling Supervisor and/or the Toolpusher will be responsible for notifying the local impacted residents, or the local authorities will take this responsibility depending on the urgency, availability and direction of the local authorities. Local authorities have indicated that they will take this responsibility typically and will notify of evacuation mandates via television and radio media announcements in addition to public address units on patrol vehicles. In the event that Antero is directed to take this responsibility, notification will be by dispatching a worker to each affected residence to inform them of evacuation requirements and procedures. See section 8.1 for additional information.

Evacuated local residents may be temporarily housed in local hotels depending on the severity and duration of the emergency. Included in Exhibits 1 & 2 are maps and drawings that may assist in the emergency response and evacuation process.

The Drilling Supervisor and/or the Toolpusher will secure the Personnel and Visitor log before evacuating the site in order to perform a headcount at the muster point.

2.4 Emergency Response Personnel

Requesting public emergency response assistance for this location would be accomplished by the Drilling Supervisor or Toolpusher via telephone to Harrison County Dispatch which can be reached by dialing 911. From there, they will dispatch the appropriate and available emergency response agencies depending on the nature and extent of the emergency.

A list of Emergency Contacts, including Antero's 24 hour emergency contact telephone number, any contractors of the operator, the Department, the local oil and gas inspector, and local emergency response units are found in Appendix C. This list will be posted at the well site.

2.5 Local Schools and Public Facilities

In the event of an emergency requiring the evacuation of schools and public facilities the Drilling Supervisor or Toolpusher will make the required notifications unless the local public emergency responders take on this responsibility. Generally, local emergency responders have stated that they will assume this responsibility. Exhibit 3 lists all schools and public facilities, with their contact information, within a one-mile radius of the horizontal well location.

2.6 Material Safety Data Sheets

The Drilling Supervisor or Contractor of the Operator will maintain Material Data Safety Sheets (MSDS) for all materials and chemicals used on the well site. The MSDS sheets should be located in the Company Representatives Office on-site. Copies of the MSDS sheets may also be obtained from the area Safety Coordinator, the operator contact for maintaining MSDSs, by calling the local Antero Resource Office at 304-622-3842.

3.0 Casing Requirements

3.1 Geologic Prognosis

A list of anticipated freshwater, saltwater, oil and gas, hydrogen sulfide, thief zones, and high pressure and high volume zones, including their expected depth are attached to this plan in Exhibit 4, WW-6B.

3.2 Casing and Cementing Program

Exhibit 4 shows the detailed casing and cementing program, which meets the standards of the American Petroleum Institute (API) and employs a minimum of three strings of casing which are of sufficient weight, quantity and quality for the anticipated conditions to be encountered. This casing and cementing program is designed to maintain well control and integrity. The casing setting depths are sufficient to cover and seal off those zones as identified in Exhibit 4.

4.0 BOP Requirements

4.1 BOP Equipment

The following is a list of all BOP equipment with types, sizes and ratings to be utilized and available during the drilling, completion and work-over of the well.

5M system:

- Annular preventer*
- Pipe ram, blind ram, and, if conditions warrant, as specified by the authorized officer, another pipe ram shall also be required*
- A second pipe ram preventer shall be used with a tapered drill string
- Drilling spool, or blowout preventer with 2 side outlets (choke side shall be a 3-inch minimum diameter, kill side shall be at least 2-inch diameter)*
- 3 inch diameter choke line
- 2 choke line valves (3 inch minimum)*
- Kill line (2 inch minimum)
- 2 chokes with 1 remotely controlled from rig floor
- 2 kill line valves and a check valve (2 inch minimum)*
- Upper kelly cock valve with handle available
- When the expected pressures approach working pressure of the system, 1 remote kill line tested to stack pressure (which shall run to the outer edge of the substructure and be unobstructed)
- Lower kelly cock valve with handle available
- Safety valve(s) and subs to fit all drill string connections in use
- Inside BOP or float sub available
- Pressure gauge on choke manifold
- All BOPE connections subjected to well pressure shall be flanged, welded, or clamped*
- Fill-up line above the uppermost preventer.

If repair or replacement of the BOPE is required after testing, this work shall be performed prior to drilling out the casing shoe.

When the BOPE cannot function to secure the hole, the hole shall be secured using cement, retrievable packer or a bridge plug packer, bridge plug, or other acceptable approved method to assure safe well conditions.

Minimum standards for choke manifold equipment.

i. All choke lines shall be straight lines unless turns use tee blocks or are targeted with
ii. running tees, and shall be anchored to prevent whip and reduce vibration.
iii. ii. Choke manifold equipment configuration shall be functionally equivalent to the appropriate example diagram shown in Appendix C. The actual configuration of the chokes may vary.

All valves (except chokes) in the kill line choke manifold, and choke line shall be a type that does not restrict the flow (full opening) and that allows a straight through flow).

Pressure gauges in the well control system shall be a type designed for drilling fluid service

5M and higher system accumulator shall have sufficient capacity to open the hydraulically-controlled gate valve (if so equipped) and close all rams plus the annular preventer (for 3 ram systems add a 50 percent safety factor to compensate for any fluid loss in the control system or preventers) and retain a minimum pressure of 200 psi above precharge on the closing manifold without use of the closing unit pumps. The fluid reservoir capacity shall be double the usable fluid volume of the accumulator system capacity and the fluid level of the reservoir shall be maintained at the manufacturer's recommendations. Two independent sources of power shall be available for powering the closing unit pumps. Sufficient nitrogen bottles are suitable as a backup power source only, and shall be recharged when the pressure falls below manufacturer's specifications.

Accumulator Precharge Pressure Test
This test shall be conducted prior to connecting the closing unit to the BOP stack and at least once every 6 months. The accumulator pressure shall be corrected if the measured precharge pressure is found to be above or below the maximum or minimum limit specified below (only nitrogen gas may be used to precharge):

Power Availability

Power for the closing unit pumps shall be available to the unit at all times so that the pumps shall automatically start when the closing valve manifold pressure has decreased to the pre-set level.

Accumulator Pump Capacity

Each BOP closing unit shall be equipped with sufficient number and sizes of pumps so that, with the accumulator system isolated from service, the pumps shall be capable of opening the hydraulically-operated gate valve (if so equipped), plus closing the annular preventer on the smallest size drill pipe to be used within 2 minutes, and obtain a minimum of 200 psi above specified accumulator precharge pressure.

Locking Devices

A manual locking device (i.e., hand wheels) or automatic locking devices shall be installed on all systems of 2M or greater. A valve shall be installed in the closing line as close as possible to the annular preventer to act as a locking device. This valve shall be maintained in the open position and shall be closed only when the power source for the accumulator system is inoperative.

Accumulator working pressure rating	Minimum acceptable operating pressure	Desired precharge pressure	Maximum acceptable precharge pressure	Minimum acceptable precharge pressure
1,500 psi	1,500 psi	750 psi	800 psi	700 psi
2,000 psi	2,000 psi	1,000 psi	1,100 psi	900 psi
3,000 psi	3,000 psi	1,000 psi	1,100 psi	900 psi

Remote Controls

Remote controls shall be readily accessible to the driller. Remote controls for all 3M or greater systems shall be capable of closing all preventers. Remote controls for 5M or greater systems shall be capable of both opening and closing all preventers. Master controls shall be at the accumulator and shall be capable of opening and closing all preventers and the choke line valve (if so equipped). No remote control for a 2M system is required.

4.2 Procedure and Schedule for Testing BOP Equipment

Well Control Equipment Testing

i. Perform all tests described below using clear water or an air..

ii. Ram type preventers and associated equipment shall be tested to approved stack working pressure if isolated by test plug or to 80 percent of internal yield pressure of casing if BOP stack is not isolated from casing. Pressure shall be maintained for at least 10 minutes or until requirements of test are met, whichever is longer. If a test plug is utilized, no bleed-off of pressure is acceptable. For a test not utilizing a test plug, if a decline in pressure of more than 10 percent in 30 minutes occurs, the test shall be considered to have failed. Valve on casing head below test plug shall be open during test of BOP stack.

iii. Annular type preventers shall be tested to 70 percent of rated working pressure. Pressure shall be maintained at least 10 minutes or until provisions of test are met, whichever is longer.

iv. As a minimum, the above test shall be performed:
   a. when initially installed:
   b. whenever any seal subject to test pressure is broken:
   c. following related repairs: and
   d. 30-day intervals.

v. Valves shall be tested from working pressure side during BOPE tests with all downstream valves open.

vi. When testing the kill line valve(s), the check valve shall be held open or the ball removed.

vii. Annular preventers shall be functionally operated at least weekly.

viii. Pipe and blind rams shall be activated each trip, however, this function need not be performed more than once a day.

ix. A BOPE pit level drill shall be conducted weekly for each drilling crew.

x. Pressure tests shall apply to all related well control equipment.

xi. All of the above described tests and/or drills shall be recorded in the drilling log.

xii. For intermediate wellbore drilling phase, the BOP equipment will be pressure and function tested upon initial installation.

xiii. For the bottom and horizontal wellbore drilling phase, the BOP equipment will be pressure and function tested upon initial installation, weekly, and after each bit trip.

4.3 BOP Installation Schedule

The BOP will be installed after running surface casing as well as after running intermediate casing. BOP equipment shall be installed on the innermost string of casing after the surface casing.

4.4 Well Control Training

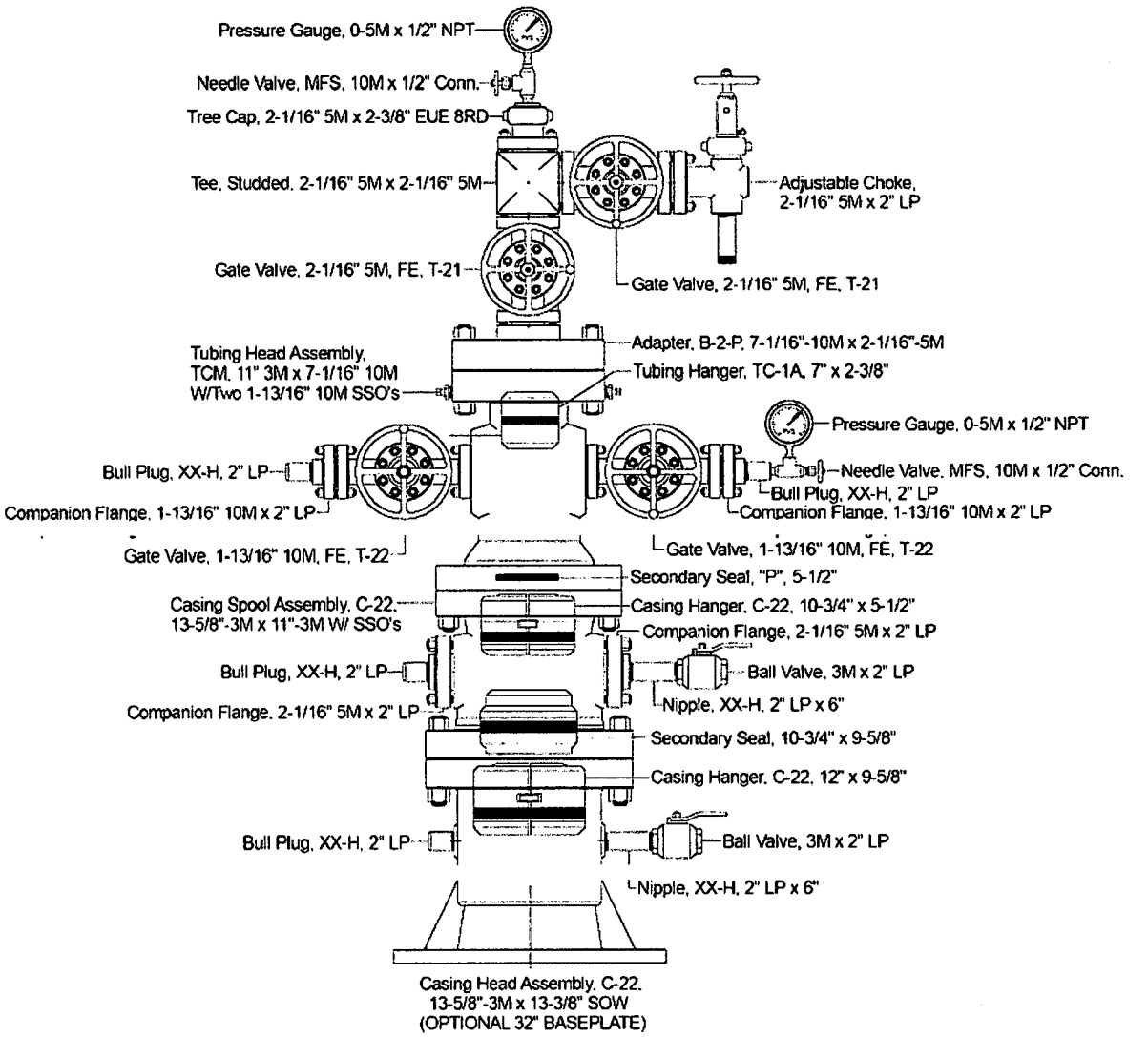
All Drilling Supervisors and Toolpushers used on this well will be IADC trained and certified. A trained person will be present during the drilling operations. Training certificates will be available for review on the location. The list of personnel with said training is provided in Appendix E.

4.5 Drilling Record

The Drilling Supervisor will maintain detailed records of significant drilling events such as lost circulation, hydrogen sulfide gas, fluid entry, kicks and abnormal pressures through the electronic data entry and recording system, Wellview. This system allows the Drilling Supervisor to enter daily reports containing the specified information. The records are then retained electronically at Antero Main Office in Denver, CO.

The Emergency Response Plan for this operating area requires the Drilling Supervisor to notify the district oil and gas inspector or the designated Office of Oil and Gas representative any unusual drilling events such as hydrogen sulfide gas or significant kicks that occur during drilling operations. Any encounter of hydrogen sulfide gas requires immediate notification of the Office of Oil and Gas.

4.6 Schematic and Description of the Wellhead Assembly



5.0 Well Flaring Operations

5.1 Size, Construction and Length of Flare Line

The flare line will be a 4" diameter, steel line that extends 50' from the well. The line will be anchored to the surface of the ground by cross pinning it in place using metal staking at multiple points along the line.

The choke assembly is described in previous section of this document and in drawing "5M Choke Manifold Equipment" BLM drawing Onshore Oil and Gas Order Number 2, Appendix D.

We do not anticipate flaring since we would first attempt to route the flow to the Gas Buster and work the gas kick off from there. Flaring would occur as a last resort or if needed.

5.2 Flare Lighting System

The system for lighting the flare will be an automatic flare igniter using a solar collector panel and battery charger system. A second igniter will be installed as a backup. Should flaring be required or needed.

The Drilling Supervisor will give notification to the local fire department prior to lighting the flare, if practicable, or as soon as possible thereafter.

5.3 Flare Safe Distances

The flare line(s) discharge shall be located not less than 50 feet from the well head, having straight lines unless turns are targeted with running tees, and shall be positioned downwind of rig and trailers. The flare system shall have an effective method for ignition. All flammable material beyond the end of the flare line will be cleared to a minimum distance of 50feet.

5.4 Flare Duration

The flare duration should not exceed the maximum time requirements needed to complete the operation.

6.0 Well Killing Operations

6.1 Mud Mixing Inventory

The following shows the inventory of all materials that will be on-site for the mixing of mud:

- 20 sack of Soda Ash
- 480 sacks of KCL
- 200 sacks of Biolose
- 40 sack of Xan-Plex
- 20 buckets of X-Cide 102
- 3 Drums of KD-40
- 5 Buckets of LD-S
- 15 super sack of MIL Bar
- 100 sacks of Soletex
- 40 Sacks of Graphite
- 300 Sack of Salt

Volume of mixed mud	=pit volume + equivalent volume in tanks = 500 bbls + 500 bbls = 1000 bbls total
Mixed Mud Weight	The mixed mud weight will vary depending on the bottom hole pressures and will calculated and adjusted as we gather more information; we intend to use 12.8 lb – 13.0 lb mud but will adjust the mud weight as information becomes available
Volume of Add'l Weighting Mat'l	Antero will have the necessary materials available to mix up enough mud to weight the mud up 1 lb more than the mud used for drilling; as an estimate, we expect to have 10 pallets of barite on site and 12 pallets of bentonite
Volume Water for Mixing	The rig has a 400 bbl rig water tank and the location will have 800 bbls additional in separate tanks.

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.

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:

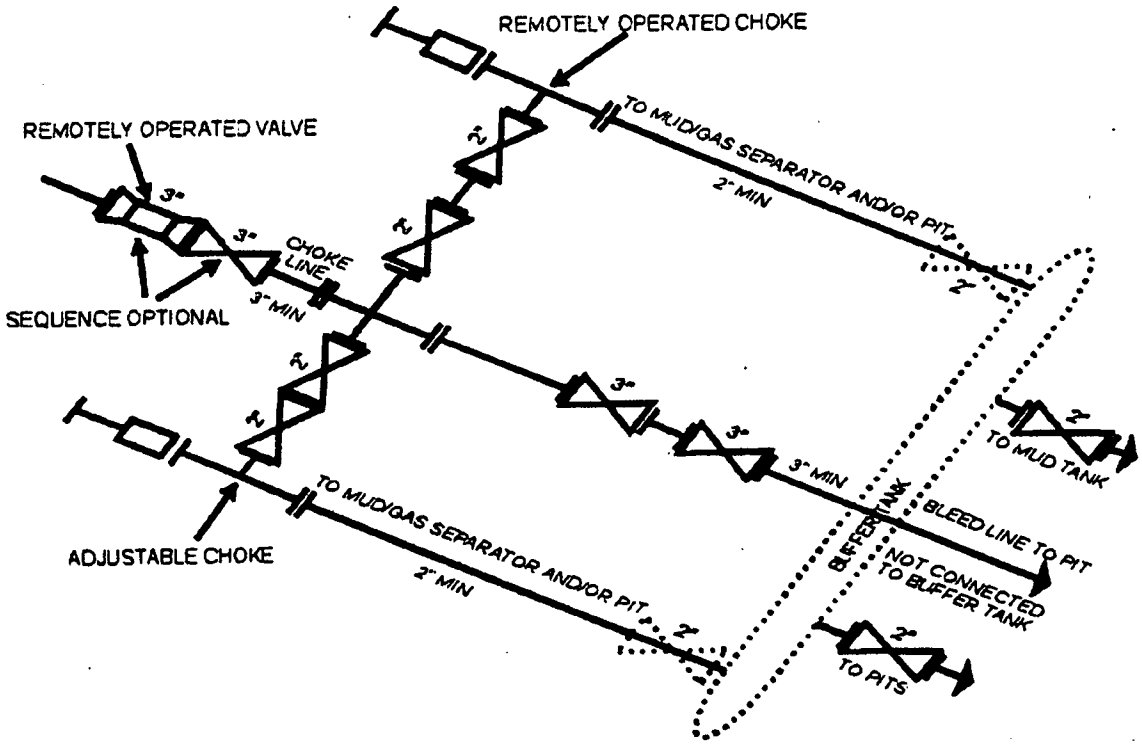
Ambulance, Fire, Law Enforcement Emergencies **Call 911**
Poison Control Center....1-304-388-4211 or 1-800-222-1222
Emergency Alert System Radio WFBY-FM 106.5

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

(State Emergency Spill Notification)	1-800-642-3074
Fire & Rescue:	
Harrison County Bureau of Emergency Services	304-623-6559
Anmoore Fire Dept.	304-622-5649
Bridgeport Fire Dept.	304-842-8252*
Clarksburg Fire Dept.	304-624-1645*
Johnstown Fire Dept.	304-624-9382*
Lost Creek Fire Dept.	304-745-4004*
Lumberport Fire Dept.	304-584-4721*
Mount Clare Fire Dept.	304-623-9625*
Nutter Fort Fire Dept.	304-622-5001*
Reynoldsville Fire Dept.	304-623-3754*
Salem Fire Dept.	304-782-3333*
Shinnston Fire Dept.	304-592-1851*
Spelter Fire Dept.	304-622-8256*
Stonewood Fire Dept.	304-622-1199*
Summit Park Fire Dept.	304-622-3363*
Wallace Fire Dept.	304-796-4014*
West Milford Fire Dept.	304-745-3355*
Flemington Volunteer Fire Dept (Taylor Co.)	304-739-2211*
W.V. State Fire Marshals (Arson Hotline)	304-558-2191 1-800-233-3473
Other important numbers:	
Allegheny Power	1-800-255-3443
Dominion Hope Gas	1-800-688-4673

*phone not manned 24 hours. If no answer call 623-6559

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)

NORTH

PREVAILING WIND
DIRECTION NNE

ANTERO RESOURCES

EXHIBIT 1
PLAUGHER
NORTH
PAD

EXHIBIT 1, PAGE 4

DRILLING LAYOUT/FLARE LINES/PREVAILING WINDS

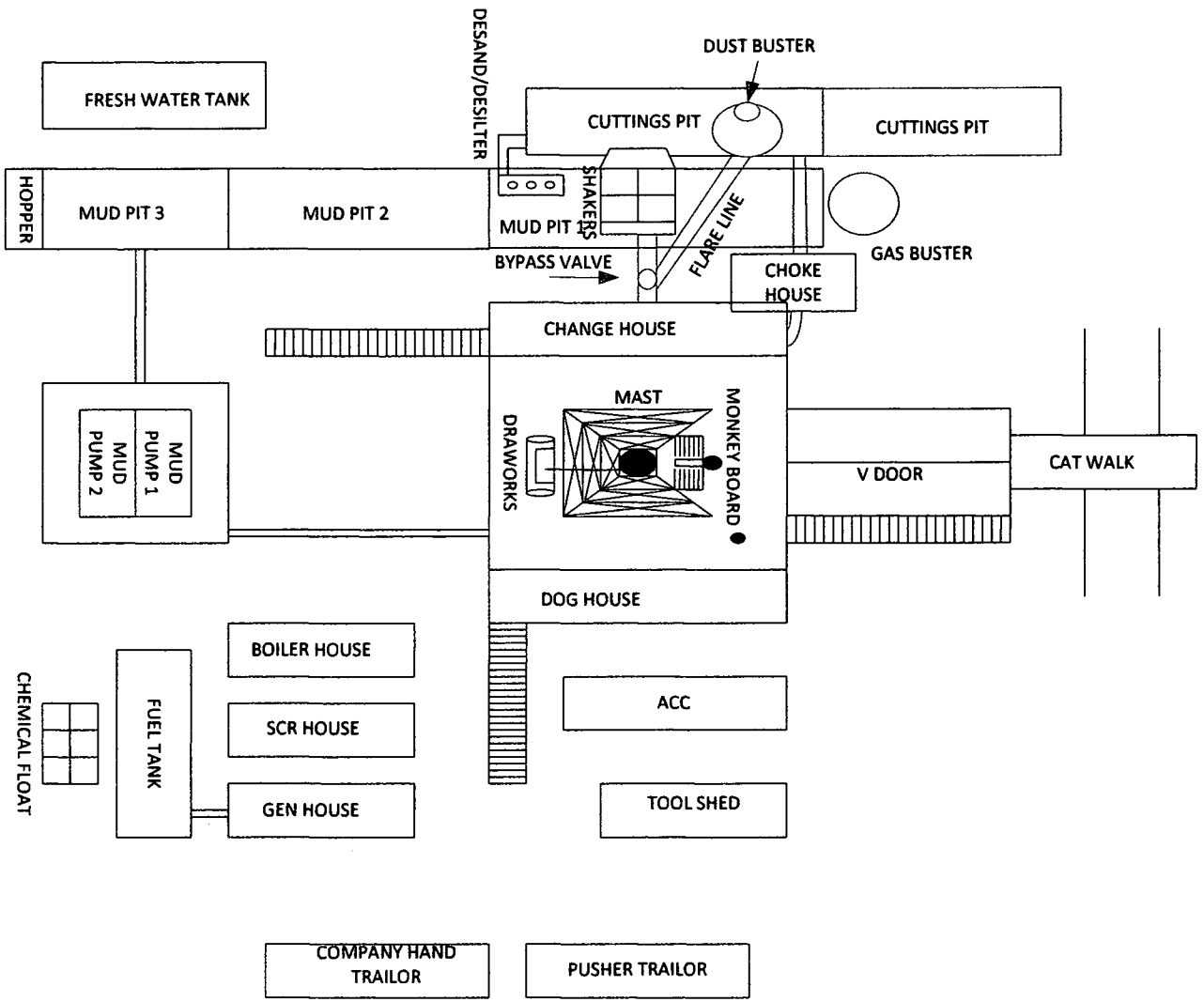
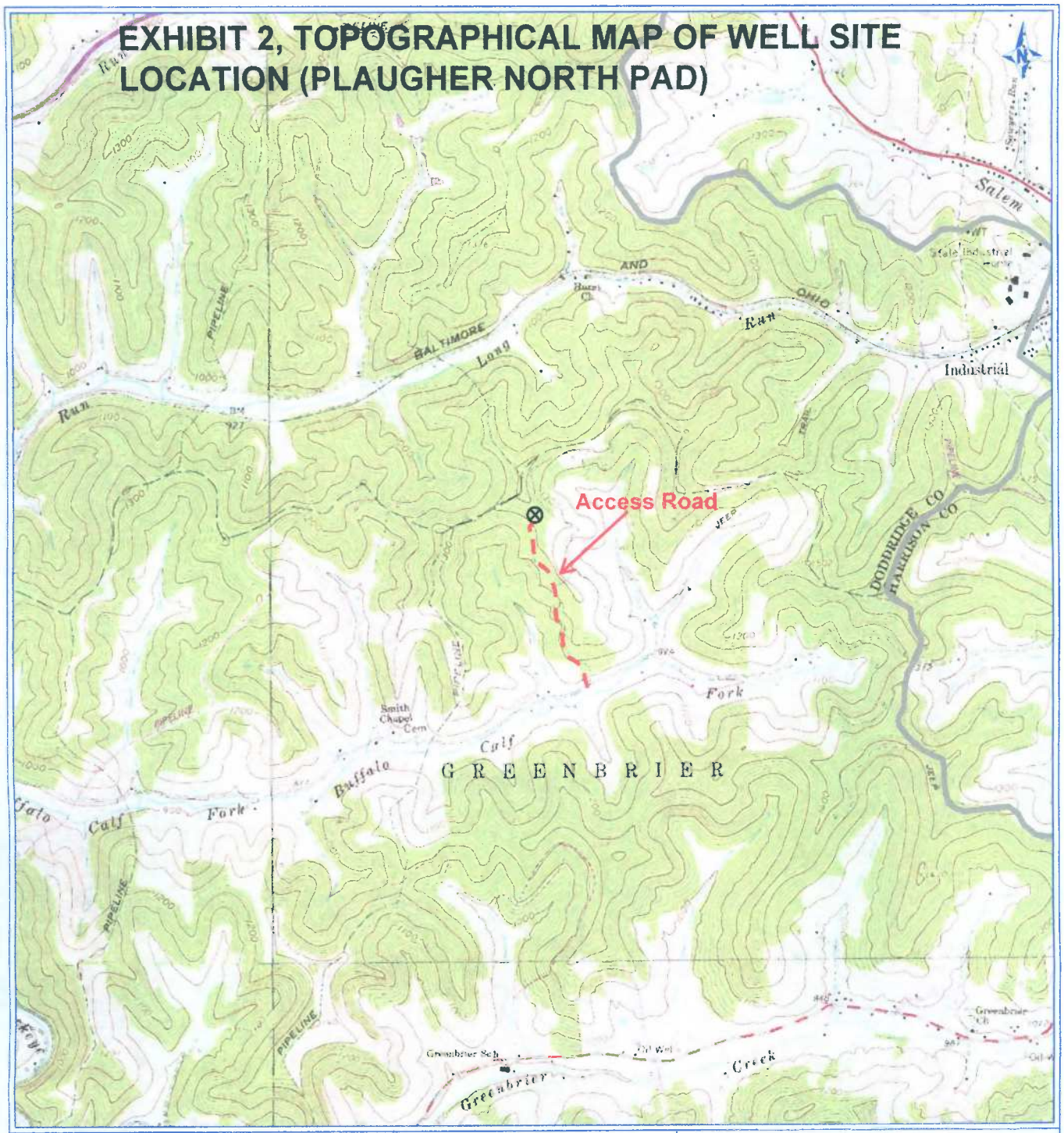


EXHIBIT 2, TOPOGRAPHICAL MAP OF WELL SITE LOCATION (PLAUGHER NORTH PAD)



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Antero Resources Corporation

Appalachian Basin

Plaugher North Pad

Doddridge County

0 2,000 4,000

FEET

REMARKS

QUADRANGLE: SALEM
WATERSHED: BUFFALO CALF FORK
DISTRICT: GREENBRIER

February 11, 2013

EXHIBIT 3
LIST OF ALL SCHOOLS & PUBLIC FACILITIES WITHIN A ONE- MILE RADIUS OF PROPOSED WELL SITE

Facility Name	Telephone Number
None identified within a 1-mile radius	

WW - 6B
(1/12)

EXHIBIT 4.a to SSP- WW-2B 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	Doddridge	Greenbrier	Salem
		Operator ID	County	District	Quadrangle

2) Operator's Well Number: Irons Unit 1H Well Pad Name: Plaugher North Pad

3 Elevation, current ground: ~1382' Elevation, proposed post-construction: 1364'

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: 7600' TVD, Anticipated Thickness- 50 Feet, Associated Pressure- 3200#

7) Proposed Total Vertical Depth: 7600' TVD
8) Formation at Total Vertical Depth: Marcellus
9) Proposed Total Measured Depth: 18,300' MD
10) Approximate Fresh Water Strata Depths: 133'
11) Method to Determine Fresh Water Depth: Offset well records. Depths have been adjusted according to surface elevations.
12) Approximate Saltwater Depths: 781', 1867', 2097'
13) Approximate Coal Seam Depths: 641', 1109', 1633'
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): 22.99 acres

19) Area to be disturbed for well pad only, less access road (acres): 3.74 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#	310'	310'	CTS, 431 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2530'	2530'	CTS, 1030 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	18300'	18300'	3853 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.

WW - 6B
(1/12)

EXHIBIT 4.b to SSP- WW-2B 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: Gainer Unit 2H Well Pad Name: Plaugher North Pad

3 Elevation, current ground: ~1382' Elevation, proposed post-construction: 1364'

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: 7600' TVD, Anticipated Thickness- 50 Feet, Associated Pressure- 3200#

7) Proposed Total Vertical Depth: 7600' TVD
8) Formation at Total Vertical Depth: Marcellus
9) Proposed Total Measured Depth: 15,500' MD
10) Approximate Fresh Water Strata Depths: 133'
11) Method to Determine Fresh Water Depth: Offset well records. Depths have been adjusted according to surface elevations.
12) Approximate Saltwater Depths: 781', 1867', 2097'
13) Approximate Coal Seam Depths: 641', 1109', 1633'
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): 22.99 acres

19) Area to be disturbed for well pad only, less access road (acres): 3.74 acres

WW - 6B
(1/12)

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#	2525'	2525'	CTS, 1028 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	15500'	15500'	3853 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.

WW - 6B
(1/12)

EXHIBIT 4.c to SSP- WW-2B FORM

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

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		Operator ID	County	District	Quadrangle

2) Operator's Well Number: Gainer Unit 1H Well Pad Name: Plaugher North Pad

3 Elevation, current ground: ~1382' Elevation, proposed post-construction: 1364'

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: 7600' TVD, Anticipated Thickness- 50 Feet, Associated Pressure- 3200#

7) Proposed Total Vertical Depth: 7600' TVD
8) Formation at Total Vertical Depth: Marcellus
9) Proposed Total Measured Depth: 15,700' MD
10) Approximate Fresh Water Strata Depths: 133'
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12) Approximate Saltwater Depths: 781', 1867', 2097'
13) Approximate Coal Seam Depths: 641', 1109', 1633'
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): 22.99 acres

19) Area to be disturbed for well pad only, less access road (acres): 3.74 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#	300'	300'	CTS, 417 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2520'	2520'	CTS, 1026 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	15700'	15700'	3909 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.

FLOODPLAIN ANALYSIS

for the

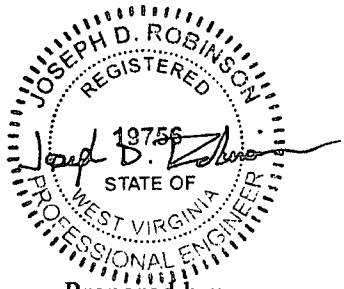
Plaugher North Pad Site

Located along the Buffalo Calf Road
Doddridge County, WV

Prepared for:

Antero Resources Appalachian Corporation

May 2013



Prepared by:

HORNOR BROTHERS ENGINEERS
140 South Third Street
Clarksburg, WV 26302
PHONE: (304) 624-6445
FAX: (304) 624-6448

TABLE OF CONTENTS

INTRODUCTION

This analysis has been prepared to provide documentation for the upstream drainage area hydraulics and the on-site flood elevations near the county road and surrounding properties of the Plaugher North Pad Site along Buffalo Calf Fork in Doddridge County, West Virginia as requested for the sole use of Antero Resources Appalachian Corporation. Antero Resources Appalachian Corporation requested that a flood analysis be completed for the evaluation of proposed access roads and tank pad areas that may be found within the flood elevation. This report provides information for the existing site conditions of the 100-year frequency storm event. The study reach is identified as a "Zone A" on FEMA's flood insurance rate map 54017C0165C. The purpose of this analysis is to delineate the one percent flood hazard area and show that only a portion of the proposed offload pad lies within the floodplain limits and to show that the proposed activities will not increase the flood elevation. This analysis also indicates that the proposed access road to the drill pad lies outside the floodplain.

EXISTING SITE INFORMATION

The site is bordered on the south by Buffalo Calf Road (County Route 42) and the nearest town is Industrial to the West. The topography was field collected for the Plaugher North Site. The surrounding upslope drainage area (554 ac) data was based on a combination of Google Earth images for the land use and a USGS map for the topology, for a combined drainage area of 554 ac. The current land use was found to be undeveloped with meadow and woods upstream. The soil types found on the site are described as Sensabaugh (Hydrologic Group B); Gilpin-Peabody (Hydrologic Group C); Vandalia (Hydrologic Group D), which can be seen in Figure 2.2.

Existing elevations within the analysis area were determined through on-site section features survey using survey grade GPS.

PRECIPITATION

Precipitation depths were determined using the WV Erosion and Sediment Control Handbook for Developing Areas (Exhibit B-1). The 2, 10, 25, 50, and 100-year 24-hour frequency rainfall depths are in order as follows 2.61", 3.90", 4.57", 4.92", and 5.40".

STORMWATER CALCULATIONS

A HydroCAD Hydrological model was used to calculate the runoff based on the SCS TR-20 method. In running the calculations, the following runoff amount was determined for the 100-year frequency storm was calculated to be 1769.28 cfs under existing conditions.

The HEC-RAS (v4.1.0) rainfall model was used to analyze the onsite drainage channel to calculate the flood elevation for the 100-year storm event.

SCS RUNOFF CURVE NUMBERS

The SCS runoff curve number (CN) method was used to convert precipitation depth into runoff excess. The curve number method is based on observable physical properties (soil and cover) of the runoff sub-areas.

A hydrological soil group (HSG) characterizes the soil properties. The soil survey provides information on the detailed make up of the various soil types, making it possible to classify their component soils into HSG A (low runoff potential and high infiltration rates) through HSG D (high runoff potential and very low infiltration rates).

The cover takes into account the land use, vegetation type, surface treatment, etc.

TIME OF CONCENTRATION

The time of concentration (T_c) of each runoff sub-area is the amount of time that it takes for runoff to travel from the hydraulically most distant point to the outlet.

The SCS method provides procedures for computing three travel time components for the time of concentration calculations: 1) sheet flow, 2) shallow concentrated flow, and 3) open channel flow. The following values were used for study Area 1: sheet flow 50', shallow concentrated flow 150', open channel flow 5752' for a total T_c time of 11.9 minutes.

MANNING'S COEFFICIENTS

The Manning's roughness coefficients were determined based on a site visit and aerial photography of the site and the values presented in the HEC-RAS Hydraulic Manual Table 3-1.
Main channel:
1.b Clean, straight, full, no rifts or deep pools, some stones and weeds: Value = 0.035

Floodplain:
2.a.2 Pasture - High grass: Value = 0.050
The maximum value was used for the possibility of brush and debris in the floodplain.

BOUNDARY CONDITIONS

FEMA has not performed a detailed hydraulic study of Buffalo Creek Fork near the project site. Therefore, a channel slope of 0.0017 was used as the normal depth boundary condition in the hydraulic model.

RESULTS

By analyzing the results from the calculations and the HEC-RAS model, the following flood elevations have been determined for the 100-yr frequency storm upstream and downstream respectively: 959.08 and 939.64 for both the existing conditions scenario and the proposed developed scenario. Based on the findings of this analysis the base flood elevation would not be modified by the proposed drilling operations and construction.

CONCLUSION

According to the methods utilized in this analysis, the main access road for the drill pad and impoundment would not encroach on the floodplain. A portion of the proposed offload pad (0.66 acres) is within the floodplain but does not have an adverse effect on the floodplain as no additional volume is added to the floodplain and the upstream and downstream flood elevations remain the same. The construction of the proposed offload pad consists of regrading the existing ground within the limits of disturbance and redistributing the cut material within the same limits of disturbance.

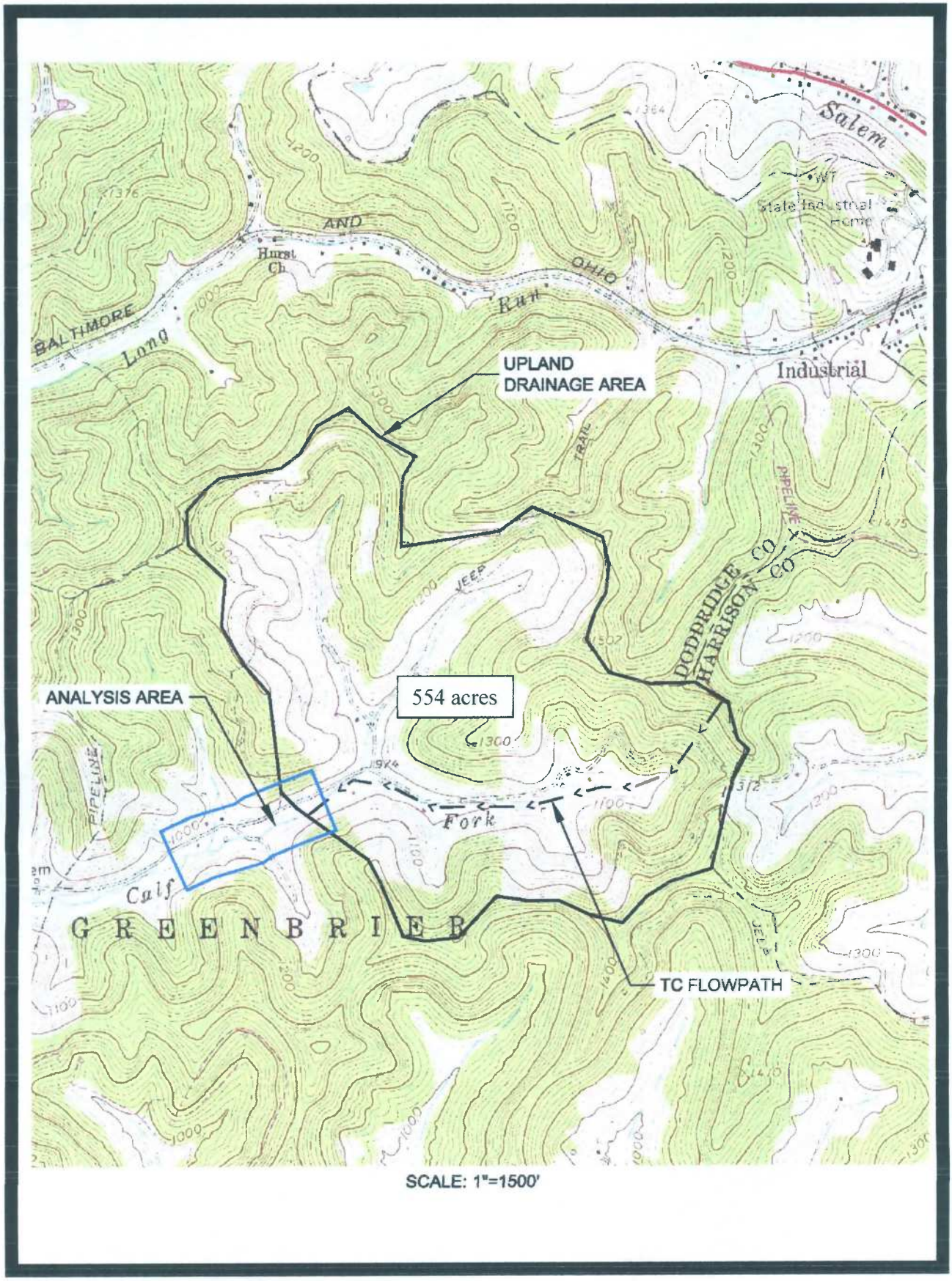


Figure 2.1 USGS map with drainage area boundary

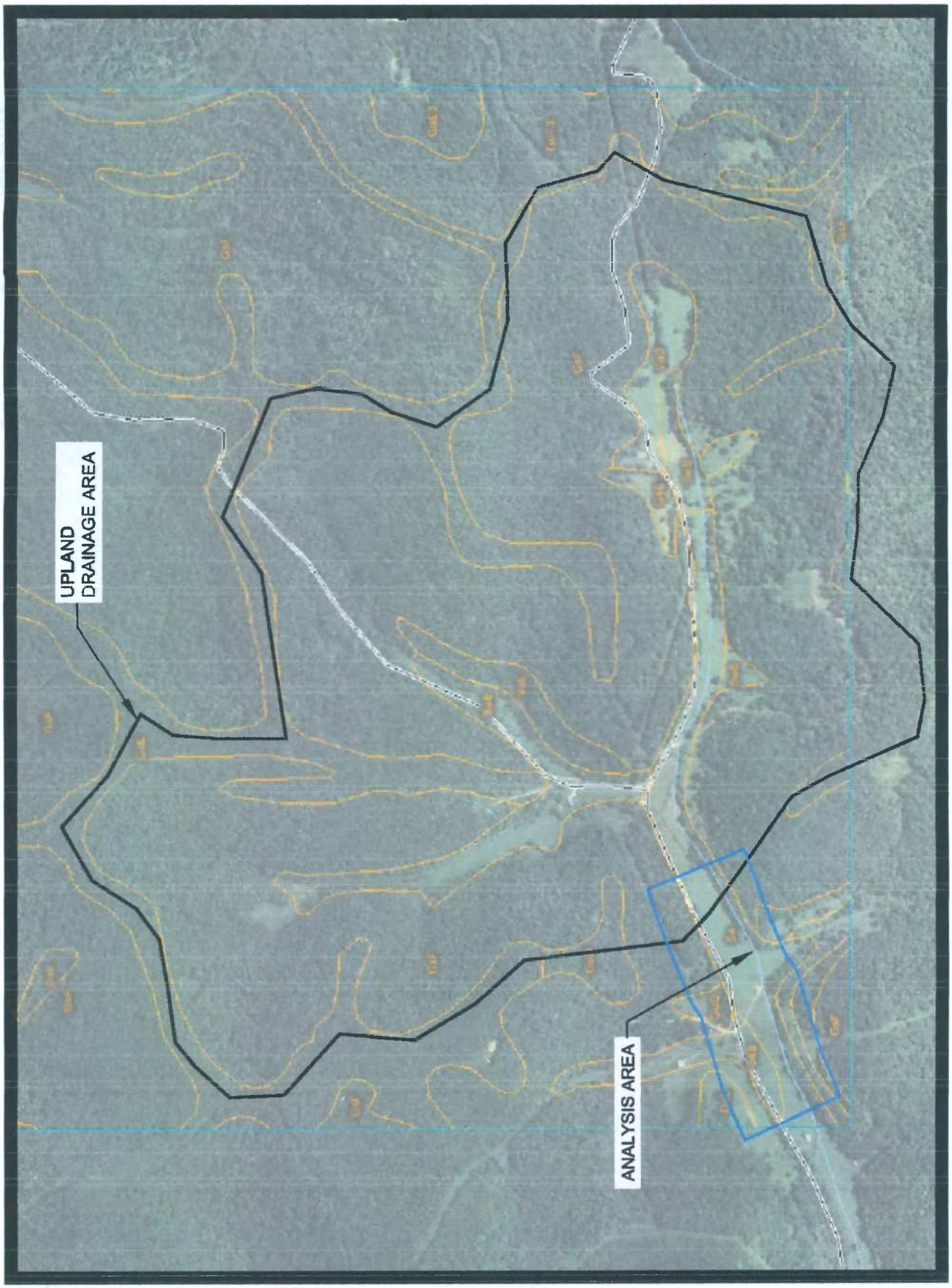


Figure 2.2 USDA Soils map (Doddridge County Soil Survey) with drainage area boundary

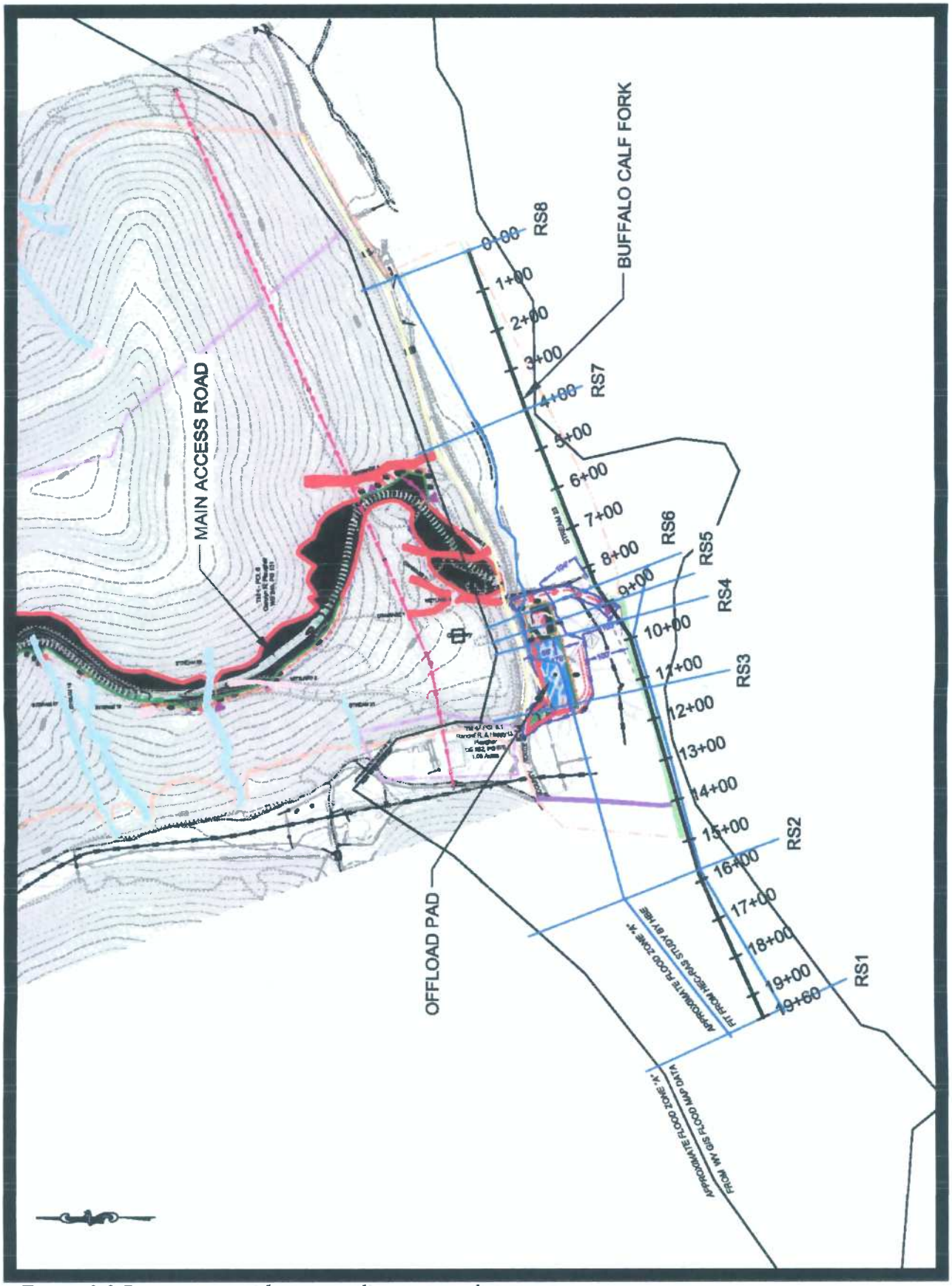


Figure 2.3 Design map with stream alignment and sections

Figure 3.1 CR42 looking East

Figure 3.2 CR42 looking West

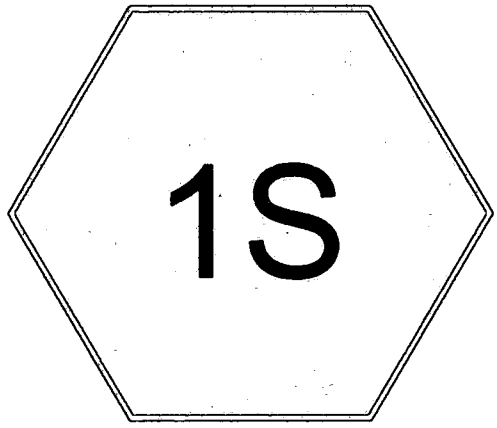
Figure 3.3 Floodplain area looking West

Figure 3.4 Floodplain area looking East

Figure 3.5 Typical stream section

Figure 3.6 Proposed offload pad location

APPENDIX



DA

Subcat Reach Pond Link

Drainage Diagram for 203-12-SWM
Prepared by HBE 5/16/2013

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DA Runoff Area=554.000 ac Runoff Depth>2.05"
Flow Length=5,952' Tc=11.9 min CN=69 Runoff=1,769.28 cfs 94.731 af

