Commercial/Industrial Floodplain Development Permit

Doddridge County, WV Floodplain Management

This permit has been issued to **EQT Production Company**, and is for the approved commercial and/or industrial development project associated with this permit that impacts the FEMA-designated floodplain and/or floodway of Doddridge County, WV, pursuant to the rules and regulations established by all applicable Federal, State and local laws and ordinances, including the Doddridge County Floodplain Ordinance. This permit must be posted at the site of work as to be clearly visible, and must remain posted during entirety of development.

Permit: #15-357 SMI 31 Well Pad

Date Approved: 05/20/2015   **Expires: N/A**

Issued to: EQT Production Company

Company Address: 115 Professional Place
                  Bridgeport, WV 26330

Project Address: New Milton District

Lat/Long: 39.264064N/80.718445W

POC: Locoa Corder
304-848-0066

Purpose of development: Well pad project. *__Project does not impact floodplain.__*

Issued by: Edwin L "Bo" Wriston, Doddridge County FPM (*or designee*)

Date: 05/20/2015

For additional information regarding this permit, please contact
Doddridge County Floodplain Manager at 304.873.2631, or via email at
doddridgecountyfpm@gmail.com
118 East Court Street; West Union, WV 26456

Legal Advertisement:

Doddridge County

Floodplain Permit Application

Please take notice that on the 19th day of May, 2015

EQT Production Company

filed an application for a Floodplain Permit to develop land located at or about:

New Milton District

39.264064N/80.718445W

Permit #15-357   SMI-31 Well Pad
(Note: This project is not within the floodplain)

The Application is on file with the Clerk of the County Court and may be inspected

or copied during regular business hours. As this project is outside the FEMA identified

floodplain of Doddridge County, Doddridge County Floodplain Management

has no regulatory authority. Any interested persons who desire to

comment shall present the same in writing by **June 22, 2015,** delivered to:

Clerk of the County Court

118 E. Court Street, West Union, WV 26456

Beth A Rogers, Doddridge County Clerk

Edwin L. "Bo" Wriston. Doddridge County Flood Plain Manager

RETTEW

One Robinson Plaza, Ste. 200, Pittsburgh, PA 15205 • Phone: (412) 446-1728
E-mail: rettew@rettew.com • Web site: rettew.com

15-357

FILED

2015 MAY 19 PM 2: 36

RETA A. ROGERS
COUNTY CLERK
DODDRIDGE COUNTY, WV

Engineers

Planners

Surveyors

Landscape

Architects

Environmental

Consultants

May 18, 2015

Mr. Edwin "Bo" Wristen
Doddridge County Floodplain Manager
Doddridge County Courthouse
118 East Court Street
West Union, WV 26456
304-873-2631

RE: SMI-31 Well Pad
        Floodplain Permit Application Submission
        New Milton Tax District, Doddridge County, WV
        RETTEW Project No. 092612019

Dear Mr. Wristen:

On behalf of EQT Production Company; RETTEW Associates, Inc. is pleased to submit the enclosed permit application referenced above. Included with this submission are the following:

- Floodplain Development Permit Application
- Location Map showing the site on USGS mapping
- Floodplain Study with site plans included

A gravel well pad and related infrastructure will be constructed within the Douglascamp Run watershed. The coordinates for the pad center are N39.264064 & W80.718445 (NAD83). The site is located in the New Milton Tax District. The proposed development is <u>not</u> located in the floodplain as shown in the floodplain study included with this submission.

If you have any questions or require clarification regarding this submission, please do not hesitate to contact me at 412-446-1728 or via email at bspray@rettew.com or Lacoa Corder at 304-848-0066 or LCorder@eqt.com.