Total Runoff Area = 554.000 ac Runoff Volume = 94.731 af Average Runoff Depth = 2.05"
100.00% Pervious Area = 554.000 ac 0.00% Impervious Area = 0.000 ac

Subcatchment 1S: DA

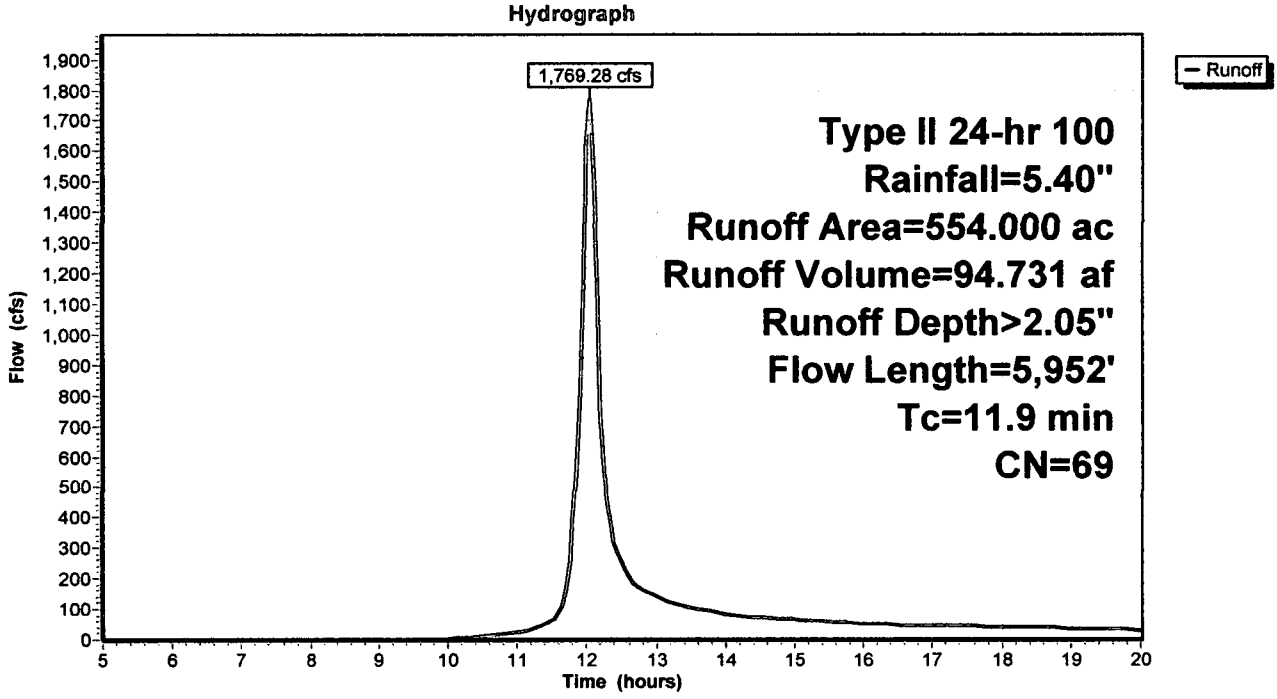
Runoff = 1,769.28 cfs @ 12.04 hrs, Volume= 94.731 af, Depth> 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100 Rainfall=5.40"

Area (ac)	CN	Description
471.000	70	Woods, Good, HSG C
70.500	58	Meadow, non-grazed, HSG B
12.500	78	Meadow, non-grazed, HSG D
554.000	69	Weighted Average
554.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	50	0.4000	0.20		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.61"
1.8	150	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.0	5,752	0.0800	15.85	1,030.47	**Channel Flow,** Area= 65.0 sf Perim= 54.0' r= 1.20' n= 0.030 Earth, grassed & winding
11.9	5,952	Total			

Subcatchment 1S: DA



Web Soil Survey

Area of Interest (AOI) | Soil Map | Shopping Cart (Free)

View Soil Information By Use: All Uses

Printable Version | Add to Shopping Cart

Intro to Soils | Suitabilities and Limitations for Use | Ecological Site Assessment | Soil Reports

Open All | Close All

- Soil Chemical Properties
- Soil Erosion Factors
- Soil Physical Properties
- **Soil Qualities and Features**
  - AASHTO Group Classification (Surface)
  - Depth to a Selected Soil Restrictive Layer
  - Depth to Any Soil Restrictive Layer
  - Drainage Class
  - Frost Action
  - Frost-Free Days

View Description | View Rating

View Options

Map ☑

Table ☑

Description of Rating ☑

Rating Options

☐ Detailed Description

Advanced Options

Aggregation Method: Dominant Condition

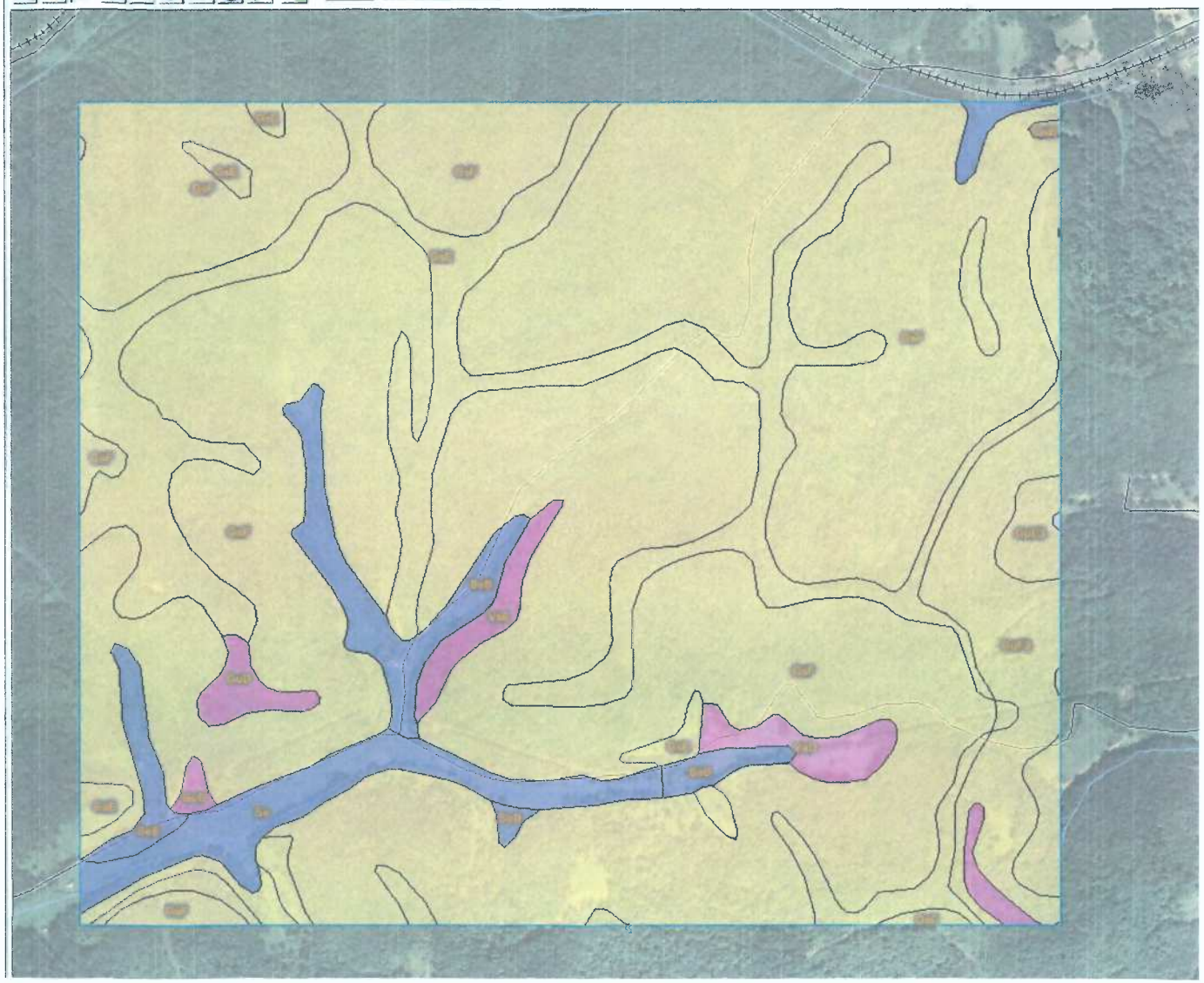
Component Percent Cutoff

Tie-break Rule: Lower / Higher

View Description | View Rating

- Map Unit Name
- Parent Material Name
- Representative Slope
- Unified Soil Classification (Surface)
- Water Features

Scale (not to scale)



Warning: Soil Ratings Map may not be valid at this scale.

You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Mapping of soils is done at a particular scale. The soil s ranging from 1:20,000 to 1:24,000. The design of map units and the level of detail shown in the resulting soil map are dependent on that map scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps d have been shown at a more detailed scale.

Summary by Map Unit — Doddridge County, West Virginia (WV017)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
GsE	Gilpin-Peabody complex, 15 to 35 percent slopes, very stony	C	166.6	15.3%
GsF	Gilpin-Peabody complex, 35 to 70 percent slopes, very stony	C	759.7	69.9%
GuD	Gilpin-Upshur complex, 15 to 25 percent slopes	D	8.2	0.8%
Se	Sensabaugh silt loam	B	30.0	2.8%
SeB	Sensabaugh silt loam, 3 to 8 percent slopes, rarely flooded	B	38.7	3.6%
VaD	Vandalia silt loam, 15 to 25 percent slopes	D	9.9	0.9%
VsE	Vandalia silt loam, 15 to 35 percent slopes, very stony	D	8.0	0.7%
Subtotals for Soil Survey Area			**1,021.2**	**93.9%**

Summary by Map Unit — Harrison and Taylor Counties, West Virginia (WV610)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
GlF	Gilpin silt loam, 35 to 60 percent slopes	C	0.7	0.1%
GuD3	Gilpin-Upshur comples, 15 to 25 percent slopes, severely eroded	D	3.4	0.3%
GuE3	Gilpin-Upshur complex, 25 to 35 percent slopes, severely eroded	C	13.9	1.3%
GuF3	Gilpin-Upshur complex,35 to 70 percent slopes, severely eroded	C	47.9	4.4%
UF	Udifluvents and Fluvaquents		0.1	0.0%
Subtotals for Soil Survey Area			**66.1**	**6.1%**
Totals for Area of Interest			**1,087.3**	**100.0%**

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X      X    X        X
X     X  X        X    X      X   X     X    X        X
X     X  XXXXXX    XXXX       X    X    X    X   XXXXX
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PROJECT DATA
Project Title: FLOOD ANALYSIS
Project File : FLOODANALYSIS.prj
Run Date and Time: 5/16/2013 10:00:22 AM

Project in English units

Project Description:
PLUAGHER N PAD 203-12

PLAN DATA

Plan Title: Plan 01
Plan File : m:\HBE PROJECTS\2012\ASI 2012 PROJECTS\ASI 203-12 PLAUGHER NORTH PAD\HEC-RAS\FLOODANALYSIS.p01

Geometry Title: BUFFALO CALF FORK-1
Geometry File : m:\HBE PROJECTS\2012\ASI 2012 PROJECTS\ASI 203-12 PLAUGHER NORTH PAD\HEC-RAS\FLOODANALYSIS.g01

Flow Title : FLOOD STUDY 203-12
Flow File : m:\HBE PROJECTS\2012\ASI 2012 PROJECTS\ASI 203-12 PLAUGHER NORTH PAD\HEC-RAS\FLOODANALYSIS.f01

Plan Summary Information:

Number of:	Cross Sections	= 8	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: FLOOD STUDY 203-12
Flow File : m:\HBE PROJECTS\2012\ASI 2012 PROJECTS\ASI 203-12 PLAUGHER NORTH PAD\HEC-RAS\FLOODANALYSIS.f01

Flow Data (cfs)

River	Reach	RS	100 YR
BUFFALO CALF FOR	1	8	1769

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
BUFFALO CALF FOR	1	100 YR		

Normal S = 0.0017

GEOMETRY DATA

Geometry Title: BUFFALO CALF FORK-1
Geometry File : m:\HBE PROJECTS\2012\ASI 2012 PROJECTS\ASI 203-12 PLAUGHER NORTH PAD\HEC-RAS\FLOODANALYSIS.g01

CROSS SECTION

RIVER: BUFFALO CALF FOR
REACH: 1 RS: 8

INPUT
Description: RS8 STA 0
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
24.19	1011.01	71.98001	957.57	95.73001	953.38	9.07001	957.5	183.14	957.48
229.5	957.27	274.13	958.52	291.56	966.25	304.31	966.38	363	998.53

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
24.19	.05	71.98001	.03589	95.07001	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
71.98001	89.07001	400	400	400	.1	.3

CROSS SECTION

RIVER: BUFFALO CALF FOR
REACH: 1 RS: 7

INPUT

Description: RS7 STA 400
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	994.91	13.17999	991.23	78.85999	952.87	128.5	951.8	137.36	948.38
146.51	951.8	212.88	952.77	258.16	954.6	300.16	959.59	336.06	964.45
355.67	970.8	369.11	971.63						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	128.5	.035	146.51	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
128.5	146.51	450	450	450	.1	.3

CROSS SECTION

RIVER: BUFFALO CALF FOR
REACH: 1 RS: 6

INPUT
Description: RS6 STA 850
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	971.47	36.74	948.11	42.64	949.54	87.3	950.1	153.21	947.79
165.67	942.6	179.78	947.81	236.02	945.97	330.06	945.4	366.02	948.55
378.62	956.49	393.38	956.22	411.59	970.31	435.69	982.8	454.61	989.14
501.12	996.66								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	153.21	.035	179.78	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
153.21	179.78	50	50	50	.1	.3

CROSS SECTION

RIVER: BUFFALO CALF FOR
REACH: 1 RS: 5

INPUT
Description: RS5 STA 900
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	972.27	36.74	948.91	42.64	950.34	87.3	950.9	153.21	948.59
165.67	943.4	179.78	948.61	236.02	946.77	330.06	946.2	366.02	949.35
378.62	957.29	393.38	957.02	411.59	971.11	435.69	983.6	454.61	989.94
501.12	997.46								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	153.21	.035	179.78	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
153.21	179.78	50	50	50	.1	.3

CROSS SECTION

RIVER: BUFFALO CALF FOR
REACH: 1 RS: 4

INPUT
Description: RS4 STA 950
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	986.31	79.71	954.19	91.9	944.52	96.65	941.8	104.28	944.49
141.61	946.14	249.05	946.02	289.95	948.14	341	948.74	358.35	952.68
371.74	952.33	413.77	979.3	468.47	989.39				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	91.9	.035	104.28	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
91.9	104.28	175	175	.1	.3

CROSS SECTION

RIVER: BUFFALO CALF FOR
REACH: 1 RS: 3

INPUT
Description: RS3 STA 1125
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	984.07	79.71	951.95	91.9	942.28	96.65	939.56	104.28	942.25
141.61	943.9	249.05	943.78	289.95	945.9	341	946.5	358.35	950.44
371.74	950.09	413.77	977.06	468.47	987.15				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	91.9	.035	104.28	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
91.9	104.28	450	450	.1	.3

CROSS SECTION

RIVER: BUFFALO CALF FOR
REACH: 1 RS: 2

INPUT
Description: RS2 STA 1575
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970.85	48.58	938.41	54.71	934.15	68.99	938.39	183.58	938.94
287.14	942.11	301.32	948.72	311.33	948.74	376.47	980.86		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	48.58	.035	68.99	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
48.58	68.99	385	385	.1	.3

CROSS SECTION

RIVER: BUFFALO CALF FOR
REACH: 1 RS: 1

INPUT
Description: RS1 STA 1960
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	973.11	53.44	941.33	100	934.47	117.42	933.51	126.52	934.46
172.19	935.99	219.99	940.4	331.52	950.98	334.51	949.37	347.18	949.18
358.7	954.34	402.76	956.98	437.64	962.7	482.36	973.19		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	100	.035	126.52	.05

Bank Sta: Left	Right	Coeff Contr.	Expan.
100	126.52	.1	.3

SUMMARY OF MANNING'S N VALUES

River:BUFFALO CALF FOR

Reach	River Sta.	n1	n2	n3
1	8	.05	.035	.05
1	7	.05	.035	.05
1	6	.05	.035	.05
1	5	.05	.035	.05
1	4	.05	.035	.05
1	3	.05	.035	.05
1	2	.05	.035	.05
1	1	.05	.035	.05

SUMMARY OF REACH LENGTHS

River: BUFFALO CALF FOR

Reach	River Sta.	Left	Channel	Right
1	8	400	400	400
1	7	450	450	450
1	6	50	50	50
1	5	50	50	50
1	4	175	175	175
1	3	450	450	450
1	2	385	385	385
1	1			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: BUFFALO CALF FOR

Reach	River Sta.	Contr.	Expan.
1	8	.1	.3
1	7	.1	.3
1	6	.1	.3
1	5	.1	.3

1	4	.1	.3
1	3	.1	.3
1	2	.1	.3
1	1	.1	.3

Plan: Plan 01 BUFFALO CALF FOR 1 RS: 8 Profile: 100 YR

E.G. Elev (ft)	959.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.67	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	959.08	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)	959.08	Flow Area (sq ft)	1.11	62.88	281.78
E.G. Slope (ft/ft)	0.011017	Area (sq ft)	1.11	62.88	281.78
Q Total (cfs)	1769.00	Flow (cfs)	2.26	609.24	1157.49
Top Width (ft)	204.82	Top Width (ft)	1.41	17.09	186.32
Vel Total (ft/s)	5.12	Avg. Vel. (ft/s)	2.03	9.69	4.11
Max Chl Dpth (ft)	5.78	Hydr. Depth (ft)	0.79	3.68	1.51
Conv. Total (cfs)	16853.7	Conv. (cfs)	21.6	5804.4	11027.7
Length Wtd. (ft)	400.00	Wetted Per. (ft)	2.12	19.62	186.46
Min Ch El (ft)	953.30	Shear (lb/sq ft)	0.36	2.20	1.04
Alpha	1.66	Stream Power (lb/ft s)	363.00	0.00	0.00
Frctn Loss (ft)	4.13	Cum Volume (acre-ft)	1.61	3.74	12.66
C & E Loss (ft)	0.02	Cum SA (acres)	1.00	0.87	6.82

Plan: Plan 01 BUFFALO CALF FOR 1 RS: 7 Profile: 100 YR

E.G. Elev (ft)	955.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	954.21	Reach Len. (ft)	450.00	450.00	450.00
Crit W.S. (ft)	954.21	Flow Area (sq ft)	94.85	74.28	153.87
E.G. Slope (ft/ft)	0.009708	Area (sq ft)	94.85	74.28	153.87
Q Total (cfs)	1769.00	Flow (cfs)	412.90	764.03	592.07
Top Width (ft)	172.06	Top Width (ft)	51.94	18.01	102.11
Vel Total (ft/s)	5.48	Avg. Vel. (ft/s)	4.35	10.29	3.85
Max Chl Dpth (ft)	5.83	Hydr. Depth (ft)	1.83	4.12	1.51
Conv. Total (cfs)	17954.2	Conv. (cfs)	4190.7	7754.4	6009.1
Length Wtd. (ft)	450.00	Wetted Per. (ft)	52.32	19.27	102.15
Min Ch El (ft)	948.38	Shear (lb/sq ft)	1.10	2.34	0.91
Alpha	1.84	Stream Power (lb/ft s)	369.11	0.00	0.00
Frctn Loss (ft)	1.47	Cum Volume (acre-ft)	1.16	3.11	10.66
C & E Loss (ft)	0.22	Cum SA (acres)	0.76	0.71	5.50

Plan: Plan 01 BUFFALO CALF FOR 1 RS: 6 Profile: 100 YR

E.G. Elev (ft)	949.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	949.19	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)		Flow Area (sq ft)	31.23	105.98	538.72
E.G. Slope (ft/ft)	0.001628	Area (sq ft)	31.23	105.98	538.72
Q Total (cfs)	1769.00	Flow (cfs)	28.88	435.26	1304.87
Top Width (ft)	259.88	Top Width (ft)	46.06	26.57	187.25
Vel Total (ft/s)	2.62	Avg. Vel. (ft/s)	0.92	4.11	2.42
Max Chl Dpth (ft)	6.59	Hydr. Depth (ft)	0.68	3.99	2.88
Conv. Total (cfs)	43849.3	Conv. (cfs)	715.8	10789.0	32344.5
Length Wtd. (ft)	50.00	Wetted Per. (ft)	46.53	28.54	187.61
Min Ch El (ft)	942.60	Shear (lb/sq ft)	0.07	0.38	0.29
Alpha	1.24	Stream Power (lb/ft s)	501.12	0.00	0.00
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	0.51	2.18	7.08
C & E Loss (ft)	0.06	Cum SA (acres)	0.25	0.48	4.00

Plan: Plan 01 BUFFALO CALF FOR 1 RS: 5 Profile: 100 YR

E.G. Elev (ft)	949.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.		0.035	0.050
W.S. Elev (ft)	948.36	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	948.36	Flow Area (sq ft)		62.75	240.98
E.G. Slope (ft/ft)	0.016464	Area (sq ft)		62.75	240.98
Q Total (cfs)	1769.00	Flow (cfs)		596.86	1172.14
Top Width (ft)	192.47	Top Width (ft)		25.32	167.14
Vel Total (ft/s)	5.82	Avg. Vel. (ft/s)		9.51	4.86
Max Chl Dpth (ft)	4.96	Hydr. Depth (ft)		2.48	1.44
Conv. Total (cfs)	13786.6	Conv. (cfs)		4651.6	9135.0
Length Wtd. (ft)	50.00	Wetted Per. (ft)		27.20	167.27
Min Ch El (ft)	943.40	Shear (lb/sq ft)		2.37	1.48
Alpha	1.36	Stream Power (lb/ft s)	501.12	0.00	0.00
Frctn Loss (ft)	0.60	Cum Volume (acre-ft)	0.50	2.08	6.63
C & E Loss (ft)	0.00	Cum SA (acres)	0.22	0.45	3.80

Plan: Plan 01 BUFFALO CALF FOR 1 RS: 4 Profile: 100 YR

E.G. Elev (ft)	948.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.74	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	947.70	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)	947.70	Flow Area (sq ft)	6.39	56.36	290.82
E.G. Slope (ft/ft)	0.009220	Area (sq ft)	6.39	56.36	290.82
Q Total (cfs)	1769.00	Flow (cfs)	21.11	593.74	1154.15
Top Width (ft)	193.63	Top Width (ft)	4.01	12.38	177.24
Vel Total (ft/s)	5.00	Avg. Vel. (ft/s)	3.31	10.54	3.97
Max Chl Dpth (ft)	5.90	Hydr. Depth (ft)	1.59	4.55	1.64
Conv. Total (cfs)	18423.0	Conv. (cfs)	219.8	6183.4	12019.7
Length Wtd. (ft)	175.00	Wetted Per. (ft)	5.12	13.56	177.32
Min Ch El (ft)	941.80	Shear (lb/sq ft)	0.72	2.39	0.94
Alpha	1.90	Stream Power (lb/ft s)	468.47	0.00	0.00
Frctn Loss (ft)	1.61	Cum Volume (acre-ft)	0.49	2.01	6.33
C & E Loss (ft)	0.00	Cum SA (acres)	0.22	0.43	3.60

Plan: Plan 01 BUFFALO CALF FOR 1 RS: 3 Profile: 100 YR

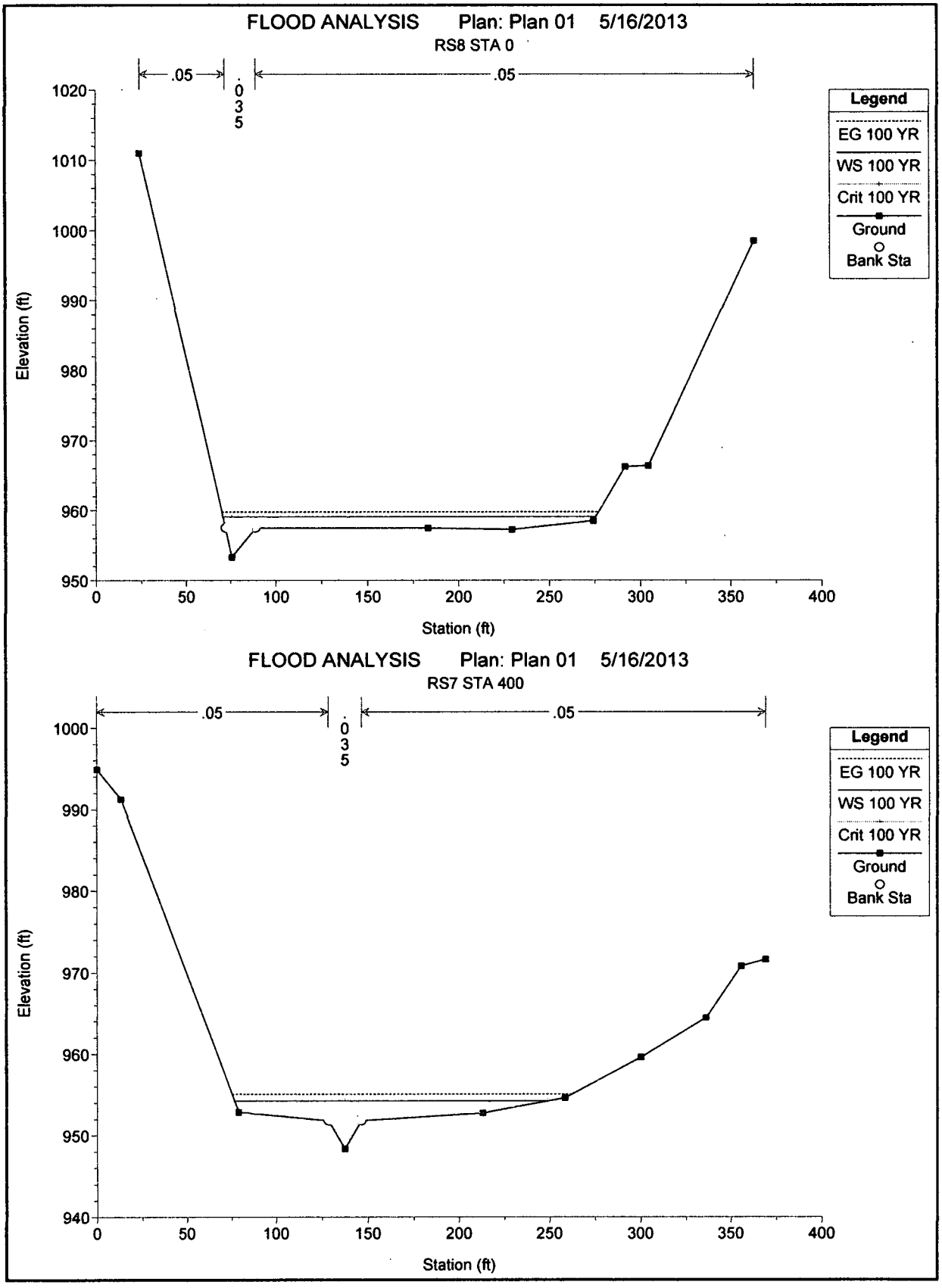
E.G. Elev (ft)	946.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.74	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	945.46	Reach Len. (ft)	450.00	450.00	450.00
Crit W.S. (ft)	945.46	Flow Area (sq ft)	6.39	56.36	290.82
E.G. Slope (ft/ft)	0.009220	Area (sq ft)	6.39	56.36	290.82
Q Total (cfs)	1769.00	Flow (cfs)	21.11	593.74	1154.15
Top Width (ft)	193.63	Top Width (ft)	4.01	12.38	177.24
Vel Total (ft/s)	5.00	Avg. Vel. (ft/s)	3.31	10.54	3.97
Max Chl Dpth (ft)	5.90	Hydr. Depth (ft)	1.59	4.55	1.64
Conv. Total (cfs)	18423.0	Conv. (cfs)	219.8	6183.4	12019.7
Length Wtd. (ft)	450.00	Wetted Per. (ft)	5.12	13.56	177.32
Min Ch El (ft)	939.56	Shear (lb/sq ft)	0.72	2.39	0.94
Alpha	1.90	Stream Power (lb/ft s)	468.47	0.00	0.00
Frctn Loss (ft)	3.96	Cum Volume (acre-ft)	0.47	1.79	5.16
C & E Loss (ft)	0.00	Cum SA (acres)	0.21	0.38	2.89

Plan: Plan 01 BUFFALO CALF FOR 1 RS: 2 Profile: 100 YR

E.G. Elev (ft)	941.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.79	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	940.53	Reach Len. (ft)	385.00	385.00	385.00
Crit W.S. (ft)	940.50	Flow Area (sq ft)	3.37	86.94	255.47
E.G. Slope (ft/ft)	0.008390	Area (sq ft)	3.37	86.94	255.47
Q Total (cfs)	1769.00	Flow (cfs)	8.45	835.99	924.56
Top Width (ft)	190.21	Top Width (ft)	3.18	20.41	166.62
Vel Total (ft/s)	5.12	Avg. Vel. (ft/s)	2.50	9.62	3.62
Max Chl Dpth (ft)	6.38	Hydr. Depth (ft)	1.06	4.26	1.53
Conv. Total (cfs)	19312.5	Conv. (cfs)	92.3	9126.7	10093.6
Length Wtd. (ft)	385.00	Wetted Per. (ft)	3.82	22.36	166.65
Min Ch El (ft)	934.15	Shear (lb/sq ft)	0.46	2.04	0.80
Alpha	1.93	Stream Power (lb/ft s)	376.47	0.00	0.00
Frctn Loss (ft)	1.25	Cum Volume (acre-ft)	0.42	1.05	2.34
C & E Loss (ft)	0.15	Cum SA (acres)	0.17	0.21	1.11

Plan: Plan 01 BUFFALO CALF FOR 1 RS: 1 Profile: 100 YR

E.G. Elev (ft)	939.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	939.64	Reach Len. (ft)			
Crit W.S. (ft)	937.63	Flow Area (sq ft)	90.71	149.89	273.84
E.G. Slope (ft/ft)	0.001701	Area (sq ft)	90.71	149.89	273.84
Q Total (cfs)	1769.00	Flow (cfs)	207.95	831.25	729.80
Top Width (ft)	146.84	Top Width (ft)	35.09	26.52	85.23
Vel Total (ft/s)	3.44	Avg. Vel. (ft/s)	2.29	5.55	2.67
Max Chl Dpth (ft)	6.13	Hydr. Depth (ft)	2.59	5.65	3.21
Conv. Total (cfs)	42886.0	Conv. (cfs)	5041.4	20152.0	17692.6
Length Wtd. (ft)		Wetted Per. (ft)	35.47	26.60	85.43
Min Ch El (ft)	933.51	Shear (lb/sq ft)	0.27	0.60	0.34
Alpha	1.52	Stream Power (lb/ft s)	482.36	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			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RS8 STA 0
.05
.035
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
FLOOD ANALYSIS Plan: Plan 01 5/16/2013
RS7 STA 400
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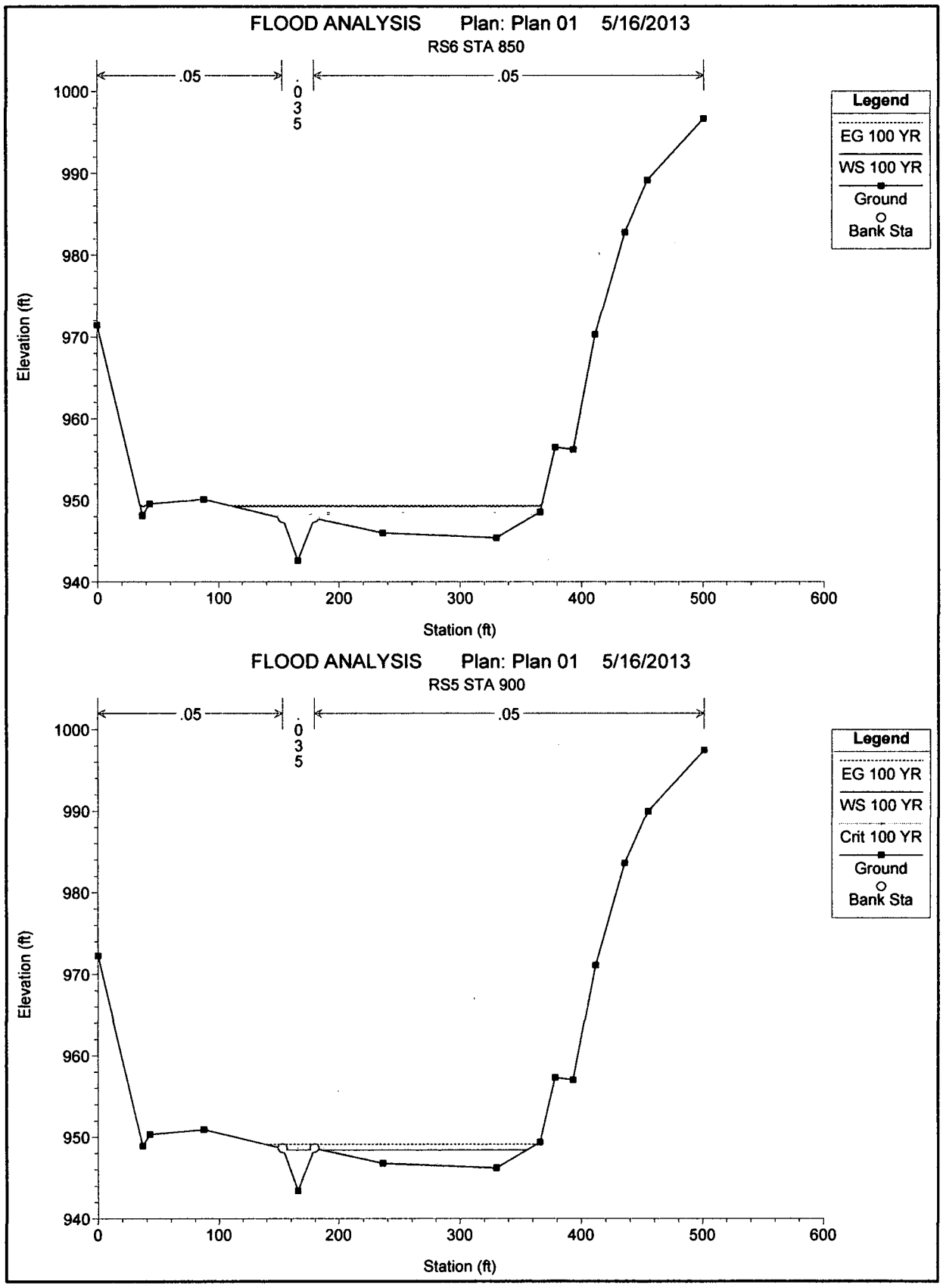
.035
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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RS6 STA 850
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Legend
EG 100 YR
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
FLOOD ANALYSIS Plan: Plan 01 5/16/2013
RS5 STA 900
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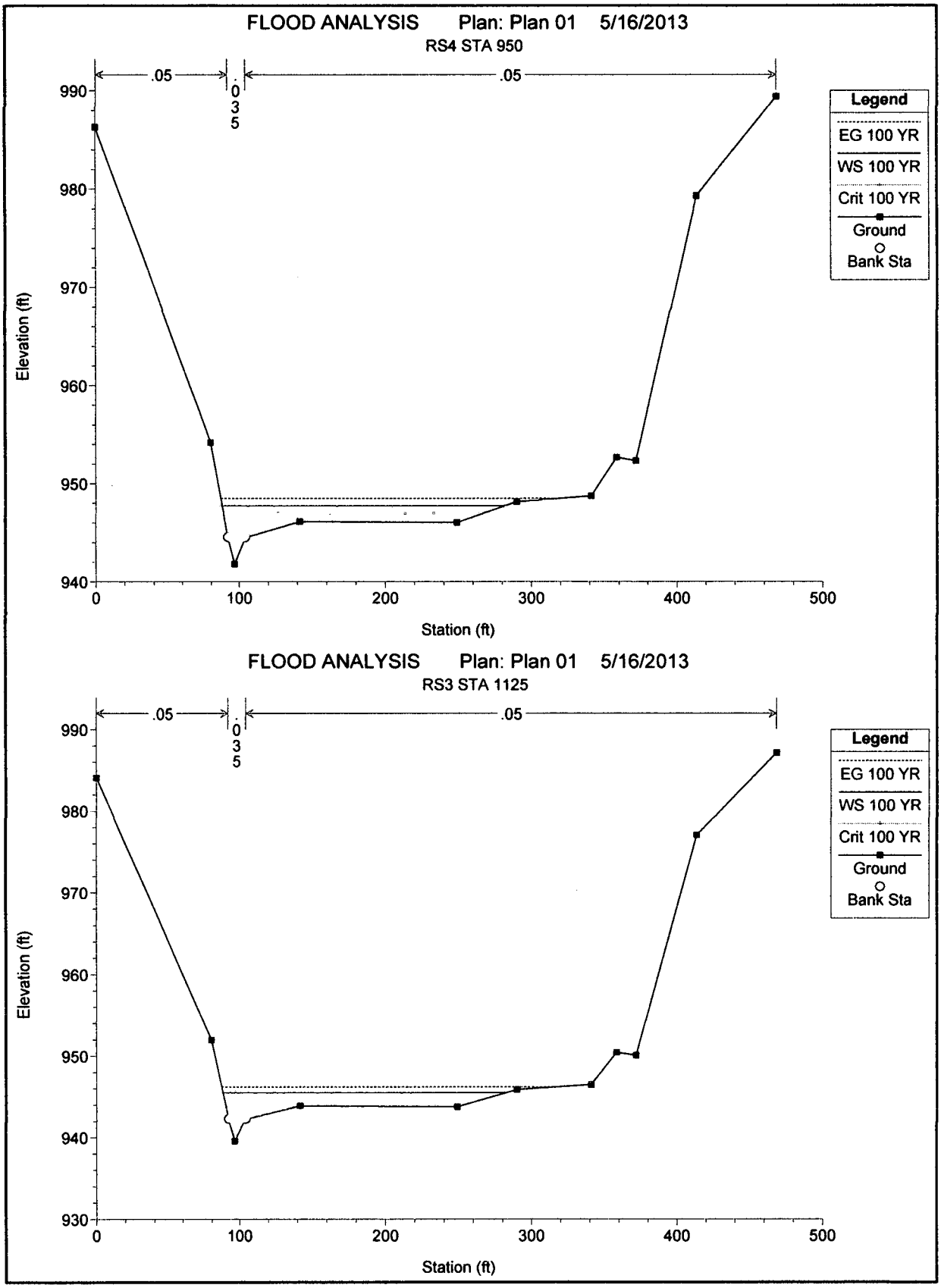
.035
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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990
980
970
960
950
940
Elevation (ft)
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100
200
300
400
500
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Bank Sta
FLOOD ANALYSIS Plan: Plan 01 5/16/2013
RS3 STA 1125
.05
.035
.05
990
980
970
960
950
940
930
Elevation (ft)
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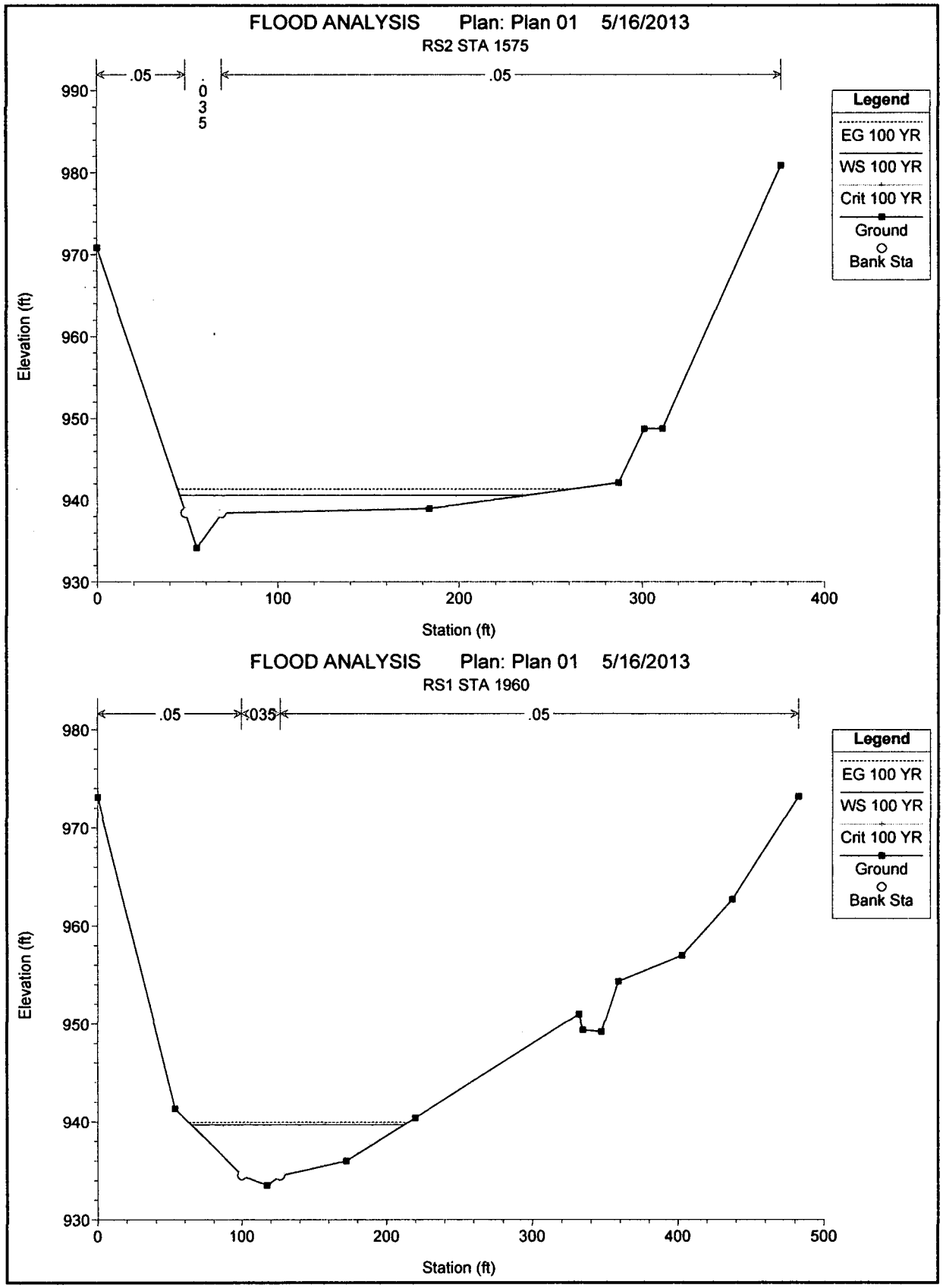
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Bank Sta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RS2 STA 1575
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.035
.05
990
980
970
960
950
940
930
Elevation (ft)
0
100
200
300
400
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Bank Sta
FLOOD ANALYSIS Plan: Plan 01 5/16/2013
RS1 STA 1960
.05
.035
.05
980
970
960
950
940
930
Elevation (ft)
0
100
200
300
400
500
Station (ft)
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Bank Sta

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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PROJECT DATA
Project Title: FLOOD ANALYSIS-PROPOSED
Project File : FLOODANALYSIS-PROP.prj
Run Date and Time: 5/16/2013 12:49:36 PM

Project in English units

Project Description:
PLUAGHER N PAD 203-12

PLAN DATA

Plan Title: Plan 02
Plan File : m:\HBE PROJECTS\2012\ASI 2012 PROJECTS\ASI 203-12 PLAUGHER NORTH PAD\HEC-RAS\FLOODANALYSIS-PROP.p02

Geometry Title: BUFFALO CALF FORK-P
Geometry File : m:\HBE PROJECTS\2012\ASI 2012 PROJECTS\ASI 203-12 PLAUGHER NORTH PAD\HEC-RAS\FLOODANALYSIS-PROP.g02

Flow Title : FLOOD STUDY 203-12
Flow File : m:\HBE PROJECTS\2012\ASI 2012 PROJECTS\ASI 203-12 PLAUGHER NORTH PAD\HEC-RAS\FLOODANALYSIS-PROP.f01

Plan Summary Information:

Number of:	Cross Sections	= 8	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: FLOOD STUDY 203-12
Flow File : m:\HBE PROJECTS\2012\ASI 2012 PROJECTS\ASI 203-12 PLAUGHER NORTH PAD\HEC-RAS\FLOODANALYSIS-PROP.f01

Flow Data (cfs)

River	Reach	RS	100 YR
BUFFALO CALF FOR	1	8	1769

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
BUFFALO CALF FOR	1	100 YR		

Normal S = 0.0017

GEOMETRY DATA

Geometry Title: BUFFALO CALF FORK-P
Geometry File : m:\HBE PROJECTS\2012\ASI 2012 PROJECTS\ASI 203-12 PLAUGHER NORTH PAD\HEC-RAS\FLOODANALYSIS-PROP.g02

CROSS SECTION

RIVER: BUFFALO CALF FOR
REACH: 1 RS: 8

INPUT
Description: RS8 STA 0
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
24.19	1011.01	71.98001	957.57	5.73001	953.38	9.07001	957.5	183.14	957.48
229.5	957.27	274.13	958.52	291.56	966.25	304.31	966.38	363	998.53

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
24.19	.05	71.98001	.03589	89.07001	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
71.98001	89.07001	400	400	400	.1	.3

CROSS SECTION

RIVER: BUFFALO CALF FOR
REACH: 1 RS: 7

INPUT

```
Description: RS7 STA 400
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  994.91 13.17999 991.23 78.85999  952.87   128.5   951.8  137.36  948.38
  146.51   951.8  212.88  952.77  258.16   954.6  300.16  959.59  336.06  964.45
  355.67   970.8  369.11  971.63

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   128.5    .035  146.51     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
         128.5  146.51              450     450     450             .1       .3

CROSS SECTION


RIVER: BUFFALO CALF FOR
REACH: 1                  RS: 6

INPUT
Description: RS6 STA 850
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  971.47   36.74  948.11   42.64  949.54    87.3   950.1  153.21  947.79
  165.67   942.6  179.78  947.81  236.02  945.97  285.34  946.42  304.29     955
  336.29     955  349.74  948.34  366.02  948.55  378.62  956.49  393.38  956.22
  411.59  970.31  435.69   982.8  454.61  989.14  501.12  996.66

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   153.21    .035  179.78     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
        153.21  179.78               50      50      50             .1       .3

CROSS SECTION


RIVER: BUFFALO CALF FOR
REACH: 1                  RS: 5

INPUT
Description: RS5 STA 900
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  972.27   36.74  948.91   42.64  950.34    87.3   950.9  153.21  948.59
  165.67   943.4  179.78  948.61  236.02  946.77  285.34  946.42  301.29     955
  336.29     955  349.74  948.34  366.02  949.35  378.62  957.29  393.38  957.02
  411.59  971.11  435.69   983.6  454.61  989.94  501.12  997.46

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .05   153.21    .035  179.78     .05

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
        153.21  179.78               50      50      50             .1       .3

CROSS SECTION


RIVER: BUFFALO CALF FOR
REACH: 1                  RS: 4
```

INPUT
Description: RS4 STA 950
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	986.31	79.71	954.19	91.9	944.52	96.65	941.8	104.28	944.49
141.61	946.14	249.05	946.02	260.4	944.58	263.25	946	328.38	946
332.04	947.82	341	948.74	358.35	952.68	371.74	952.33	413.77	979.3
468.47	989.39								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	91.9	.035	104.28	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
91.9	104.28	175	175	.1	.3

CROSS SECTION

RIVER: BUFFALO CALF FOR
REACH: 1 RS: 3

INPUT
Description: RS3 STA 1125
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	984.07	79.71	951.95	91.9	942.28	96.65	939.56	104.28	942.25
141.61	943.9	249.05	943.78	260.4	944.58	263.25	946	328.38	946
332.04	947.82	341	946.5	358.35	950.44	371.74	950.09	413.77	977.06
468.47	987.15								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	91.9	.035	104.28	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
91.9	104.28	450	450	.1	.3

CROSS SECTION

RIVER: BUFFALO CALF FOR
REACH: 1 RS: 2

INPUT
Description: RS2 STA 1575
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970.85	48.58	938.41	54.71	934.15	68.99	938.39	183.58	938.94
287.14	942.11	301.32	948.72	311.33	948.74	376.47	980.86		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	48.58	.035	68.99	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
48.58	68.99	385	385	.1	.3

CROSS SECTION

RIVER: BUFFALO CALF FOR

REACH: 1 RS: 1

INPUT
Description: RS1 STA 1960
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	973.11	53.44	941.33	100	934.47	117.42	933.51	126.52	934.46
172.19	935.99	219.99	940.4	331.52	950.98	334.51	949.37	347.18	949.18
358.7	954.34	402.76	956.98	437.64	962.7	482.36	973.19		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	100	.035	126.52	.05

Bank Sta: Left	Right	Coeff Contr.	Expan.
100	126.52	.1	.3

SUMMARY OF MANNING'S N VALUES

River:BUFFALO CALF FOR

Reach	River Sta.	n1	n2	n3
1	8	.05	.035	.05
1	7	.05	.035	.05
1	6	.05	.035	.05
1	5	.05	.035	.05
1	4	.05	.035	.05
1	3	.05	.035	.05
1	2	.05	.035	.05
1	1	.05	.035	.05

SUMMARY OF REACH LENGTHS

River: BUFFALO CALF FOR

Reach	River Sta.	Left	Channel	Right
1	8	400	400	400
1	7	450	450	450
1	6	50	50	50
1	5	50	50	50
1	4	175	175	175
1	3	450	450	450
1	2	385	385	385
1	1			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: BUFFALO CALF FOR

Reach	River Sta.	Contr.	Expan.
1	8	.1	.3
1	7	.1	.3

1	6	.1	.3
1	5	.1	.3
1	4	.1	.3
1	3	.1	.3
1	2	.1	.3
1	1	.1	.3

Plan: Plan 02 BUFFALO CALF FOR 1 RS: 8 Profile: 100 YR

E.G. Elev (ft)	959.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.67	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	959.08	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)	959.08	Flow Area (sq ft)	1.11	62.88	281.78
E.G. Slope (ft/ft)	0.011017	Area (sq ft)	1.11	62.88	281.78
Q Total (cfs)	1769.00	Flow (cfs)	2.26	609.24	1157.49
Top Width (ft)	204.82	Top Width (ft)	1.41	17.09	186.32
Vel Total (ft/s)	5.12	Avg. Vel. (ft/s)	2.03	9.69	4.11
Max Chl Dpth (ft)	5.78	Hydr. Depth (ft)	0.79	3.68	1.51
Conv. Total (cfs)	16853.7	Conv. (cfs)	21.6	5804.4	11027.7
Length Wtd. (ft)	400.00	Wetted Per. (ft)	2.12	19.62	186.46
Min Ch El (ft)	953.30	Shear (lb/sq ft)	0.36	2.20	1.04
Alpha	1.66	Stream Power (lb/ft s)	363.00	0.00	0.00
Frctn Loss (ft)	4.13	Cum Volume (acre-ft)	1.87	3.86	11.82
C & E Loss (ft)	0.02	Cum SA (acres)	1.31	0.87	6.46

Plan: Plan 02 BUFFALO CALF FOR 1 RS: 7 Profile: 100 YR

E.G. Elev (ft)	955.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	954.21	Reach Len. (ft)	450.00	450.00	450.00
Crit W.S. (ft)	954.21	Flow Area (sq ft)	94.85	74.28	153.87
E.G. Slope (ft/ft)	0.009708	Area (sq ft)	94.85	74.28	153.87
Q Total (cfs)	1769.00	Flow (cfs)	412.90	764.03	592.07
Top Width (ft)	172.06	Top Width (ft)	51.94	18.01	102.11
Vel Total (ft/s)	5.48	Avg. Vel. (ft/s)	4.35	10.29	3.85
Max Chl Dpth (ft)	5.83	Hydr. Depth (ft)	1.83	4.12	1.51
Conv. Total (cfs)	17954.2	Conv. (cfs)	4190.7	7754.4	6009.1
Length Wtd. (ft)	450.00	Wetted Per. (ft)	52.32	19.27	102.15
Min Ch El (ft)	948.38	Shear (lb/sq ft)	1.10	2.34	0.91
Alpha	1.84	Stream Power (lb/ft s)	369.11	0.00	0.00
Frctn Loss (ft)	1.62	Cum Volume (acre-ft)	1.43	3.23	9.82
C & E Loss (ft)	0.20	Cum SA (acres)	1.07	0.71	5.13

Plan: Plan 02 BUFFALO CALF FOR 1 RS: 6 Profile: 100 YR

E.G. Elev (ft)	950.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	949.90	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)		Flow Area (sq ft)	77.89	124.96	393.45
E.G. Slope (ft/ft)	0.001864	Area (sq ft)	77.89	124.96	393.45
Q Total (cfs)	1769.00	Flow (cfs)	94.15	613.09	1061.76
Top Width (ft)	259.43	Top Width (ft)	98.02	26.57	134.84
Vel Total (ft/s)	2.97	Avg. Vel. (ft/s)	1.21	4.91	2.70
Max Chl Dpth (ft)	7.30	Hydr. Depth (ft)	0.79	4.70	2.92
Conv. Total (cfs)	40971.3	Conv. (cfs)	2180.5	14199.7	24591.1
Length Wtd. (ft)	50.00	Wetted Per. (ft)	98.75	28.54	136.38
Min Ch El (ft)	942.60	Shear (lb/sq ft)	0.09	0.51	0.34
Alpha	1.45	Stream Power (lb/ft s)	501.12	0.00	0.00
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	0.54	2.20	6.99
C & E Loss (ft)	0.07	Cum SA (acres)	0.29	0.48	3.91

Plan: Plan 02 BUFFALO CALF FOR 1 RS: 5 Profile: 100 YR

E.G. Elev (ft)	949.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	948.98	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	948.98	Flow Area (sq ft)	2.13	79.05	199.45
E.G. Slope (ft/ft)	0.013570	Area (sq ft)	2.13	79.05	199.45
Q Total (cfs)	1769.00	Flow (cfs)	2.45	771.13	995.41
Top Width (ft)	159.79	Top Width (ft)	11.38	26.57	121.84
Vel Total (ft/s)	6.30	Avg. Vel. (ft/s)	1.15	9.75	4.99
Max Chl Dpth (ft)	5.58	Hydr. Depth (ft)	0.19	2.98	1.64
Conv. Total (cfs)	15186.0	Conv. (cfs)	21.1	6619.8	8545.2
Length Wtd. (ft)	50.00	Wetted Per. (ft)	11.41	28.54	122.68
Min Ch El (ft)	943.40	Shear (lb/sq ft)	0.16	2.35	1.38
Alpha	1.40	Stream Power (lb/ft s)	501.12	0.00	0.00
Frctn Loss (ft)	0.58	Cum Volume (acre-ft)	0.49	2.08	6.65
C & E Loss (ft)	0.06	Cum SA (acres)	0.23	0.45	3.76

Plan: Plan 02 BUFFALO CALF FOR 1 RS: 4 Profile: 100 YR

E.G. Elev (ft)	947.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	947.32	Reach Len. (ft)	175.00	175.00	175.00
Crit W.S. (ft)	947.32	Flow Area (sq ft)	4.95	51.64	324.94
E.G. Slope (ft/ft)	0.009935	Area (sq ft)	4.95	51.64	324.94
Q Total (cfs)	1769.00	Flow (cfs)	15.60	532.78	1220.62
Top Width (ft)	242.67	Top Width (ft)	3.53	12.38	226.76
Vel Total (ft/s)	4.64	Avg. Vel. (ft/s)	3.15	10.32	3.76
Max Chl Dpth (ft)	5.52	Hydr. Depth (ft)	1.40	4.17	1.43
Conv. Total (cfs)	17747.7	Conv. (cfs)	156.5	5345.2	12246.1
Length Wtd. (ft)	175.00	Wetted Per. (ft)	4.51	13.56	227.53
Min Ch El (ft)	941.80	Shear (lb/sq ft)	0.68	2.36	0.89
Alpha	1.95	Stream Power (lb/ft s)	468.47	0.00	0.00
Frctn Loss (ft)	1.63	Cum Volume (acre-ft)	0.49	2.01	6.35
C & E Loss (ft)	0.01	Cum SA (acres)	0.22	0.43	3.56

Plan: Plan 02 BUFFALO CALF FOR 1 RS: 3 Profile: 100 YR

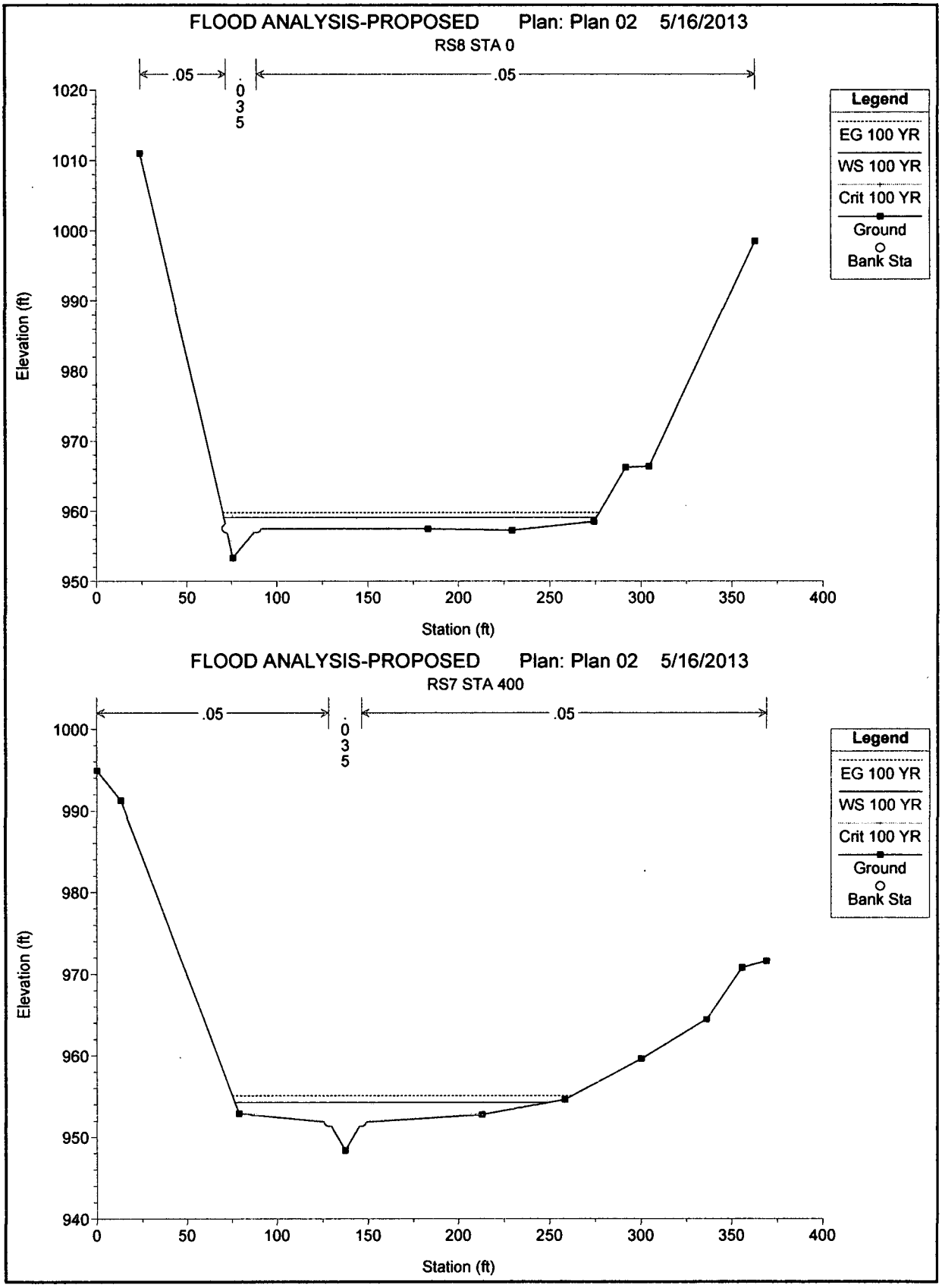
E.G. Elev (ft)	946.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	945.50	Reach Len. (ft)	450.00	450.00	450.00
Crit W.S. (ft)	945.50	Flow Area (sq ft)	6.52	56.77	284.18
E.G. Slope (ft/ft)	0.008701	Area (sq ft)	6.52	56.77	284.18
Q Total (cfs)	1769.00	Flow (cfs)	21.09	583.95	1163.96
Top Width (ft)	174.39	Top Width (ft)	4.05	12.38	157.96
Vel Total (ft/s)	5.09	Avg. Vel. (ft/s)	3.23	10.29	4.10
Max Chl Dpth (ft)	5.94	Hydr. Depth (ft)	1.61	4.59	1.80
Conv. Total (cfs)	18964.2	Conv. (cfs)	226.1	6260.2	12478.0
Length Wtd. (ft)	450.00	Wetted Per. (ft)	5.18	13.56	158.24
Min Ch El (ft)	939.56	Shear (lb/sq ft)	0.68	2.27	0.98
Alpha	1.78	Stream Power (lb/ft s)	468.47	0.00	0.00
Frctn Loss (ft)	3.84	Cum Volume (acre-ft)	0.47	1.79	5.13
C & E Loss (ft)	0.01	Cum SA (acres)	0.21	0.38	2.79

Plan: Plan 02 BUFFALO CALF FOR 1 RS: 2 Profile: 100 YR

E.G. Elev (ft)	941.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.79	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	940.53	Reach Len. (ft)	385.00	385.00	385.00
Crit W.S. (ft)	940.50	Flow Area (sq ft)	3.37	86.94	255.47
E.G. Slope (ft/ft)	0.008390	Area (sq ft)	3.37	86.94	255.47
Q Total (cfs)	1769.00	Flow (cfs)	8.45	835.99	924.56
Top Width (ft)	190.21	Top Width (ft)	3.18	20.41	166.62
Vel Total (ft/s)	5.12	Avg. Vel. (ft/s)	2.50	9.62	3.62
Max Chl Dpth (ft)	6.38	Hydr. Depth (ft)	1.06	4.26	1.53
Conv. Total (cfs)	19312.5	Conv. (cfs)	92.3	9126.7	10093.6
Length Wtd. (ft)	385.00	Wetted Per. (ft)	3.82	22.36	166.65
Min Ch El (ft)	934.15	Shear (lb/sq ft)	0.46	2.04	0.80
Alpha	1.93	Stream Power (lb/ft s)	376.47	0.00	0.00
Frctn Loss (ft)	1.25	Cum Volume (acre-ft)	0.42	1.05	2.34
C & E Loss (ft)	0.15	Cum SA (acres)	0.17	0.21	1.11

Plan: Plan 02 BUFFALO CALF FOR 1 RS: 1 Profile: 100 YR

E.G. Elev (ft)	939.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	939.64	Reach Len. (ft)			
Crit W.S. (ft)	937.63	Flow Area (sq ft)	90.71	149.89	273.84
E.G. Slope (ft/ft)	0.001701	Area (sq ft)	90.71	149.89	273.84
Q Total (cfs)	1769.00	Flow (cfs)	207.95	831.25	729.80
Top Width (ft)	146.84	Top Width (ft)	35.09	26.52	85.23
Vel Total (ft/s)	3.44	Avg. Vel. (ft/s)	2.29	5.55	2.67
Max Chl Dpth (ft)	6.13	Hydr. Depth (ft)	2.59	5.65	3.21
Conv. Total (cfs)	42886.0	Conv. (cfs)	5041.4	20152.0	17692.6
Length Wtd. (ft)		Wetted Per. (ft)	35.47	26.60	85.43
Min Ch El (ft)	933.51	Shear (lb/sq ft)	0.27	0.60	0.34
Alpha	1.52	Stream Power (lb/ft s)	482.36	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			


FLOOD ANALYSIS-PROPOSED Plan: Plan 02 5/16/2013
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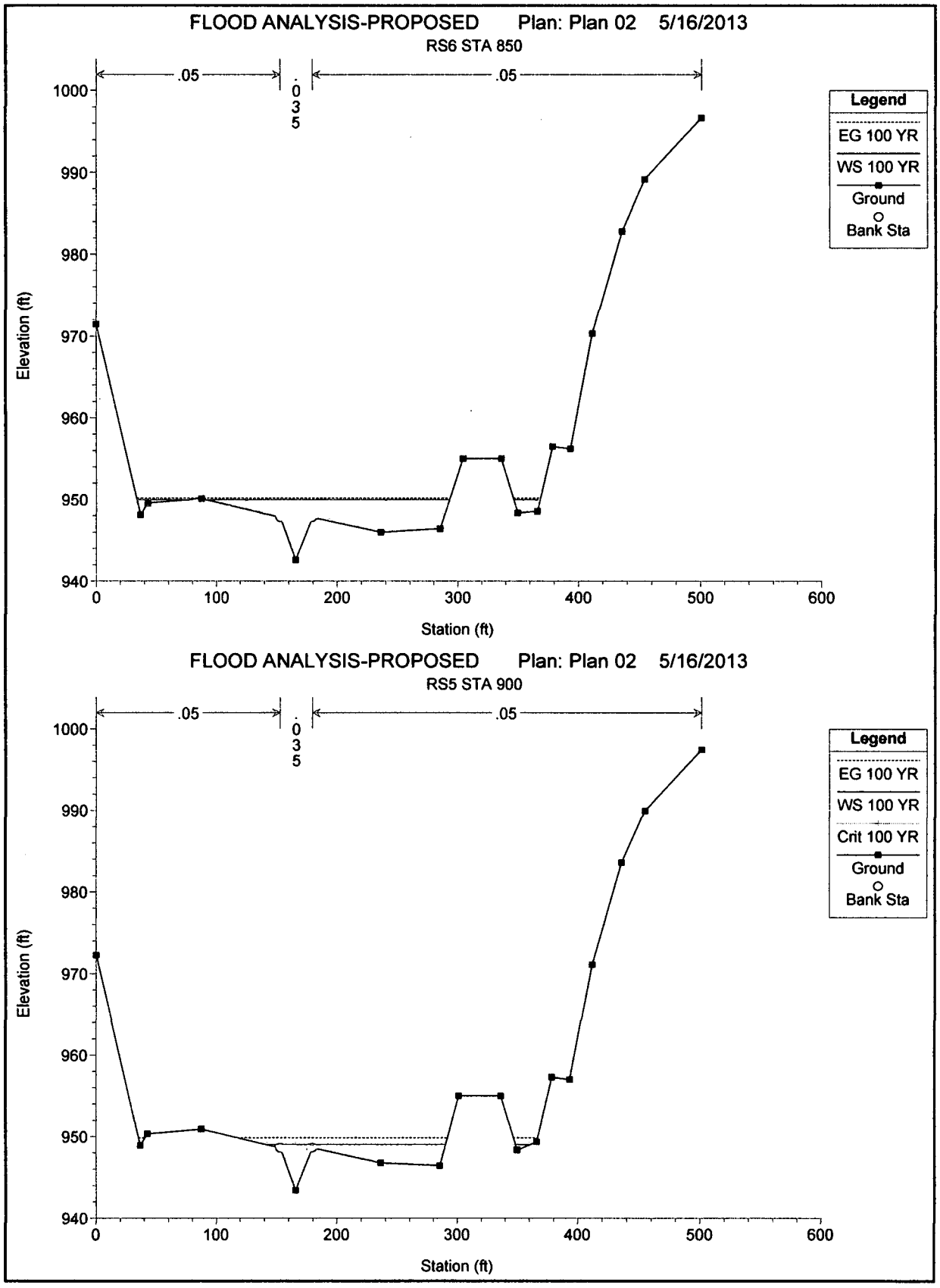
.035
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
FLOOD ANALYSIS-PROPOSED Plan: Plan 02 5/16/2013
RS7 STA 400
.05
.035
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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RS6 STA 850
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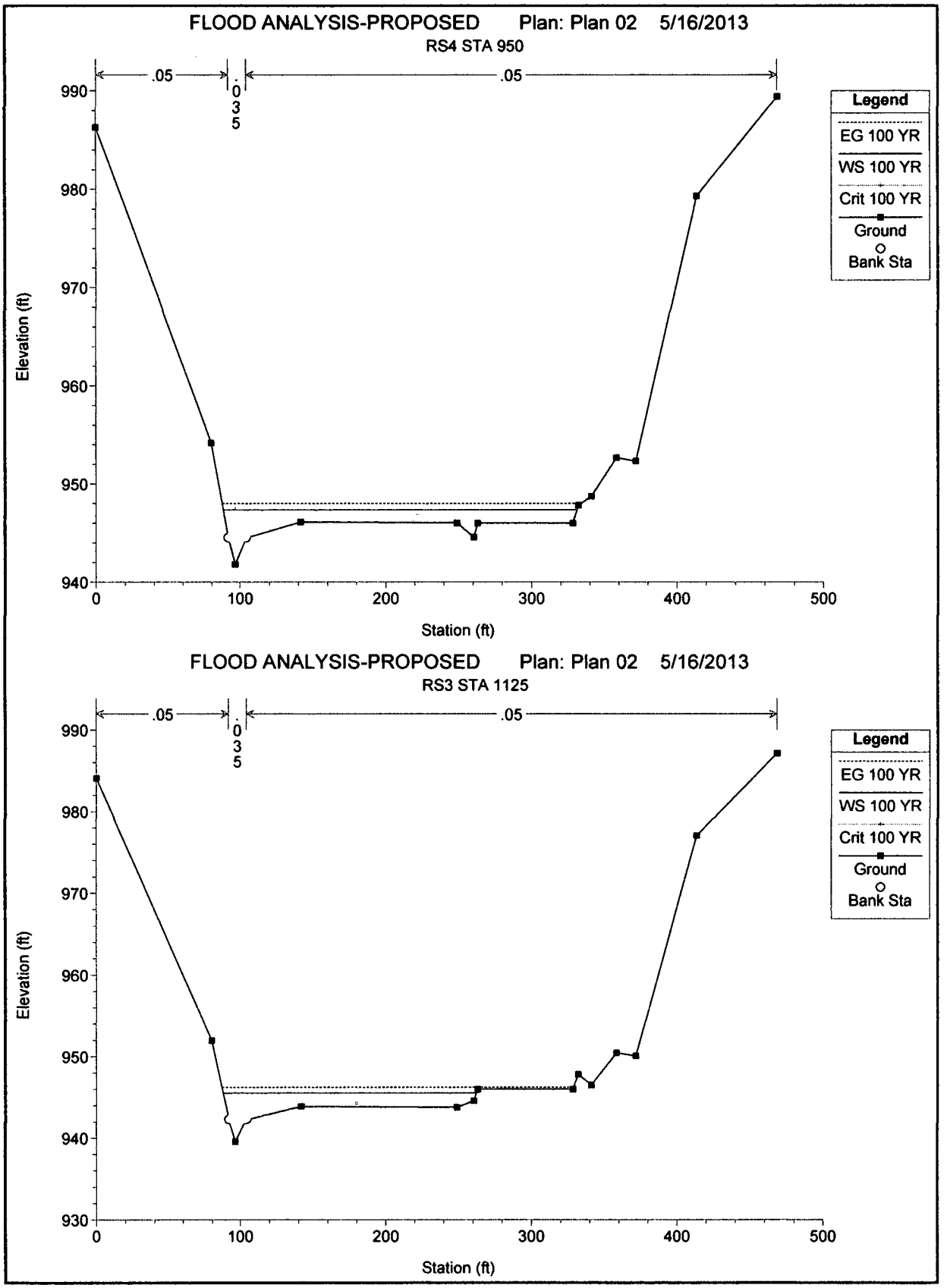
.035
.05
Legend
EG 100 YR
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
FLOOD ANALYSIS-PROPOSED Plan: Plan 02 5/16/2013
RS5 STA 900
.05
.035
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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Legend
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WS 100 YR
Crit 100 YR
Ground
Bank Sta
Elevation (ft)
990
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950
940
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Station (ft)
FLOOD ANALYSIS-PROPOSED Plan: Plan 02 5/16/2013
RS3 STA 1125
.05
.035
.05
Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Bank Sta
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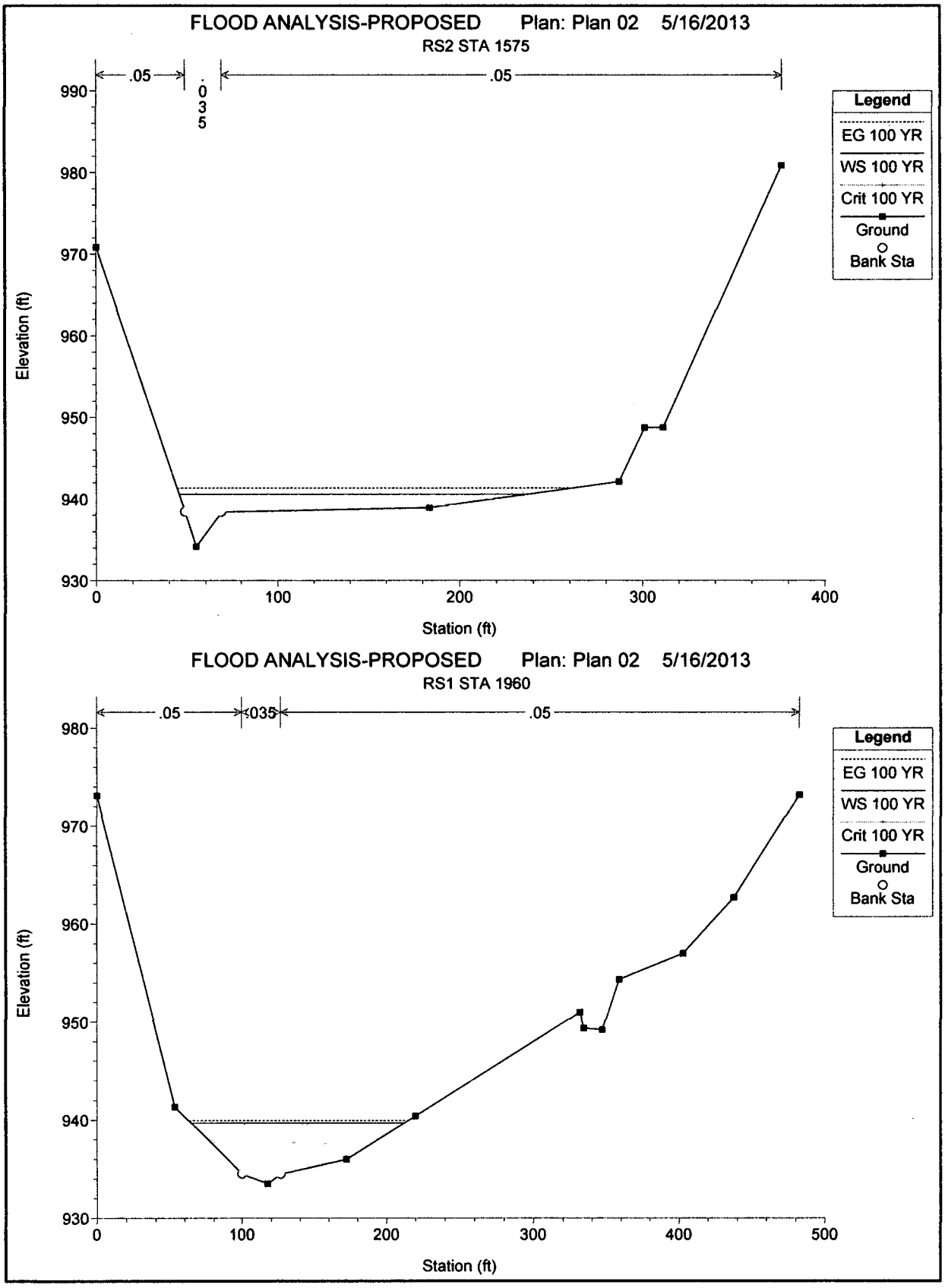
Station (ft)


FLOOD ANALYSIS-PROPOSED Plan: Plan 02 5/16/2013
RS2 STA 1575
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.035
.05
Legend
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WS 100 YR
Crit 100 YR
Ground
Bank Sta
Elevation (ft)
990
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Station (ft)
FLOOD ANALYSIS-PROPOSED Plan: Plan 02 5/16/2013
RS1 STA 1960
.05
.035
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Legend
EG 100 YR
WS 100 YR
Crit 100 YR
Ground
Bank Sta
Elevation (ft)
980
970
960
950
940
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200
300
400
500
Station (ft)

Delrick Corporation
PO Box 693, Tazewell, VA 24651
Phone: 276-988-4458 Fax: 276-988-6362

Plaugher North Drill Pad & Frac Water Pit

5/28/2013 - Revised

Work Activity	QTY	UNIT	RATE	TOTAL	Notes
Clearing and Grubbing					
Mobilization	1	EA	$ 6,000.00	$ 6,000.00	
Construction Entrance	2	AC	$ 5,000.00	$ 10,000.00	
Clearing and Grubbing	22.79	AC	$ 4,800.00	$ 109,392.00	
24" Compost Filter Sock	5,912	LF	$ 10.00	$ 59,120.00	
Super Silt Fence	663	LF	$ 6.75	$ 4,475.25	
9" Straw Wattles	6,094	LF	$ 4.00	$ 24,376.00	
Site					
Drill Pad Excavation	40,811	CY	$ 3.15	$ 128,554.65	
Access Road Excavation	33,535	CY	$ 3.15	$ 105,635.25	
Tank Pad and/or Frac Pit Excavation	35,877	CY	$ 3.15	$ 113,012.55	
Topsoil	8,268	CY	$ 2.50	$ 20,670.00	
Diversion Ditch	1,277	LF	$ 3.15	$ 4,022.55	
Roadside Ditch	5,299	LF	$ 3.15	$ 16,691.85	
Sump (s)					
Install 102" x 78" x 44" Precast Sump	4	EA	$ 2,500.00	$ 10,000.00	***
Valve Box HDPE Pipe (Min 12" Dia x 48" Ht)	4	EA	$ 800.00	$ 3,200.00	***
4" PVC Connective Pipe (Antero sump drain)	315	LF	$ 10.00	$ 3,150.00	***
				$ -	
Aggregate Surfacing				$ -	
Drill Pad AASHTO #1 (8" thick)	2,333	Ton	$ 2.00	$ 4,666.00	
Drill Pad 1-1/2" or 3/4" crusher run (2"thk)	700	Ton	$ 2.00	$ 1,400.00	
Drill Pad Geotextile Fabric (US200)	7,367	SY	$ 1.50	$ 11,050.50	***
Access Roads 6" or 4" minus Crusher Run	3,999	Ton	$ 2.00	$ 7,998.00	
Access Roads 1-1/2" or 3/4" Crusher Run	1,000	Ton	$ 2.00	$ 2,000.00	
Access Roads Geotextile Fabric (US200)	3,000	SY	$ 1.50	$ 4,500.00	***
Tank Pad 6" or 4" minus Crusher Run	531	Ton	$ 2.00	$ 1,062.00	
Tank Pad 1-1/2" or 3/4" minus Crusher Run	133	Ton	$ 2.00	$ 266.00	
Tank Pad Geotextile Fabric (US200)	1,264	SY	$ 1.50	$ 1,896.00	***
Road Culverts					
15" HDPE Culvert	410	LF	$ 20.00	$ 8,200.00	***
30" HDPE Culvert	15	SY	$ 60.00	$ 900.00	***
R4 Rip Rap (Inlets/outlets)	28	Ton	$ 6.00	$ 166.20	
AASHTO #1 Stone (Ditch checks)	6.8	Ton	$ 8.00	$ 54.40	

Ditch Lining (Access Road) Synthetic Matt	578	SY	$ 2.00	$ 1,156.00	
Ditch Lining (Access Road) Rip Rap	2,794	Ton	$ 7.00	$ 19,558.00	
Fencing/Gates					
8' Chain Link Fence w/min 10' Post Spacing	1,094	LF	$ 30.00	$ 32,820.00	
16' Double Gate	1	Ea	$ 2,000.00	$ 2,000.00	
Seeding					
Site Seeding - Regular Hydroseed	17.42	AC	$ 2,000.00	$ 34,840.00	###
Unforseen Site Conditions					
Rock Clause - Blasting	1	CY	$ 4.00		
Rock Clause - Hoe Ramming	1	HR	$ 205.00		
French Drains	1	FT	$ 7.00		
Phase 1 Fencing - Steel Corrugated Panels	1	LF	T & M		
Phase 2 Fencing - Silt Fence/Filter Sock	1	LF	T & M		
Phase 3 Fencing Orange Safety Fence	1	LF	$ 3.00		
Silt Fence	1	LF	$ 2.00		
Temporary Seeding	1	AC	$ 2,000.00		
Construction Stakeout	1	HR			
Jute Matting - Slope Matting	1	SY	$ 2.00		
Earth Guard Hydroseed, if requested	1	AC	$ 5,500.00		
Clay Mud Seams	1		T & M		
Key Way Excavation	1		T & M		
Total Cost for Project				**$ 752,833.20**	

Antero Resources to supply all materials (rock and culverts, etc.)

*** **Install ONLY - Antero to supply materials**
This is for regular hydroseed

All T & M (Time and materials) per rate sheet on file with Antero office.

APPROVED
By Aaron T Kunzler at 8:55 am, May 28, 2013

west virginia department of environmental protection

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

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

June 13, 2013

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-1706245, issued to ANTERO RESOURCES APPALACHIAN CORPORATION, is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

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

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.

James Martin
Chief

Operator's Well No: IRONS UNIT 1H
Farm Name: PLAUGHER, CAROLYN
API Well Number: 47-1706245
Permit Type: Horizontal 6A Well
Date Issued: 06/13/2013

Promoting a healthy environment.

PERMIT CONDITIONS

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

CONDITIONS

1. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.

2. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the fill material shall be within plus or minus 2% (unless soil test results show a greater range of moisture content is appropriate and 95% compaction can still be achieved) of the optimum moisture content as determined by the standard proctor density test, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. Each lift must meet 95 % compaction of the optimum density based on results from the standard proctor density test of the actual soils used in specific engineered fill sites. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.

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

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

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

1706245

WW - 6B
(1/12)

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: Irons Unit 1H Well Pad Name: Plaugher North Pad

3 Elevation, current ground: ~1382' Elevation, proposed post-construction: 1364'

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: 7600' TVD, Anticipated Thickness- 50 Feet, Associated Pressure- 3200#

7) Proposed Total Vertical Depth: 7600' TVD
8) Formation at Total Vertical Depth: Marcellus
9) Proposed Total Measured Depth: 18,300' MD
10) Approximate Fresh Water Strata Depths: 133'
11) Method to Determine Fresh Water Depth: Offset well records. Depths have been adjusted according to surface elevations.
12) Approximate Saltwater Depths: 781', 1867', 2097'
13) Approximate Coal Seam Depths: 641', 1109', 1633'
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): 22.99 acres

19) Area to be disturbed for well pad only, less access road (acres): 3.74 acres

Received
Office of Oil & Gas

DCN
4-13-2017

Dnl

1706245

WW - 6B
(1/12)

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#	310'	310'	CTS, 431 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2530'	2530'	CTS, 1030 Cu. Ft.
Intermcdiate							
Production	5-1/2"	New	P-110	20#	18300'	18300'	3853 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			

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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.

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4-19-2013

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Rev. 1/12

API No. 47 - 017 - 06245
Operator's Well No. Irons Unit 1H

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

CONSTRUCTION AND RECLAMATION PLAN AND SITE REGISTRATION APPLICATION FORM
GENERAL PERMIT FOR OIL AND GAS PIT WASTE DISCHARGE

Operator Name Antero Resources Appalachian Corporation OP Code 494488557

Watershed Buffalo Calf Fork Quadrangle Salem

Elevation 1364' County Doddridge District Greenbrier

Description of anticipated Pit Waste: Drilling and Flowback Fluids and Cuttings

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

Will a synthetic liner be used in the pit? Yes . If so, what mil.? 60 mil

DCN 11-19-2013

Proposed Disposal Method For Treated Pit Wastes:

____ Land Application
____ Underground Injection (UIC Permit Number ____)
■ Reuse (at API Number Future permitted well locations when applicable. API# will be provided on Form WR-34)
■ Off Site Disposal (Meadowfill Landfill Permit #SWF-1032-98)
____ Other (Explain ____

Drilling medium anticipated for this well? Air, freshwater, oil based, etc. Surface - Air/Freshwater, Intermediate - Dust/Stiff Foam, Production - Water Based Mud
-If oil based, what type? Synthetic, petroleum, etc. N/A
Additives to be used? Please See Attachment
Will closed loop system be used ? Yes
Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Removed offsite and taken to landfill
-If left in pit and plan to solidify what medium will be used? Cement, lime, N/A
-Landfill or offsite name/permit number? Meadowfill Landfill (Permit #SWF-1032-98)

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

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

Company Official Signature ____

Company Official (Typed Name) Gerard G. Alberts

Company Official Title Environmental & Regulatory Manager

Subscribed and sworn before me this 20 day of March, 20 13

____ Notary Public

My commission expires 11/9/16

LISA BOTTINELLI
Notary Public
State of Colorado
Notary ID 20124072365
My Commission Expires Nov 9, 2016

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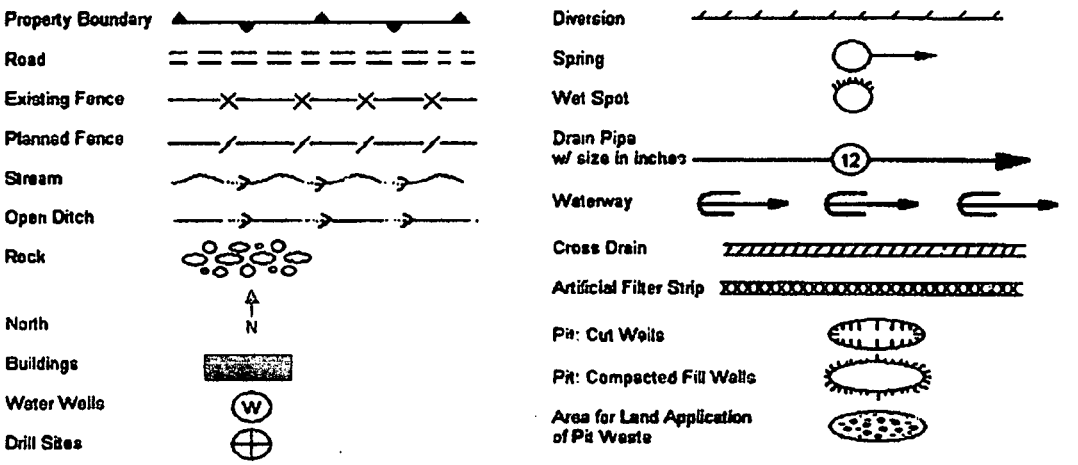
API No. 47 - 017 - 06245
Operator's Well No. Irons Unit 1H



Access Road(10.16)+ Drill Pad(3.74)+Frac Pit(4.35)+Frac Pit Access& Turnaround(1.10)+Water Tank Pad, Ditch & Culvert(1.05)+Water Tank Pad Access(.10)+Spoil Pads 2.49)= 22.99Acres

Proposed Revegetation Treatment: Acres Disturbed 22.99 Prevegetation pH _____

Lime 2-4 Tons/acre or to correct to pH 6.5

Fertilizer (10-20-20 or equivalent) 500 lbs/acre (500 lbs minimum)

Mulch 2-3 Tons/acre Hay or straw or Wood Fiber (will be used where needed)

Seed Mixtures

Area I (Temporary) Seed Type	lbs/acre	Area II (Permanent) Seed Type	lbs/acre
Tall Fescue	45	Tall Fescue	45
Perennial Rye Grass	20	Perennial Rye Grass	20
*or type of grass seed requested by surface owner		*or type of grass seed requested by surface owner	

Attach:
Drawing(s) of road, location,pit and proposed area for land application.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Douglas Newlon

Comments: Proceed & Mulch install E+S to Dep regulations

Title: Oil & Gas inspector Date: 4-18-2013

Field Reviewed? (✓) Yes ( ) No

Douglas Newlon

1706245

Form WW-9 Additives Attachment

SURFACE INTERVAL

1. Fresh Water
2. Soap –Foamer AC
3. Air

INTERMEDIATE INTERVAL

STIFF FOAM RECIPE:

1) 1 ppb Soda Ash / Sodium Carbonate-Alkalinity Control Agent
2) 1 ppb Conqor 404 (11.76 ppg) / Corrosion Inhibitor
3) 4 ppb KLA-Gard (9.17 ppg) / Amine Acid Complex-Shale Stabilizer
4) 1ppb Mil Pac R / Sodium Carboxymethylcellulose-Filtration Control Agent
5) 12 ppb KCL / Potassium Chloride-inorganic Salt
6) Fresh Water 80 bbls
7) Air

PRODUCTION INTERVAL

1. Alpha 1655
   Salt Inhibitor
2. Mil-Carb
   Calcium Carbonate
3. Cottonseed Hulls
   Cellulose-Cottonseed Pellets – LCM
4. Mil-Seal
   Vegetable, Cotton & Cellulose-Based Fiber Blend – LCM
5. Clay-Trol
   Amine Acid Complex – Shale Stabilizer
6. Xan-Plex
   Viscosifier For Water Based Muds
7. Mil-Pac (All Grades)
   Sodium Carboxymethylcellulose – Filtration Control Agent
8. New Drill
   Anionic Polyacrylamide Copolymer Emulsion – Shale Stabilizer
9. Caustic Soda
   Sodium Hydroxide – Alkalinity Control
10. Mil-Lime
    Calcium Hydroxide – Lime
11. LD-9
    Polyether Polyol – Drilling Fluid Defoamer
12. Mil Mica
    Hydro-Biotite Mica – LCM

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13. Escaid 110
    Drilling Fluild Solvent – Aliphatic Hydrocarbon
14. Ligco
    Highly Oxidized Leonardite – Filteration Control Agent
15. Super Sweep
    Polypropylene – Hole Cleaning Agent
16. Sulfatrol K
    Drilling Fluid Additive – Sulfonated Asphalt Residuum
17. Sodium Chloride, Anhydrous
    Inorganic Salt
18. D-D
    Drilling Detergent – Surfactant
19. Terra-Rate
    Organic Surfactant Blend
20. W.O. Defoam
    Alcohol-Based Defoamer
21. Perma-Lose HT
    Fluid Loss Reducer For Water-Based Muds
22. Xan-Plex D
    Polysaccharide Polymer – Drilling Fluid Viscosifier
23. Walnut Shells
    Ground Cellulosic Material – Ground Walnut Shells – LCM
24. Mil-Graphite
    Natural Graphite – LCM
25. Mil Bar
    Barite – Weighting Agent
26. X-Cide 102
    Biocide
27. Soda Ash
    Sodium Carbonate – Alkalinity Control Agent
28. Clay Trol
    Amine Acid complex – Shale Stabilizer
29. Sulfatrol
    Sulfonated Asphalt – Shale Control Additive
30. Xanvis
    Viscosifier For Water-Based Muds
31. Milstarch
    Starch – Fluid Loss Reducer For Water Based Muds
32. Mil-Lube
    Drilling Fluid Lubricant

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west virginia department of environmental protection

Water Management Plan:
Primary Water Sources

WMP: 01121 API/ID Number: 047-017-06245 Operator: Antero Resources

Irons Unit 1H

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 MAY 2 4 2013

Source Summary

WMP 01121 | API Number: 047-017-06245 | Operator: Antero Resources

Irons Unit 1H

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:
11/10/2013	11/10/2014	11,040,000		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:
11/10/2013	11/10/2014	11,040,000		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:
11/10/2013	11/10/2014	11,040,000		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:

1706245

- 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:
11/10/2013	11/10/2014	11,040,000		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:
11/10/2013	11/10/2014	11,040,000		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:
11/10/2013	11/10/2014	11,040,000		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:

1706245

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:
11/10/2013	11/10/2014	11,040,000		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:
11/10/2013	11/10/2014	11,040,000		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:
11/10/2013	11/10/2014	11,040,000		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:

1706245

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

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
11/10/2013	11/10/2014	11,040,000		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:
11/10/2013	11/10/2014	11,040,000		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:
11/10/2013	11/10/2014	11,040,000		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:

1706245

Source: North Fork of Hughes River @ Davis Withdrawal — Owner: Lewis P. Davis and Norma J. Davis

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
11/10/2013	11/10/2014	11,040,000		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 01121 API Number 047-017-06245 Operator Antero Resources

Irons Unit 1H

Purchased Water

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:
11/10/2013	11/10/2014	11,040,000	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.

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:
11/10/2013	11/10/2014	11,040,000	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:

1706245

Source Detail

WMP 01121 | API/ID Number: 047-017-06245 | Operator: Antero Resources

Irons Unit 1H

Source ID: 14447 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm):
Max. Simultaneous Trucks:
Max. Truck pump rate (gpm) 0

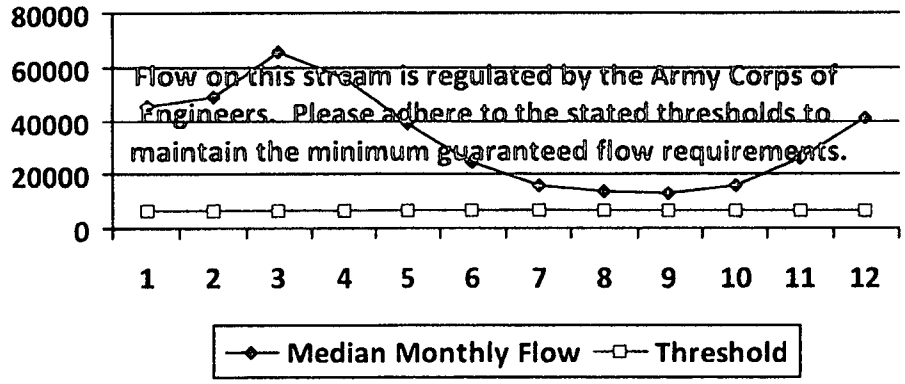
- ☐ Endangered Species?
- ☑ Mussel Stream?
- ☐ Trout Stream?
- ☐ Tier 3?
- ☑ Regulated Stream? Ohio River Min. Flow
- ☑ Proximate PSD? City of St. Marys
- ☑ Gauged Stream?

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 roposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

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Source Detail

WMP 01121 API/ID Number: 047-017-06245 Operator: Antero Resources

Irons Unit 1H

Source ID: 14448 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm):
Max. Simultaneous Trucks:
Max. Truck pump rate (gpm)

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

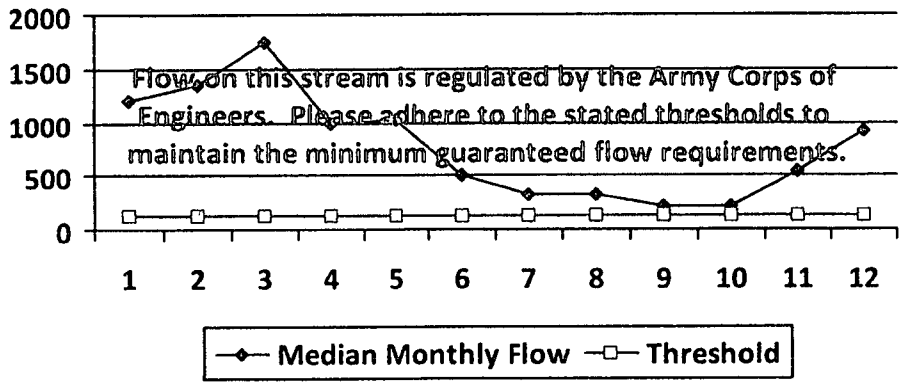
Reference Gaug 3061000 WEST FORK RIVER AT ENTERPRISE, WV

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.

1706245

Source Detail

WMP: 01121 API/ID Number: 047-017-06245 Operator: Antero Resources

Irons Unit 1H

Source ID: 14434 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 2,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

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

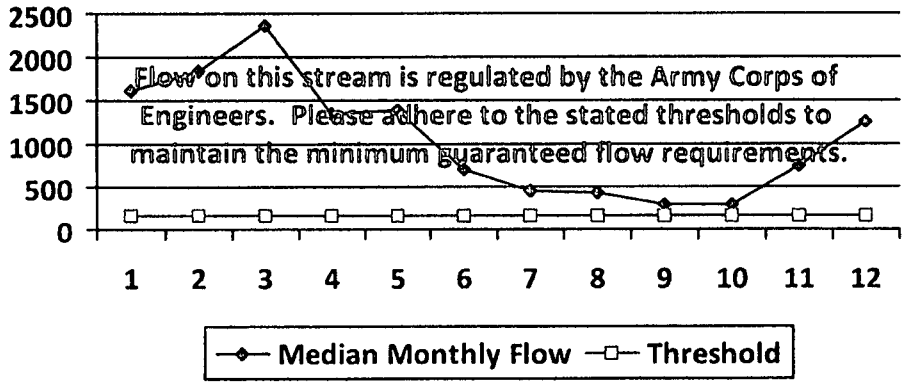
Reference Gaug 3061000 WEST FORK RIVER AT ENTERPRISE, WV

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.

1706245

Source Detail

WMP-01121 API/ID Number: 047-017-06245 Operator: Antero Resources

Irons Unit 1H

Source ID: 14435 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 3,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

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

Stonewall Jackson Dam

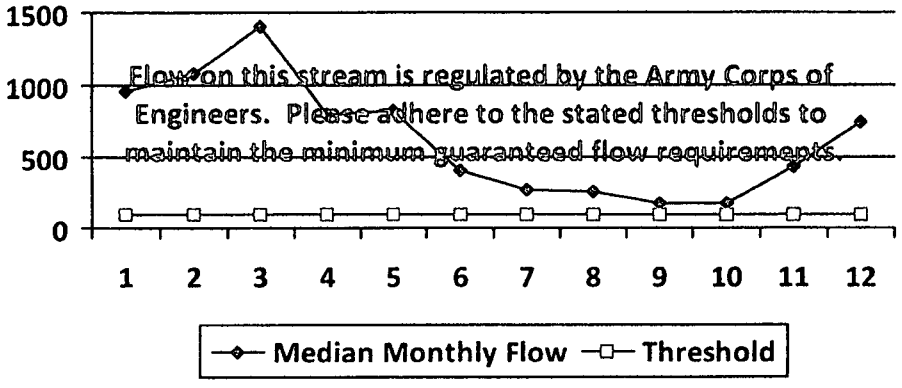
Reference Gaug 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.) 759.00

Gauge Threshold (cfs): 234

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	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.