Sincerely,

Brian D. Spray
Project Manager

Enclosures

copy: Lacoa Corder, EQT Production Company
        File

\\CHOWDER\Share\Projects\09261\092612019\LD\Permits\Doddridge Floodplain\LTR-Submit-SMI31 Doddridge Floodplain.docx

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 _Lacoa Corder of EQT Production_

DATE _5-7-15_

SECTION 2: PROPOSED 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: Lacoa Corder, EQT Production
ADDRESS: 120 Professional Place, Bridgeport, WV 26330
TELEPHONE NUMBER: 304-848-0066

CONTRACTOR NAME:_____To Be Determined_____

ADDRESS:_____

TELEPHONE #_____

 WV CONTRACTOR LICENCE #_____

ENGINEER'S NAME:_____Brian Spray, RETTEW Associates, Inc._____

ADDRESS:_____One Robinson Plaza, Suite 200, 6600 Steubenville Pike,

_____Pittsburgh, PA 15205_

TELEHONE NUMBER:____412-446-1728_____

PROJECT LOCATION:

NAME OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT)_____

_____Ronald G. Barnes & Donald Barnes_____

ADDRESS OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT)_____

_____181 Smith Lane, Howard, PA 16841_____

DISTRICT:_____New Milton_____

LAND BOOK DESCRIPTION:_____

DEED BOOK REFERENCE:_____Book 277 Page 653 & Book 277 Page 657_____

TAX MAP REFERENCE:_____6-1-10_____

EXISTING BUILDINGS/USES OF PROPERTY:___office/storage buildings_____

NAME OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE SUBJECT

PROPERTY_____no dwellings_____

ADDRESS OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE

SUBJECT PROPERTY_____n/a_____

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

See attached location map

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 DEVELOPLMENT ACTIVITIES:

[X] Fill   [] Mining   [X] Drilling   [X] Pipelining

[X] Grading

[X] Excavation (except for STRUCTURAL DEVELOPMENT checked above)

[] Watercourse Alteration (including dredging and channel modification)

[X] Drainage Improvements (including culvert work)

[X] Road, Street, or Bridge Construction

[] Subdivision (including new expansion)

[] Individual Water or Sewer System

[X] Other (please specify)

_____Horizontal Well Development_____

C. STANDARD SITE PLAN OR SKETCH

1. SUBMIT ALL STANDARD SITE PLANS, IF ANY HAVE BEEN PREPARED (ENGINEERING PLANS MUST BE SIGNED AND SEALED).
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/ PROPOSED CONSTRUCTION PROJECT WITHIN THE FLOODPLAIN

$ **0.00**_____

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: Homer L. & Delores Weekley (6-3-4.2)
ADDRESS: HC 68 Box 16B
West Union, WV 26456

NAME: Davis G. & Victoria L. Bland   (6-3-4)
ADDRESS: 3889 WV RT 18 S
West Union, WV 26456

NAME: Thurman & Virginia Osborne Bailey (6-3-3)
ADDRESS: RT 1 Box 730
Greenwood, WV 26415

NAME: Fern A. Shepard (6-3-2)
ADDRESS: 5188 Long Run Road
Pennsboro , WV 26415

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: Homer L. & Delores Weekley (6-3-4.2)
ADDRESS: HC 68 Box 16B
West Union, WV 26456

NAME: Davis G. & Victoria L. Bland (6-3-4)
ADDRESS: 3889 WV RT 18S
West Union, WV 26456

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): *Lacoa Corder*

SIGNATURE: *Lacoa Corder*   DATE: *5-15-15*

After completing SECTION 2, APPLICANT should submit form and fees to Clerk of Doddridge County Court 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:_____
Dated:_____

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

[]   Is located in Special Flood Hazard Area.
        FIRM zone designation_____
        100-Year flood elevation is _____NGVD .
        Stream name _____.
        Profile # _____.

[]   Unavailable

[]   The proposed development is located in a floodway.

[]   See section 4 for additional instructions.

SIGNED_____   **DATE**_____

SECTION 4: ADDITIONAL INFORMATION REQUIRED FOR DEVELOPMENT IN SPECIAL FLOOD HAZARD AREA (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 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 proofing 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 10 lots or 2 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.
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 Flood Hazard 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_____DATE_____

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 appeal.

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.
2   Actual (As Built) elevation of floodproofing is _____FT. NGVD.
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.

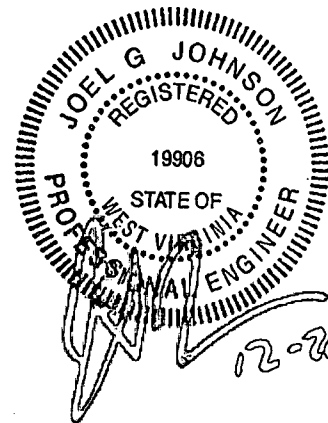SIGNED_____DATE_____

RETTEW

We answer to you.