1706245

Source Detail

WMP-01121 API/ID Number: 047-017-06245 Operator: Antero Resources

Irons Unit 1H

Source ID: 14436 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 2,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

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

Stonewall Jackson Dam

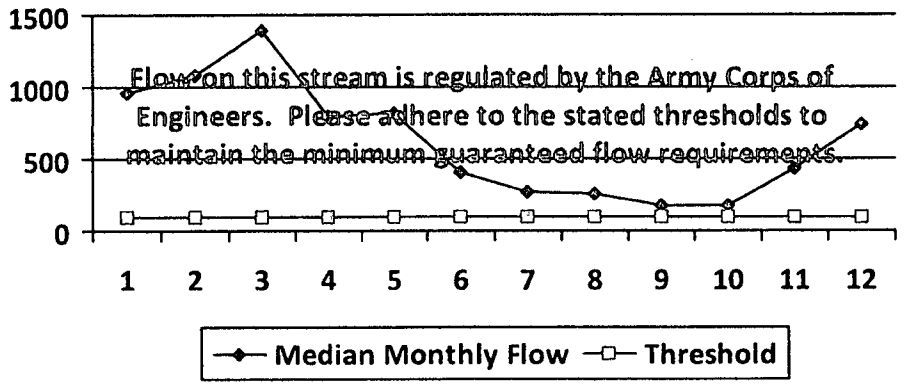
Reference Gaug 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.) 759.00

Gauge Threshold (cfs): 234

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	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



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 01121 API/ID Number: 047-017-06245 Operator: Antero Resources

Irons Unit 1H

Source ID: 14437 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 3,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

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

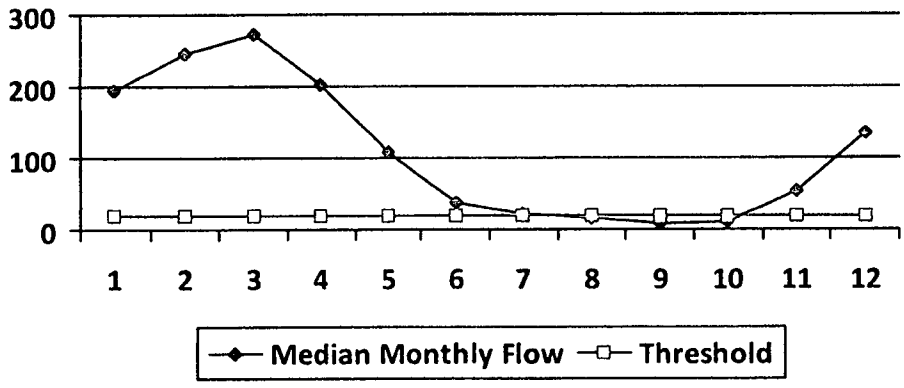
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

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 01121 | API/ID Number: 047-017-06245 | Operator: Antero Resources

Irons Unit 1H

Source ID: 14438 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

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

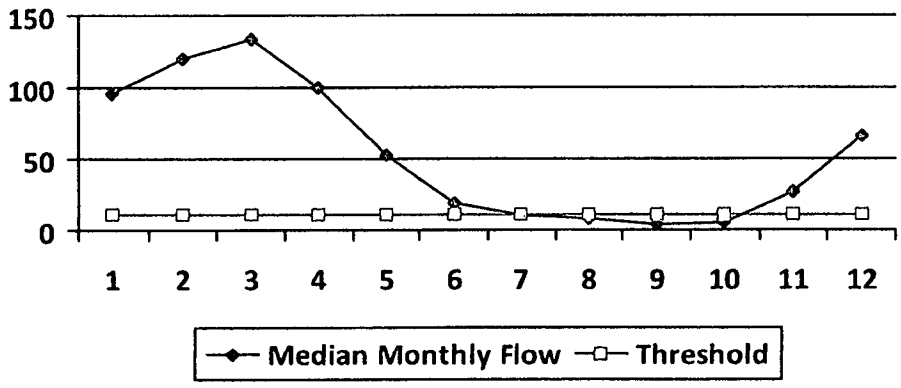
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

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 01121 | API/ID Number: 047-017-06245 | Operator: Antero Resources

Irons Unit 1H

Source ID: 14439 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

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

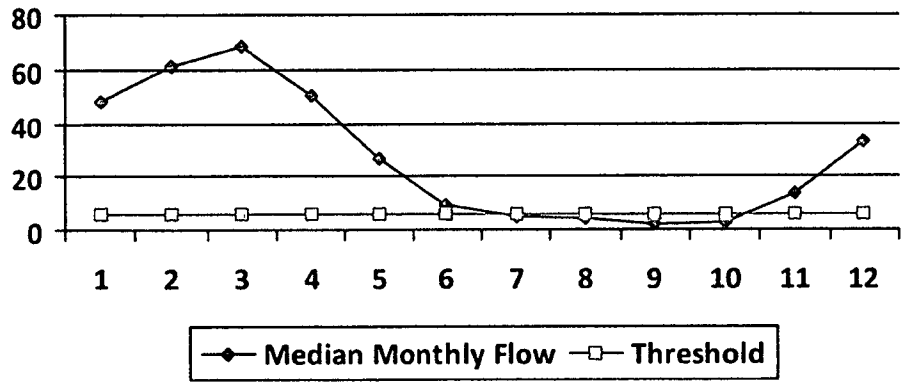
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

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-01121 API/ID Number: 047-017-06245 Operator: Antero Resources

Irons Unit 1H

Source ID: 14440 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

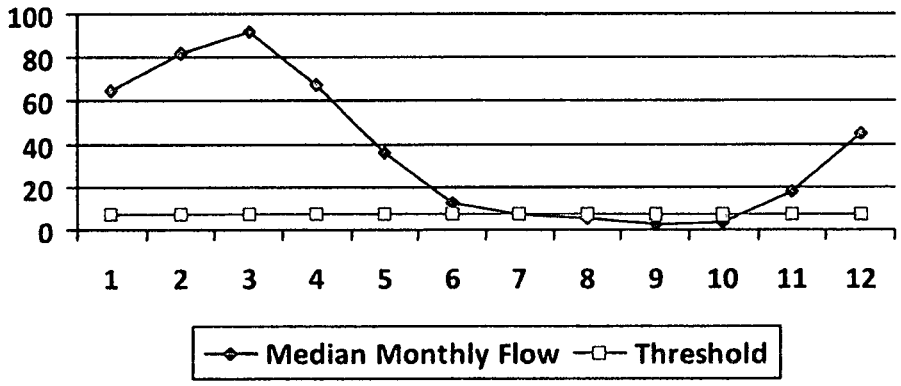
- [x] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [ ] Gauged Stream?

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 01121 | API/ID Number: 047-017-06245 | Operator: Antero Resources

Irons Unit 1H

Source ID: 14441 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

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

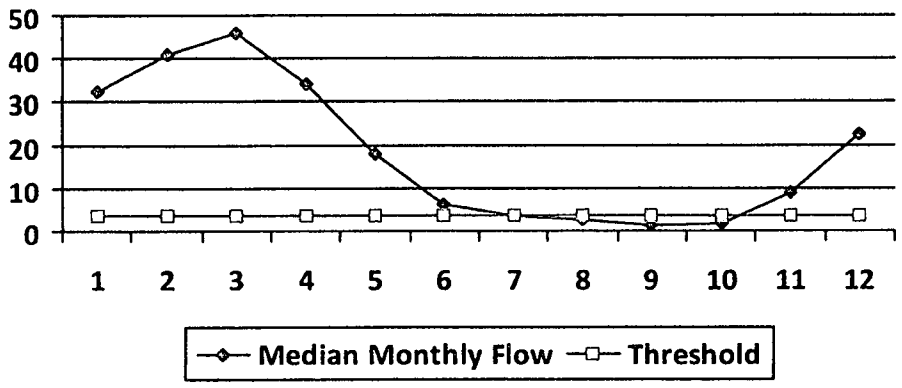
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

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 01121 | API/ID Number: 047-017-06245 | Operator: Antero Resources

Irons Unit 1H

Source ID: 14442 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

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

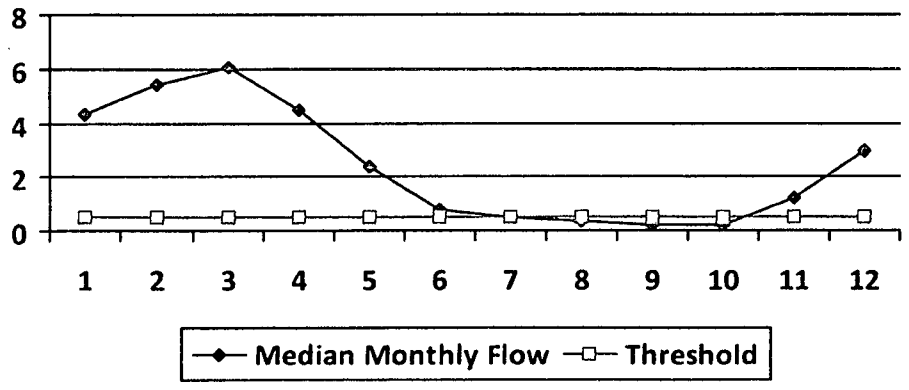
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

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 01121 | API/ID Number: 047-017-06245 | Operator: Antero Resources

Irons Unit 1H

Source ID: 14443 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

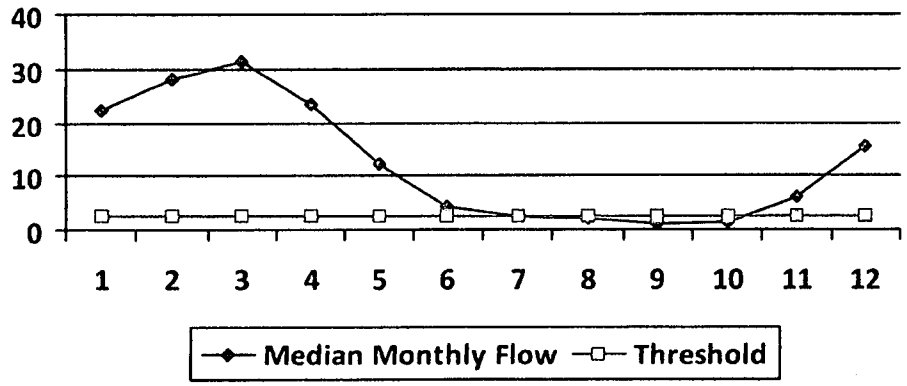
☐ Endangered Species? ☑ Mussel Stream?
☐ Trout Stream? ☐ Tier 3?
☐ Regulated Stream?
☐ Proximate PSD?
☐ Gauged Stream?

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 01121 | API/ID Number: 047-017-06245 | Operator: Antero Resources

Irons Unit 1H

Source ID: 14444 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

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

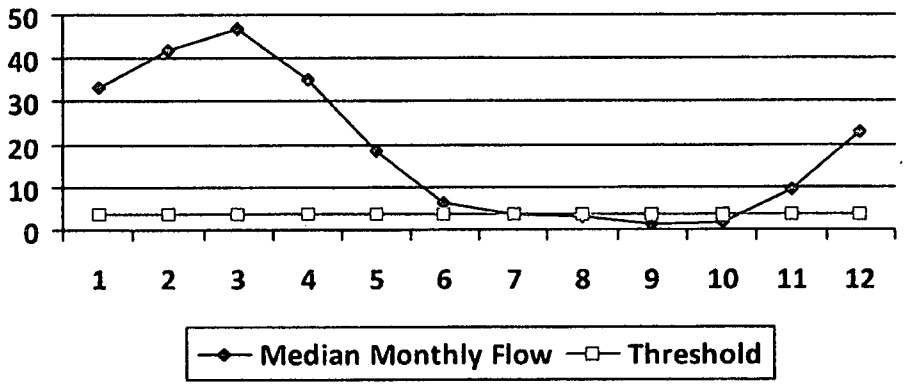
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

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 01121 | API/ID Number: 047-017-06245 | Operator: Antero Resources

Irons Unit 1H

Source ID: 14445 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 3,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

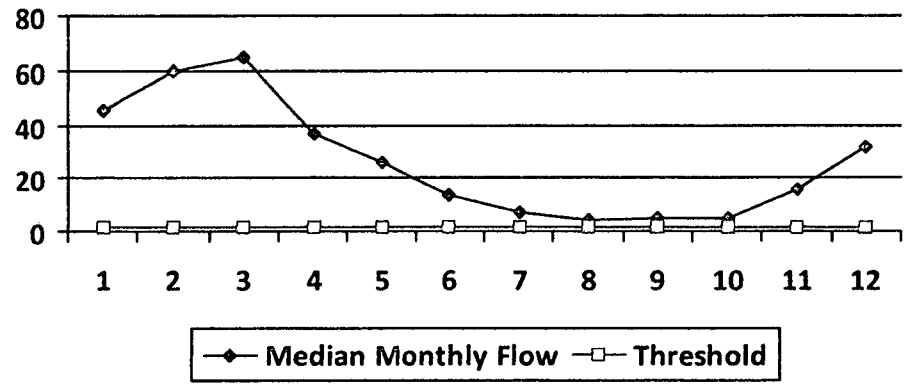
- [x] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [x] Gauged Stream?

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 01121 | API/ID Number: 047-017-06245 | Operator: Antero Resources

Irons Unit 1H

Source ID: 14446 Source Name: North Fork of Hughes River @ Davis Withdrawal
Lewis P. Davis and Norma 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: 11/10/2013
Anticipated withdrawal end date: 11/10/2014
Total Volume from Source (gal): 11,040,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

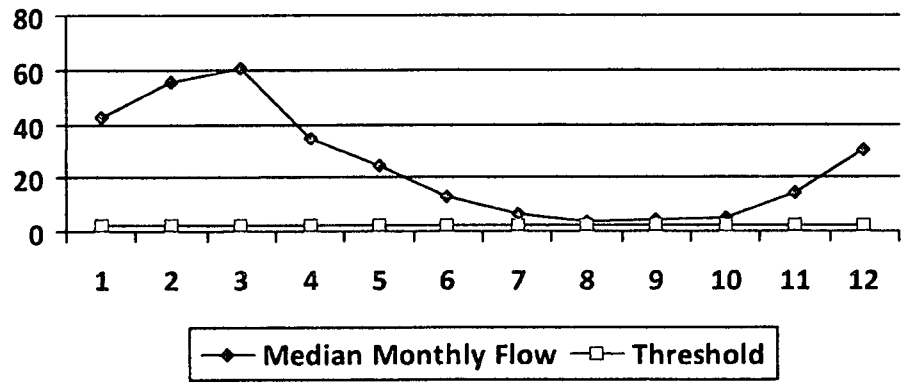
- [x] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [ ] Gauged Stream?

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	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.

Water Management Plan:
Secondary Water Sources

WMP-01121 API/ID Number 047-017-06245 Operator: Antero Resources

Irons Unit 1H

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: 14449 Source Name City of Salem Reservior (Lower Dog Run)
Public Water Provider

Source start date: 11/10/2013
Source end date: 11/10/2014

Source Lat: 39.28834 Source Long: -80.54966 County Harrison

Max. Daily Purchase (gal) 1,000,000 Total Volume from Source (gal): 11,040,000

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: 14450 Source Name Pennsboro Lake

Source start date: 11/10/2013

Source end date: 11/10/2014

Source Lat: 39.281689 Source Long: -80.925526 County Ritchie

Max. Daily Purchase (gal) Total Volume from Source (gal): 11,040,000

DEP Comments:

Source ID: 14451 Source Name Powers Lake (Wilderness Water Park Dam)
Private Owner

Source start date: 11/10/2013

Source end date: 11/10/2014

Source Lat: 39.255752 Source Long: -80.463262 County Harrison

Max. Daily Purchase (gal) Total Volume from Source (gal): 11,040,000

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: 14452 Source Name Powers Lake Two

Source start date: 11/10/2013

Source end date: 11/10/2014

Source Lat: 39.247604 Source Long: -80.466642 County Harrison

Max. Daily Purchase (gal)

Total Volume from Source (gal): 11,040,000

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.

Other

Source ID: 14453 Source Name Poth Lake (Landowner Pond)
Private Owner

Source start date: 11/10/2013
Source end date: 11/10/2014

Source Lat: 39.221306 Source Long: -80.463028 County Harrison

Max. Daily Purchase (gal) Total Volume from Source (gal): 11,040,000

DEP Comments:

Source ID: 14454 Source Name Williamson Pond (Landowner Pond)

Source start date: 11/10/2013
Source end date: 11/10/2014

Source Lat: 39.19924 Source Long: -80.886161 County Ritchie

Max. Daily Purchase (gal) Total Volume from Source (gal): 11,040,000

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: 14455 Source Name Eddy Pond (Landowner Pond)

Source start date: 11/10/2013

Source end date: 11/10/2014

Source Lat: 39.19924 Source Long: -80.886161 County Ritchie

Max. Daily Purchase (gal) Total Volume from Source (gal): 11,040,000

DEP Comments:

Source ID: 14456 Source Name Hog Lick Quarry Industrial Facility

Source start date: 11/10/2013

Source end date: 11/10/2014

Source Lat: 39.419272 Source Long: -80.217941 County Marion

Max. Daily Purchase (gal) 1,000,000 Total Volume from Source (gal): 11,040,000

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: 14457 Source Name Glade Fork Mine Industrial Facility

Source start date: 11/10/2013

Source end date: 11/10/2014

Source Lat: 38.965767 Source Long: -80.299313 County Upshur

Max. Daily Purchase (gal) 1,000,000 Total Volume from Source (gal): 11,040,000

DEP Comments:

Recycled Frac Water

Source ID: 14458 Source Name Clark Unit 1H

Source start date: 11/10/2013

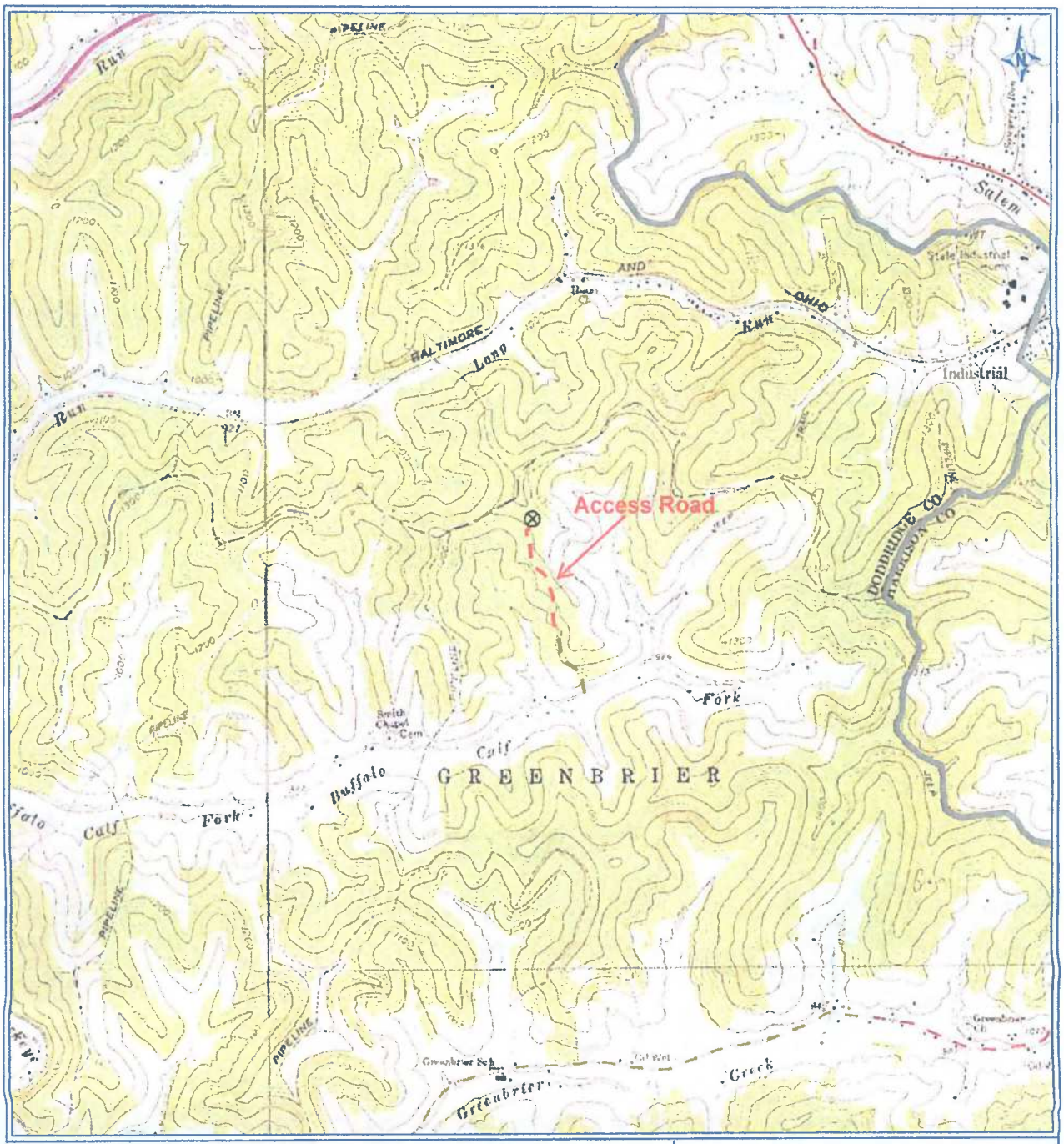
Source end date: 11/10/2014

Source Lat: Source Long: County

Max. Daily Purchase (gal) Total Volume from Source (gal): 11,040,000

DEP Comments:

1706245



PETRA 2/11/2013 3:39:31 PM

Antero Resources Corporation

Appalachian Basin

Irons Unit 1H

Doddridge County

0 2,000 4,000

FEET

REMARKS:
QUADRANGLE: SALEM
WATERSHED: BUFFALO CALF FORK
DISTRICT: GREENBRIER

February 11, 2013

STATE OF WEST VIRGINIA,
COUNTY OF DODDRIDGE, TO WIT

I, Virginia Nicholson, Editor of THE HERALD RECORD, a weekly newspaper published regularly, in Doddridge County, West Virginia, Do Hereby Certify Upon Oath That the Accompanying Legal Notice Entitled:

Floodplain Permit Application
Antero Resources

was published in said paper for 2

successive weeks beginning with the issue

of June 18th 2013 and

ending with the issue of

June 25th 2013 and

that said notice contains 168

WORD SPACE at 115 cents a word

amounts to the sum of $ 19.32

FOR FIRST PUBLICATION, SECOND PUBLICATION IS 75% OF THE FIRST PUBLICATION

$ 14.49

and each publication thereafter

$ 33.81 TOTAL

EDITOR

Virginia Nicholson

SWORN TO AND SUBSCRIBED

BEFORE ME THIS THE 27 DAY

OF June 2013

NOTARY PUBLIC

Laura J Adams

13-006

Legal Advertisement:
Doddridge County
Floodplain Permit Application

Please take notice that on the 14th day of June 2013, ANTERO RESOURCES APPALACHIAN filed an application for a Floodplain Permit to develop land located at or about: CAROLYN N. PLAUGHER SURFACE OWNER, 328.92 ACRES BUFFALO CALF, TAX MAP 4, PARCEL 6.

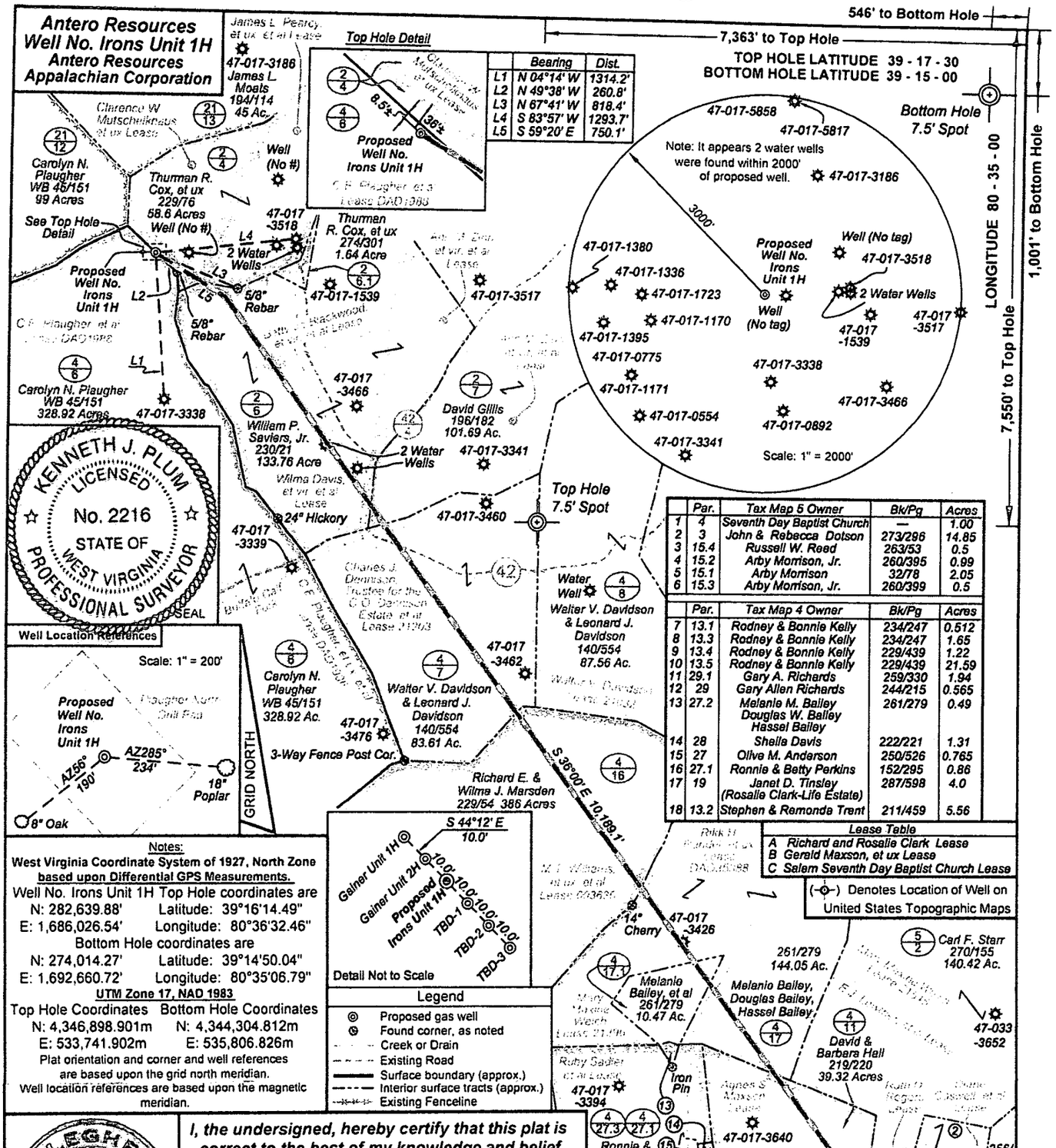
The Application is on file with the Clerk of the County Court and may be inspected or copied during regular business hours. Any interested persons who desire to comment shall present the same in writing by July 4, 2013.

Delivered to the:
Clerk of the County Court
118 E. Court Street, West Union, WV 26456
Beth A. Rogers, Doddridge County Clerk
Dan Wellings, Doddridge County Flood Plain Manager
6-18-2xb

OFFICIAL SEAL
Notary Public, State Of West Virginia
LAURA J ADAMS
212 Edmond Street
West Union, WV 26456
My Commission Expires June 14, 2023

Antero Resources Well No. Irons Unit 1H
Antero Resources Appalachian Corporation

546' to Bottom Hole
7,363' to Top Hole
TOP HOLE LATITUDE 39 - 17 - 30
BOTTOM HOLE LATITUDE 39 - 15 - 00
LONGITUDE 80 - 35 - 00
1,001' to Bottom Hole
7,550' to Top Hole



	Par.	Tax Map 5 Owner	Bk/Pg	Acres
1	4	Seventh Day Baptist Church	—	1.00
2	3	John & Rebecca Dotson	273/296	14.85
3	15.4	Russell W. Reed	263/53	0.5
4	15.2	Arby Morrison, Jr.	260/395	0.99
5	15.1	Arby Morrison	32/78	2.05
6	15.3	Arby Morrison, Jr.	260/399	0.5

	Par.	Tax Map 4 Owner	Bk/Pg	Acres
7	13.1	Rodney & Bonnie Kelly	234/247	0.512
8	13.3	Rodney & Bonnie Kelly	234/247	1.65
9	13.4	Rodney & Bonnie Kelly	229/439	1.22
10	13.5	Rodney & Bonnie Kelly	229/439	21.59
11	29.1	Gary A. Richards	259/330	1.94
12	29	Gary Allen Richards	244/215	0.565
13	27.2	Melanie M. Bailey Douglas W. Bailey Hassel Bailey	261/279	0.49
14	28	Sheila Davis	222/221	1.31
15	27	Olive M. Anderson	250/526	0.765
16	27.1	Ronnie & Betty Perkins	152/295	0.86
17	19	Janet D. Tinsley (Rosalie Clark-Life Estate)	287/598	4.0
18	13.2	Stephen & Remonda Trent	211/459	5.56

Notes:

West Virginia Coordinate System of 1927, North Zone
based upon Differential GPS Measurements.

Well No. Irons Unit 1H Top Hole coordinates are
N: 282,639.88' Latitude: 39°16'14.49"
E: 1,686,026.54' Longitude: 80°36'32.46"
Bottom Hole coordinates are
N: 274,014.27' Latitude: 39°14'50.04"
E: 1,692,660.72' Longitude: 80°35'06.79"
UTM Zone 17, NAD 1983
Top Hole Coordinates Bottom Hole Coordinates
N: 4,346,898.901m N: 4,344,304.812m
E: 533,741.902m E: 535,806.826m
Plat orientation and corner and well references are based upon the grid north meridian.
Well location references are based upon the magnetic meridian.

KENNETH J. PLUM LICENSED No. 2216 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR SEAL

ALLEGHENY SURVEYS, INC.

I, the undersigned, hereby certify that this plat is correct to the best of my knowledge and belief and shows all the information required by law and the regulations issued and prescribed by the Department of Environmental Protection.

Kenneth J. Plum, P.S. 2216

FILE NO: 44-30-G-13
DRAWING NO: 44-13 Irons 1H Well Plat
SCALE: 1" = 1200'
MINIMUM DEGREE OF ACCURACY: Submeter
PROVEN SOURCE OF ELEVATION: WVDOT, Bridgeport, WV

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

DATE: March 12 2013
OPERATOR'S WELL NO. Irons Unit 1H

API WELL NO
47 - 017 - 06245H6A
STATE COUNTY PERMIT

WELL TYPE: ☐ OIL ☒ GAS ☐ LIQUID INJECTION ☐ WASTE DISPOSAL
(IF GAS) PRODUCTION : ☐ STORAGE ☐ DEEP ☒ SHALLOW

LOCATION: ELEVATION: 1364' WATERSHED: Buffalo Calf Fork QUADRANGLE: Salem & Big Isaac
DISTRICT: Greenbrier COUNTY: Doddridge
SURFACE OWNER: Carolyn N. Plaugher ACREAGE: 328.92
ROYALTY OWNER: Charles J. Dennison, Trustee for the C.O. Dennison Estate, et al LEASE NO: DAD1988; 21203; 1227 ACREAGE: 165; 350; 49.5; 90; 84
PROPOSED WORK: ☒ DRILL ☐ CONVERT ☐ DRILL DEEPER ☒ FRACTURE OR STIMULATE ☐ PLUG OFF OLD FORMATION
☒ PERFORATE NEW FORMATION ☐ OTHER PHYSICAL CHANGE IN WELL (SPECIFY)
☐ PLUG AND ABANDON ☐ CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 7,600' TVD 18,300' MD

James L. Pearcy, et ux, et al; Clarence W. Mutschelknaus, et ux; Betty Jo Blackwood, et vir, et al; Ruth D. Rogers; Wilma Davis, et vir, et al; Ann M. Zinn, et vir, et al; M.T. Williams, et ux, et al; Agnes S. Maxson; C.E. Plaugher, et al; Mary Maxine Welch
003636; 21396
66; 39.51; 7; 35; 21.79; 55.47

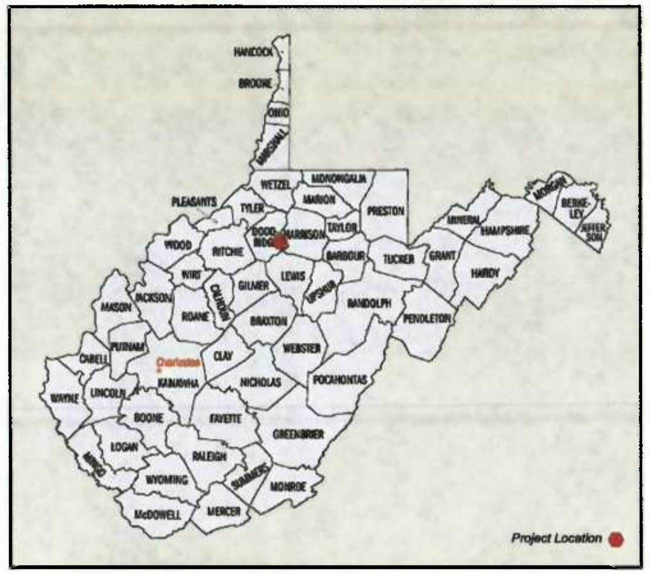
WELL OPERATOR: Antero Resources Appalachian Corporation
ADDRESS: 1625 17th Street, Denver, CO 80202
DESIGNATED AGENT: Dianna Stamper - CT Corporation System
ADDRESS: 5400 D Big Tyler Road, Charleston, WV 25313

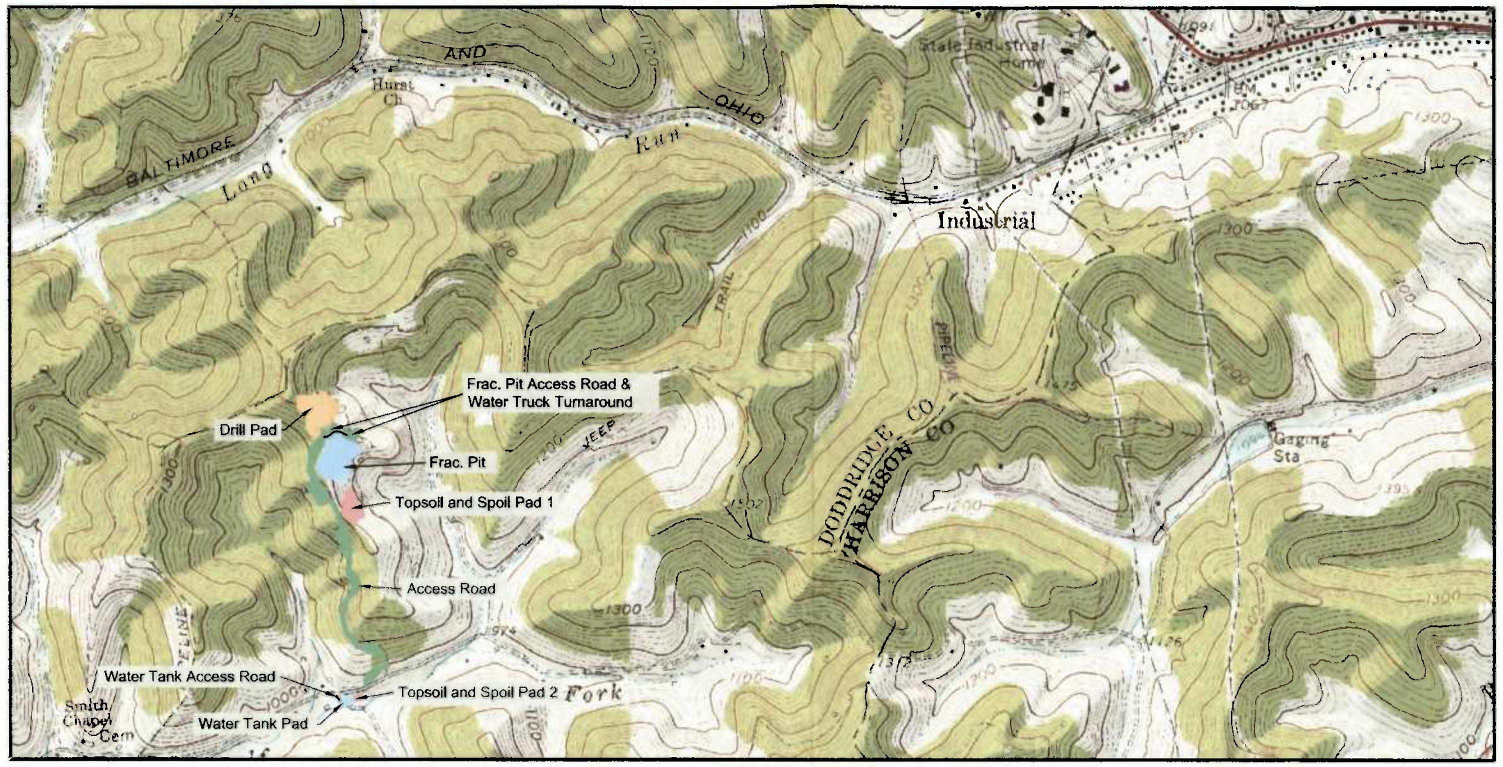
PLAUGHER NORTH DRILL PAD

FINAL SITE DESIGN, CONSTRUCTION PLANS, & EROSION & SEDIMENT CONTROL PLANS

ANTERO RESOURCES APPALACHIAN CORPORATION

West Virginia Coordinate System of 1983
State Plane Grid North
Elevations NAVD88
Established By Survey Grade GPS





SALEM QUAD
GREENBRIER DISTRICT, DODDRIDGE COUNTY, WEST VIRGINIA
BUFFALO CALF WATER SHED

0 1000 2000 3000

AFFECTED TAX PARCELS: 2/4, 2/6 & 4/6
GREENBRIER DISTRICT, DODDRIDGE COUNTY

TM 2 - Pcl. 4
Thurman R. & Connie S. Cox
DB 229, PG 21
58.6 Acres±
(Affected area from Proposed Drill Pad = 2.07 Acres)
(Affected area from Proposed Frac Pit = 0.23 Acres)
(Affected area from Proposed Frac Pit Access Road & Turnaround = 232 feet, 0.73 Acres)

TM 2 - Pcl. 6
William P. Saviers Jr.
DB 230, PG 21
133.76 Acres±
(Affected area from Proposed Frac. Pit = 2.37 Acres)
(Affected area from Proposed Frac. Pit Access Road & Turnaround = 29 feet, 0.19 Acres)
(Affected area from Proposed Spoil Piles = 0.96 Acres)

TM 4 - Pcl. 6
Carolyn N. Plaugher
WB 45, PG 151
(Affected area from Proposed Access Road = 3,444 feet, 10.16 Acres)
(Affected area from Proposed Drill Pad = 1.67 Acres)
(Affected area from Proposed Frac. Pit = 1.75 Acres)
(Affected area from Proposed Frac. Pit Access Road & Turnaround = 134 feet, 0.18 Acres)
(Affected area from Proposed Water Tank Pad, Farm Road, New Diversion Ditch & Culvert = 0.85 Acres)
(Affected area from Proposed Water Tank Pad Access = 61 feet, 0.10 Acres)
(Affected area from Proposed Spoil Piles = 1.53 Acres)

LOD AREAS (ACRES)	
DESCRIPTION	AREA
MAIN ACCESS ROAD	10.16
DRILL PAD	3.74
FRAC PIT	4.35
FRAC PIT ACCESS & TURNAROUND	1.10
WATER TANK PAD, DITCH & CULVERT	0.85
WATER TANK PAD ACCESS	0.10
SPOIL PADS	2.49
TOTAL	22.79
TOTAL WOODED AREA	19.37

Well Location Restrictions:

All Pad and Fracture Pit complies with the Well Location Restrictions of WV code 22-6A-12

* 250' from an existing well or developed spring used for human or domestic animals.
* 625' occupied dwelling or barn greater 2500 SF used for poultry or dairy measured from the center of the pad.
* 100' from edge of disturbance to wetlands, perennial streams, natural or artificial lake, pond or reservoir.
* 300' from edge of disturbance to naturally reproducing trout streams.
* 1000' of surface or ground water intake to a public water supply.

Well Table

Prop. Well Gainer Unit 1H WV-N NAD83 N: 282690.753333 WV-N NAD83 E: 1654571.794396 LAT NAD83: 39.270819 LON NAD83: -80.608889	Prop. Well Gainer Unit 2H WV-N NAD83 N: 282683.584226 WV-N NAD83 E: 1654578.768446 LAT NAD83: 39.270799 LON NAD83: -80.608864	Prop. Well Irons Unit 1H WV-N NAD83 N: 282676.415119 WV-N NAD83 E: 1654585.738097 LAT NAD83: 39.270780 LON NAD83: -80.608839
Prop. Well TBD-1 WV-N NAD83 N: 282669.246013 WV-N NAD83 E: 1654592.709347 LAT NAD83: 39.270760 LON NAD83: -80.608814	Prop. Well TBD-2 WV-N NAD83 N: 282662.082137 WV-N NAD83 E: 1654599.676311 LAT NAD83: 39.270741 LON NAD83: -80.608789	Prop. Well TBD-3 WV-N NAD83 N: 282684.913031 WV-N NAD83 E: 1654606.647961 LAT NAD83: 39.270721 LON NAD83: -80.608764

FLOODPLAIN CONDITIONS	
DO SITE CONSTRUCTON ACTIVITIES TAKE PLACE IN FLOODPLAIN:	YES
PERMIT NEEDED FROM COUNTY FLOODPLAIN COORDINATOR:	YES
HEC-RAS STUDY COMPLETED: (CURENTLY IN PROGRESS)	YES
FLOODPLAIN SHOWN ON DRAWINGS:	YES
FIRM MAP NUMBER(S) FOR SITE:	54017C0165C
ACREAGES OF CONSTRUCTION IN FLOODPLAIN:	0.95 ACRES (TANK PAD) 0.26 ACRES (MAIN ACCESS ROAD)

Design Certification
The drawings, construction notes, and reference diagrams attached hereto have been prepared in accordance with the West Virginia Code of State Rules, Division of Environmental Protection, Office of Oil and Gas §35-4-21. The information reflects a temporary frac pit pond. The computed above grade storage volume is less than 15 acre feet, filling method pumped, frac. pond is lined.

Project Contacts

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Surveyor & Engineer

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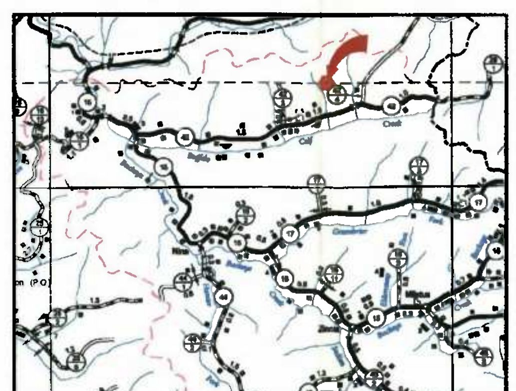
Tom Corathers - PE, PS - Hornor Brothers Engineers
304-624-6445 Office 304-672-0777 Cell

SITE LOCATIONS STATE PLANE NAD 83 (WV NORTH ZONE)		
	LATITUDE	LONGITUDE
Begin Access Road	39.262392	-80.606753
Center of Pad	39.270780	-80.608839
Center of Pad (UTM 83-17 M)	N= 4346898.903360	E= 533741.899928
Center of Frac. Pit	39.269495	-80.608149
Center of Frac. Pit (UTM 83-17 M)	N= 4346756.597372	E= 533802.019126
Begin Water Tank Pad Access Road	39.262199	-80.607917
Center of Water Tank Pad	39.262030	-80.607517
Center of Pad (UTM 83-17 M)	N= 4345928.393520	E= 533860.170229



GRAPHIC SCALE

1 INCH = 1 MILE

EPHEMERAL STREAM IMPACT (LINEAR FEET)				
STREAM AND IMPACT CAUSE	CULVERT (LF)	INLETS/OUTLETS STRUCTURES (LF)	CONSTRUCTION DISTURBANCE TO LOD (LF)	TOTAL IMPACT (LF)
STREAM 16 (ACCESS ROAD)	0	0	63 LF	63 LF
STREAM 17 (ACCESS ROAD)	0	0	76 LF	76 LF
STREAM 20 (ACCESS ROAD)	48	10	36 LF	94 LF
			TOTAL	233 LF

WETLAND IMPACT (SQUARE FEET)			
WETLAND AND IMPACT CAUSE	FILL (SF)	CONSTRUCTION DISTURBANCE TO LOD (LF)	TOTAL IMPACT (LF)
3 (ACCESS ROAD)	885	0	885
		TOTAL	885
		TOTAL ACRES	0.02

SHEET INDEX

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!!

811
Know what's below.
Call before you dig.

DATE	REVISIONS
2-26-2013	ADDED RESTRICTION NOTE/PIT LATS & LONGS
3-18-2013	ADDED OVERVIEW PLAN
5-8-2013	REVISED TO REFLECT ANTEROS NEW DESIGN STANDARDS
5-8-2013	ADDRESSED WVDEP REVIEW COMMENTS

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Bridgeport, WV 26330
(304) 848-5035

Hornor Bros. Engineers
Since 1902
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11-30-2012

ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

COVER SHEET / LOCATION MAP
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: AS SHOWN
Designed By: JDR & TBC
File No.

Schedule of Quantities
Well Site: Plaugher North Drill Pad & Frac. Water Pit

CLEARING & GRUBBING/EROSION & SEDIMENT CONTROLS	QUANTITY	UNIT		
MOBILIZATION	0	EA		$
CONSTRUCTION ENTRANCE	2	EA		$
CLEARING & GRUBBING	22.78	AC		$
TREE REMOVAL	18.37	AC		$
8" COMPOST FILTER SOCK	0	LF		$
12" COMPOST FILTER SOCK	0	LF		$
18" COMPOST FILTER SOCK	0	LF		$
24" COMPOST FILTER SOCK	5,912	LF		$
32" COMPOST FILTER SOCK	0	LF		$
SUPER SILT FENCE	663	LF		$
9" STRAW WATTLES	6,094	LF		$
TOTAL				$

SITE	QUANTITY	UNIT		
DRILL PAD EXCAVATION and GATHERING FACILITIES PAD	40,811	CY		$
ACCESS ROADS EXCAVATION	33,535	CY		$
TANK PAD and/or FRAC PIT EXCAVATION	35,877	CY		$
TOPSOIL	8,268	CY		$
DIVERSION DITCH	1,277	LF		$
ROAD SIDE DITCH	5,299	LF		$
TOTAL				$

SUMP(S) PER ANTERO RESOURCES STANDARD DETAIL	QUANTITY	UNIT		
INSTALL 102" X 78" X 44" PRECAST SUMP - SEE ANTERO RESOURCES DETAIL	4	EA		$
VALVE BOX HDPE PIPE (MINIMUM 12" DIAMETER X 48" HIGH)	4	EA		$
4" PVC CONNECTIVE PIPE (ANTERO SUMP DRAIN DETAIL)	315	LF		$
TOTAL				$

AGGREGATE SURFACING/SPREADING/COMPACTION and/or INSTALLATION	QUANTITY	UNIT		
DRILL PAD AASHTO #1 (8" THICK)	2,333	TON		$
DRILL PAD and GATHERING FACILITIES PAD 1 1/2" or 3/4" CRUSHER RUN STONE (2" THICK)	700	TON		$
DRILL PAD and GATHERING FACILITIES PAD GEOTEXTILE FABRIC (US 200)	7,367	SY		$
ACCESS ROADS 6" or 4" MINUS CRUSHER RUN AGGREGATE (8" THICK)	3,999	TON		$
ACCESS ROADS 1 1/2" or 3/4" MINUS CRUSHER RUN AGGREGATE (2" THICK)	1,000	TON		$
ACCESS ROADS GEOTEXTILE FABRIC (US 200)	3,000	SY		$
*INSTALL TENSAR TX190 GEOGRID or EQUIVALENT	0	SY		$
TANK PAD 6" or 4" MINUS CRUSHER RUN AGGREGATE (8" THICK)	531	TON		$
TANK PAD 1 1/2" or 3/4" MINUS CRUSHER RUN AGGREGATE (2" THICK)	133	TON		$
TANK PAD GEOTEXTILE FABRIC (US 200)	1,264	SY		$
*INSTALL TENSAR TX190 GEOGRID or EQUIVALENT	0	SY		$
TOTAL				$

ROAD CULVERTS	QUANTITY	UNIT		
15" HDPE	410	LF		$
18" HDPE	0	LF		$
24" HDPE	0	LF		$
30" HDPE	15	LF		$
36" HDPE	0	LF		$
42" HDPE	0	LF		$
48" HDPE	0	LF		$
60" HDPE	0	LF		$
R4 RIP RAP (INLETS/OUTLETS)	27.7	TON		$
AASHTO #1 STONE (DITCH CHECKS)	6.8	TON		$
DITCH LINING - (ACCESS ROAD) SYNTHETIC MATTING (TRM)	578	SY		$
DITCH LINING - (ACCESS ROAD) RIP RAP	2,794	SY		$
TOTAL				$

FENCING/GATES	QUANTITY	UNIT		
8 FT CHAIN LINK FENCE w/MINIMUM 10 FT POST SPACING and BARB WIRE ALONG TOP	1,094	LF		$
16 FT DOUBLE GATE	1	EA		$
TOTAL				$

SEEDING	QUANTITY	UNIT		
SITE SEEDING (LIME, FERTILIZER, SEEDING and HYDRO-MULCH w/TACK (HYC-2 or EQUAL)	17.42	AC		$
TOTAL				$

UNFORESEEN SITE CONDITIONS	QUANTITY	UNIT		
*ROCK CLAUSE - BLASTING	1.0	CY		$
*ROCK CLAUSE - HOE RAMMING	1.0	CY		$
*FRENCH DRAINS	1.0	FT		$
*PHASE 1 FENCING - STEEL CORRUGATED PANELS w/"T" POST (10 FT CENTERS - WETLAND PROTECTION	1.0	LF		$
*PHASE 2 FENCING - SILT FENCE and/or FILTER SOCK OUTSIDE OF PHASE 3 FENCING - WETLAND PROTECTION	1.0	LF		$
*PHASE 3 FENCING - ORANGE SAFETY FENCE w/"T" POST (10FT CENTERS) - WETLAND PROTECTION	1.0	LF		$
*SILT FENCE	1.0	LF		$
*TEMPORARY SEEDING	1.0	AC		$
*CONSTRUCTION STAKEOUT	1.0	HOUR		$
*JUTE MATTING - SLOPE MATTING (TEMPORARY TURF REINFORCEMENT MATTING)	1.0	SY		$
*GUARD RAIL	1.0	LF		$
TOTAL				
		GRAND TOTAL		$

ALL WOOD WASTE SHALL BE USED AS A SEDIMENT BARRIER (SEE DETAIL SHEET), CHIPPED, LEGALLY HAULED OFF, OR LEGALLY BURNED ON SITE

FRAC PIT VOLUMES				
ELEVATION	BARRELS	GALLONS	ACRE-FT	UNINCISED ACRE-FT
1317 (BOTTOM)	0	0	0	0
1319	2,996	125,852	0.386	0
1321	7,921	332,717	1.021	0
1323	14,281	599,846	1.841	0
1325	22,200	932,481	2.862	0
1327	31,797	1,335,553	4.099	0
1329	43,183	1,813,818	5.566	1.468
1331	56,472	2,372,012	7.279	3.181
1333	71,777	3,014,856	9.252	5.154
1335 (CAPACITY)	89,210	3,747,099	11.499	7.401
1337 (TOP BERM)	108,884	4,573,470	14.035	9.937

FRAC. WATER PIT INFORMATION

NAD 83 LAT 39.2695 LONG -80.6081 UTM N=4346756.5974 E=533802.0191 CENTER OF PIT

LENGTH 362 Feet WIDTH 248 Feet DEPTH 20 Feet

ACCESS ROAD ENTRANCE 0+00

NAD 83 LAT 39.2624 LONG -80.6068 UTM N=4345968.7916 E=533925.9144

WATER TANK ACCESS ROAD ENTRANCE 0+00

NAD 83 LAT 39.2622 LONG -80.6079 UTM N=4345947.0212 E=533825.5215

GRADING VOLUMES			
DESCRIPTION	CUT (CY)	FILL (CY)	NET (CY)
MAIN ACCESS ROAD	30,458	37,620	-7,162
DRILL PAD	42,319	15,704	26,615
FRAC PIT	37,366	45,490	-8,124
FRAC PIT ACCESS ROAD & TURNAROUND	7,560	2,179	5,381
WATER TANK PAD	688	0	688
WATER TANK PAD ACCESS	99	5	94
SPOIL PADS	0	17,676	-17,676
TOTAL	118,490	118,674	-184

NOTES:

1. TOPSOIL QUANTITY FOR THIS SITE IS ESTIMATED AT A UNIFORM THICKNESS OF 4" OVER THE ENTIRE EXCAVATED AREA. ACTUAL QUANTITY MAY VARY.
2. AREAS RECEIVING JUTE MATTING AND SYNTHETIC MATTING (TRM) ARE TO BE SEEDED, LIMED AND FERTILIZED PRIOR TO INSTALLATION OF MATERIALS.

GRADING	
CUT SLOPE	2:1
FILL SLOPE	2:1
FRAC PIT INTERIOR	3:1
PAD CONTAINMENT BERM SLOPE	1.5:1
CUT SWELL FACTOR	1.05
FILL SHRINK FACTOR	1.00
PAD ELEVATION:	1364.00'

NOTES:

1. SITE NOT WITHIN THE 100 YEAR FLOOD PER FIRM PANEL 54017C0165C
2. ALL PROPOSED SLOPES TO BE 2:1 EXCEPT WHERE NOTED.

The earthwork quantities provided are an estimate for consideration. The quantities shown may be greater or less than actually excavated. The engineer is not responsible for variances from the estimated quantities and does not certify to their accuracy.

DATE	REVISIONS
1-08-2013	REVISED AFFECTED STREAM INFO
1-29-2013	ADDED SUMP/DEWATERING TANKS TO LAYOUT
2-04-2013	REVISED AFFECTED STREAM INFO
2-26-2013	UPDATED QUANTITIES; ADDED SHADING FOR INCISED VOLUME
5-8-2013	REVISED TO REFLECT ANTEROS NEW DESIGN STANDARDS

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ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

SCHEDULE OF QUANTITIES
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: N/A
Designed By: JDR &TBC
File No. [illegible]
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CONSTRUCTION, GENERAL AND EROSION AND SEDIMENT NOTES

CONSTRUCTION SPECIFICATIONS:

1. FRAC. PITS, WATER TANK PADS, ROADS AND DRILL PADS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS AND THE SCOPE OF WORK AND SHALL CONFORM GENERALLY WITH THE GRADES, DEPTHS AND DIMENSIONS SHOWN.
2. THE CONSTRUCTION DOCUMENTS SHOW THE EXISTING AND NEW GRADES AND BERMS, ETC. THAT ALL CUT AND FILL ESTIMATES ARE BASED UPON. THE ENGINEER'S ESTIMATES OF THE QUANTITIES ARE ONLY ESTIMATES AND MAY CHANGE BASED ON ACTUAL FIELD CONDITIONS.
3. THE GRADES, BERMS, DEPTHS, AND DIMENSIONS MAY CHANGE BASED ON ACTUAL FIELD CONDITIONS. THE ENGINEER RESERVES THE RIGHT TO CHANGE GRADES, BERMS, DEPTHS AND DIMENSIONS AS NECESSARY TO MEET FIELD CONDITIONS.
4. THE CONTRACTOR SHALL PROVIDE THE ENGINEER ALL REASONABLE FACILITIES AND PROVIDE INFORMATION AND SAMPLES AS REQUIRED BY THE ENGINEER FOR PROPER MONITORING AND TESTING OF MATERIAL WORKMANSHIP.
5. THE CONTRACTOR SHALL HAVE ON SITE AT ALL TIMES WHEN CONSTRUCTION IS IN PROGRESS A COMPETENT SUPERINTENDENT THOROUGHLY FAMILIAR WITH THE CONSTRUCTION OF EARTH BERMS AND EMBANKMENTS, THE COMPACTION OF SOILS AND PLACEMENTS OF LINERS.
6. 24" SILT SOCK OR SILT FENCE SHALL BE INSTALLED PRIOR TO CLEARING AND GRUBBING AS SHOWN ON THE DRAWINGS IN ACCORDANCE WITH WV DEP BEST MANAGEMENT PRACTICES MANUAL DATED MAY 2012. SURFACE WATER SHALL BE DIVERTED AWAY FROM ALL EXCAVATIONS AND THE FACE OF ALL FILLS TO PREVENT FLOODING AND SOFTENING OF THE SUBGRADE OR COMPACTED MATERIALS.
7. CLEARING AND GRUBBING SHALL REMOVE ALL BRUSH, TREES, ROOTS, STUMPS, FENCES, SIGNS OR ANY OTHER MATERIAL THAT IS NOT TO BE REUSED FOR THE CONSTRUCTION. SOME STUMPS MAY REMAIN AT THE APPROVAL OF THE ENGINEER. NO CLEARING DEBRIS SHALL BE BURIED ON-SITE.
8. TOP SOIL SHALL BE STRIPPED AND STOCKPILED WITH APPROPRIATE STABILIZATION AND SILT FENCE TO PREVENT EROSION. THE TOP SOIL SHALL BE REUSED DURING THE RECLAMATION PROCESS OR ON THE FACE OF THE IMPOUNDMENT PRIOR TO SEEDING.
9. TOE CUTS OF 12' MINIMUM WIDE SHALL BE EXCAVATED ON ALL RECEIVING SLOPES TO PROVIDE A BASE FOR THE IMPOUNDMENT BERM.
10. PRIOR TO PLACING ANY FILL, THE EXPOSED SUBGRADE SHALL BE COMPACTED AND PROOF ROLLED TO PRODUCE A STABLE AND UNYIELDING SITE.
11. FRAC PIT BERMS SHALL BE UNIFORMLY GRADED SOIL FREE FROM AGGREGATE EXCEEDING 6". THE FILL SHALL BE FREE OF ALL ORGANIC MATERIAL, STUMPS , BRUSH, OR OTHER DELETERIOUS MATTER.
12. ALL FILL SHALL BE PLACED IN LOOSE LIFTS OF UP TO 12" AND SHALL BE COMPACTED TO AT LEAST 95% OF THE LABORATORY MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR TEST METHOD (ASTM D 698). THE MOISTURE CONTENT SHALL BE CONTROLLED IN ACCORDANCE WITH THE LIMITS FROM THE STANDARD PROCTOR TEST (ASTM D 698) RESULTS TO FACILITATE COMPACTION. CONTRACTOR IS RESPONSIBLE FOR THE ORIGINAL SOIL TEST AND PROVIDING A COPY OF THE RESULTS WITH MOISTURE-DENSITY CURVE TO THE ENGINEER. THE CONTRACTOR SHALL DO IN-PLACE DENSITY TESTS EVERY THIRD LIFT OF SOIL AND SHALL BE DONE IN TWO RANDOM PLACES ON EACH STRAIGHT SIDE OF THE IMPOUNDMENT BERM. FIELD DENSITY TESTS FOR COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH ASTM D 2922 (NUCLEAR METHOD). RECORDS SHALL BE MAINTAINED OF TEST LOCATION AND RESULTS AND PROVIDED TO THE ENGINEER ON REQUEST. AREAS THAT FAIL FOR COMPACTION SHALL BE REMOVED, RE-COMPACTED AND RETESTED FOR COMPLIANCE. IN LIEU OF STANDARD PROCTOR TESTING, THE CONTRACTOR MAY PROOF-ROLL THE SOIL EVERY 24" OF SOIL LIFT WITH A LOADED 15 TON TANDEM DUMP TRUCK. SOIL THAT DEFLECTS UNDER THE REAR WHEELS GREATER THAN 1/2" SHALL BE REMOVED, RE-COMPACTED AND RETESTED. COMPACTION OF SOIL SHALL BE DONE WITH A SHEEPS FOOT, OR VIBRATORY ROLLER.
13. ON-SITE FILL SHALL BE USED TO THE MAXIMUM EXTENT POSSIBLE. ANY IMPORTED FILL SHALL BE CERTIFIED BY THE CONTRACTOR TO BE CLEAR OF ALL HAZARDOUS SUBSTANCES OR MATERIALS. IF MATERIAL IS ENCOUNTERED THAT CANNOT BE RIPPED BY A CAT D6 WITH A SINGLE TOOTH RIPPER, THEN THE CONTRACTOR SHALL CONTACT THE ENGINEER WHO WILL VISIT THE SITE AND DETERMINE IF THE MATERIAL MAY BE USED AS IS OR MUST BE REMOVED BY OTHER MEANS. IF UNSUITABLE SOILS IN THE SUBGRADE ARE FOUND THEY SHALL BE REMOVED AND REPLACED WITH APPROPRIATE FILL AT THE CONTRACTORS EXPENSE AND THE ENGINEER'S DIRECTION.
14. IF SPRINGS OR SEEPS ARE ENCOUNTERED, SUBSURFACE DRAINAGE FEATURES SHALL BE INSTALLED PRIOR TO FILL PLACEMENT. CONTACT ENGINEER FOR EVALUATION AND RECOMMENDATION OF CORRECTIVE MEASURES.
15. THE FILL TOE FOR ALL FILL EMBANKMENTS SHALL BE BENCHED OR KEYED INTO THE NATURAL SOIL. ALL FILL TOES SHALL BE SUPPORTED BY COMPETENT BEDROCK OR SOIL MATERIAL.
16. FILL PLACED AGAINST EXISTING SLOPES SHALL BE BENCHED INTO THE EXISTING MATERIAL DURING FILL PLACEMENT TO REDUCE THE POTENTIAL FOR DEVELOPMENT OF A SMOOTH INTERFACE BETWEEN THE FILL AND EXISTING SLOPE.
17. ANY SOFT AREAS SHALL BE OVER-EXCAVATED TO A FIRM MATERIAL AND BACKFILLED WITH A WELL COMPACTED STRUCTURAL FILL.
18. FILL REQUIRED TO OBTAIN DESIGN GRADES SHALL BE PLACED AS CONTROLLED, COMPACTED FILL. THE FILL SHALL BE FREE OF TRASH, WOOD, TOPSOIL, ORGANICS, COAL, COAL MINE REFUSE, FROZEN MATERIAL AND PIECES OF ROCK GREATER THAN 6" IN ANY DIMENSION.
19. DURING PLACEMENT OF MATERIAL, MOISTEN OR AERATE EACH LAYER OF FILL, AS NECESSARY, TO OBTAIN THE REQUIRED COMPACTION. FILL SHOULD NOT BE PLACED ON SURFACES THAT ARE MUDDY OR FROZEN, OR HAVE NOT BEEN APPROVED BY PRIOR PROOF-ROLLING. FREE WATER SHALL BE PREVENTED FROM APPEARING ON THE SURFACE DURING OR SUBSEQUENT TO COMPACTION OPERATIONS.
20. SOIL MATERIAL WHICH IS REMOVED BECAUSE IT IS TOO WET TO PERMIT PROPER COMPACTION MAY BE SPREAD AND ALLOWED TO DRY. DRYING CAN BE FACILITATED BY DISCING OR HARROWING UNTIL THE MOISTURE CONTENT IS REDUCED TO AN ACCEPTABLE LEVEL. WHEN THE SOIL IS TOO DRY, WATER MAY BE UNIFORMLY APPLIED TO THE LAYER TO BE COMPACTED.
21. THE FILL OUTSLOPES SHALL BE OVERBUILT AND TRIMMED BACK TO DESIGN CONFIGURATIONS TO VERIFY PROPER COMPACTION.
22. GRANULAR MATERIALS, SUCH AS AASHTO NO. 57 STONE SHALL BE COMPACTED TO 85% OF ITS RELATIVE DENSITY, AS DETERMINED BY ASTM D 4253 AND D 4254 TEST METHODS.
23. THE INSIDE OF THE FRAC PIT SHALL BE BOTH SMOOTH DRUM ROLLED AND FREE OF PROTRUDING OR SHARP ROCKS IN ORDER TO RECEIVE THE LINER.
24. PRIOR TO THE LINER INSTALLATION THE CONTRACTOR SHALL CONTACT THE SURVEYOR TO DO AN AS-BUILT SURVEY OF THE IMPOUNDMENT TO ENSURE CONFORMANCE WITH THE ENGINEER'S DRAWINGS. THE SURVEYOR SHALL PROVIDE THE INFORMATION TO THE ENGINEER WHO WILL MAKE DETERMINATIONS ON ANY VARIATION FROM THE DRAWINGS AND DIRECT THE CONTRACTOR TO DO CORRECTIVE WORK.
25. LINER SHALL BE POLYFLEX IMPERVIOUS TEXTURED HDPE GEOMEMBRANE, 60MIL, INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. THE TOP OF THE LINER SHALL BE TURNED DOWN INTO A 4' ANCHOR TRENCH AT THE TOP OF THE BERM AND BACKFILLED WITH SELECT FILL AS SHOWN ON THE DRAWINGS OR AS REQUIRED BY THE LINER MANUFACTURER.
26. PHOTOGRAPHIC DOCUMENTATION SHALL BE TAKEN BY THE CONTRACTOR AND PROVIDED TO THE ENGINEER OF THE FOLLOWING ACTIVITIES; 1, SITE AFTER CLEARING AND GRUBBING; 2, THE SITE AFTER TOPSOIL REMOVAL; 3, TOE KEY AND INSPECTION TRENCH CONSTRUCTION; 4, DAILY PHOTOS OF CUT AND FILL OPERATIONS; 5 , PROOF-ROLLING TESTS.
27. PRIOR TO AS-BUILT CERTIFICATION, THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A COMPLETE BINDER THAT INCLUDES ALL PHOTO DOCUMENTATION, ALL COMPACTION TEST REPORTS, RESULTS AND MAPS, A REPORT OF ALL CUT AND FILL VOLUMES IN CUBIC YARDS, AND A COPY OF THE AS-BUILT CONFIRMATION SURVEY PRIOR TO LINER PLACEMENT.

ALL WOOD WASTE SHALL BE USED AS A
SEDIMENT BARRIER (SEE DETAIL SHEET),
CHIPPED, LEGALLY HAULED OFF, OR
LEGALLY BURNED ON SITE

GENERAL NOTES

1. ANY DISCREPANCIES FOUND BETWEEN THE DRAWINGS AND SPECIFICATIONS AND SITE CONDITIONS OR ANY INCONSISTENCIES OR AMBIGUITIES IN DRAWINGS OR SPECIFICATIONS SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER, IN WRITING, WHO SHALL PROMPTLY ADDRESS SUCH PROBLEMS. WORK DONE BY THE CONTRACTOR AFTER THE DISCOVERY OF SUCH DISCREPANCIES, INCONSISTENCIES, OR AMBIGUITIES SHALL BE DONE AT THE CONTRACTOR'S RISK.
2. WORK ON THIS PROJECT SHALL CONFORM TO THE LATEST EDITIONS OF THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE HANDBOOK. IN THE EVENT OF CONFLICT BETWEEN THE DESIGN, SPECIFICATIONS, OR PLANS, THE MOST STRINGENT WILL GOVERN.
3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED DAILY, RELOCATED WHEN NECESSARY AND SHALL BE CHECKED AFTER EVERY RAINFALL. SEEDED AREAS SHALL BE CHECKED REGULARLY AND SHALL BE WATERED, FERTILIZED, RESEEDED AND MULCHED AS NECESSARY TO OBTAIN A DENSE STAND OF GRASS.
4. ALL DRAIN INLETS SHALL BE PROTECTED FROM SILTATION. INEFFECTIVE PROTECTION DEVICES SHALL BE REPLACED AND THE INLET CLEANED. FLUSHING IS NOT AN ACCEPTABLE MEANS OF CLEANING.
5. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL PUBLIC OR PRIVATE UTILITIES WHICH LIE IN OR ADJACENT TO THE CONSTRUCTION SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR, AT HIS OR HER EXPENSE, OF ALL EXISTING UTILITIES DAMAGED DURING CONSTRUCTION. FORTY-EIGHT HOURS PRIOR TO ANY EXCAVATION THE CONTRACTOR SHALL CALL MISS UTILITY AT (800) 552-7001.
6. INSTALLATION OF CONCRETE, CORRUGATED METAL, OR HDPE STORM PIPE SHALL BE IN CONFORMANCE WITH THESE DRAWINGS.
7. ALL MATERIALS USED FOR FILL OR BACK FILL SHALL BE FREE OF WOOD, ROOTS, ROCKS, BOULDERS OR ANY OTHER NON-COMPACTABLE SOIL TYPE MATERIALS. UNSATISFACTORY MATERIALS ALSO INCLUDE MAN MADE FILLS AND REFUSE DEBRIS DERIVED FROM ANY SOURCE.
8. MATERIALS USED TO FILL AROUND DRAINAGE STRUCTURES IN UTILITY TRENCHES OR ANY OTHER DEPRESSION REQUIRING FILL OR BACK FILL SHALL BE COMPACTED TO 95% OF MAXIMUM DENSITY AS DETERMINED BY THE STANDARD PROCTOR TEST AS SET FORTH IN ASTM STANDARD D-698. THE CONTRACTOR SHALL, PRIOR TO ANY OPERATIONS INVOLVING FILLING OR BACK FILLING, SUBMIT THE RESULTS OF THE PROCTOR TEST TOGETHER WITH A CERTIFICATION THAT THE SOIL TESTED IS REPRESENTATIVE OF THE MATERIALS TO BE USED ON THE PROJECT. THE TESTS SHALL BE CONDUCTED BY A CERTIFIED MATERIALS TESTING LABORATORY AND THE CERTIFICATIONS MADE BY A LICENSED PROFESSIONAL ENGINEER REPRESENTING THE LABORATORY. THE CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THESE TESTS AND THEIR SUBMITTALS.
9. FILL SHALL BE PLACED IN LIFTS AT A MAXIMUM UNCOMPACTED DEPTH OF 12-INCHES WITH SOIL FREE FROM AGGREGATES EXCEEDING 6".
10. ALL TEST RESULTS SHALL BE SUBMITTED TO THE ENGINEER. FAILURE TO CONDUCT DENSITY TESTS SHALL BE CAUSE FOR NON-ACCEPTANCE OF THE FACILITY. TESTS SHALL BE CONDUCTED AT THE SOLE COST OF THE CONTRACTOR OR HIS AGENT.
11. A PRE-CONSTRUCTION CONFERENCE SHALL BE HELD PRIOR TO THE START OF CONSTRUCTION.
12. SATISFACTORY MATERIALS FOR USE AS FILL FOR PAD AREAS INCLUDE MATERIALS CLASSIFIED IN ASTM D-2487AS GW, GP, GM, GC, SW, SP, SM, SC, ML, AND CL GROUPS. THE MOISTURE CONTENT SHALL BE CONTROLLED IN ACCORDANCE WITH THE LIMITS FROM THE STANDARD PROCTOR TEST (ASTM D 698) RESULTS TO FACILITATE COMPACTION. GENERALLY, UNSATISFACTORY MATERIALS INCLUDE MATERIALS CLASSIFIED IN ASTM D-2487 AS PT, CH, MH, OL, OH AND ANY SOIL TOO WET TO FACILITATE COMPACTION. CH AND MH SOILS MAY BE USED SUBJECT TO APPROVAL OF THE ENGINEER. SOILS SHALL HAVE A MINIMUM DRY DENSITY OF 92 LB/CF PER ASTM D-698 AND SHALL HAVE A PLASTICITY INDEX LESS THAN 17.
13. CONTRACTOR SHALL SUBMIT AND ADHERE TO A GENERAL GROUNDWATER PROTECTION PLAN.

EROSION CONTROL NOTES

1. THE CONTRACTOR SHALL ARRANGE FOR A PRE-CONSTRUCTION CONFERENCE WITH THE APPROPRIATE EROSION AND SEDIMENT CONTROL INSPECTOR 48 HOURS PRIOR TO BEGINNING WORK.
2. ALL EROSION CONTROL DEVICES AS SHOWN OR AS REQUIRED, ARE TO BE CONSTRUCTED TO THE CURRENT STANDARDS AND SPECIFICATIONS OF THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL AND ARE TO BE IN PLACE PRIOR TO ALL CONSTRUCTION.
3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED CONTINUOUSLY, RELOCATED WHEN AND AS NECESSARY AND SHALL BE CHECKED AFTER EVERY RAINFALL. SEEDED AREAS SHALL BE CHECKED REGULARLY AND SHALL BE WATERED, FERTILIZED, RESEEDED AND MULCHED AS NECESSARY TO OBTAIN A DENSE STAND OF GRASS.
4. ALL DISTURBED AREAS NOT PAVED OR BUILT UPON ARE TO BE FERTILIZED AND HYDRO-SEEDED WITH STRAW AND COTTON PRODUCT WITH TACK AGENTS BY THE CONTRACTOR IN ACCORDANCE WITH THE CURRENT WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL.
5. ALL DRAIN INLETS SHALL BE PROTECTED FROM SILTATION. INEFFECTIVE PROTECTION DEVICES SHALL BE IMMEDIATELY REPLACED AND THE INLET CLEANED. FLUSHING IS NOT AN ACCEPTABLE METHOD OF CLEANING.
6. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT (UNDISTURBED) FOR LONGER THAN 21 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN SIX MONTHS.
7. DURING CONSTRUCTION OF THE PROJECT, SOIL STOCKPILES SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES.
8. SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.
9. STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS IMPOUNDMENTS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
10. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE ENGINEER. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.
11. ALL DISTURBED AREAS NOT PAVED OR BUILT UPON SHALL BE HYDRO-SEEDED AND FERTILIZED. PERFORM PERMANENT TOP SOILING, SEEDING AND FERTILIZING AS SOON AFTER FINISH GRADING AS POSSIBLE. SEEDING SHALL COMPLY WITH THE FOLLOWING:
    - A. TOPSOIL - 4 INCH MINIMUM FOR PERMANENT TURF
    - B. FERTILIZER - 500 POUNDS PER ACRES OF 10-20-10 FERTILIZER OR EQUIVALENT POUNDAGE OF DIFFERENT ANALYSIS. WORK INTO SOIL PRIOR TO SEEDING.
    - C. LIME (PERMANENT SEEDING) - AGRICULTURAL LIME SPREAD AT RATE OF 4 TONS/ACRE. WORK INTO SOIL PRIOR TO SEEDING.
    - D. MULCH - WOOD FIBER OR CHOPPED STRAW AT RATE OF 2 TONS PER ACRE. HYDRO-MULCH AT RATE OF 30 BALES PER ACRE.
    - E. SEED - 45 LBS. PER ACRE TALL FESCUE AND 20 LBS. PER ACRE PERENNIAL RYE GRASS. TO BE SEEDED BY HYDRO-SEEDER.

EROSION AND SEDIMENT CONTROL NARRATIVE

1. PROJECT DESCRIPTION: THE PURPOSE OF THIS PROJECT IS TO GRADE AND INSTALL EROSION AND SEDIMENT CONTROL MEASURES, IN PREPARATION FOR THE CONSTRUCTION OF A GAS WELL PAD NEAR SMITH CHAPEL, WEST VIRGINIA, IN DODDRIDGE COUNTY. THE CONSTRUCTION INCLUDES TWO ACCESS ROADS, ONE FRAC. WATER PIT, DRILL PAD,WATER TANK PAD, STORM WATER CONTROLS, AND INCIDENTAL WORK. THE TOTAL APPROXIMATE LAND DISTURBANCE ASSOCIATED WITH THIS PROJECT IS 22.79 ACRES.
2. EXISTING SITE CONDITIONS: THE EXISTING SITE IS UPLAND HARDWOODS WITH GENTLE TO MODERATELY STEEP TOPOGRAPHY WITH 5% TO 20% SLOPES. NO EROSION IS NOTICED ON SITE, OR IN ANY NATURAL DRAINAGE WAYS.
3. ADJACENT PROPERTY: THE SITE IS BORDERED ON ALL SIDES BY UPLAND HARDWOODS.
4. SOILS: NO SOIL STUDIES OR SUBSURFACE INVESTIGATIONS WERE PERFORMED FOR THIS PROJECT.
5. OFF SITE AREAS: THERE SHALL BE NO BORROW AREA OUTSIDE OF THE PROPOSED GRADING AND CONSTRUCTION AREA.
6. CRITICAL EROSION AREAS-CONTROL MAINTENANCE: ALL 3:1 SLOPES AND STEEPER, DITCHES AND OTHER CONTROLS SHALL BE CONSIDERED CRITICAL EROSION AREAS. THESE AREAS SHALL BE MONITORED & MAINTAINED DAILY AND AFTER EACH RAIN FALL OF 0.5 INCHES OR GREATER. THE LOCAL GOVERNING AUTHORITY WILL HAVE THE AUTHORITY TO RECOMMEND THE PLACEMENT OF ADDITIONAL EROSION CONTROL MEASURES IN THESE AREAS IF IT BECOMES EVIDENT DURING CONSTRUCTION THAT THE ONES IN PLACE ARE NOT FUNCTIONING SUFFICIENTLY.
7. EROSION AND SEDIMENT CONTROL MEASURES: UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE CURRENT WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL THE CONTRACTOR SHALL OBTAIN A COPY OF THIS MANUAL FROM THE WVDEP WEBSITE AND CONSTRUCT ALL DEVICES BASED ON THIS MANUAL OR A HANDBOOK THAT IS COMPARABLE OR EXCEEDS THE SPECIFICATIONS OF THE WEST VIRGINIA MANUAL. THE MINIMUM STANDARDS OF THIS MANUAL SHALL BE ADHERED TO UNLESS OTHERWISE WAIVED OR APPROVED BY A VARIANCE. SEE PLANS FOR ALL PROPOSED EROSION AND SEDIMENT CONTROL MEASURES.
8. STRUCTURAL PRACTICES:
   -DIVERSION DITCHES: WILL BE CONSTRUCTED AS SHOWN ON THE PLANS.
   -DIVERSION BERMS: WILL BE CONSTRUCTED AS SHOWN ON THE PLANS.
   -OUTLET PROTECTION: WILL BE CONSTRUCTED AS SHOWN ON THE PLANS.
   -24" SILT SOXX/SILT FENCE/SUPER SILT FENCE: WILL BE CONSTRUCTED AS SHOWN ON THE PLANS.
9. VEGETATIVE PRACTICE TOPSOILING: TOPSOIL WILL BE STRIPPED FROM THE SITE AND STOCKPILED IN AN AREA DETERMINED IN THE FIELD. UPON THE COMPLETION OF THE PROJECT TOPSOIL WILL BE PLACED ON ALL DISTURBED AREAS AT A MINIMUM DEPTH OF 4 INCHES. TEMPORARY SEEDING: ALL DENUDED AREAS LEFT DORMANT FOR MORE THAN 21 DAYS SHALL BE SEEDED WITH A FAST GERMINATING SEED. THE TIME OF YEAR WILL BE THE BASIS FOR THE SEED MIXTURE. PERMANENT SEEDING: ALL SEEDED AREAS WILL BE RESEEDED, MULCHED AND FERTILIZED AS NEEDED TO OBTAIN AN ADEQUATE STAND OF GRASS. PERMANENT SEEDING SHALL BE PLACED WITHIN SEVEN DAYS UPON ACHIEVING FINAL GRADE. WATER, MULCH, AND RESEED AS NECESSARY TO OBTAIN AN ADEQUATE STAND OF VEGETATION, IN THE OPINION OF THE ENGINEER.
10. MANAGEMENT STRATEGIES: CONSTRUCTION WILL BE SEQUENCED SO THAT GRADING OPERATIONS WILL BEGIN AND END AS SOON AS POSSIBLE. THE JOB SUPERINTENDENT SHALL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL MEASURES. AFTER ACHIEVING ADEQUATE STABILIZATION THE TEMPORARY EROSION AND SEDIMENT CONTROLS SHALL BE REMOVED AND ANY AREAS DISTURBED DURING THIS PROCESS SHALL BE STABILIZED.
11. SEQUENCE OF EVENTS:
    - A. A PRE-CONSTRUCTION CONFERENCE WILL BE HELD ON SITE WITH CONTRACTOR TO REVIEW THE CONSTRUCTION DRAWINGS AND PROVIDE ANY REQUESTED GUIDANCE.
    - B. CONSTRUCT THE CONSTRUCTION ENTRANCE.
    - C. CONSTRUCT ALL PROPOSED SEDIMENT CONTROL DEVICES AS SOON AS CLEARING AND GRUBBING OPERATIONS ALLOW. DIVERSIONS AND SEDIMENT BASINS SHALL BE SEEDED AND MULCHED IMMEDIATELY.
    - D. 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.
    - E. GRADING OPERATIONS AS REQUIRED. CUT SLOPES AND FILL SLOPES SHALL BE TOPSOILED AS 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 4% - ORGANIC JUTE MATTING, 4 TO 10% - SYNTHETIC MATTING (TRM), AND 10% - 20% - RIPRAP.
    - F. 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.
    - G. WHEN FINAL GRADE IS ACHIEVED, TOPSOIL TO BE PLACED ON ALL DISTURBED AREAS NOT LINED. HYDRO-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.
    - H. LIME, FERTILIZER, AND SEED WILL BE APPLIED BY USING A HYDRO-SEEDER. HYDRO-MULCH PRODUCTS SHALL BE MIXED AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
    - I. FINAL SEEDING MUST OCCUR WITHIN 7 DAYS OF FINAL GRADING.
    - J. WHEN SITE IS STABILIZED, ALL EROSION AND SEDIMENT CONTROL MEASURES CAN BE REMOVED AND REPAIR/STABILIZE THOSE AREAS IN ACCORDANCE WITH STATE STANDARDS.
    - K. MAKE MODIFICATIONS FOR PERMANENT STORM WATER MANAGEMENT.
    - L. FINAL SITE INSPECTION.
12. PERMANENT STABILIZATION: ALL AREAS LEFT UNCOVERED BY EITHER BUILDINGS OR PAVEMENT SHALL BE STABILIZED WITH PERMANENT SEEDING IMMEDIATELY FOLLOWING FINISH GRADING AND WITHIN 7 DAYS. AT NO TIME SHALL LAND LAY DORMANT FOR LONGER THAN 21 DAYS. SEE SEQUENCE OF EVENTS FOR RATES.
13. MAINTENANCE, AND OTHER CONSIDERATIONS AND GROUND WATER PROTECTION: ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED DAILY AND AFTER EACH RAINFALL OF 0.5 INCH OR MORE. THEY WILL BE INSPECTED FOR UNDERMINING, DETERIORATION, EROSION AND EXCESS DEPOSITED MATERIAL. ALL DEFICIENCIES WILL BE CORRECTED IMMEDIATELY. EXCESS MATERIAL WILL BE SPREAD ON THE SITE IN A MANNER WHERE IT IS NOT LIKELY TO ERODE IN THE FUTURE. CLEANING PROCEDURES WILL BE COMPLETED AT REGULAR INTERVALS AND AT LEAST WHEN SEDIMENT REACHES 33% OF CAPACITY, OR AS SHOWN ON APPLICABLE DETAILS. RECORDS OF CLEANING AND CORRECTIONS WILL BE MAINTAINED BY THE CONTRACTOR. THE "GENERIC GROUNDWATER PROTECTION PLAN FOR CONSTRUCTION SITES" WILL BE USED AND AVAILABLE ON SITE AT ALL TIMES. AN AREA WILL BE PROVIDED FOR VEHICLE AND EQUIPMENT MAINTENANCE. MOBILE FUEL TRUCKS WITH APPROVED TANKS WILL BE USED ON THIS SITE. PORTABLE SANITARY FACILITIES WILL BE AVAILABLE FOR EMPLOYEES. IF CONCRETE IS USED, EXCESS CONCRETE WILL BE DISPOSED OF PROPERLY AND NOT ALLOWED TO REMAIN ON THIS SITE. MACHINERY WILL NOT BE ALLOWED IN LIVE STREAMS. FLUIDS SUCH AS DIESEL FUEL, GAS, OIL OR ANTIFREEZE WILL BE KEPT IN PROPER CONTAINERS AND ANY SPILLAGE WILL BE CLEANED AND TAKEN OFF SITE TO A PROPER FACILITY. SOLID OR HAZARDOUS WASTES WILL BE DISPOSED IN ACCORDANCE WITH APPROPRIATE STATE AND FEDERAL REGULATIONS. IT IS THE CONTRACTORS RESPONSIBILITY TO MAKE CHANGES AND NOTIFY WVDEP OF ANY CHANGES TO GPP. A FINAL INSPECTION WILL BE MADE AT THE CONCLUSION OF THE PROJECT AND ALL CORRECTIONS MADE BEFORE SIGN-OFF OF THE PROJECT SITE.

DATE	REVISIONS

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

THOMAS D. CORATHERS REGISTERED 14161 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
11-30-2012

Hornor Bros. Engineers
Since 1902
Civil, Mining, Environmental and Consulting Engineering
140 South Third Street, Post Office Box 386, Clarksburg, West Virginia, 26301 (304) 624-6445

ANTERO RESOURCES

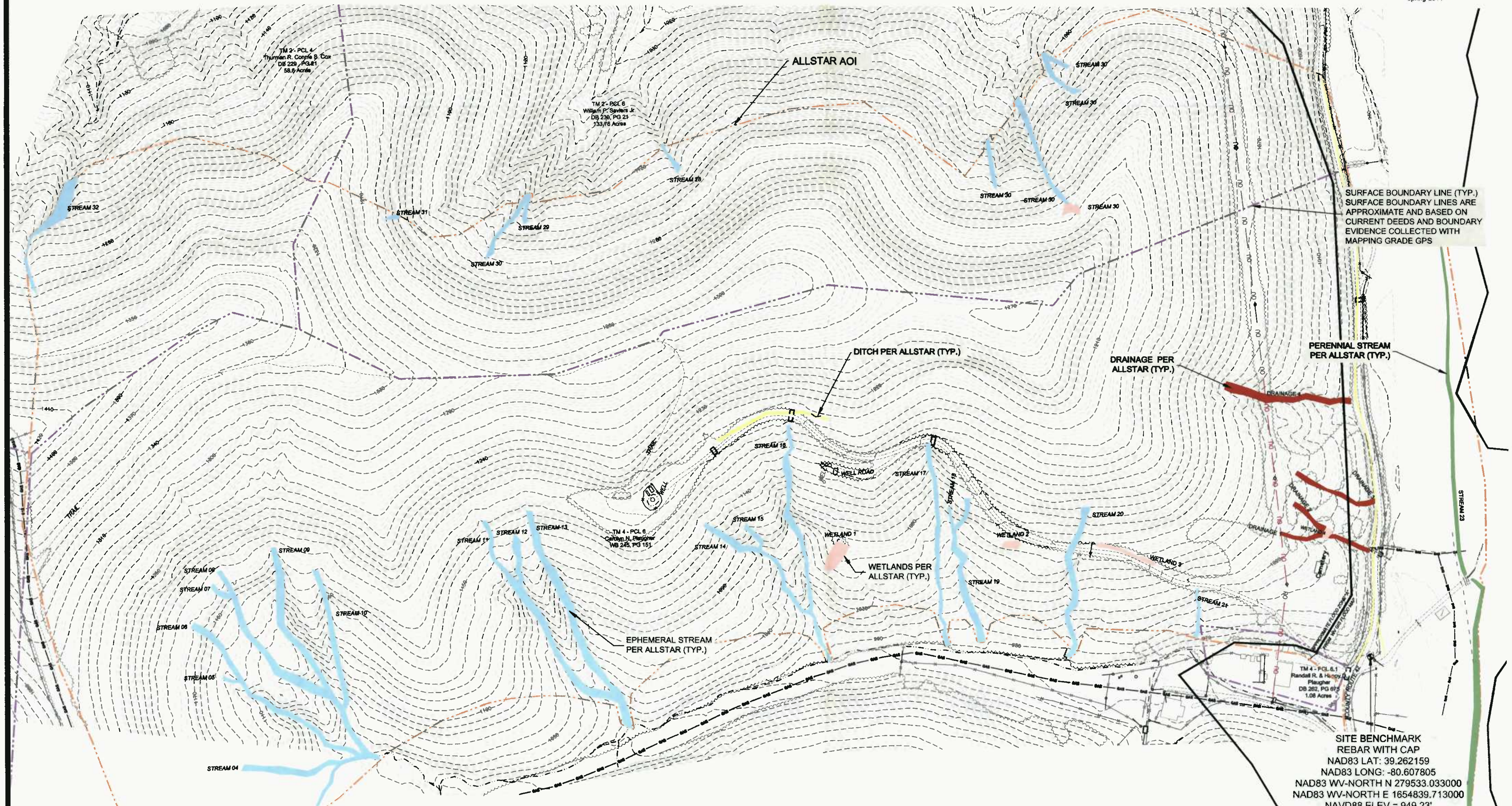
THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

CONSTRUCTION, GENERAL AND E & S NOTES
PLAUGHER NORTH
DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: N/A
Designed By: JDR &TBC
File No. HBE PROJECTS/2012/ASI/ 203-12C3D-2012/ 203-12-FINAL.dwg

PLAUGHER NORTH DRILL PAD
EXISTING CONDITIONS PLAN
ANTERO RESOURCES APPALACHIAN CORPORATION

All topographic information shown hereon is based on aerial photography provided by Blue Mountain Aerial Mapping with a flight date of Spring 2011



STREAM 03
STREAM 02
STREAM 01

GRAPHIC SCALE
120 0 60 120 240 480
(IN FEET)
1 inch = 120 ft.

Legend

- Existing 2' Contour
- Existing 10' Contour
- Existing Tree Line
- Existing Utility Pole
- Existing Overhead Utility
- Existing Gas Line CL
- Existing Water Line CL

DATE	REVISIONS
1-08-2013	REVISED AFFECTED STREAM INFO
2-26-2013	REVISED ENVIRONMENTAL DELINEATION

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ANTERO RESOURCES

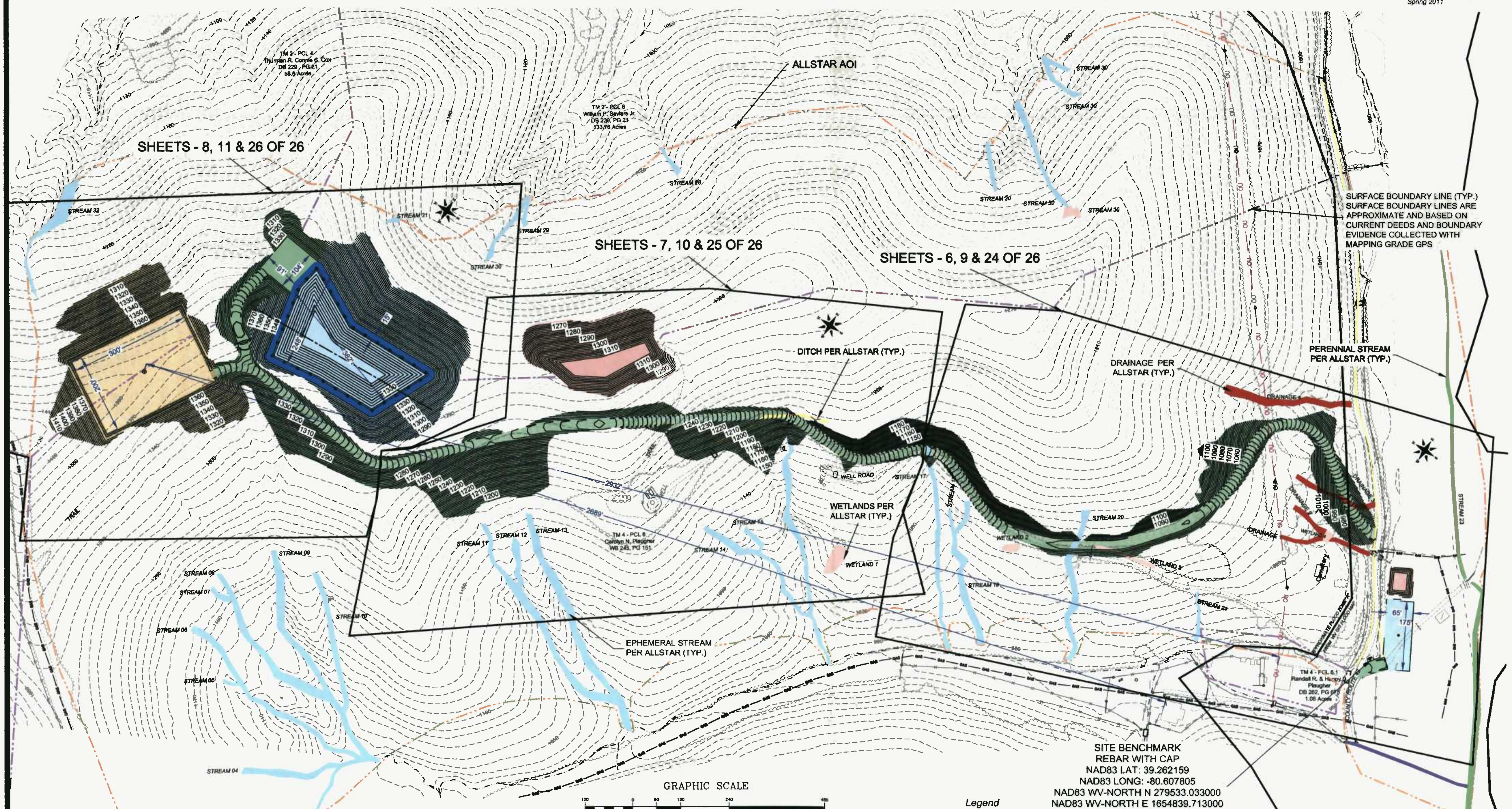
THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

EXISTING CONDITIONS PLAN
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 120'
Designed By: JDR & TBC
File No.
Page 4 of 26

PLAUGHER NORTH DRILL PAD
OVERVIEW PLAN & PLAN SHEET INDEX
ANTERO RESOURCES APPALACHIAN CORPORATION

All topographic information shown hereon is based on aerial photography provided by Blue Mountain Aerial Mapping with a flight date of Spring 2011



Legend

- Proposed Road Area
- Proposed Drill Pad Area
- Proposed Impoundment Area or Water Tank Pad
- Proposed Spoil Area
- Existing 2' Contour
- Existing 10' Contour
- Existing Tree Line
- Existing Utility Pole
- Existing Overhead Utility
- Existing Gas Line CL
- Existing Water Line CL

DATE	REVISIONS
1-08-2013	REVISED AFFECTED STREAM INFO
2-26-2013	REVISED ENVIRONMENTAL DELINEATION
3-18-2013	ADDED OVERVIEW PLAN SHEET

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05-08-2013

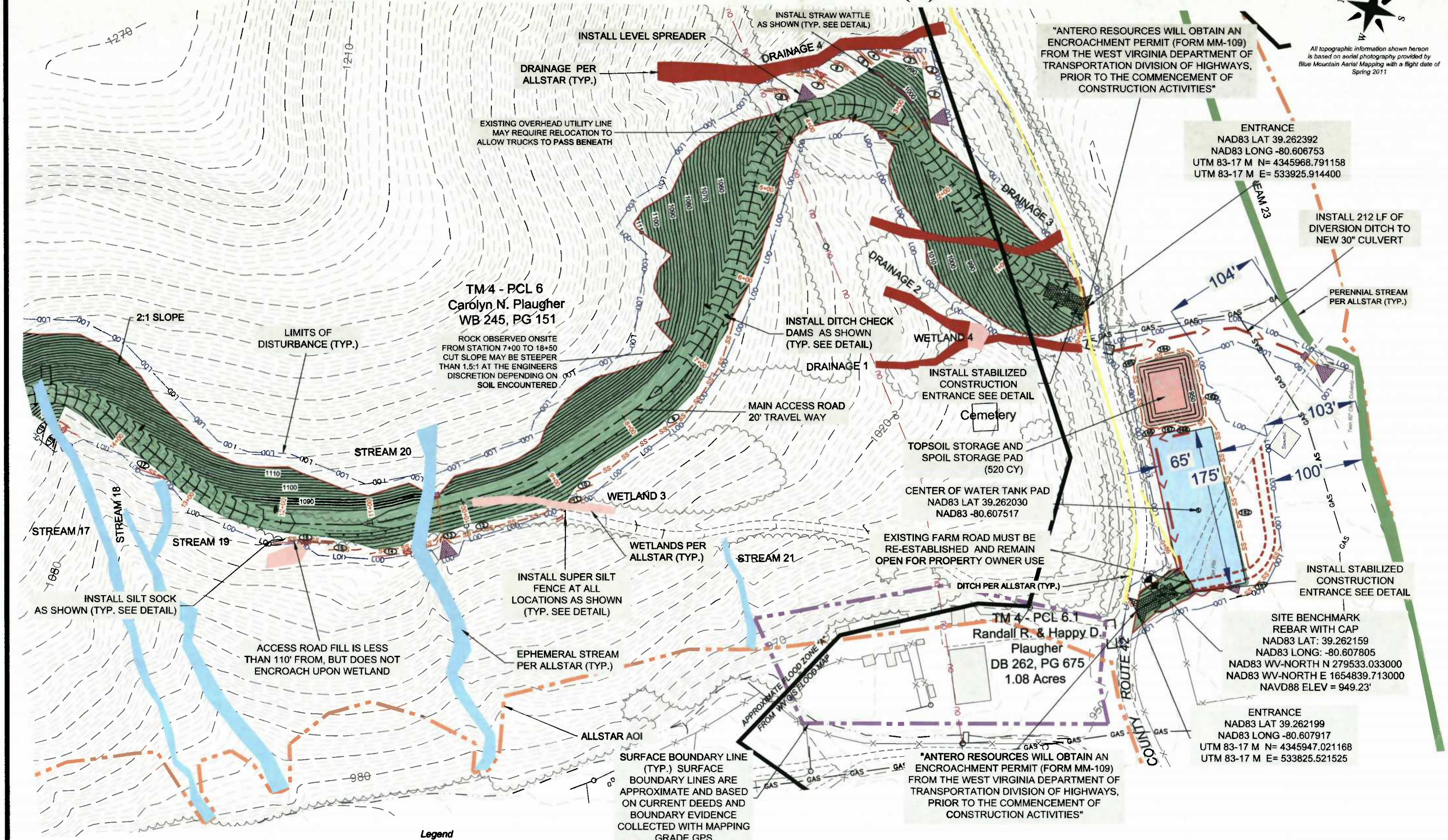
ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

OVERVIEW PLAN
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 120'
Designed By: JDR & TBC
File No. HBB PROJECTS/2012/ASI/ 203-12CSD-2012/ 203-12-6X.dwg

E&S CONTROL PLAN (1)