FLOODPLAIN STUDY

FOR

SMI31 Well Pad

DODDRIDGE COUNTY, WEST VIRGINIA
PROJECT NO. 092612019

Prepared by:

RETTEW ASSOCIATES, INC.
4955 Steubenville Pike; Suite 305
Pittsburgh, PA 15205

December 13, 2013

TABLE OF CONTENTS

BACKGROUND

On behalf of EQT Production Company, RETTEW has prepared a Floodplain study of the area of Douglascamp Run denoted as Zone 'A' on the FEMA mapping (Attachment 3) to demonstrate compliance with the Doddridge County Floodplain Ordinance. The proposed project encompasses the construction of a natural gas well pad, flowback pit, and access road. The center of the proposed well pad is at Latitude 39.264064, Longitude -80.718445. The enclosed mapping indicates the proposed project location (Attachment 2)

There is no proposed encroachment into the floodplain. The purpose of this study is to provide proof that the project is beyond the actual floodplain.

FLOODPLAIN STUDY

HYDROLOGY
Douglascamp Run flows generally from North of the property in a South Southwest direction to State Route 18 and finally to Meathouse Fork. The flow utilized for this flood study was computed using the equations developed in the USGS report *Estimation of Flood-Frequency Discharges for Rural, Unregulated Streams in West Virginia*. A 100-year flow of 448 cfs was used for the floodplain study. A watershed map showing the drainage area from the USGS mapping is included herein. (Attachment 1)

HYDRAULICS
The Corps of Engineers' HEC-RAS computer program, version 4.1, was utilized to establish water surface elevations for the 100-year flow. The average starting slopes for normal depth calculations were obtained from the topographical survey of the area.

The HEC-RAS cross sections and culvert (labeled as bridge in the HEC-RAS model) for the study were obtained from the 2-foot contour generated by topographical survey.

The HEC-RAS summary table is provided on the next page; however the key elements are listed below.

Cross Section Water Surface Elevation Summary

| Cross Section	Flow	WSE	Change in WSE
7	448.00	824.56	
6	448.00	820.28	0
5	448.00	818.10	0
4	448.00	815.88	0
3	448.00	815.77	0
2	448.00	812.95	0
1	448.00	813.00*	0

*Value taken from FEMA study of Meathouse Fork

HEC-RAS Plan: Plan 04   River: Douglas Run   Reach: Douglas Run   Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Douglas Run	1048	PF 1	448.00	821.80	824.56	824.56	824.99	0.019900	6.34	102.99	123.90	0.96
Douglas Run	843	PF 1	448.00	817.19	820.28	820.08	820.49	0.010665	5.43	139.89	146.29	0.70
Douglas Run	657	PF 1	448.00	813.99	818.10	818.10	818.42	0.013855	5.19	120.40	170.06	0.79
Douglas Run	451	PF 1	448.00	810.79	815.88		815.90	0.000319	1.55	464.42	202.25	0.14
Douglas Run	161	PF 1	448.00	805.28	815.77	808.77	815.83	0.000175	2.01	244.95	204.51	0.12
Douglas Run	108		Bridge									
Douglas Run	100	PF 1	448.00	803.75	812.95	807.68	813.07	0.000286	2.82	158.68	145.24	0.19
Douglas Run	15	PF 1	448.00	804.39	813.00	806.60	813.01	0.000016	0.76	942.67	258.42	0.05

ATTACHMENTS
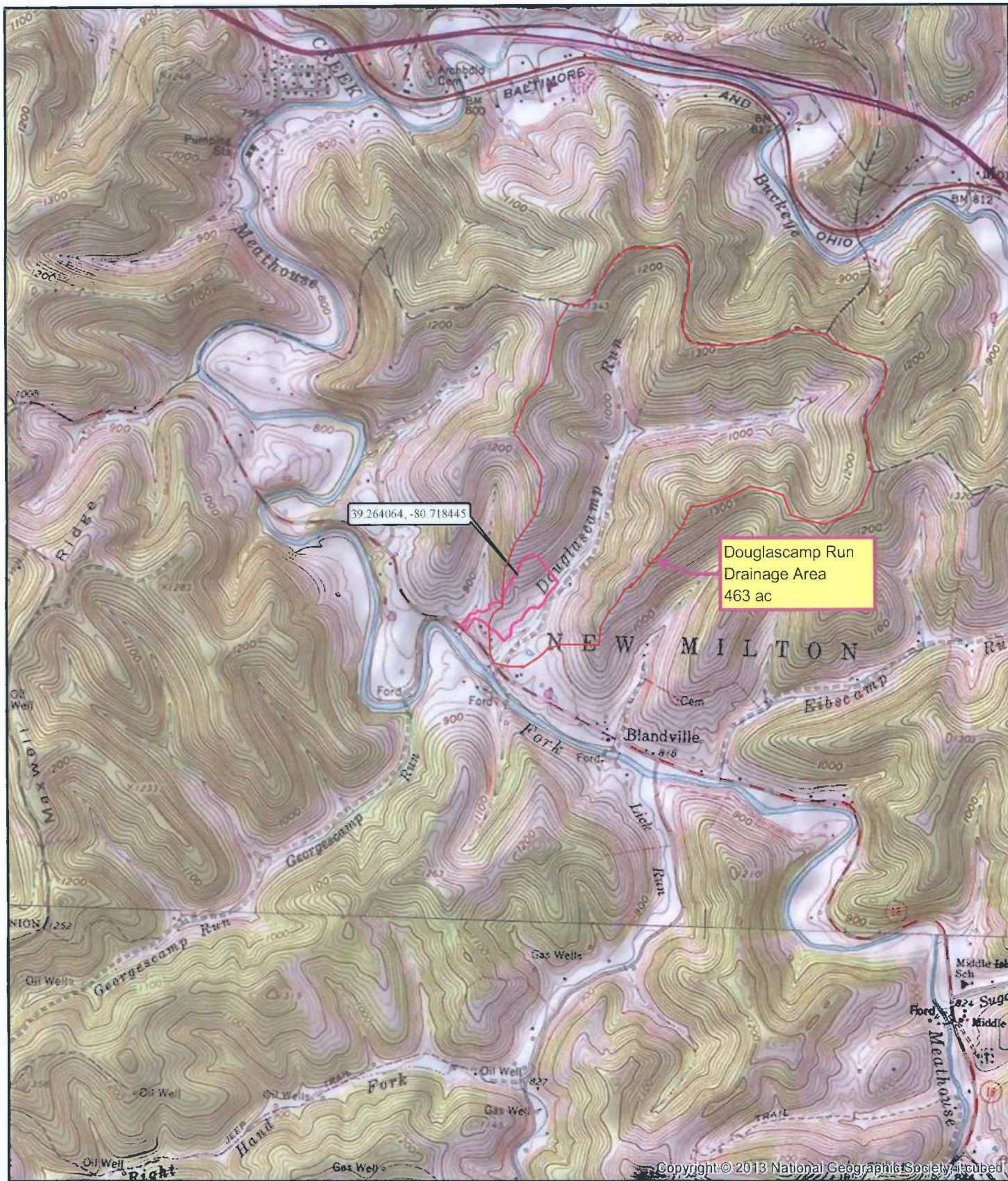
39.264064, -80.718445

Douglascamp Run
Drainage Area
463 ac

Copyright © 2013 National Geographic Society i-cubed

EQT Production Company

SMI 31 Well Pad

Figure 1 - Site Location Map

Project No: 092612019

Limits of Disturbance
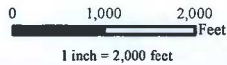
New Milton Tax District, Doddridge County, WV
Smithburg, WV USGS 7.5' Topographic Quadrangle

12/11/2013

N
W E
S

0   1,000   2,000
                    Feet

1 inch = 2,000 feet

EQT
Where energy meets innovation.