INSTALL STRAW WATTLE AS SHOWN (TYP. SEE DETAIL)
INSTALL LEVEL SPREADER
DRAINAGE PER ALLSTAR (TYP.)
DRAINAGE 4
"ANTERO RESOURCES WILL OBTAIN AN ENCROACHMENT PERMIT (FORM MM-109) FROM THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS, PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES"
All topographic information shown hereon is based on aerial photography provided by Blue Mountain Aerial Mapping with a flight date of Spring 2011
EXISTING OVERHEAD UTILITY LINE MAY REQUIRE RELOCATION TO ALLOW TRUCKS TO PASS BENEATH
ENTRANCE
NAD83 LAT 39.262392
NAD83 LONG -80.606753
UTM 83-17 M N= 4345968.791158
UTM 83-17 M E= 533925.914400
DRAINAGE 3
INSTALL 212 LF OF DIVERSION DITCH TO NEW 30" CULVERT
DRAINAGE 2
104'
PERENNIAL STREAM PER ALLSTAR (TYP.)
TM 4 - PCL 6
Carolyn N. Plaugher
WB 245, PG 151
2:1 SLOPE
LIMITS OF DISTURBANCE (TYP.)
ROCK OBSERVED ONSITE FROM STATION 7+00 TO 18+50 CUT SLOPE MAY BE STEEPER THAN 1.5:1 AT THE ENGINEERS DISCRETION DEPENDING ON SOIL ENCOUNTERED
INSTALL DITCH CHECK DAMS AS SHOWN (TYP. SEE DETAIL)
WETLAND 4
DRAINAGE 1
INSTALL STABILIZED CONSTRUCTION ENTRANCE SEE DETAIL
MAIN ACCESS ROAD 20' TRAVEL WAY
Cemetery
103'
STREAM 20
TOPSOIL STORAGE AND SPOIL STORAGE PAD (520 CY)
65'
175'
100'
CENTER OF WATER TANK PAD
NAD83 LAT 39.262030
NAD83 -80.607517
WETLAND 3
STREAM 17
STREAM 18
STREAM 19
WETLANDS PER ALLSTAR (TYP.)
STREAM 21
EXISTING FARM ROAD MUST BE RE-ESTABLISHED AND REMAIN OPEN FOR PROPERTY OWNER USE
INSTALL SUPER SILT FENCE AT ALL LOCATIONS AS SHOWN (TYP. SEE DETAIL)
DITCH PER ALLSTAR (TYP.)
INSTALL STABILIZED CONSTRUCTION ENTRANCE SEE DETAIL
INSTALL SILT SOCK AS SHOWN (TYP. SEE DETAIL)
TM 4 - PCL 6.1
Randall R. & Happy D. Plaugher
DB 262, PG 675
1.08 Acres
SITE BENCHMARK
REBAR WITH CAP
NAD83 LAT: 39.262159
NAD83 LONG: -80.607805
NAD83 WV-NORTH N 279533.033000
NAD83 WV-NORTH E 1654839.713000
NAVD88 ELEV = 949.23'
ACCESS ROAD FILL IS LESS THAN 110' FROM, BUT DOES NOT ENCROACH UPON WETLAND
EPHEMERAL STREAM PER ALLSTAR (TYP.)
APPROXIMATE FLOOD ZONE "A" FROM WVGIS FLOOD MAP
COUNTY ROUTE 42
ENTRANCE
NAD83 LAT 39.262199
NAD83 LONG -80.607917
UTM 83-17 M N= 4345947.021168
UTM 83-17 M E= 533825.521525
ALLSTAR AOI
SURFACE BOUNDARY LINE (TYP.) SURFACE BOUNDARY LINES ARE APPROXIMATE AND BASED ON CURRENT DEEDS AND BOUNDARY EVIDENCE COLLECTED WITH MAPPING GRADE GPS
"ANTERO RESOURCES WILL OBTAIN AN ENCROACHMENT PERMIT (FORM MM-109) FROM THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS, PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES"

Legend

- Proposed Road Area
- Proposed Drill Pad Area
- Proposed Impoundment Area or Water Tank Pad
- Proposed Spoil Area
- Existing 2' Contour
- Existing 10' Contour
- Existing Tree Line
- Existing Utility Pole
- Existing Overhead Utility
- Existing Gas Line CL
- Existing Water Line CL
- Proposed 2' Contour
- Proposed 10' Contour

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

ALL WOOD WASTE SHALL BE USED AS A SEDIMENT BARRIER, CHIPPED, LEGALLY HAULED OFF, OR LEGALLY BURNED ON SITE

DATE	REVISIONS
1-08-2013	REVISED AFFECTED STREAM INFO
2-04-2013	REVISED AFFECTED STREAM INFO
2-26-2013	REVISED ENVIRONMENTAL DELINEATION
5-8-2013	ADDED STRAW WATTLES AND GUARDRAIL

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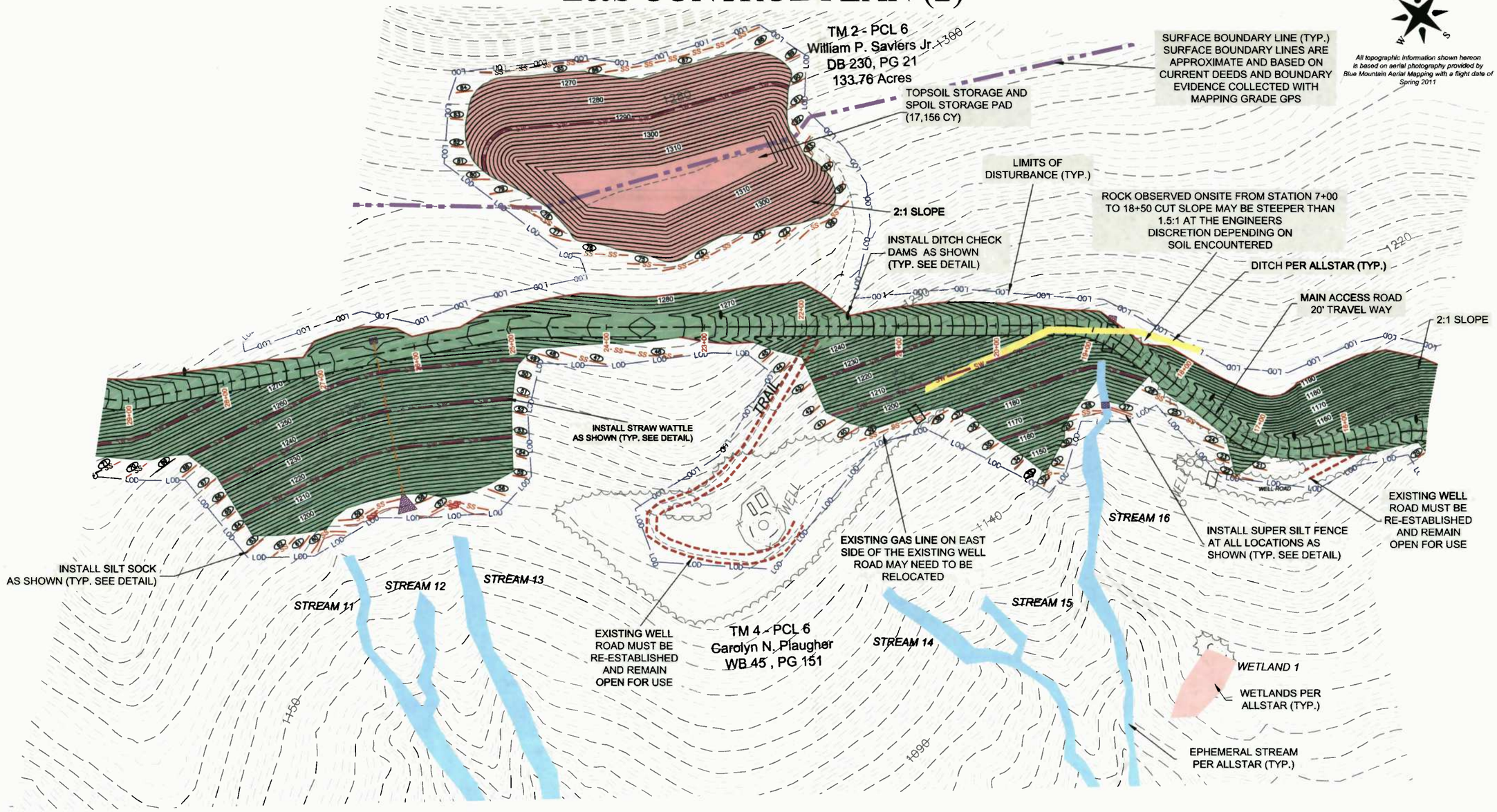
ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

EROSION & SEDIMENT CONTROL PLAN
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR & TBC
File No.

E&S CONTROL PLAN (2)



Legend

- Proposed Road Area
- Proposed Drill Pad Area
- Proposed Impoundment Area or Water Tank Pad
- Proposed Spoil Area

Legend

- Existing 2' Contour
- 1330 Existing 10' Contour
- Existing Tree Line
- Existing Utility Pole
- OU Existing Overhead Utility
- Existing Gas Line CL
- Existing Water Line CL
- Proposed 2' Contour
- Proposed 10' Contour

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

ALL WOOD WASTE SHALL BE USED AS A SEDIMENT BARRIER, CHIPPED, LEGALLY HAULED OFF, OR LEGALLY BURNED ON SITE

DATE	REVISIONS
5-8-2013	ADDED STRAW WATTLES AND GUARDRAIL

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ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

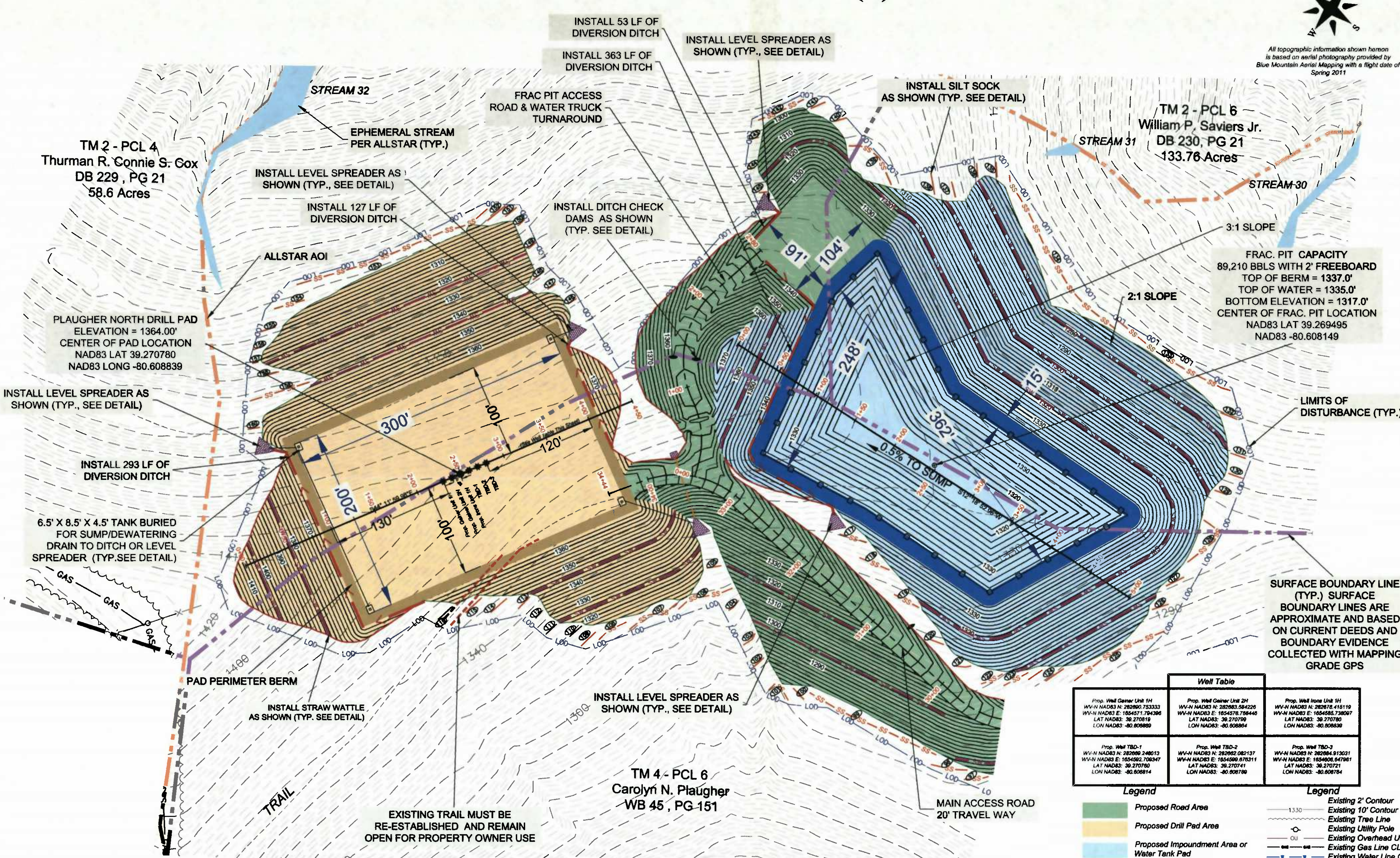
EROSION & SEDIMENT CONTROL PLAN

PLAUGHER NORTH DRILL PAD SITE

GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR & TBC
File No. [illegible]
Page 7 of 26

E&S CONTROL PLAN (3)



Well Table

Prop. Well Geiner Unit 1H WV-N NAD83 N: 282690.753333 WV-N NAD83 E: 1654571.794396 LAT NAD83: 39.270819 LON NAD83: -80.608869	Prop. Well Geiner Unit 2H WV-N NAD83 N: 282683.584226 WV-N NAD83 E: 1654578.766446 LAT NAD83: 39.270799 LON NAD83: -80.608864	Prop. Well Irons Unit 1H WV-N NAD83 N: 282676.415119 WV-N NAD83 E: 1654585.738097 LAT NAD83: 39.270780 LON NAD83: -80.608839
Prop. Well TBD-1 WV-N NAD83 N: 282669.246013 WV-N NAD83 E: 1654592.709347 LAT NAD83: 39.270760 LON NAD83: -80.608814	Prop. Well TBD-2 WV-N NAD83 N: 282662.082137 WV-N NAD83 E: 1654599.676311 LAT NAD83: 39.270741 LON NAD83: -80.608789	Prop. Well TBD-3 WV-N NAD83 N: 282684.913031 WV-N NAD83 E: 1654606.647961 LAT NAD83: 39.270721 LON NAD83: -80.608764

Legend

- Proposed Road Area
- Proposed Drill Pad Area
- Proposed Impoundment Area or Water Tank Pad
- Proposed Spoil Area

Legend

- Existing 2' Contour
- 1330 Existing 10' Contour
- Existing Tree Line
- Existing Utility Pole
- OU Existing Overhead Utility
- Existing Gas Line CL
- Existing Water Line CL
- Proposed 2' Contour
- Proposed 10' Contour

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

ALL WOOD WASTE SHALL BE USED AS A SEDIMENT BARRIER, CHIPPED, LEGALLY HAULED OFF, OR LEGALLY BURNED ON SITE

DATE	REVISIONS
1-29-2013	ADDED SUMP/DEWATERING TANKS TO LAYOUT
5-8-2013	ADDED STRAW WATTLES AND GUARDRAIL

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

Hornor Bros. Engineers
Since 1902
Civil, Mining, Environmental and Consulting Engineering
140 South Third Street, Post Office Box 386, Clarksburg, West Virginia, 26301 (304) 624-6445

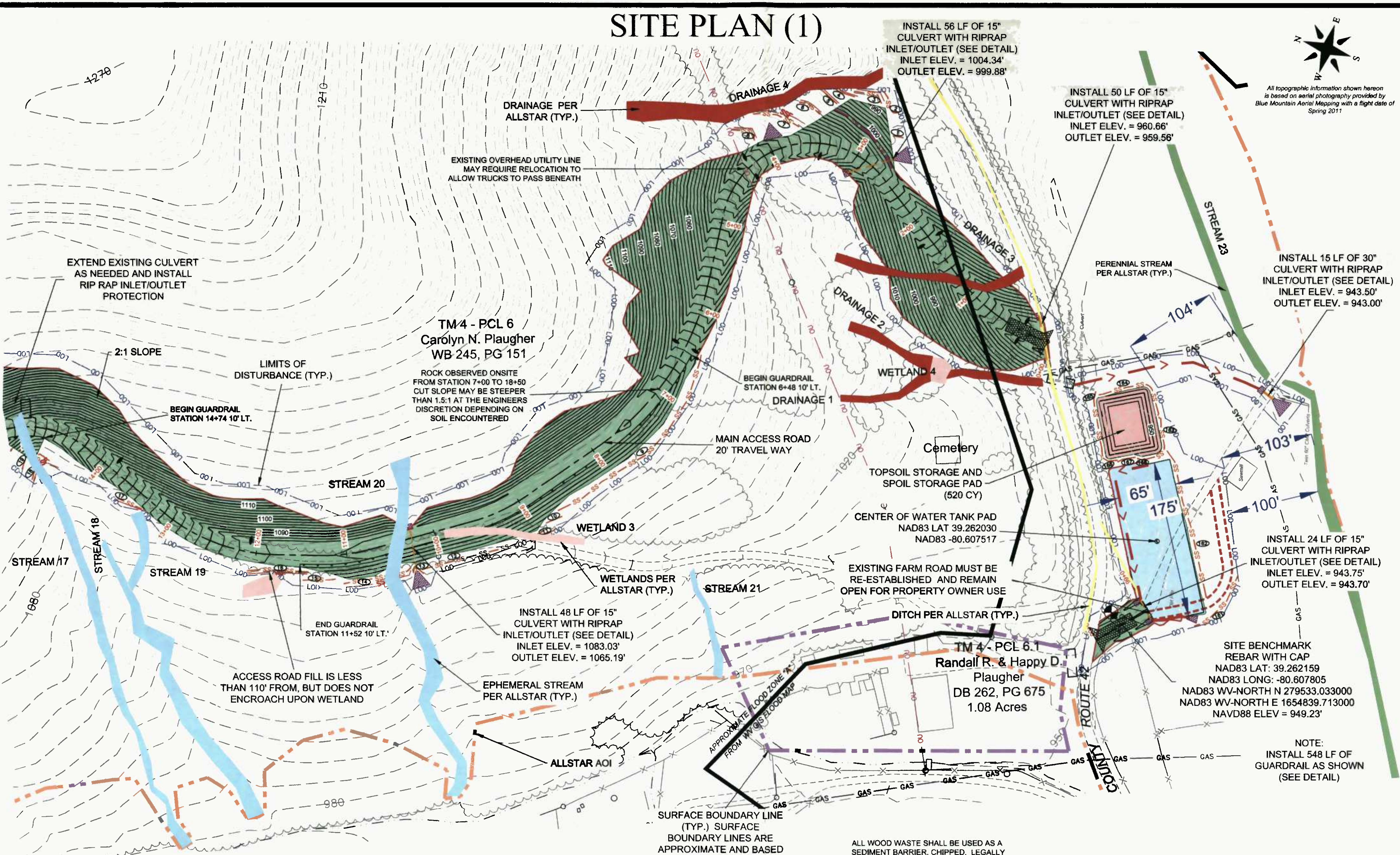
ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

EROSION & SEDIMENT CONTROL PLAN
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR & TBC
File No. HBE PROJECTS/2012/ASI/ 203-12C3D-2012/ 203-12-FINAL.dwg

SITE PLAN (1)



AFFECTED STREAMS

STREAM #	LENGTH	PIPE INFO	INLET	OUTLET (3xDIA)
16 (ACCESS ROAD)	63 LF	25 LF 15" HDPE	3 LF RIPRAP	3.75 LF RIPRAP
17 (ACCESS ROAD)	76 LF	25 LF 15" HDPE	3 LF RIPRAP	3.75 LF RIPRAP
20 (ACCESS ROAD)	94 LF	48 LF 15" HDPE	3 LF RIPRAP	3.75 LF RIPRAP

AFFECTED WETLANDS

WETLAND #	AREA	DESCRIPTION
3 (ACCESS ROAD)	885 sf/0.02 ac	ENGINEERED FILL

Legend

- *Proposed Road Area*
- *Proposed Drill Pad Area*
- *Proposed Impoundment Area or Water Tank Pad*
- *Proposed Spoil Area*

Legend

- *Existing 2' Contour*
- 1330 *Existing 10' Contour*
- *Existing Tree Line*
- *Existing Utility Pole*
- OU *Existing Overhead Utility*
- *Existing Gas Line CL*
- *Existing Water Line CL*
- *Proposed 2' Contour*
- *Proposed 10' Contour*

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

DATE	REVISIONS
1-08-2013	**REVISED AFFECTED STREAM INFO**
2-04-2013	**REVISED AFFECTED STREAM INFO**
2-12-2013	ADDED DIMENSION LINES FROM TANK PAD TO STREAM
2-26-2013	REVISED ENVIRONMENTAL DELINEATION
5-8-2013	ADDED STRAW WATTLES AND GUARDRAIL

Allegheny Surveys, Inc.
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Bridgeport, WV 26330
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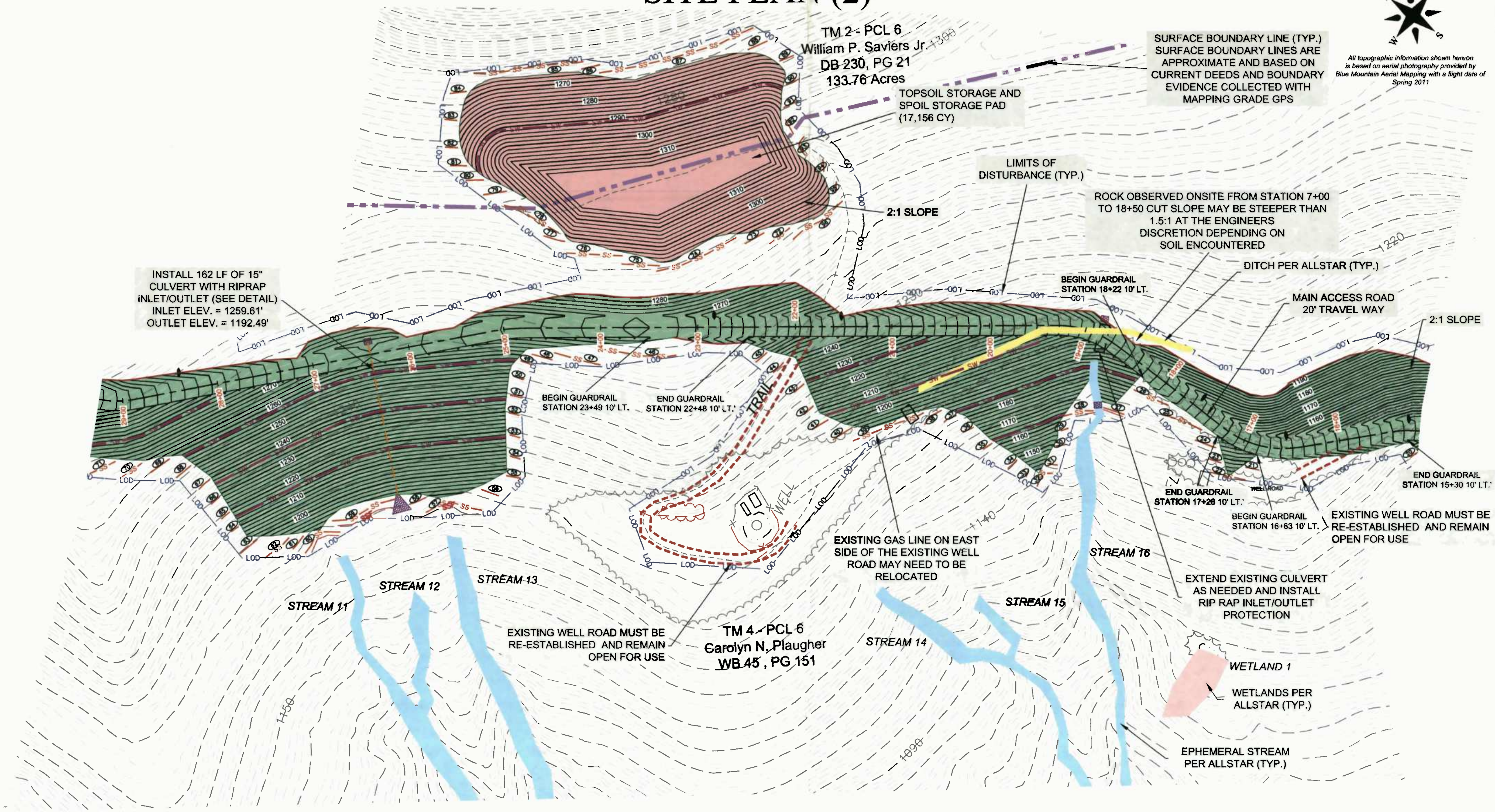
ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

FINAL SITE DESIGN
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR &TBC
File No. HBE PROJECTS/2012/ASI/ ...-12C3D-2012/ ...-12-FINAL.dwg

SITE PLAN (2)



AFFECTED STREAMS				
STREAM #	LENGTH	PIPE INFO	INLET	OUTLET (3xDIA)
16 (ACCESS ROAD)	63 LF	25 LF 15" HDPE	3 LF RIPRAP	3.75 LF RIPRAP
17 (ACCESS ROAD)	76 LF	25 LF 15" HDPE	3 LF RIPRAP	3.75 LF RIPRAP
20 (ACCESS ROAD)	94 LF	48 LF 15" HDPE	3 LF RIPRAP	3.75 LF RIPRAP

AFFECTED WETLANDS		
WETLAND #	AREA	DESCRIPTION
3 (ACCESS ROAD)	885 sf/0.02 ac	ENGINEERED FILL

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

NOTE:
INSTALL 1,057 LF OF GUARDRAIL AS SHOWN (SEE DETAIL)

ALL WOOD WASTE SHALL BE USED AS A SEDIMENT BARRIER, CHIPPED, LEGALLY HAULED OFF, OR LEGALLY BURNED ON SITE

Legend

- Proposed Road Area
- Proposed Drill Pad Area
- Proposed Impoundment Area or Water Tank Pad
- Proposed Spoil Area

Legend

- Existing 2' Contour
- Existing 10' Contour
- Existing Tree Line
- Existing Utility Pole
- Existing Overhead Utility
- Existing Gas Line CL
- Existing Water Line CL
- Proposed 2' Contour
- Proposed 10' Contour

DATE	REVISIONS
2-26-2013	REVISED ENVIRONMENTAL DELINEATION
5-8-2013	ADDED STRAW WATTLES AND GUARDRAIL

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ANTERO RESOURCES

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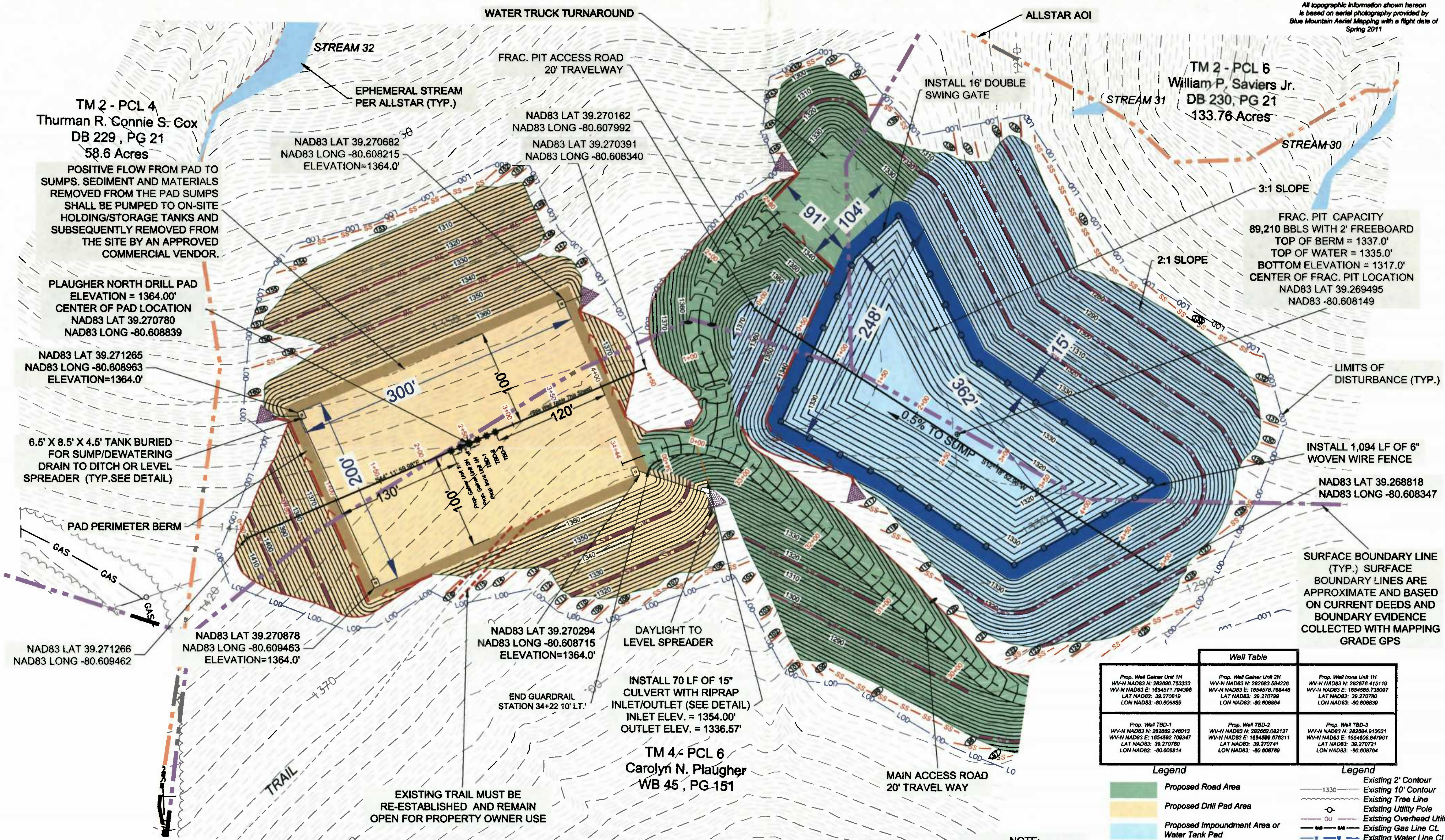
FINAL SITE DESIGN
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR & TBC
File No. HBR PROJECTS/2012/ASI/ 203-12C3D-2012/ 203-12-FINAL.dwg

SITE PLAN (3)

NOTE:
PIT LINER SYSTEM (BY OTHERS) SHALL CONSIST OF 7,414 SY OF 10 OUNCE FELT OVERLAIN WITH 7,414 SY 60 MIL POLYFLEX IMPERVIOUS, TEXTURED HDPE GEOMEMBRANE.

All topographic information shown hereon is based on aerial photography provided by Blue Mountain Aerial Mapping with a flight date of Spring 2011



Well Table

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Prop. Well TBD-1 WV-N NAD83 N: 282669.246013 WV-N NAD83 E: 1654592.709347 LAT NAD83: 39.270760 LON NAD83: -80.608814	Prop. Well TBD-2 WV-N NAD83 N: 282662.082137 WV-N NAD83 E: 1654599.676311 LAT NAD83: 39.270741 LON NAD83: -80.608789	Prop. Well TBD-3 WV-N NAD83 N: 282684.913031 WV-N NAD83 E: 1654606.647961 LAT NAD83: 39.270721 LON NAD83: -80.608764

Legend

- Proposed Road Area
- Proposed Drill Pad Area
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- Proposed Spoil Area

Legend

- Existing 2' Contour
- 1330 Existing 10' Contour
- Existing Tree Line
- Existing Utility Pole
- OU Existing Overhead Utility
- Existing Gas Line CL
- Existing Water Line CL
- Proposed 2' Contour
- Proposed 10' Contour

NOTE:
INSTALL 497 LF OF GUARDRAIL AS SHOWN (SEE DETAIL)

GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.

ALL WOOD WASTE SHALL BE USED AS A SEDIMENT BARRIER, CHIPPED, LEGALLY HAULED OFF, OR LEGALLY BURNED ON SITE

DATE	REVISIONS
1-29-2013	ADDED SUMP/DEWATERING TANKS TO LAYOUT
5-8-2013	ADDED STRAW WATTLES AND GUARDRAIL

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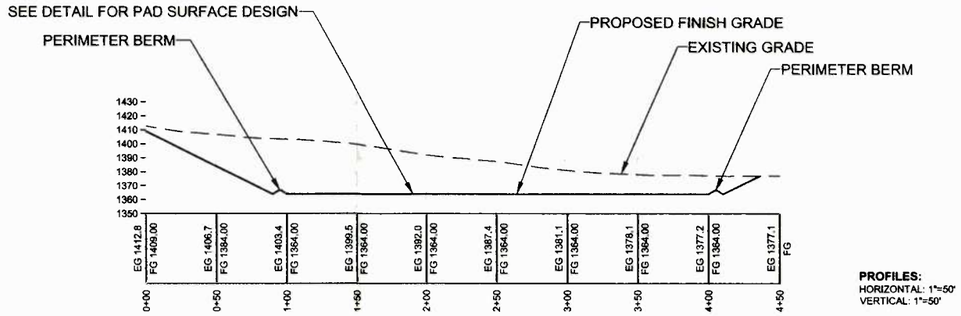
ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

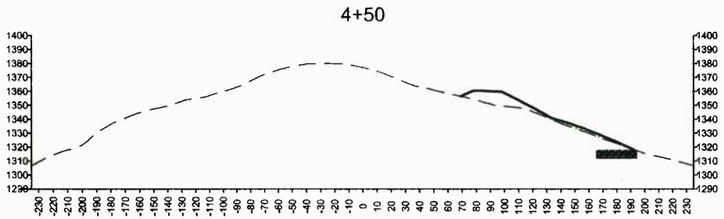
FINAL SITE DESIGN
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

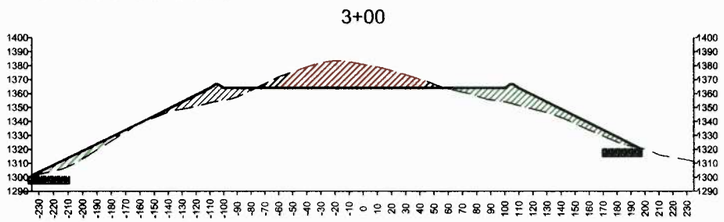
Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR & TBC
File No. HBB PROJECTS/2012/ASI/ 203-12C3D-2012/ 203-12-FINAL.dwg

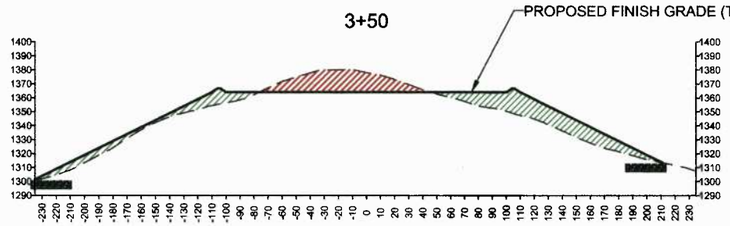
DRILL PAD PROFILE & CROSS SECTIONS 0+00 - 4+50

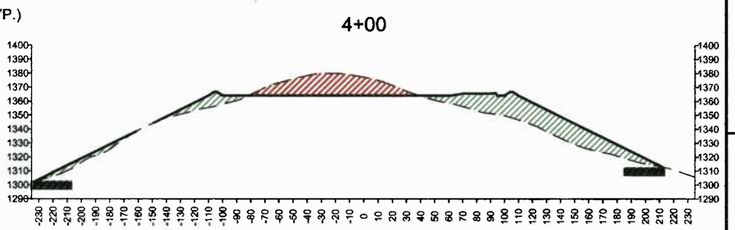


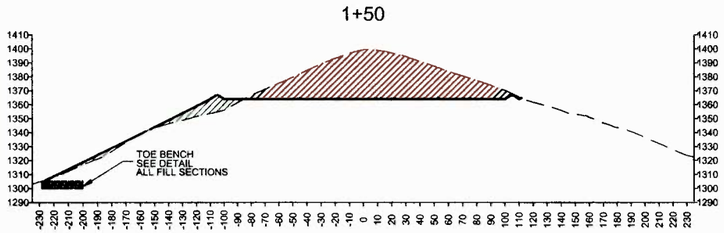
PROFILES:
HORIZONTAL: 1"=50'
VERTICAL: 1"=50'

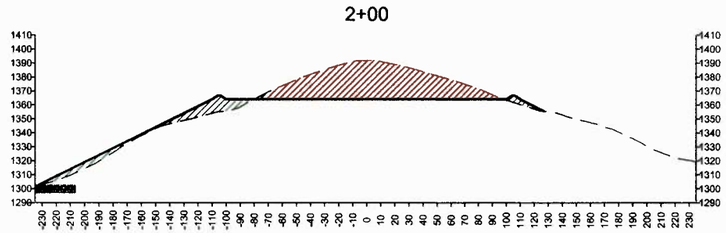


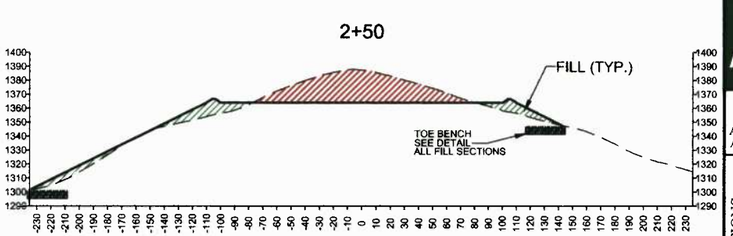


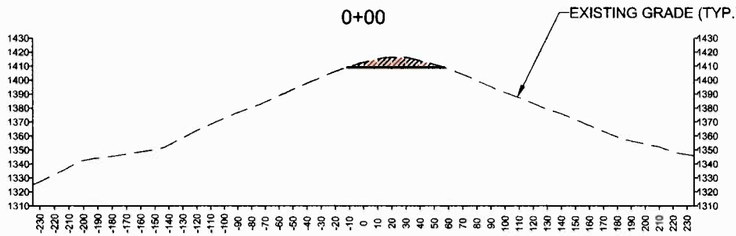


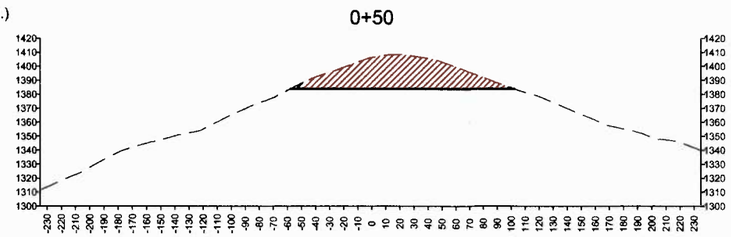


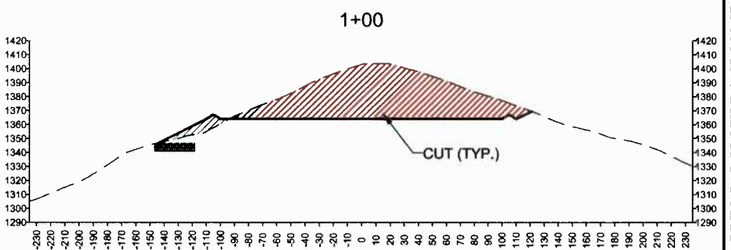












GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

SECTIONS:
HORIZONTAL: 1"=50'
VERTICAL: 1"=50'

DATE	REVISIONS
5-8-2013	UPDATED SHEET NUMBERS

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

Hornor Bros. Engineers
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Civil, Mining, Environmental and Consulting Engineering
140 South Third Street, Post Office Box 386
Clarksburg, West Virginia 26302 (304) 624-4445

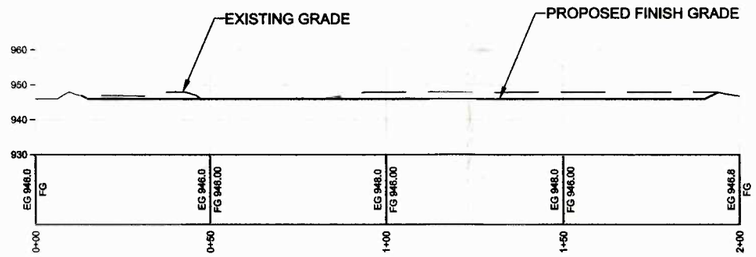
ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

DRILL PAD PROFILE & CROSS SECTIONS
PLAUGHER NORTH
DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

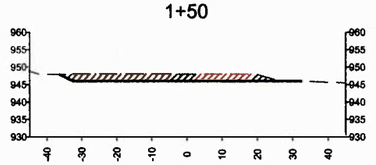
Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR & TBC
File No. 201-12CSD-2012/201-12-FINAL-SECTIONS.dwg

WATER TANK PAD PROFILE & CROSS SECTIONS 0+00 - 2+00

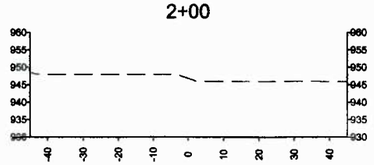


PROFILES:
HORIZONTAL: 1"=20'
VERTICAL: 1"=20'

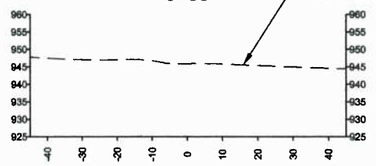
1+50



2+00



0+00



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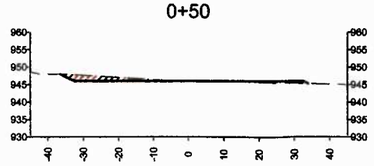
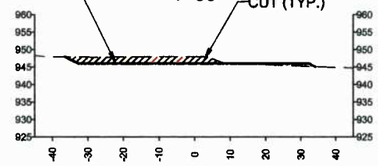


PROPOSED FINISH GRADE (TYP.)

1+00



GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

SECTIONS:
HORIZONTAL: 1"=50'
VERTICAL: 1"=50'

DATE	REVISIONS

Allegheny Surveys, Inc.
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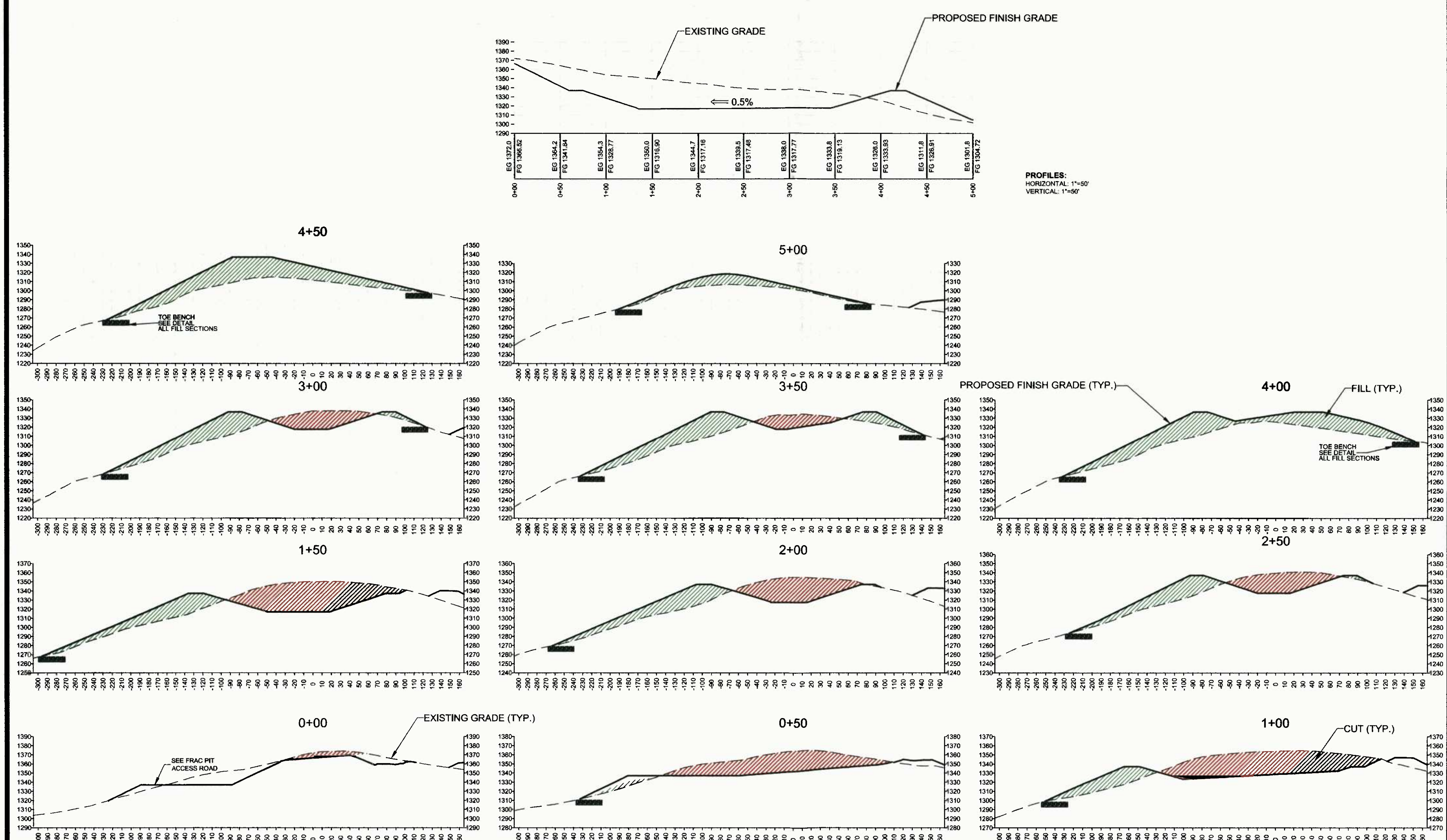
ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

WATER TANK PAD PROFILE & CROSS SECTIONS
PLAUGHER NORTH
DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 5-8-2013
Scale: 1" = 20'
Designed By: JDR & TBC
File No. 203-12CD-2012/ 203-12-FINAL-SECTIONS.dwg

FRAC PIT PROFILE & CROSS SECTIONS 0+00 - 5+00



GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

SECTIONS:
HORIZONTAL: 1"=50'
VERTICAL: 1"=50'

DATE	REVISIONS
5-8-2013	UPDATED SHEET NUMBERS

Allegheny Surveys, Inc.
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11-30-2012

ANTERO RESOURCES

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FRAC PIT PROFILE & CROSS SECTIONS
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR &TBC
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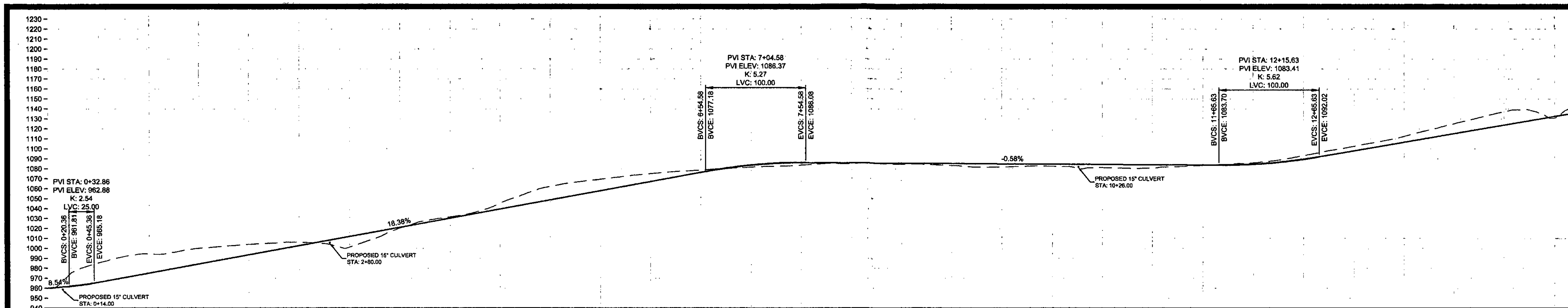
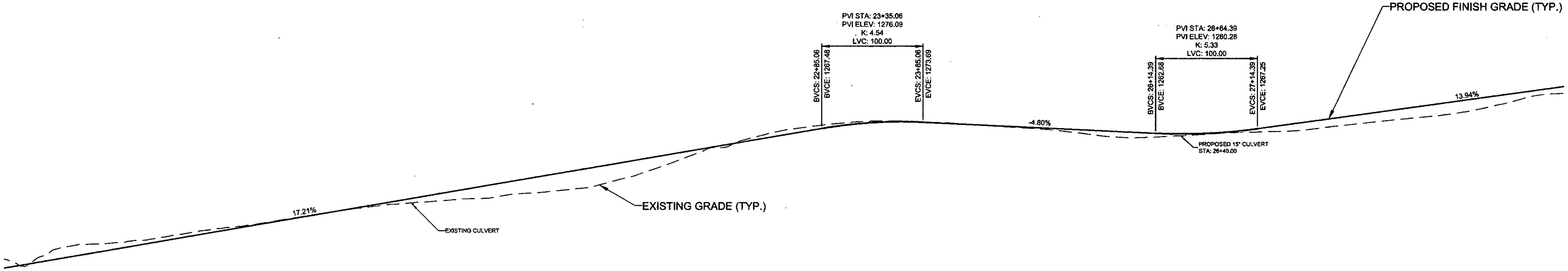


Station	EG	FG
0+00	960.1	960.08
0+50	985.5	966.03
1+00	994.4	975.22
1+50	1000.2	984.42
2+00	1004.1	993.61
2+50	1006.2	1002.80
3+00	1001.4	1011.99
3+50	1020.5	1021.18
4+00	1031.5	1030.37
4+50	1045.6	1039.57
5+00	1062.3	1048.76
5+50	1069.4	1057.95
6+00	1075.0	1067.14
6+50	1078.6	1076.33
7+00	1081.7	1083.57
7+50	1083.6	1086.09
8+00	1085.1	1085.82
8+50	1084.4	1085.53
9+00	1083.2	1085.24
9+50	1081.7	1084.95
10+00	1082.6	1084.66
10+50	1081.1	1084.37
11+00	1080.9	1084.08
11+50	1083.4	1083.79
12+00	1085.9	1084.55
12+50	1093.2	1089.54
13+00	1102.6	1097.93
13+50	1112.5	1106.54
14+00	1125.2	1115.14
14+50	1137.3	1123.75
15+00	1130.9	1132.36

CONTRACTOR SHALL INSTALL DITCH CHECK DAMS FROM STATIONS 0+30 - 30+70 AS SHOWN ON PLAN

MAIN ACCESS ROAD

PROFILES:
HORIZONTAL: 1"=50'
VERTICAL: 1"=50'



Station	EG	FG
15+00	1130.9	1132.36
15+50	1151.7	1140.96
16+00	1155.2	1149.57
16+50	1161.8	1158.17
17+00	1168.9	1166.78
17+50	1176.0	1175.39
18+00	1184.3	1183.99
18+50	1190.9	1192.60
19+00	1194.8	1201.21
19+50	1197.8	1209.81
20+00	1203.2	1218.42
20+50	1208.2	1227.02
21+00	1220.3	1235.63
21+50	1238.3	1244.24
22+00	1253.3	1252.84
22+50	1266.1	1261.45
23+00	1272.4	1269.81
23+50	1274.9	1274.02
24+00	1273.5	1272.87
24+50	1270.2	1270.57
25+00	1267.0	1268.17
25+50	1261.6	1265.77
26+00	1258.5	1263.37
26+50	1261.0	1262.16
27+00	1263.7	1265.44
27+50	1265.2	1272.21
28+00	1270.8	1279.18
28+50	1276.2	1286.16
29+00	1281.3	1293.13
29+50	1290.7	1300.10
30+00	1301.8	1307.07

MAIN ACCESS ROAD

GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.