RETTEW

H:\Projects\09261\092612019\GIS\MapDocs\Agency\092612019_Smithburg_31_Pad_Topo_Basemap_8.5x11.mxd

New Milton

EQT Production Company

SMI 31 Well Pad

Figure 2 - Aerial Basemap

New Milton Tax District, Doddridge County, WV

Project No: 092612019

—— Contour (20ft Interval)	——▶ Stream Continuation Arrow	—— Roadway
—— Field Delineated Stream	——▶ Wetland Continuation Arrow	▨ Field Delineated Wetland

☐ Soil (Hydric Status)

☐ Parcel

☐ Limits of Disturbance

0   200   Feet

1 inch = 200 feet
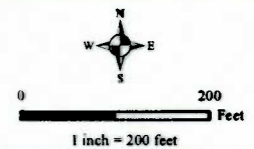
EQT **RETTEW**

Drawn By: GSR

12/11/2013

MAP SCALE 1" = 1000'

500   0   1000   2000

FEET

MET
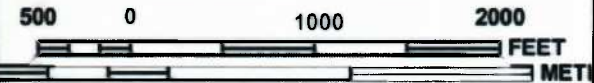
PANEL 0140C

FIRM

FLOOD INSURANCE RATE MAP

DODDRIDGE COUNTY, WEST VIRGINIA
AND INCORPORATED AREAS

PANEL 140 OF 325

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DODDRIDGE COUNTY	540024	0140	C

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

MAP NUMBER
54017C0140C

MAP REVISED
OCTOBER 4, 2011

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

Meathouse Fork

802

802

806

809

813

ZONE AE

ZONE A

ZONE A

ZONE A

ZONE A

Meathouse Fork

Run

Douglascamp

Run

50H 6

185

813

816

816

817

818

18

ZONE A

scamp

Brick Run

FLOW CALCULATIONS
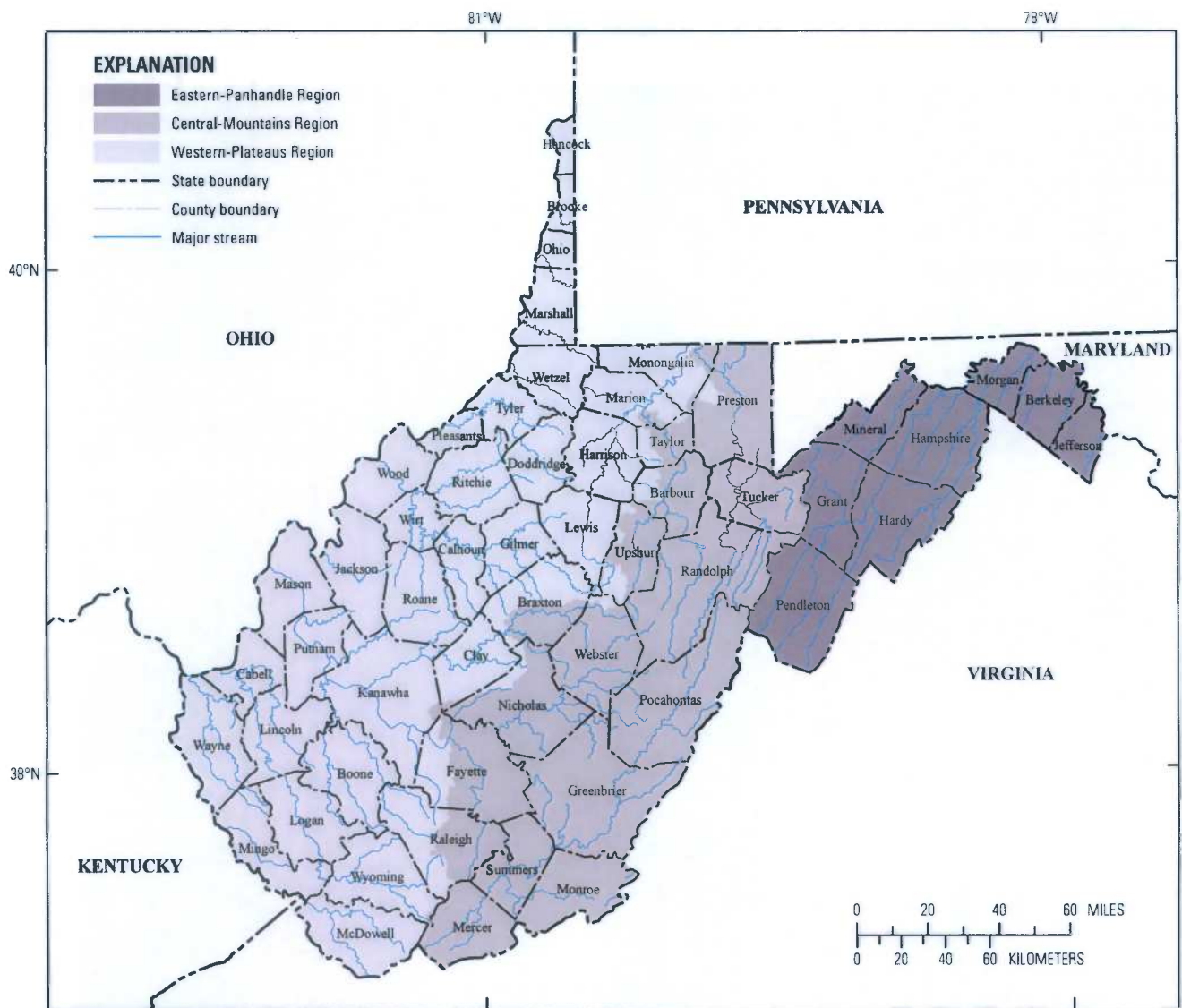
Base from U.S. Geological Survey 1:100,000 digital line graphics for state boundaries and streams and
from the West Virginia Department of Environmental Protection 1:24,000 digital data for county boundaries.
Universal Transverse Mercator projection, zone 17, NAD 83.

Figure 4. The Eastern Panhandle, Central Mountains, and Western Plateaus Regions of West Virginia for which equations for estimation of flood frequency discharges were developed in this study.

Table 4. Equations used to estimate selected flood-frequency discharges for streams in the Eastern Panhandle, Central Mountains, and Western Plateaus Regions of West Virginia.

[PK(n_n), peak discharge in cubic feet per second for the (n.n)-year recurrence interval; PK(n), peak discharge in cubic feet per second for the (n)-year recurrence interval; %, percent; AOP, annual-occurrence probability; DRNAREA, drainage area in square miles]

Equation	Standard error of the model, in percent	Average standard error of sampling, in percent	Average prediction error, in percent	Equivalent years of record, unitless
Eastern Panhandle Region (Range in DRNAREA from 0.21 to 1,461 for 57 streamgage stations)				
$PK1\_1(90\%AOP) = 29.6\ DRNAREA^{0.818}$	43.4	10.3	44.8	3.4
$PK1\_5(67\%AOP) = 46.4\ DRNAREA^{0.828}$	35.7	8.9	36.9	3.3
$PK2(50\%AOP) = 59.8\ DRNAREA^{0.832}$	32.1	8.6	33.4	4.1
$PK5(20\%AOP) = 105\ DRNAREA^{0.838}$	25.6	8.9	27.2	10.6
$PK10(10\%AOP) = 145\ DRNAREA^{0.842}$	22.5	9.5	24.5	19.1
$PK25(4\%AOP) = 204\ DRNAREA^{0.848}$	19.7	10.3	22.4	34.1
$PK50(2\%AOP) = 254\ DRNAREA^{0.852}$	18.6	11.1	21.7	46.1
$PK100(1\%AOP) = 307\ DRNAREA^{0.855}$	18.3	11.6	21.7	56.7
$PK200(0.5\%AOP) = 365\ DRNAREA^{0.859}$	18.4	12.4	22.4	64.7
$PK500(0.2\%AOP) = 447\ DRNAREA^{0.864}$	19.4	13.5	23.8	70.9
Central Mountains Region (Range in DRNAREA from 0.10 to 1,619 for 83 streamgage stations)				
$PK1\_1(90\%AOP) = 33.4\ DRNAREA^{0.914}$	40.0	8.3	41.0	2.4
$PK1\_5(67\%AOP) = 53.8\ DRNAREA^{0.887}$	34.6	7.3	35.4	2.0
$PK2(50\%AOP) = 69.4\ DRNAREA^{0.873}$	33.4	7.3	34.2	2.1
$PK5(20\%AOP) = 116\ DRNAREA^{0.845}$	34.1	8.0	35.1	3.2
$PK10(10\%AOP) = 153\ DRNAREA^{0.831}$	36.3	8.6	37.4	4.0
$PK25(4\%AOP) = 206\ DRNAREA^{0.816}$	39.9	9.8	41.2	4.8
$PK50(2\%AOP) = 250\ DRNAREA^{0.807}$	42.9	10.6	44.4	5.3
$PK100(1\%AOP) = 297\ DRNAREA^{0.800}$	46.2	11.3	47.9	5.6
$PK200(0.5\%AOP) = 347\ DRNAREA^{0.793}$	49.7	12.0	51.5	5.9
$PK500(0.2\%AOP) = 420\ DRNAREA^{0.785}$	54.3	13.1	56.3	6.1
Western Plateaus Region (Range in DRNAREA from 0.13 to 1,516 for 106 streamgage stations)				
$PK1\_1(90\%AOP) = 56.9\ DRNAREA^{0.763}$	38.2	7.6	39.1	3.8
$PK1\_5(67\%AOP) = 97.8\ DRNAREA^{0.741}$	33.4	6.5	34.1	2.8
$PK2(50\%AOP) = 129\ DRNAREA^{0.730}$	31.6	6.1	32.2	2.8
$PK5(20\%AOP) = 221\ DRNAREA^{0.710}$	29.3	6.5	30.0	4.4
$PK10(10\%AOP) = 292\ DRNAREA^{0.699}$	28.9	6.5	29.7	5.9
$PK25(4\%AOP) = 391\ DRNAREA^{0.688}$	29.4	7.3	30.3	7.9
$PK50(2\%AOP) = 472\ DRNAREA^{0.681}$	30.2	7.6	31.3	9.1
$PK100(1\%AOP) = 557\ DRNAREA^{0.674}$	31.4	8.0	32.5	10.1
$PK200(0.5\%AOP) = 647\ DRNAREA^{0.668}$	32.7	8.3	33.9	10.8
$PK500(0.2\%AOP) = 775\ DRNAREA^{0.661}$	34.8	8.9	36.1	11.4