CONTRACTOR SHALL INSTALL DITCH LINING AS FOLLOWS:
JUTE MATTING = 0%-4%
SYNTHETIC MATTING (TRM) = 4%-10%
6"-8" RIPRAP = 10%-20%

CONTRACTOR SHALL INSTALL GEOTEXTILE FABRIC (US200) UNDER TRUCK TURN AROUND AREA AND ALL ACCESS ROAD SECTIONS WHERE THE PROFILE GRADE IS LESS THAN 10%.

DATE	REVISIONS
5-8-2013	UPDATED SHEET NUMBERS

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

14161
11-30-2012

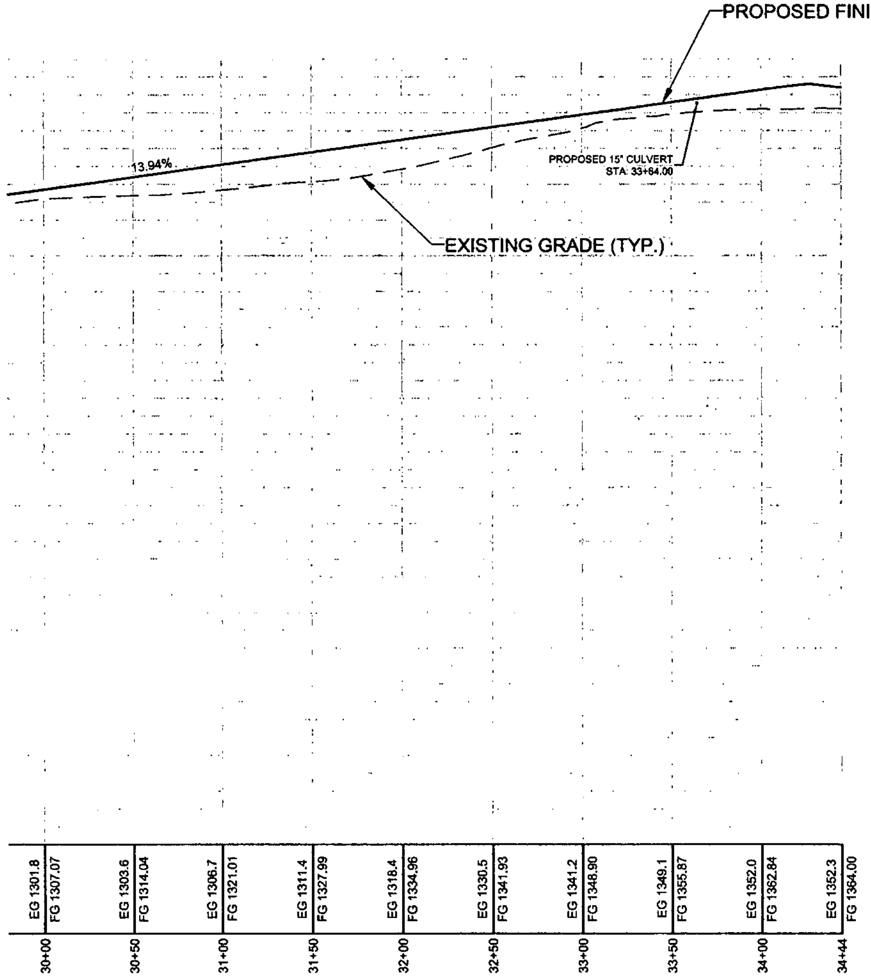
Hornor Bros. Engineers
Since 1902
Civil, Mining, Environmental and Consulting Engineering
140 South Third Street, Post Office Box 386, Clarksburg, West Virginia, 26301 (304) 624-6445

ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

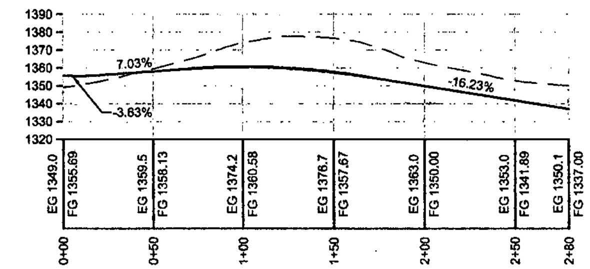
ACCESS ROADS PROFILES
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR & TBC
File No. 203-13-FINAL-SECTIONS.dwg
Page 15 of 26



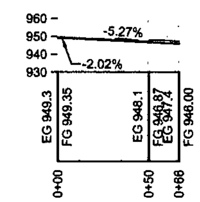
MAIN ACCESS ROAD

PROFILES:
HORIZONTAL: 1"=50'
VERTICAL: 1"=50'



FRAC PIT ACCESS ROAD

CONTRACTOR SHALL INSTALL DITCH CHECK DAMS AT STATION 1+35 AS SHOWN ON PLAN



OFFLOAD ACCESS ROAD

GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.

CONTRACTOR SHALL INSTALL DITCH LINING AS FOLLOWS:
JUTE MATTING = 0%-4%
SYNTHETIC MATTING (TRM) = 4%-10%
6"-8" RIPRAP = 10%-20%

CONTRACTOR SHALL INSTALL GEOTEXTILE FABRIC (US200) UNDER TRUCK TURN AROUND AREA AND ALL ACCESS ROAD SECTIONS WHERE THE PROFILE GRADE IS LESS THAN 10%.

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GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

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Scale: 1" = 50'
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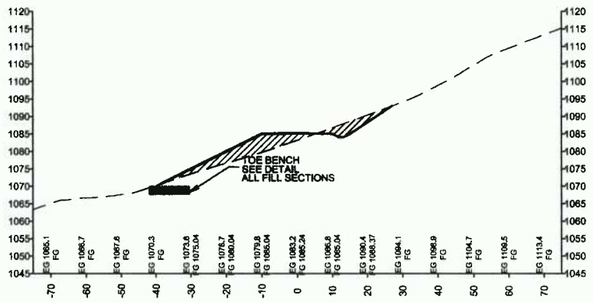
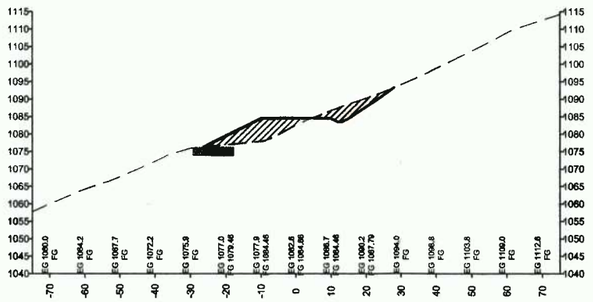
File No.
Page 16 of 26

MAIN ACCESS ROAD CROSS SECTIONS 0+00 - 11+00

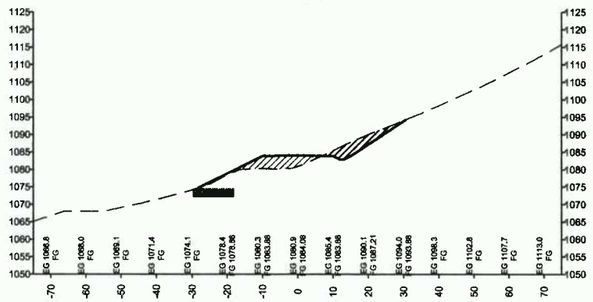
9+00



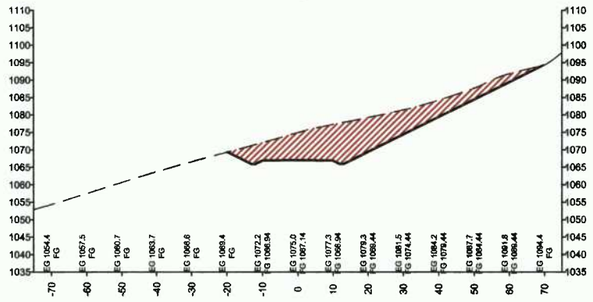
10+00



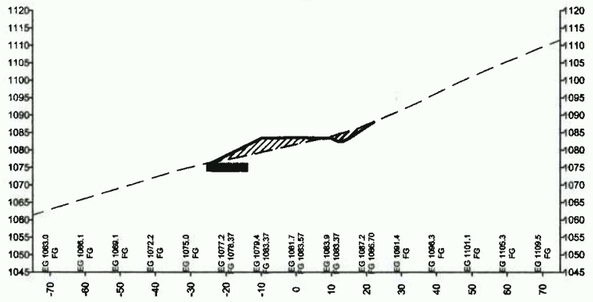
11+00



6+00



7+00



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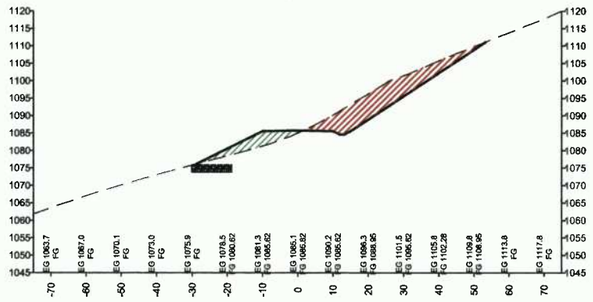
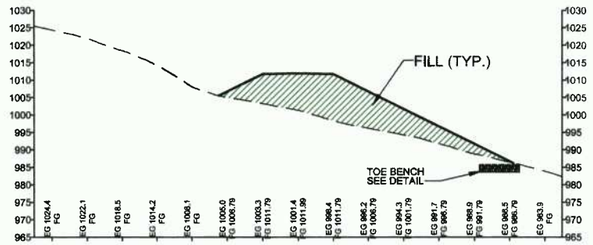
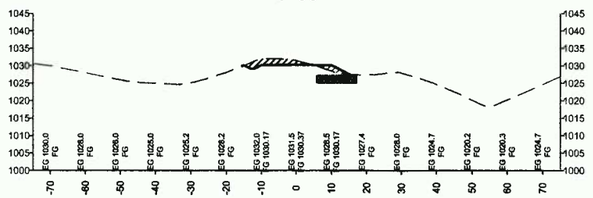


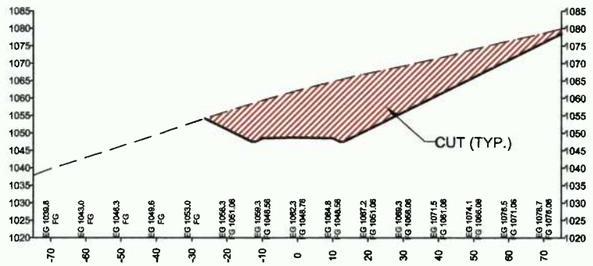
3+00



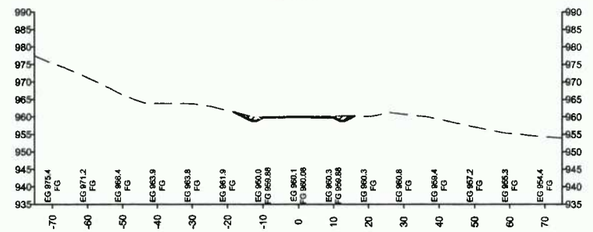
4+00



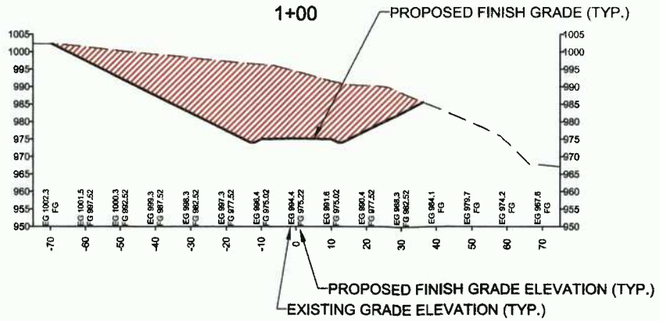
5+00



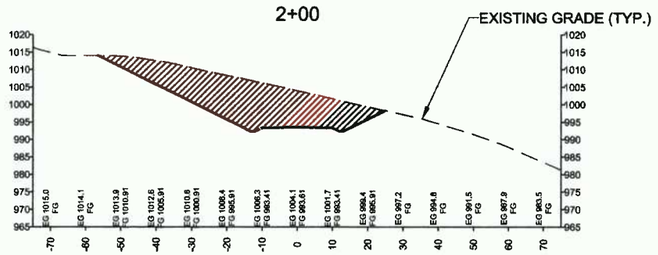
0+00



1+00



2+00



GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

SECTIONS:
HORIZONTAL: 1"=20'
VERTICAL: 1"=20'

DATE	REVISIONS
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THOMAS D. CORATOLA — 14151 — STATE OF WEST VIRGINIA — PROFESSIONAL ENGINEER

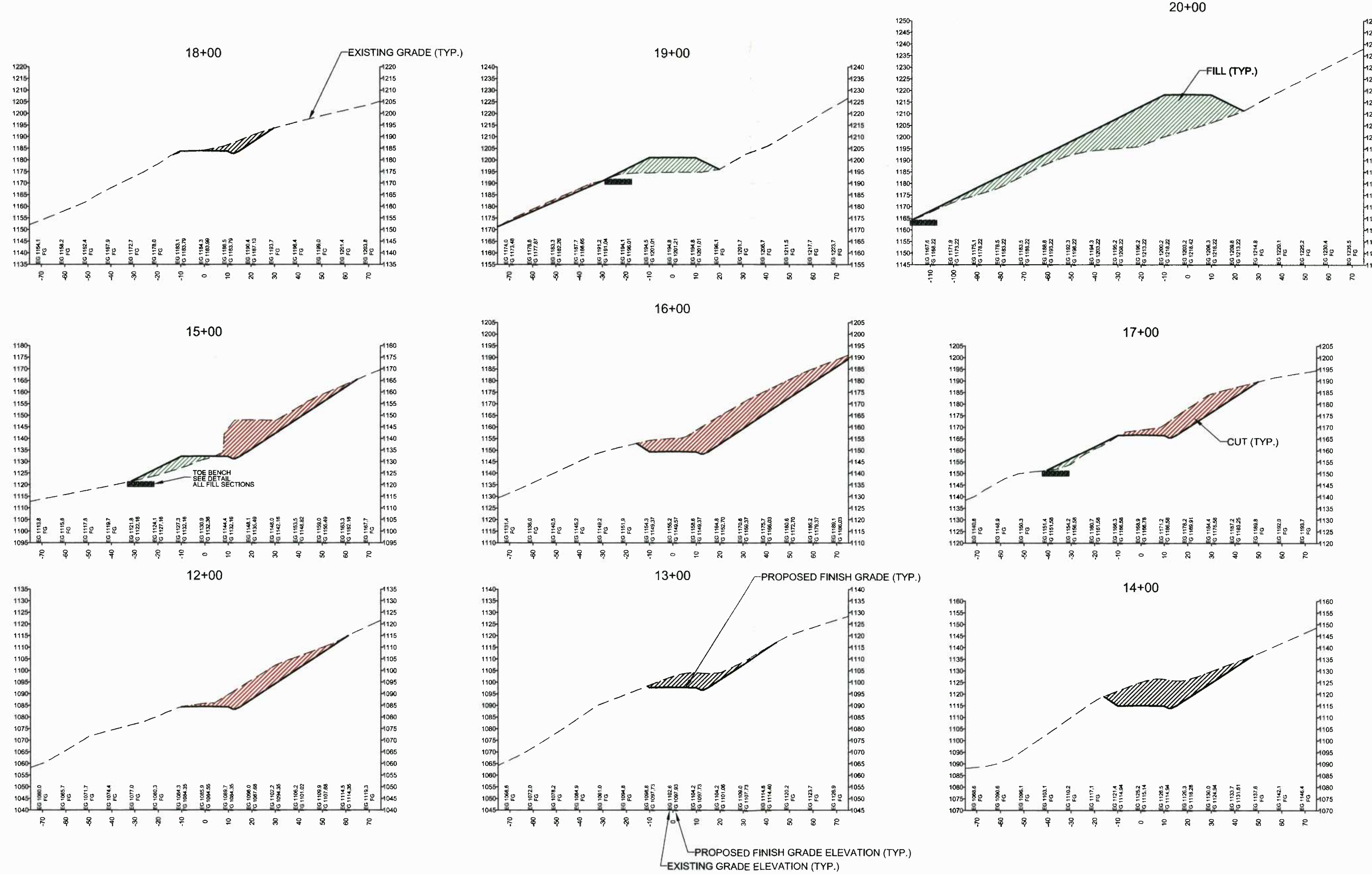
ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

ACCESS ROADS CROSS SECTIONS
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR &TBC
File No. 205-13-FIN-ALL-SECTIONS.dwg
Page 17 of 26

MAIN ACCESS ROAD CROSS SECTIONS 12+00 - 20+00



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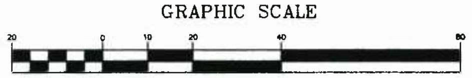

(IN FEET)
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PLAUGHER NORTH
DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

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Scale: 1" = 50'
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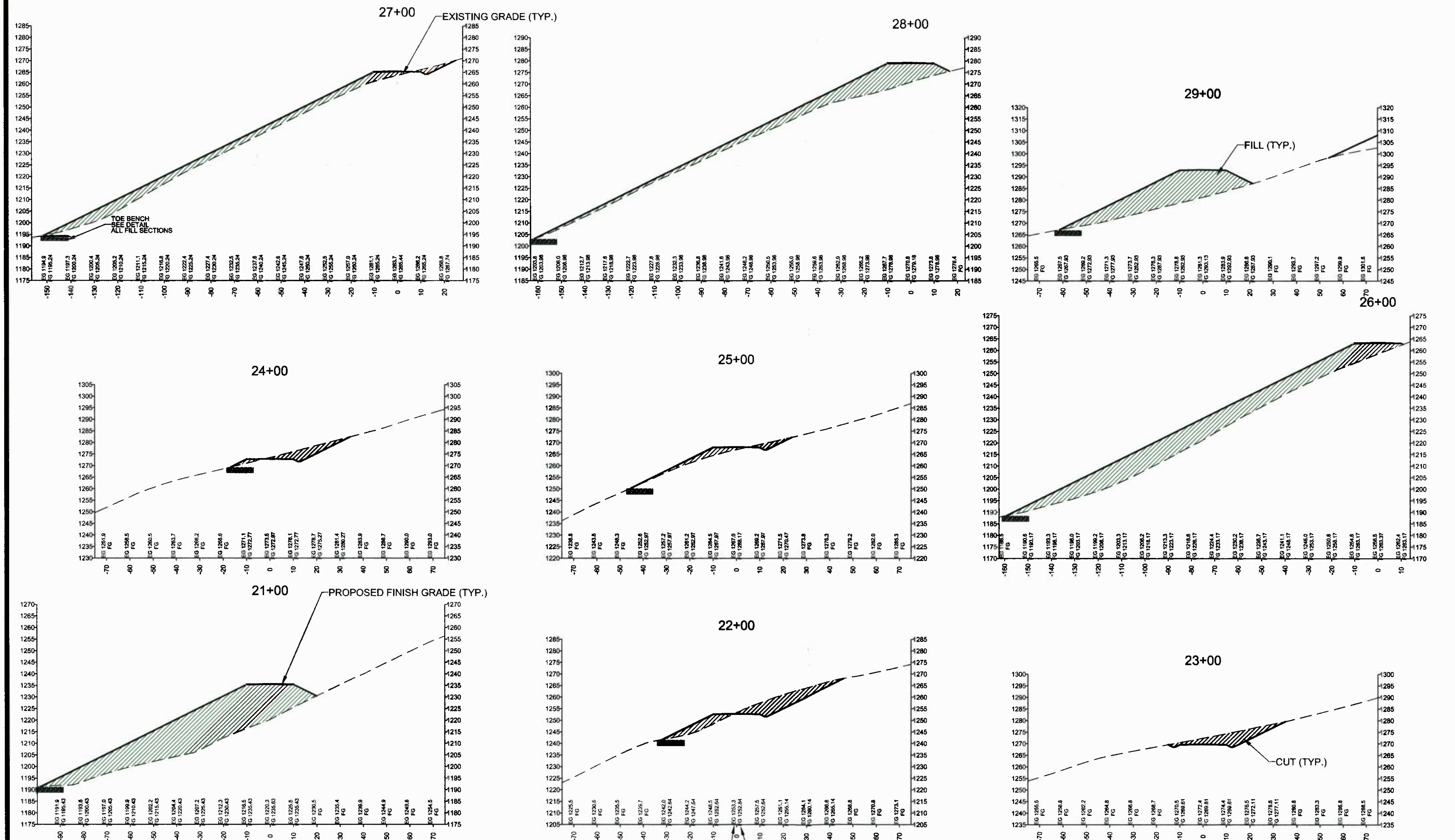
File No. HBE PROJECTS/2012/ASI/203-12C3D-2012/203-12-FINAL-SECTIONS.dwg

MAIN ACCESS ROAD CROSS SECTIONS 21+00 - 29+00



GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

SECTIONS:
HORIZONTAL: 1"=20'
VERTICAL: 1"=20'

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PLAUGHER NORTH
DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012	
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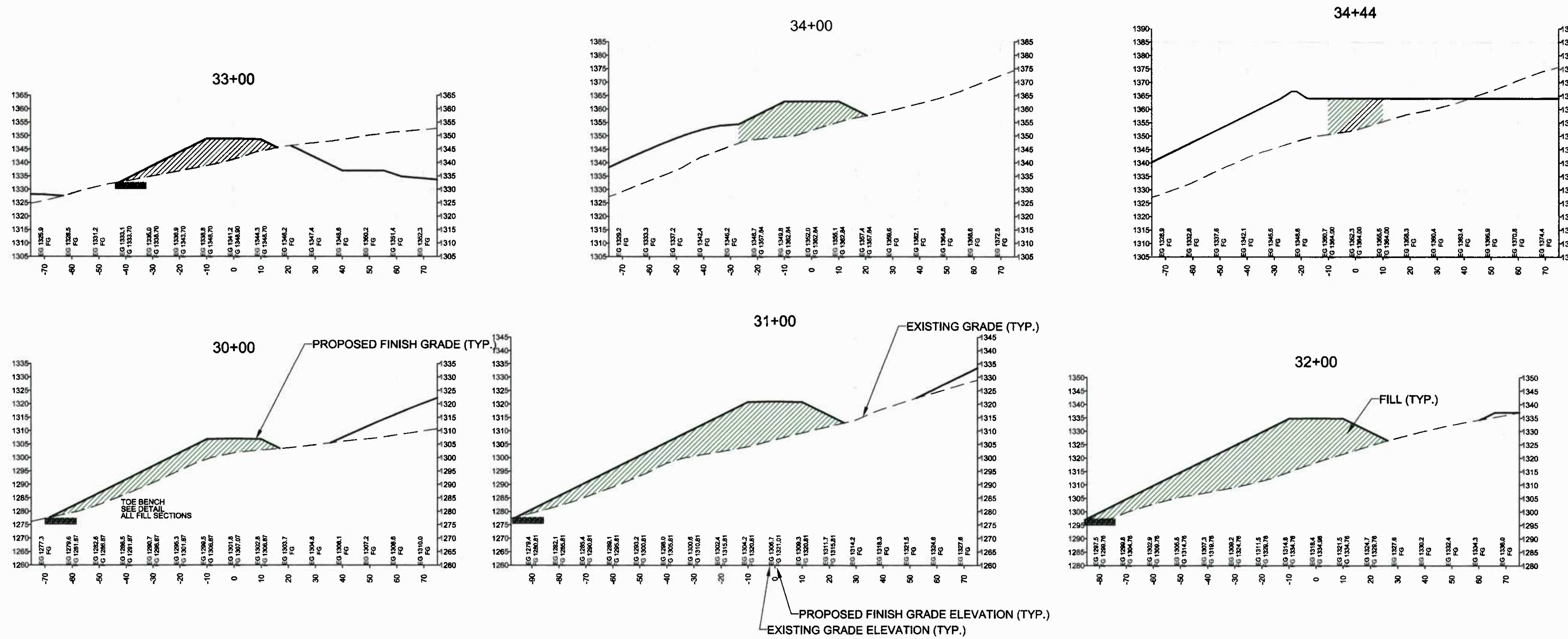
Designed By: JDR &TBC	
File No.	

MAIN ACCESS ROAD CROSS SECTIONS 30+00 - 34+44



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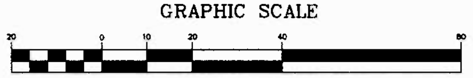

(IN FEET)
1 inch = 20 ft.

SECTIONS:
HORIZONTAL: 1"=20'
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GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

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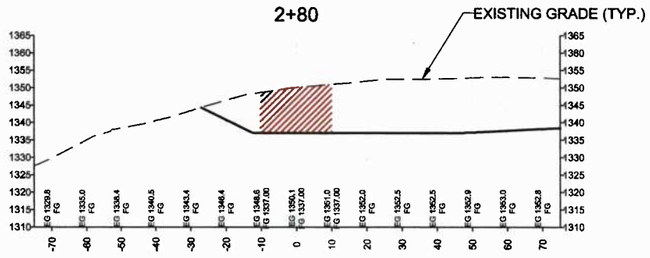
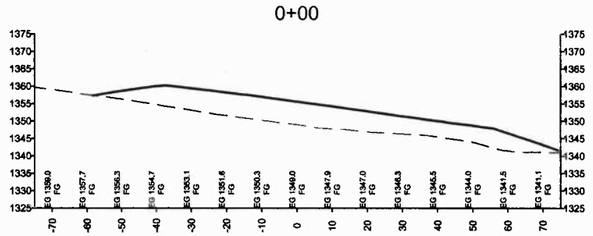
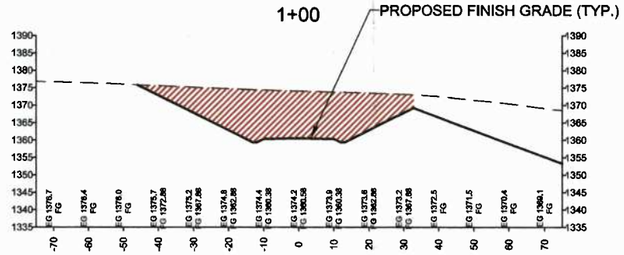
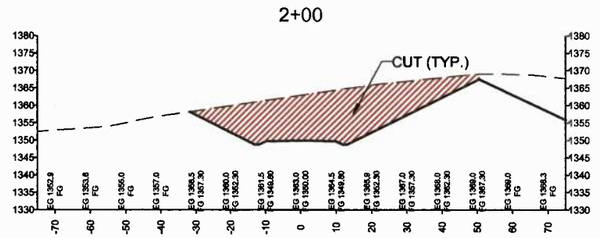
Designed By: JDR &TBC
File No.
Page 20 of 26

FRAC PIT & OFFLOAD ACCESS ROAD CROSS SECTIONS 0+00 - 2+80 & 0+00 - 0+61

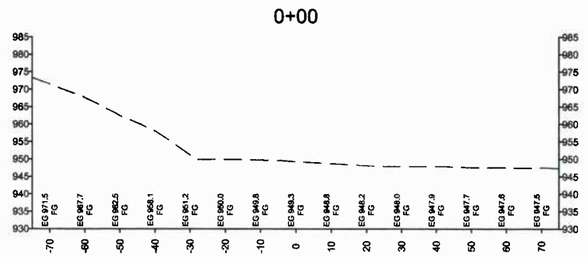


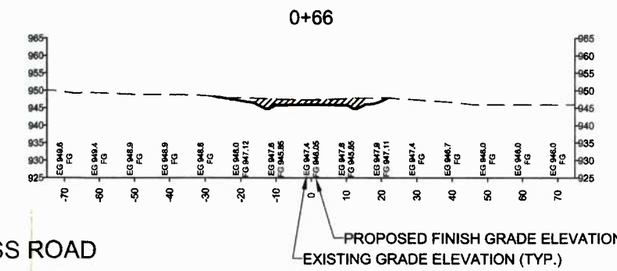






FRAC PIT ACCESS ROAD





OFFLOAD ACCESS ROAD

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

SECTIONS:
HORIZONTAL: 1"=20'
VERTICAL: 1"=20'

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THOMAS D. CORATOLA
14161
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER
11-30-2012

ANTERO RESOURCES

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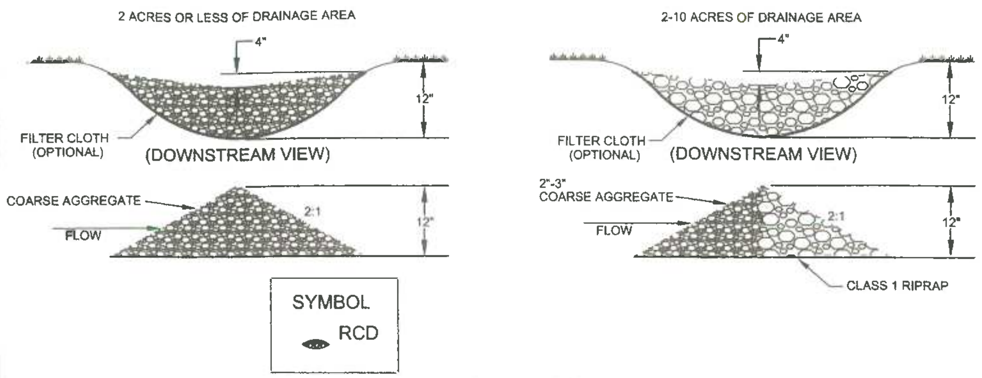
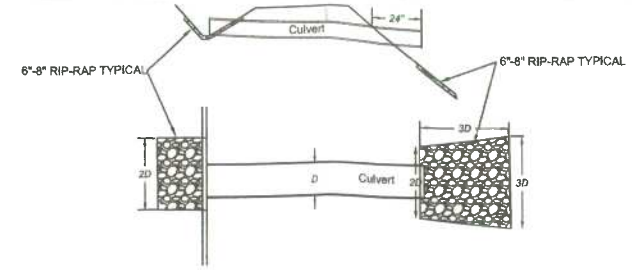
PLAUGHER NORTH
DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

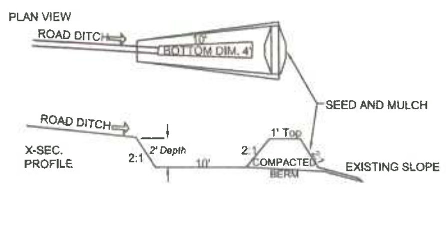
Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR &TBC
File No. H:\PROJECTS\2012\ASI\203-12-JCTO-2012\203-12-FINAL-SECTIONS.dwg



DITCH CHECK DAM DETAIL/
SPACING AS INDICATED ON PROFILES
N.T.S.

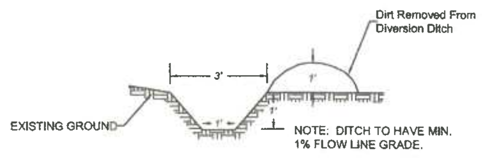


TYPICAL CULVERT & CULVERT INLET/OUTLET PROTECTION DETAIL
N.T.S.

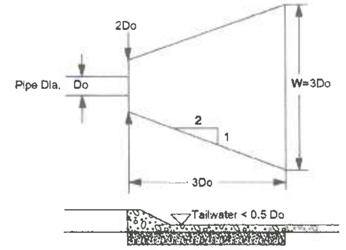


LEVEL SPREADER DETAIL
N.T.S.

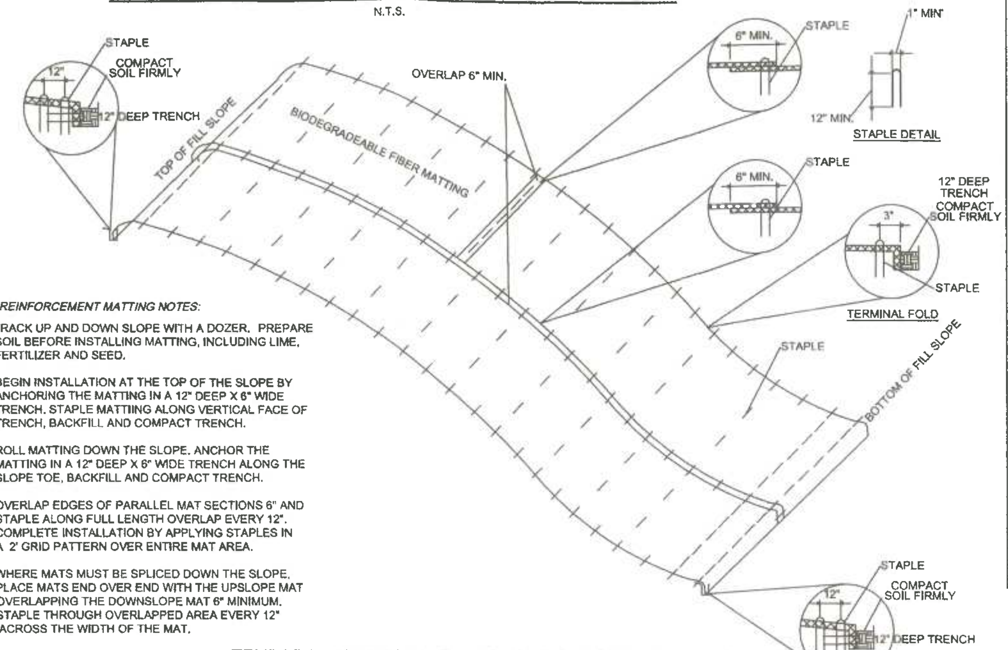
NOTE: TO BE PLACED AT THE ENDS OF DITCHES CALLING FOR LEVEL SPREADERS LEVEL SPREADERS WILL BE CUT INTO THE CONTOUR OF THE EXISTING SLOPE.



DIVERSION DITCH DETAIL
N.T.S.



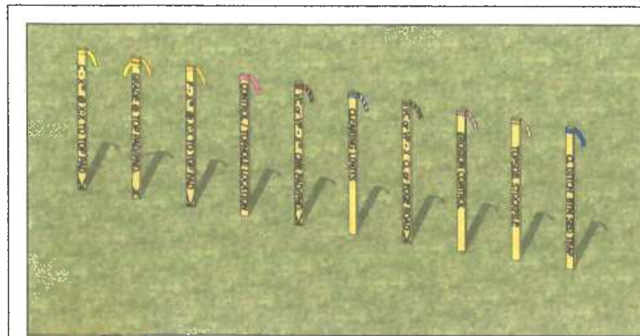
RIP RAP APRON OUTLET PROTECTION
MINIMUM TAILWATER CONDITION
N.T.S.



TURF REINFORCEMENT MATTING NOTES:

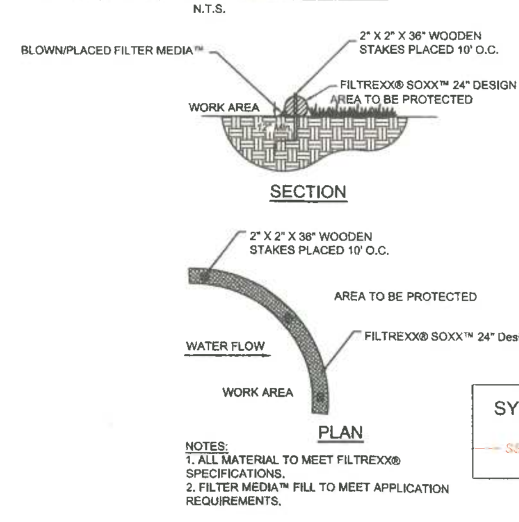
1. TRACK UP AND DOWN SLOPE WITH A DOZER. PREPARE SOIL BEFORE INSTALLING MATTING, INCLUDING LIME, FERTILIZER AND SEED.
2. BEGIN INSTALLATION AT THE TOP OF THE SLOPE BY ANCHORING THE MATTING IN A 12" DEEP X 6" WIDE TRENCH. STAPLE MATTIING ALONG VERTICAL FACE OF TRENCH, BACKFILL AND COMPACT TRENCH.
3. ROLL MATTING DOWN THE SLOPE. ANCHOR THE MATTING IN A 12" DEEP X 6" WIDE TRENCH ALONG THE SLOPE TOE, BACKFILL AND COMPACT TRENCH.
4. OVERLAP EDGES OF PARALLEL MAT SECTIONS 6" AND STAPLE ALONG FULL LENGTH OVERLAP EVERY 12". COMPLETE INSTALLATION BY APPLYING STAPLES IN A 2' GRID PATTERN OVER ENTIRE MAT AREA.
5. WHERE MATS MUST BE SPLICED DOWN THE SLOPE, PLACE MATS END OVER END WITH THE UPSLOPE MAT OVERLAPPING THE DOWNSLOPE MAT 6" MINIMUM. STAPLE THROUGH OVERLAPPED AREA EVERY 12" ACROSS THE WIDTH OF THE MAT.

TEMPORARY TURF REINFORCEMENT MATTING FOR FILL SLOPES
REQUIRED FOR FILL SLOPES OVER 100 FEET IN LENGTH
N.T.S.



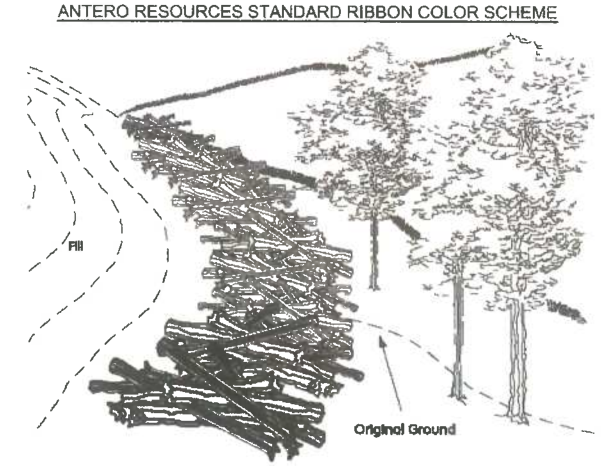
Yellow	Yellow Ribbon: Yellow Ribbon used to indicate top of Cuts (C) Cut to be determined at time of stakeout Slope determined by site design
Yellow & Orange	Yellow & Orange Ribbon: Yellow and Orange Ribbon used to indicate Grade at Top of Pad/Pond/Pit
Orange	Orange Ribbon: Orange Ribbon used to indicate toes of Fills (F) Fill to be determined at time of stakeout Slope determined by site design
Pink	Pink Ribbon: Pink Ribbon used to indicate Top Hole Location Pink Ribbon used to indicate Survey Control Location
Pink & Black Stripe	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	Blue & White Stripe Ribbon: Blue & White Stripe Ribbon used to indicate clearing limits/construction limits
Orange & Black Stripe	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	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	Orange & White Stripe Ribbon: Orange & White Stripe Ribbon used to indicate Topsoil Stockpile Locations
Blue	Blue Ribbon: Blue Ribbon used to indicate Centerline (℄) Ditch Blue Ribbon used to indicate Bottom (BTM) Sediment Traps

ANTERO RESOURCES STANDARD RIBBON COLOR SCHEME

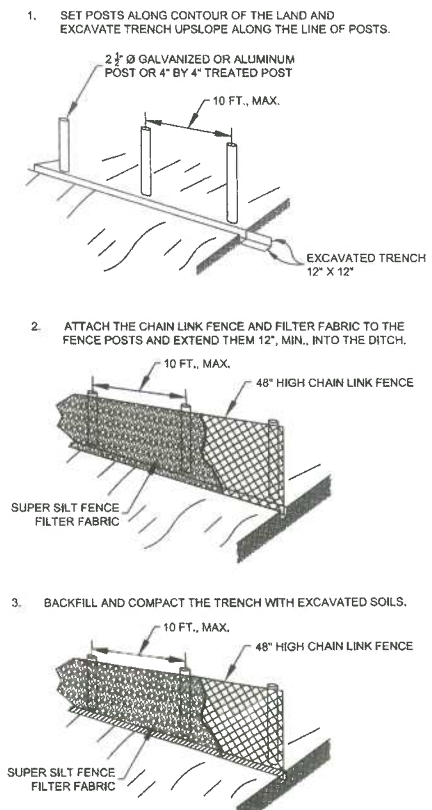


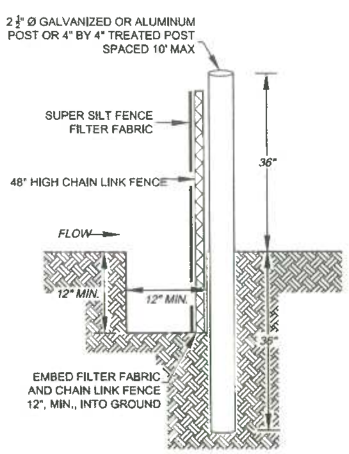
NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. FILTER MEDIA™ FILL TO MEET APPLICATION REQUIREMENTS.

FILTREXX "SOXX" 24" FILTER SOCK DETAIL
N.T.S.



WVDEP BRUSH PILE SEDIMENT BARRIER

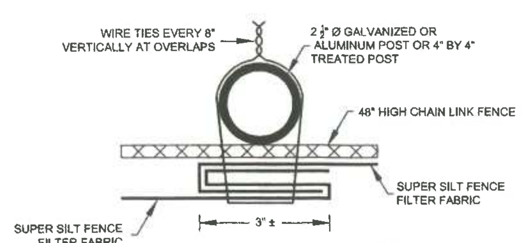




SIDE VIEW

SUPER SILT FENCE NOTES:

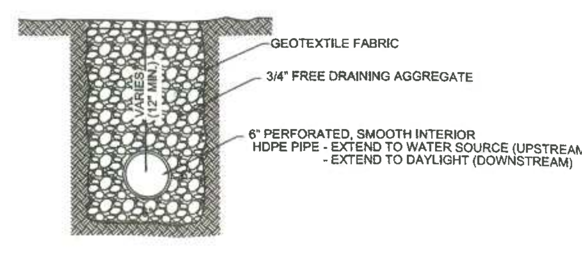
1. CHAIN LINK FENCE SHALL BE CONSTRUCTED IN ACCORDANCE WITH SECTION 608 OF THE WVDOH SPECIFICATIONS. CHAIN LINK FENCE SHALL BE FASTENED SECURELY TO THE POSTS WITH WIRE TIES OR STAPLES.
2. POSTS NEED NOT BE SET IN CONCRETE.
3. THE FILTER FABRIC SHALL BE FASTENED TO THE CHAIN LINK FENCE WITH TIES EVERY 24" AT THE TOP AND MID SECTION.
4. FABRIC AND FENCE SHALL BE EMBEDDED 12", MINIMUM, INTO THE GROUND.
5. A 6", MINIMUM, OVERLAP SHALL BE PROVIDED WHERE TWO SECTIONS OF FABRIC ADJOIN. THE OVERLAPPED FABRIC SHALL BE FOLDED TOGETHER AND ATTACHED TO THE CHAIN LINK FENCE.
6. 4" BY 4" PRESSURE TREATED POSTS MAY BE SUBSTITUTED FOR METAL FENCE POSTS WITH THE APPROVAL OF THE ENGINEER.
7. THE LENGTH OF SLOPE ABOVE THE FENCE SHALL NOT EXCEED 400 FEET IN STEEP TERRAIN. IN FLATTER AREAS THE LENGTH CAN BE EXTENDED WITH THE APPROVAL OF THE ENGINEER.



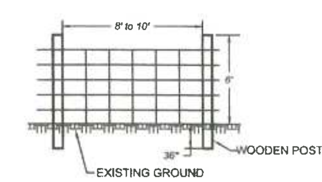
END LAP TOP VIEW

SYMBOL
SSF

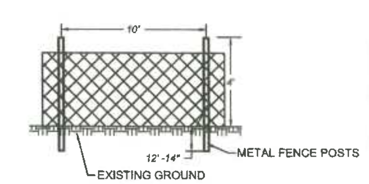
SUPER SILT FENCE DETAIL



SEEP/ SPRING DRAIN DETAIL
N.T.S.



TYPICAL WOVEN WIRE FENCE DETAIL
N.T.S.



TYPICAL CONSTRUCTION FENCE DETAIL
N.T.S.

DATE	REVISIONS
5-8-2013	REVISED TO REFLECT ANTEROS NEW DESIGN STANDARDS
5-15-2013	ADDED TEMPORARY TURF REINFORCEMENT DETAIL

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

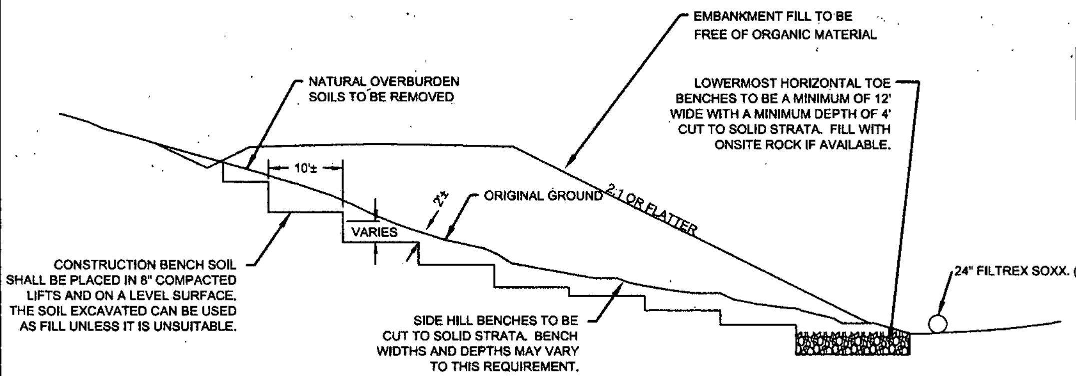
Hornor Bros. Engineers
Since 1902
Civil, Mining, Environmental and Consulting Engineering
140 South Third Street, Post Office Box 386, Clarksburg, West Virginia, 26301 (304) 624-6445

ANTERO RESOURCES

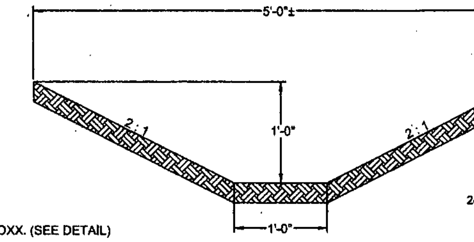
THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

CONSTRUCTION DETAILS
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

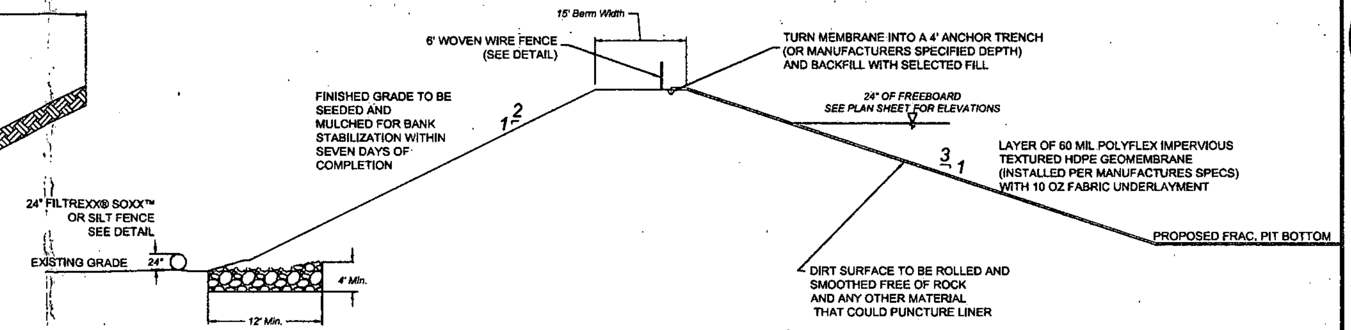
Date: 11-30-2012
Scale: N.T.S.
Designed By: JDR & TBC
File No. HBE PROJECTS/2012/ASI/ 203-12C3D-2012/ 203-12-COVER.dwg



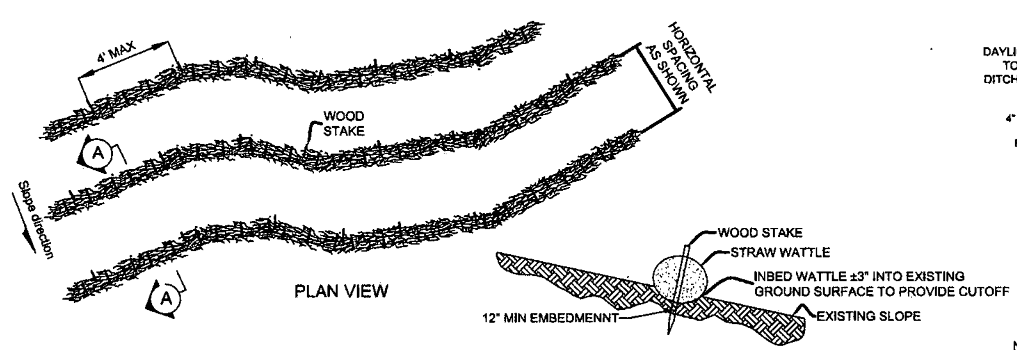
EMBANKMENT FILL BENCH DETAIL (TYP.)
N.T.S.