463 ac drainage area = 0.723437sqmi
557*(0.723437)^0.674 = 448 cfs

Prepared in cooperation with the West Virginia Department of Transportation,
Division of Highways

Virginia

Division of Highways

U.S. Department of the Interior
KEN SALAZAR, Secretary

U.S. Geological Survey
Marcia K. McNutt, Director

U.S. Geological Survey, Reston, Virginia: 2010

EXISTING HEC-RAS OUTPUT

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
```

PROJECT DATA
Project Title: Smithsburg 31
Project File : Smithsburg31.prj
Run Date and Time: 12/12/2013 9:36:23 AM

Project in English units

PLAN DATA

Plan Title: Plan 05
Plan File : h:\Projects\09261\092612019\LD\HECRAS\Smithsburg31.p05

          Geometry Title: SMBG31
          Geometry File : h:\Projects\09261\092612019\LD\HECRAS\Smithsburg31.g02

          Flow Title   : WSE
          Flow File   : h:\Projects\09261\092612019\LD\HECRAS\Smithsburg31.f03

Plan Summary Information:
Number of: Cross Sections =   7   Multiple Openings =   0
            Culverts   =   0   Inline Structures =   0
            Bridges   =   1   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: WSE
Flow File : h:\Projects\09261\092612019\LD\HECRAS\Smithsburg31.f03

Flow Data (cfs)

River	Reach	RS	PF 1
Douglas Run	Douglas Run	1048	448

Boundary Conditions

River	Reach	Profile	Upstream
Downstream			
Douglas Run	Douglas Run	PF 1	
Known WS = 813			

GEOMETRY DATA

Geometry Title: SMBG31
Geometry File : h:\Projects\09261\092612019\LD\HECRAS\Smithsburg31.g02

CROSS SECTION

RIVER: Douglas Run
REACH: Douglas Run   RS: 1048

INPUT
Description: X Section 6
Station Elevation Data   num=   10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	826.97	9.51	824.15	32.56	824.02	39.99	821.8	46.69	823.36
61.92	823.9	91.53	823.39	120.3	824.17	151.08	825.2	158.56	827.25

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	32.56	.04	61.92	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
32.56	61.92	158 205	174	.1	.3

CROSS SECTION

RIVER: Douglas Run
REACH: Douglas Run   RS: 843

INPUT
Description: X Section 5
Station Elevation Data   num=   13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	822.51	4.65	820.96	31.96	819.7	62.18	818.81	91.91	819.71
95.11	819.76	102.28	817.19	106.14	819.52	116.98	819.6	132.01	819.52
159.29	818.88	169.74	821.19	174.51	823.02				

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	95.11	.04	106.14	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
95.11	106.14	159 186	142	.1	.3

CROSS SECTION

RIVER: Douglas Run
REACH: Douglas Run   RS: 657

INPUT
Description: X section 4
Station Elevation Data   num=   13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	821.33	7.41	818.77	30.52	818	121.77	817.22	152.36	818.15
172.21	816.33	175.57	816.22	183.13	813.99	185.86	816.95	196.67	817.54
199.91	818.07	200.05	818.151	205.5	821.31				

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	152.36	.04	200.05	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