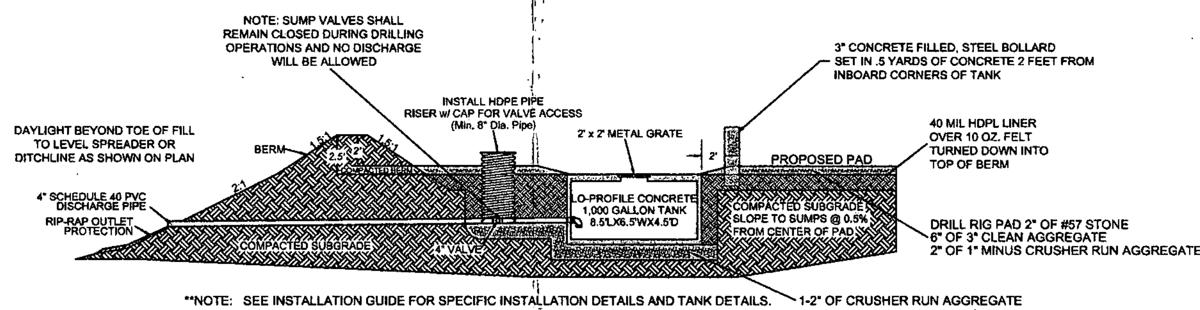
TYPICAL ROAD DITCH DETAIL
N.T.S.



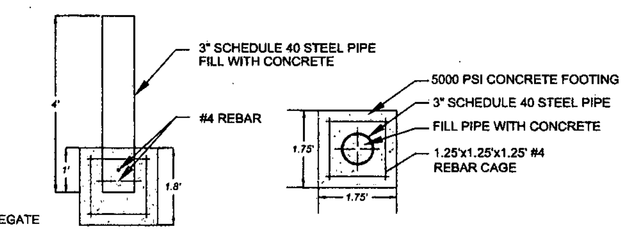
TYPICAL FRAC. PIT EMBANKMENT DETAIL
N.T.S.



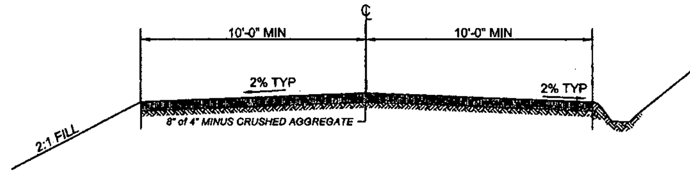
STRAW WATTLE DETAIL
N.T.S.



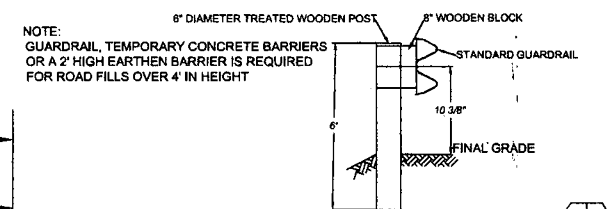
PAD DIVERSION BERM & SUMP/DEWATERING DETAIL
NTS



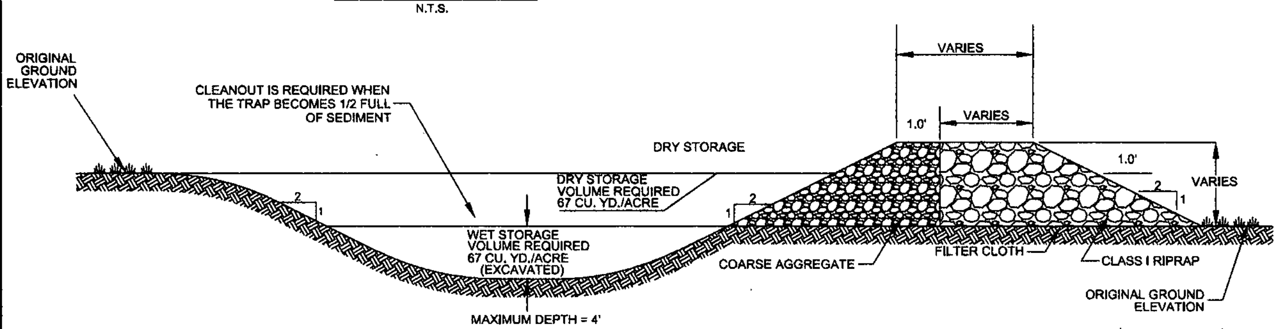
TYPICAL BOLLARD DETAIL
N.T.S.



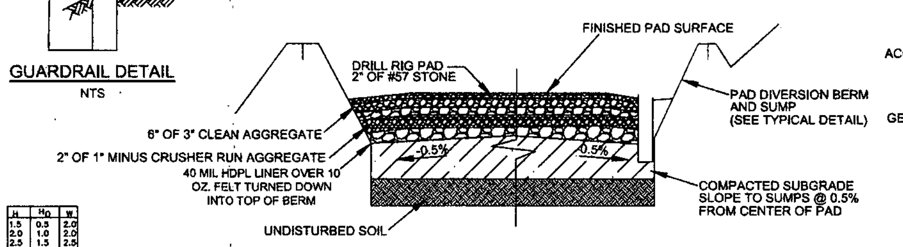
TYPICAL ROAD CROSS SECTION DETAIL
N.T.S.



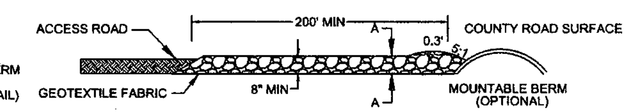
GUARDRAIL DETAIL
NTS



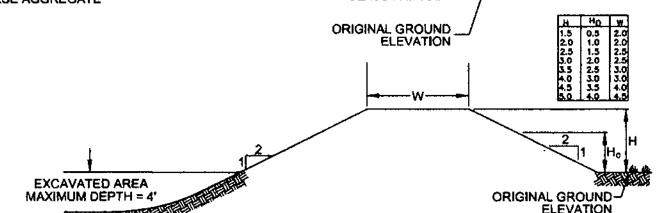
CROSS SECTION OF OUTLET



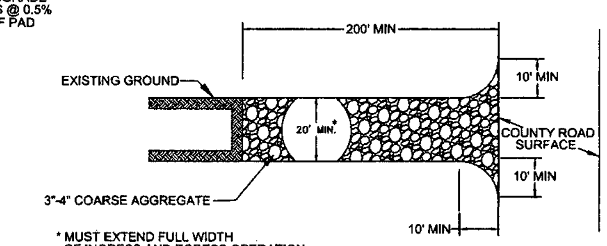
TYPICAL PAD CROSS-SECTION DETAIL
NTS



SIDE ELEVATION



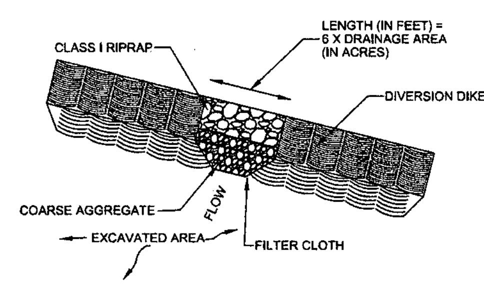
MINIMUM TOP WIDTH (W) REQUIRED FOR SEDIMENT TRAP EMBANKMENTS ACCORDING TO HEIGHT OF EMBANKMENT (FEET)



PLAN VIEW

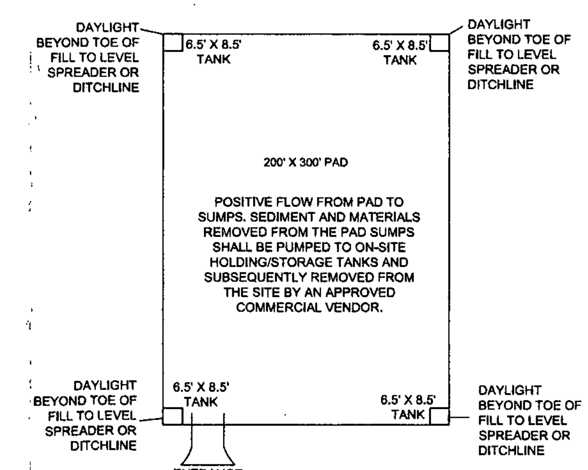
TEMPORARY SEDIMENT TRAP NOTES:

1. THE DETAIL SHOWN IS A GENERAL SCHEMATIC. THE CONTRACTOR SHALL DESIGN AND SIZE EACH TRAP ACCORDING TO HIS GRADING PLAN.
2. SEDIMENT TRAPS SHALL BE USED IN AREAS WHERE THE TOTAL CONTRIBUTING DRAINAGE AREA IS LESS THAN 5 ACRES.
3. FILL MATERIAL FOR ANY SEDIMENT TRAP EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION, ORGANIC MATERIAL, LARGE STONES, AND OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHOULD BE COMPACTED IN 6" LAYERS BY TRAVERSING WITH CONSTRUCTION EQUIPMENT.
4. ANY SEDIMENT TRAP EARTH EMBANKMENT SHALL BE SEEDED WITH TEMPORARY VEGETATION IMMEDIATELY AFTER INSTALLATION.
5. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION ARE MINIMIZED.
6. THE SEDIMENT TRAP SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE UPSLOPE DRAINAGE AREA HAS BEEN STABILIZED.
7. ALL CUT AND FILL SLOPES FORMING THE SEDIMENT TRAP SHALL BE 2:1 OR FLATTER.
8. SEDIMENT SHALL BE REMOVED AND THE TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 OF THE VOLUME. SEDIMENT REMOVED FROM THE TRAP SHALL BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE AND CAUSE SEDIMENTATION PROBLEMS.
9. THE STRUCTURE SHOULD BE CHECKED REGULARLY TO ENSURE THAT IT IS STRUCTURALLY SOUND AND HAS NOT BEEN DAMAGED BY EROSION OR CONSTRUCTION EQUIPMENT.
10. A RIPRAP SPILLWAY CHANNEL MAY BE NECESSARY IF A CONCENTRATED OUTLET FLOW IS ANTICIPATED.
11. FILTER STONE SHALL BE REGULARLY CHECKED TO ENSURE THAT FILTRATION PERFORMANCE IS MAINTAINED. STONE CHOKED WITH SEDIMENT SHALL BE REMOVED AND CLEANED OR REPLACED.

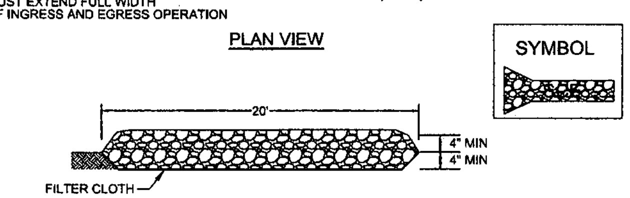


OUTLET (PERSPECTIVE VIEW)

TEMPORARY SEDIMENT TRAP DETAIL
N.T.S.



PAD DIVERSION/SUMP LAYOUT DETAIL
N.T.S.



SECTION A-A

STONE CONSTRUCTION ENTRANCE DETAIL
N.T.S.

DATE	REVISIONS
01-28-13	Added Revised Pad Diversion/Sump Detail & Bollard Detail
05-8-13	Added Valve Shutoff note to Sump Detail (per Antero)
05-8-13	Added Straw Wattle Detail
5-8-2013	REVISED TO REFLECT ANTEROS NEW DESIGN STANDARDS

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11-30-2012

ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

CONSTRUCTION DETAILS
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: N.T.S.
Designed By: JDR & TBC

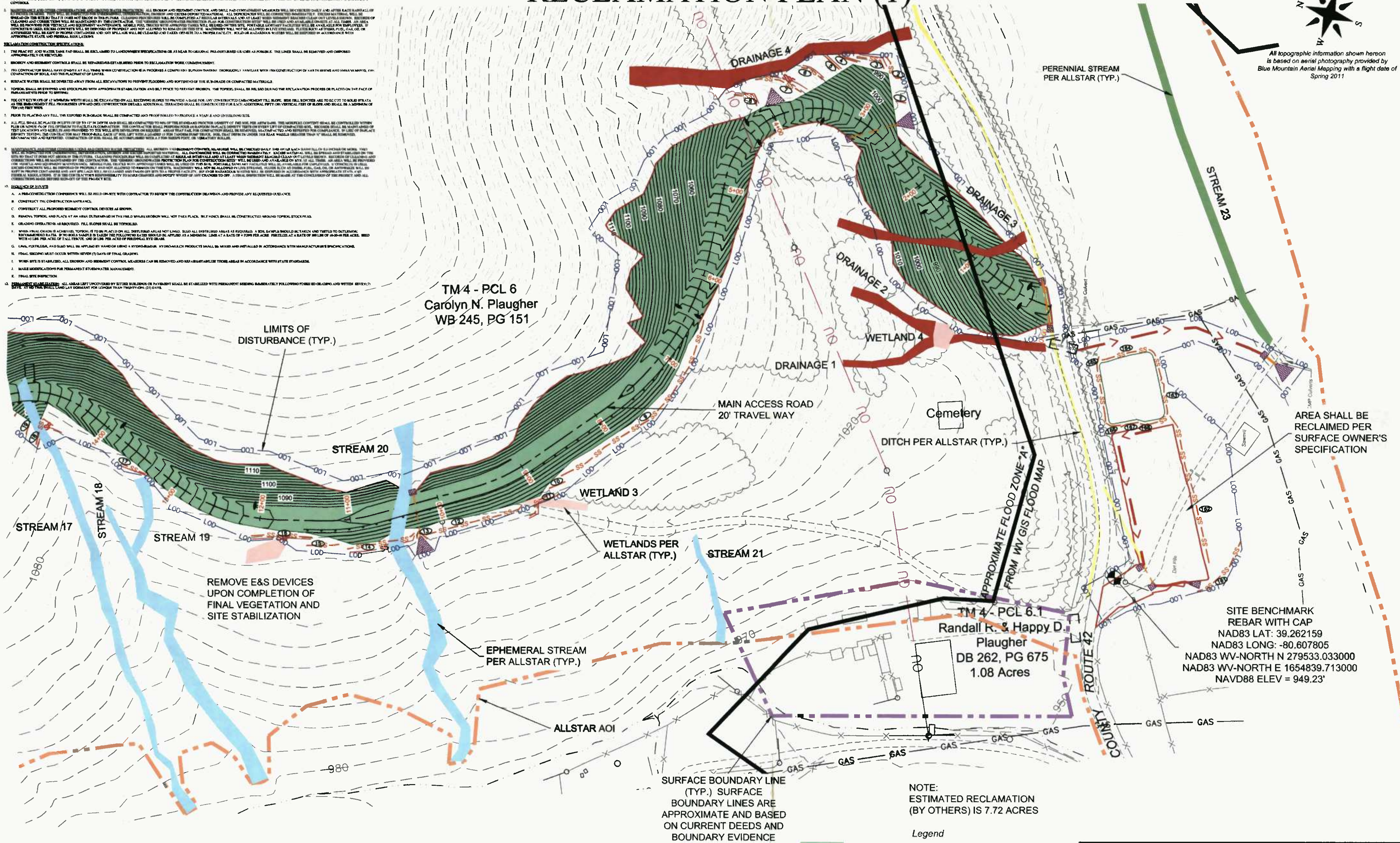
RECLAMATION PLAN (1)

POST CONSTRUCTION DRILLING/FRACTURING REQUIREMENTS:

1. EROSION AND SEDIMENT CONTROLS SHALL BE REPAIRED/RE-ESTABLISHED IN AREAS WHERE AT LEAST 70% TURF HAS NOT BEEN ATTAINED OR EROSION HAS OCCURRED SINCE INITIAL CONSTRUCTION. REPAIRS TO CRITICAL EROSION AREAS (RE-GRADING, SEEDING AND MULCH AND/OR SLOPE MATTING) SHALL BE COMPLETED BEFORE DRILLING/FRACTURING OPERATIONS COMMENCE. WVDEP BMP SHALL BE USED FOR EROSION AND SEDIMENT CONTROLS.
2. MAINTENANCE AND OTHER CONSIDERATIONS AND GROUND WATER PROTECTION: ALL EROSION AND SEDIMENT CONTROL AND DRILL PAD CONTAINMENT MEASURES WILL BE CHECKED DAILY AND AFTER EACH RAINFALL OF [illegible] ALL DEFICIENCIES WILL BE CORRECTED IMMEDIATELY. EXCESS MATERIAL WILL BE SPREAD ON THE SITE SO THAT IT DOES NOT ERODE IN THE FUTURE. CLEANING PROCEDURES WILL BE COMPLETED AT REGULAR INTERVALS AND AT LEAST WHEN SEDIMENT REACHES CLEAN OUT LEVELS SHOWN. RECORDS OF CLEANING AND CORRECTIONS WILL BE MAINTAINED BY THE CONTRACTOR. THE "GENERIC GROUNDWATER PROTECTION PLAN FOR CONSTRUCTION SITES" WILL BE USED AND AVAILABLE ON-SITE AT ALL TIMES. AN AREA WILL BE PROVIDED FOR VEHICLE AND EQUIPMENT MAINTENANCE. MOBILE FUEL TRUCKS WITH APPROVED TANKS WILL BE USED ON THIS SITE. PORTABLE SANITARY FACILITIES WILL BE AVAILABLE FOR EMPLOYEES. IF CONCRETE IS USED, EXCESS CONCRETE WILL BE DISPOSED OF PROPERLY AND NOT ALLOWED TO REMAIN ON THIS SITE. MACHINERY WILL NOT BE ALLOWED IN LIVE STREAMS. FLUIDS SUCH AS DIESEL FUEL, GAS, OIL OR ANTIFREEZE WILL BE KEPT IN PROPER CONTAINERS AND ANY SPILLAGE WILL BE CLEANED AND TAKEN OFF-SITE TO A PROPER FACILITY. SOLID OR HAZARDOUS WASTES WILL BE DISPOSED IN ACCORDANCE WITH APPROPRIATE STATE AND FEDERAL REGULATIONS.

RECLAMATION CONSTRUCTION SPECIFICATIONS:

1. THE FRAC PIT AND WATER TANK PAD SHALL BE RECLAIMED TO LANDOWNER'S SPECIFICATIONS OR AS NEAR TO ORIGINAL PRE-DISTURBED GRADES AS POSSIBLE. THE LINER SHALL BE REMOVED AND DISPOSED APPROPRIATELY OR RECYCLED.
2. EROSION AND SEDIMENT CONTROLS SHALL BE REPAIRED/RE-ESTABLISHED PRIOR TO RECLAMATION WORK COMMENCEMENT.
3. THE CONTRACTOR SHALL HAVE ONSITE AT ALL TIMES WHEN CONSTRUCTION IS IN PROGRESS A COMPETENT SUPERINTENDENT THOROUGHLY FAMILIAR WITH THE CONSTRUCTION OF EARTH BERMS AND EMBANKMENTS, THE COMPACTION OF SOILS, AND THE PLACEMENT OF LINERS.
4. SURFACE WATER SHALL BE DIVERTED AWAY FROM ALL EXCAVATIONS TO PREVENT FLOODING AND SOFTENING OF THE SUB-GRADE OR COMPACTED MATERIALS.
5. TOPSOIL SHALL BE STRIPPED AND STOCKPILED WITH APPROPRIATE STABILIZATION AND SILT FENCE TO PREVENT EROSION. THE TOPSOIL SHALL BE RE-USED DURING THE RECLAMATION PROCESS OR PLACED ON THE FACE OF EMBANKMENTS PRIOR TO SEEDING.
6. TOE CUT KEYWAYS OF 12' MINIMUM WIDTH SHALL BE EXCAVATED ON ALL RECEIVING SLOPES TO PROVIDE A BASE FOR ANY CONSTRUCTED EMBANKMENT FILL SLOPE. SIDE HILL BENCHES ARE TO BE CUT TO SOLID STRATA AS THE EMBANKMENT FILL PROGRESSES UPWARD (SEE CONSTRUCTION DETAIL). ADDITIONAL TERRACING SHALL BE CONSTRUCTED FOR EACH ADDITIONAL FIFTY (50) VERTICAL FEET OF SLOPE AND SHALL BE A MINIMUM OF TEN (10) FEET WIDE.
7. PRIOR TO PLACING ANY FILL, THE EXPOSED SUB-GRADE SHALL BE COMPACTED AND PROOF ROLLED TO PRODUCE A STABLE AND UNYIELDING SITE.
8. ALL FILL SHALL BE PLACED IN LIFTS OF UP TO 12" IN DEPTH AND SHALL BE COMPACTED TO 95% OF THE STANDARD PROCTOR DENSITY OF THE SOIL PER ASTM D-698. THE MOISTURE CONTENT SHALL BE CONTROLLED WITHIN PLUS OR MINUS 4% OF THE OPTIMUM TO FACILITATE COMPACTION. THE CONTRACTOR SHALL PERFORM FOUR (4) RANDOM IN-PLACE DENSITY TESTS ON EVERY LIFT OF COMPACTED SOIL. RECORDS SHALL BE MAINTAINED OF TEST LOCATIONS AND RESULTS AND PROVIDED TO THE WELL SITE DEVELOPER ON REQUEST. AREAS THAT FAIL FOR COMPACTION SHALL BE REMOVED, RE-COMPACTED AND RETESTED FOR COMPLIANCE. IN LIEU OF IN-PLACE DENSITY TESTING, THE CONTRACTOR MAY PROOF-ROLL EACH 12" SOIL LIFT WITH A LOADED 13 TON TANDEM DUMP TRUCK. SOIL THAT DEFECTS UNDER THE REAR WHEELS GREATER THAN ½" SHALL BE REMOVED, RE-COMPACTED AND RETESTED. COMPACTION OF SOIL SHALL BE ACCOMPLISHED WITH A 3 TON SHEEPS FOOT OR VIBRATORY ROLLER.
9. MAINTENANCE AND OTHER CONSIDERATIONS AND GROUND WATER PROTECTION: ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED DAILY AND AFTER EACH RAINFALL OF [illegible] ALL DEFICIENCIES WILL BE CORRECTED IMMEDIATELY. EXCESS MATERIAL WILL BE SPREAD AND STABILIZED ON THE SITE SO THAT IT DOES NOT ERODE IN THE FUTURE. CLEANING PROCEDURES WILL BE COMPLETED AT REGULAR INTERVALS AND AT LEAST WHEN SEDIMENT REACHES CLEAN OUT LEVELS SHOWN. RECORDS OF CLEANING AND CORRECTIONS WILL BE MAINTAINED BY THE CONTRACTOR. THE "GENERIC GROUNDWATER PROTECTION PLAN FOR CONSTRUCTION SITES" WILL BE USED AND AVAILABLE ON SITE AT ALL TIMES. AN AREA WILL BE PROVIDED FOR VEHICLE AND EQUIPMENT MAINTENANCE. [illegible] PORTABLE SANITARY FACILITIES WILL BE AVAILABLE FOR EMPLOYEES. [illegible] MACHINERY WILL NOT BE ALLOWED IN LIVE STREAMS. [illegible] IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE CHANGES AND NOTIFY WVDEP OF ANY CHANGES TO GPP. A FINAL INSPECTION WILL BE MADE AT THE CONCLUSION OF THE PROJECT AND ALL CORRECTIONS MADE BEFORE SIGN-OFF OF THE PROJECT SITE.
10. SEQUENCE OF EVENTS
    - A. A PRE-CONSTRUCTION CONFERENCE WILL BE HELD ON-SITE WITH CONTRACTOR TO REVIEW THE CONSTRUCTION DRAWINGS AND PROVIDE ANY REQUESTED GUIDANCE.
    - B. CONSTRUCT THE CONSTRUCTION ENTRANCE.
    - C. CONSTRUCT ALL PROPOSED SEDIMENT CONTROL DEVICES AS SHOWN.
    - D. REMOVE TOPSOIL AND PLACE AT AN AREA DETERMINED IN THE FIELD WHERE EROSION WILL NOT TAKE PLACE. SILT FENCE SHALL BE CONSTRUCTED AROUND TOPSOIL STOCKPILES.
    - E. GRADING OPERATIONS AS REQUIRED. FILL SLOPES SHALL BE TOPSOILED.
    - F. WHEN FINAL GRADE IS ACHIEVED, TOPSOIL IS 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.
    - G. LIME, FERTILIZER, AND SEED WILL BE APPLIED BY HAND OR USING A HYDRO-SEEDER. HYDRO-MULCH PRODUCTS SHALL BE MIXED AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
    - H. FINAL SEEDING MUST OCCUR WITHIN SEVEN (7) DAYS OF FINAL GRADING.
    - I. WHEN SITE IS STABILIZED, ALL EROSION AND SEDIMENT CONTROL MEASURES CAN BE REMOVED AND REPAIR/STABILIZE THOSE AREAS IN ACCORDANCE WITH STATE STANDARDS.
    - J. MAKE MODIFICATIONS FOR PERMANENT STORMWATER MANAGEMENT.
    - K. FINAL SITE INSPECTION.
12. PERMANENT STABILIZATION: ALL AREAS LEFT UNCOVERED BY EITHER BUILDINGS OR PAVEMENT SHALL BE STABILIZED WITH PERMANENT SEEDING IMMEDIATELY FOLLOWING FINISHED GRADING AND WITHIN SEVEN (7) DAYS. AT NO TIME SHALL LAND LAY DORMANT FOR LONGER THAN TWENTY-ONE (21) DAYS.



NOTE:
ESTIMATED RECLAMATION (BY OTHERS) IS 7.72 ACRES

Legend

- Proposed Road Area
- Existing 2' Contour
- Existing 10' Contour
- Existing Tree Line
- Existing Utility Pole
- Existing Overhead Utility
- Existing Gas Line CL
- Existing Water Line CL
- Proposed 2' Contour

GRAPHIC SCALE
(IN FEET)
1 inch = 50 ft.

DATE	REVISIONS
1-08-2013	REVISED AFFECTED STREAM INFO
2-04-2013	REVISED AFFECTED STREAM INFO
2-26-2013	REVISED ENVIRONMENTAL DELINEATION
5-08-2013	WVDEP COMMENTS AND LATEST ANTERO REQUIREMENTS

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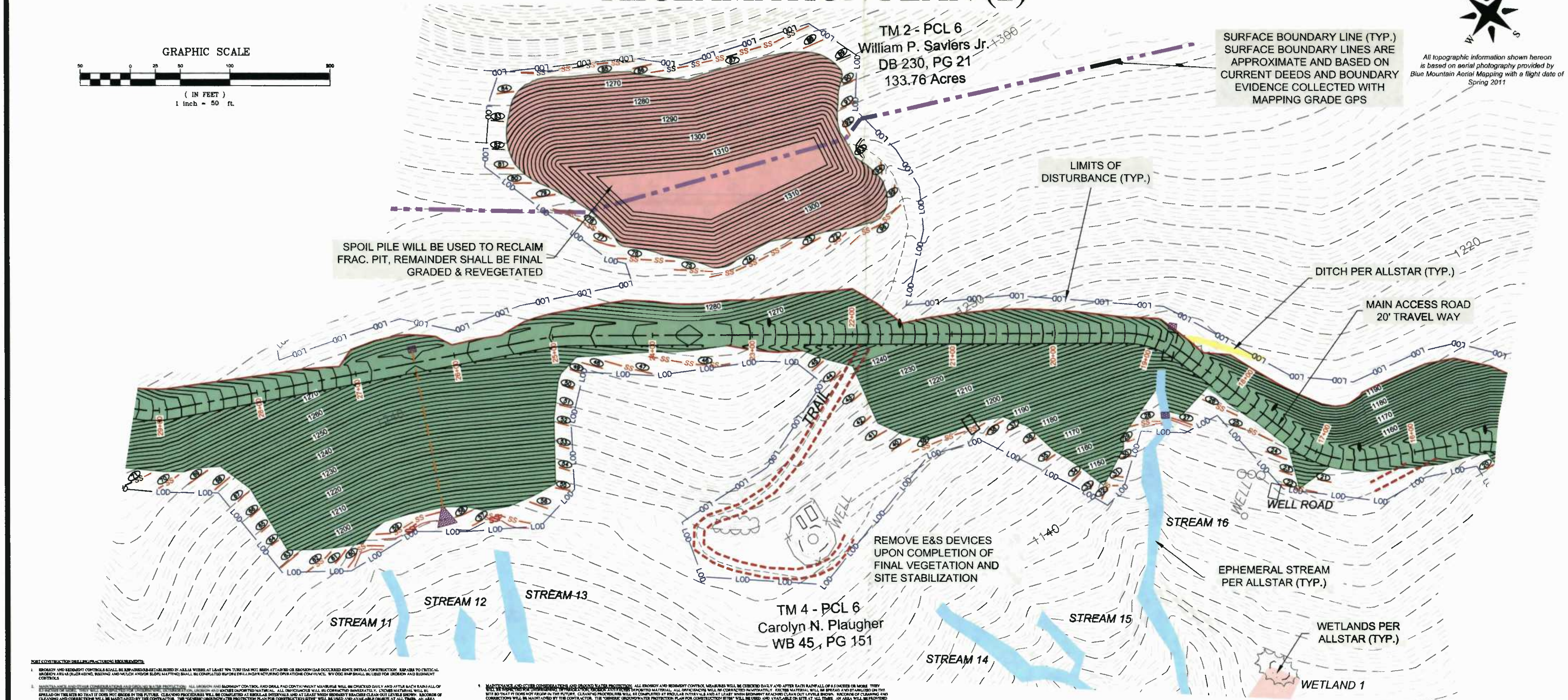
ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

RECLAMATION PLAN
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR &TBC
File No. HBE PROJECTS/2012/ASI/203-12C3D-2012/203-12-FINAL-RCLM.dwg

RECLAMATION PLAN (2)



POST CONSTRUCTION DRILLING/FRACTURING REQUIREMENTS:

1. EROSION AND SEDIMENT CONTROLS SHALL BE REPAIRED/RE-ESTABLISHED IN AREAS WHERE AT LEAST 70% TURF HAS NOT BEEN ATTAINED OR EROSION HAS OCCURRED SINCE INITIAL CONSTRUCTION. REPAIRS TO CRITICAL EROSION AREAS (REGRADING, SEEDING AND MULCH AND/OR SLOPE MATTING) SHALL BE COMPLETED BEFORE DRILLING/FRACTURING OPERATIONS COMMENCE. WV OOG BMP SHALL BE USED FOR EROSION AND SEDIMENT CONTROLS.
2. MAINTENANCE AND OTHER CONSIDERATIONS AND GROUND WATER PROTECTION. ALL EROSION AND SEDIMENT CONTROL AND DRILL PAD CONTAINMENT MEASURES WILL BE CHECKED DAILY AND AFTER EACH RAINFALL OF 0.5 INCHES OR MORE. THEY WILL BE INSPECTED FOR UNDERMINING, DETERIORATION, EROSION AND EXCESS DEPOSITED MATERIAL. ALL DEFICIENCIES WILL BE CORRECTED IMMEDIATELY. EXCESS MATERIAL WILL BE SPREAD ON THE SITE SO THAT IT DOES NOT ERODE IN THE FUTURE. CLEANING PROCEDURES WILL BE COMPLETED AT REGULAR INTERVALS AND AT LEAST WHEN SEDIMENT REACHES CLEAN OUT LEVELS SHOWN. RECORDS OF CLEANING AND CORRECTIONS WILL BE MAINTAINED BY THE CONTRACTOR. THE "GENERIC GROUNDWATER PROTECTION PLAN FOR CONSTRUCTION SITES" WILL BE USED AND AVAILABLE ON-SITE AT ALL TIMES. AN AREA WILL BE PROVIDED FOR VEHICLE AND EQUIPMENT MAINTENANCE. MOBILE FUEL TRUCKS WITH APPROVED TANKS WILL BE USED ON THIS SITE. PORTABLE SANITARY FACILITIES WILL BE AVAILABLE FOR EMPLOYEES. IF CONCRETE IS USED, EXCESS CONCRETE WILL BE DISPOSED OF PROPERLY AND NOT ALLOWED TO REMAIN ON THIS SITE. MACHINERY WILL NOT BE ALLOWED IN LIVE STREAMS. FLUIDS SUCH AS DIESEL FUEL, GAS, OIL OR ANTIFREEZE WILL BE KEPT IN PROPER CONTAINERS AND ANY SPILLAGE WILL BE CLEANED AND TAKEN OFF-SITE TO A PROPER FACILITY. SOLID OR HAZARDOUS WASTES WILL BE DISPOSED IN ACCORDANCE WITH APPROPRIATE STATE AND FEDERAL REGULATIONS.

RECLAMATION CONSTRUCTION SPECIFICATIONS:

1. THE FRAC PIT AND WATER TANK PAD SHALL BE RECLAIMED TO LANDOWNER'S SPECIFICATIONS OR AS NEAR TO ORIGINAL PRE-DISTURBED GRADES AS POSSIBLE. THE LINER SHALL BE REMOVED AND DISPOSED APPROPRIATELY OR RECYCLED.
2. EROSION AND SEDIMENT CONTROLS SHALL BE REPAIRED/RE-ESTABLISHED PRIOR TO RECLAMATION WORK COMMENCEMENT.
3. THE CONTRACTOR SHALL HAVE ON-SITE AT ALL TIMES WHEN CONSTRUCTION IS IN PROGRESS A COMPETENT SUPERINTENDENT THOROUGHLY FAMILIAR WITH THE CONSTRUCTION OF EARTH BERMS AND EMBANKMENTS, THE COMPACTION OF SOILS, AND THE PLACEMENT OF LINERS.
4. SURFACE WATER SHALL BE DIVERTED AWAY FROM ALL EXCAVATIONS TO PREVENT FLOODING AND SOFTENING OF THE SUB-GRADE OR COMPACTED MATERIALS.
5. TOPSOIL SHALL BE STRIPPED AND STOCKPILED WITH APPROPRIATE STABILIZATION AND SILT FENCE TO PREVENT EROSION. THE TOPSOIL SHALL BE REUSED DURING THE RECLAMATION PROCESS OR PLACED ON THE FACE OF EMBANKMENTS PRIOR TO SEEDING.
6. TOE CUT KEYWAYS OF 12' MINIMUM WIDTH SHALL BE EXCAVATED ON ALL RECEIVING SLOPES TO PROVIDE A BASE FOR ANY CONSTRUCTED EMBANKMENT FILL SLOPE. SIDE HILL BENCHES ARE TO BE CUT TO SOLID STRATA AS THE EMBANKMENT FILL PROGRESSES UPWARD (SEE CONSTRUCTION DETAIL). ADDITIONAL TERRACING SHALL BE CONSTRUCTED FOR EACH ADDITIONAL FIFTY (50) VERTICAL FEET OF SLOPE AND SHALL BE A MINIMUM OF TEN (10) FEET WIDE.
7. PRIOR TO PLACING ANY FILL, THE EXPOSED SUB-GRADE SHALL BE COMPACTED AND PROOF ROLLED TO PRODUCE A STABLE AND UNYIELDING SITE.
8. ALL FILL SHALL BE PLACED IN LIFTS OF UP TO 12" IN DEPTH AND SHALL BE COMPACTED TO 90% OF THE STANDARD PROCTOR DENSITY OF THE SOIL PER ASTM D-698. THE MOISTURE CONTENT SHALL BE CONTROLLED WITHIN PLUS OR MINUS 4% OF THE OPTIMUM TO FACILITATE COMPACTION. THE CONTRACTOR SHALL PERFORM FOUR (4) RANDOM IN-PLACE DENSITY TESTS ON EVERY LIFT OF COMPACTED SOIL. RECORDS SHALL BE MAINTAINED OF TEST LOCATIONS AND RESULTS AND PROVIDED TO THE WELL SITE DEVELOPER ON REQUEST. AREAS THAT FAIL FOR COMPACTION SHALL BE REMOVED, RE-COMPACTED AND RETESTED FOR COMPLIANCE. IN LIEU OF IN-PLACE DENSITY TESTING, THE CONTRACTOR MAY PROOF-ROLL EACH 12" SOIL LIFT WITH A LOADED 15 TON TANDEM DUMP TRUCK. SOIL THAT DEFLECTS UNDER THE REAR WHEELS GREATER THAN 1/2" SHALL BE REMOVED, RE-COMPACTED AND RETESTED. COMPACTION OF SOIL SHALL BE ACCOMPLISHED WITH A 5 TON SHEEPS FOOT, OR VIBRATORY ROLLER.
9. MAINTENANCE AND OTHER CONSIDERATIONS AND GROUND WATER PROTECTION. ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED DAILY AND AFTER EACH RAINFALL OF 0.5 INCHES OR MORE. THEY WILL BE INSPECTED FOR UNDERMINING, DETERIORATION, EROSION AND EXCESS DEPOSITED MATERIAL. ALL DEFICIENCIES WILL BE CORRECTED IMMEDIATELY. EXCESS MATERIAL WILL BE SPREAD AND STABILIZED ON THE SITE SO THAT IT DOES NOT ERODE IN THE FUTURE. CLEANING PROCEDURES WILL BE COMPLETED AT REGULAR INTERVALS AND AT LEAST WHEN SEDIMENT REACHES CLEAN OUT LEVELS SHOWN. RECORDS OF CLEANING AND CORRECTIONS WILL BE MAINTAINED BY THE CONTRACTOR. THE "GENERIC GROUNDWATER PROTECTION PLAN FOR CONSTRUCTION SITES" WILL BE USED AND AVAILABLE ON SITE AT ALL TIMES. AN AREA WILL BE PROVIDED FOR VEHICLE AND EQUIPMENT MAINTENANCE. MOBILE FUEL TRUCKS WITH APPROVED TANKS WILL BE USED ON THIS SITE. PORTABLE SANITARY FACILITIES WILL BE AVAILABLE FOR EMPLOYEES. IF CONCRETE IS USED, EXCESS CONCRETE WILL BE DISPOSED OF PROPERLY AND NOT ALLOWED TO REMAIN ON THIS SITE. MACHINERY WILL NOT BE ALLOWED IN LIVE STREAMS. FLUIDS SUCH AS DIESEL FUEL, GAS, OIL OR ANTIFREEZE WILL BE KEPT IN PROPER CONTAINERS AND ANY SPILLAGE WILL BE CLEANED AND TAKEN OFF SITE TO A PROPER FACILITY. SOLID OR HAZARDOUS WASTES WILL BE DISPOSED IN ACCORDANCE WITH APPROPRIATE STATE AND FEDERAL REGULATIONS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE CHANGES AND NOTIFY WVDEP OF ANY CHANGES TO OPP. A FINAL INSPECTION WILL BE MADE AT THE CONCLUSION OF THE PROJECT AND ALL CORRECTIONS MADE BEFORE SIGN-OFF OF THE PROJECT SITE.
10. SEQUENCE OF EVENTS:
    - A. A PRE-CONSTRUCTION CONFERENCE WILL BE HELD ON-SITE WITH CONTRACTOR TO REVIEW THE CONSTRUCTION DRAWINGS AND PROVIDE ANY REQUESTED GUIDANCE.
    - B. CONSTRUCT THE CONSTRUCTION ENTRANCE.
    - C. CONSTRUCT ALL PROPOSED SEDIMENT CONTROL DEVICES AS SHOWN.
    - D. REMOVE TOPSOIL AND PLACE AT AN AREA DETERMINED IN THE FIELD WHERE EROSION WILL NOT TAKE PLACE. SILT FENCE SHALL BE CONSTRUCTED AROUND TOPSOIL STOCKPILES.
    - E. GRADING OPERATIONS AS REQUIRED. FILL SLOPES SHALL BE TOPSOILED.
    - F. WHEN FINAL GRADE IS ACHIEVED, TOPSOIL IS 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 SOIL SAMPLE IS TAKEN THE FOLLOWING RATES SHOULD BE APPLIED AS A MINIMUM. LIME AT A RATE OF 4 TONS PER ACRE. FERTILIZER 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.
    - G. LIME, FERTILIZER, AND SEED WILL BE APPLIED BY HAND OR USING A HYDRO-SEEDER. HYDRO-MULCH PRODUCTS SHALL BE MIXED AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
    - H. FINAL SEEDING MUST OCCUR WITHIN SEVEN (7) DAYS OF FINAL GRADING.
    - I. WHEN SITE IS STABILIZED, ALL EROSION AND SEDIMENT CONTROL MEASURES CAN BE REMOVED AND REPAIR/STABILIZE THOSE AREAS IN ACCORDANCE WITH STATE STANDARDS.
    - J. MAKE MODIFICATIONS FOR PERMANENT STORMWATER MANAGEMENT.
    - K. FINAL SITE INSPECTION.
12. PERMANENT STABILIZATION. ALL AREAS LEFT UNCOVERED BY EITHER BUILDINGS OR PAVEMENT SHALL BE STABILIZED WITH PERMANENT SEEDING IMMEDIATELY FOLLOWING FINISHED GRADING AND WITHIN SEVEN (7) DAYS. AT NO TIME SHALL LAND LAY DORMANT FOR LONGER THAN TWENTY-ONE (21) DAYS.

NOTE:
ESTIMATED RECLAMATION
(BY OTHERS) IS 7.72 ACRES

Legend

Proposed Road Area	Existing 2' Contour
Proposed Spoil Area	Existing 10' Contour
	Existing Tree Line
	Existing Utility Pole
	Existing Overhead Utility
	Existing Gas Line CL
	Existing Water Line CL
	Proposed 2' Contour
	Proposed 10' Contour

DATE	REVISIONS
2-26-2013	ADDED RECLAMATION NOTES
5-08-2013	WVDEP COMMENTS AND LATEST ANTERO REQUIREMENTS

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

Hornor Bros. Engineers
Since 1902
Civil, Mining, Environmental and Consulting Engineering
140 South Third Street, Post Office Box 386, Clarksburg, West Virginia 26302 (304) 624-6445

ANTERO RESOURCES

THIS DOCUMENT PREPARED FOR ANTERO RESOURCES APPALACHIAN CORP

RECLAMATION PLAN
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR & TBC
File No. 203-13C50-2012/203-13-FINAL-RCLM.dwg
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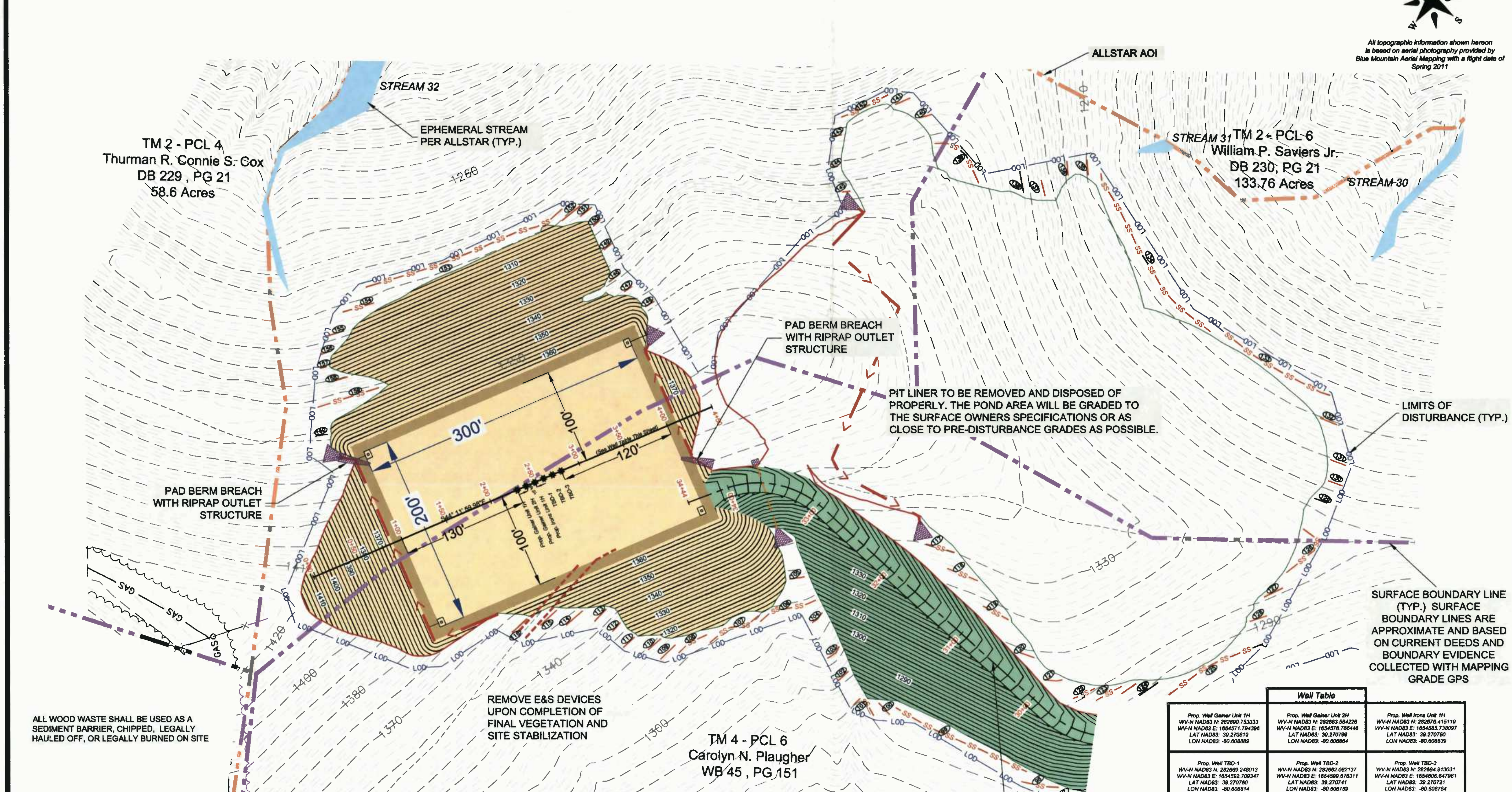
RECLAMATION PLAN (3)



NOTE:
ESTIMATED RECLAMATION (BY OTHERS) IS 7.72 ACRES

Well Table

Prop. Well Gainer Unit 1H WV-N NAD83 N: 282690.753333 WV-N NAD83 E: 1654571.794396 LAT NAD83: 39.270819 LON NAD83: -80.608889	Prop. Well Gainer Unit 2H WV-N NAD83 N: 282683.584226 WV-N NAD83 E: 1654578.766446 LAT NAD83: 39.270799 LON NAD83: -80.608864	Prop. Well Irons Unit 1H WV-N NAD83 N: 282676.415119 WV-N NAD83 E: 1654585.738097 LAT NAD83: 39.270780 LON NAD83: -80.608839
Prop. Well TBD-1 WV-N NAD83 N: 282669.246013 WV-N NAD83 E: 1654592.709347 LAT NAD83: 39.270760 LON NAD83: -80.608814	Prop. Well TBD-2 WV-N NAD83 N: 282662.082137 WV-N NAD83 E: 1654599.676311 LAT NAD83: 39.270741 LON NAD83: -80.608789	Prop. Well TBD-3 WV-N NAD83 N: 282654.913031 WV-N NAD83 E: 1654606.647961 LAT NAD83: 39.270721 LON NAD83: -80.608764

Legend

- Proposed Road Area
- Proposed Drill Pad Area
- Existing 2' Contour
- Existing 10' Contour
- Existing Tree Line
- Existing Utility Pole
- Existing Overhead Utility
- Existing Gas Line CL
- Existing Water Line CL
- Proposed 2' Contour
- Proposed 10' Contour

GRAPHIC SCALE
(IN FEET)
1 inch = 50 ft.

DATE	REVISIONS
1-29-2013	ADDED SUMP/DEWATERING TANKS TO LAYOUT
5-08-2013	WVDEP COMMENTS AND LATEST ANTERO REQUIREMENTS

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

11-30-2012

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RECLAMATION PLAN
PLAUGHER NORTH DRILL PAD SITE
GREENBRIER DISTRICT
DODDRIDGE COUNTY, WV

Date: 11-30-2012
Scale: 1" = 50'
Designed By: JDR & TBC
File No. HBE PROJECTS/2012/A... 203-12C3D-2012/ 203-12-FINAL-RCLM.dwg
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