152.36	200.05	222 206	195	.1	.3

CROSS SECTION

RIVER: Douglas Run
REACH: Douglas Run   RS: 451

INPUT
Description: X Section 3
Station Elevation Data   num=   10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820	16.28	815.03	33.17	814.66	59.83	813.51	110.1	813.57
198.76	813.13	208.03	810.79	210.19	812.52	212.01	813.15	221.39	820

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	198.76	.04	212.01	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
198.76	212.01	223 290	247	.1	.3

CROSS SECTION

RIVER: Douglas Run
REACH: Douglas Run   RS: 161

INPUT
Description: X Section 2
Station Elevation Data   num=   23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	821.93	8.05	818.43	20.54	816.82	42.35	814.91	53.68	811.24
109.81	811.07	154.1	811.13	161.42	810.7	163.57	810.35	174.4	810.17
183.72	809.5	189.74	807.41	192.23	807.25	200	805.28	201.37	805.28
206	805.28	208.87	808.76	210.65	809.93	217.1	814.17	226.7	815.74
246.97	815.89	253.34	815.28	268.74	821.64				

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	183.72	.04	210.65	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
183.72	210.65	239 61	87	.3	.5

Ineffective Flow   num=   2

```
   Sta L    Sta R    Elev   Permanent
       0      187    816.4       F
     221   268.74    816.4       F
```

BRIDGE

RIVER: Douglas Run
REACH: Douglas Run   RS: 108

INPUT
Description: 6x6 culvert
Distance from Upstream XS =   14
Deck/Roadway Width   =   20
Weir Coefficient   =   2.6
Upstream Deck/Roadway Coordinates
    num=   8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	816.7		50	816.7		100	816.42	
150	816.35		200	816.39	811.28	206	816.4	811.28
250	816.7		268	817.63				

Upstream Bridge Cross Section Data
Station Elevation Data   num=   23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	821.93	8.05	818.43	20.54	816.82	42.35	814.91	53.68	811.24
109.81	811.07	154.1	811.13	161.42	810.7	163.57	810.35	174.4	810.17
183.72	809.5	189.74	807.41	192.23	807.25	200	805.28	201.37	805.28
206	805.28	208.87	808.76	210.65	809.93	217.1	814.17	226.7	815.74
246.97	815.89	253.34	815.28	268.74	821.64				

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	183.72	.04	210.65	.08

```
Bank Sta: Left    Right    Coeff Contr.   Expan.
        183.72  210.65              .3      .5
```

Ineffective Flow   num=   2

Sta L	Sta R	Elev	Permanent
0	187	816.4	F
221	268.74	816.4	F

Downstream Deck/Roadway Coordinates
   num=   14

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	818.45		50	817.9		100	817.55	
150	816.92		200	816.69		250	816.63	
300	816.45		350	816.51		400	816.26	
432	816.39	809.73	438	816.4	809.73	450	816.43	
500	816.85		537	817.99				

Downstream Bridge Cross Section Data
Station Elevation Data   num=   24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	817.45	35.04	817.31	105.95	816.87	155.53	815.59	231.27	813.28
294.71	811.66	303.6	814.35	328.17	815.55	359.35	813.8	374.52	813.63
385.97	814.05	402.98	813.28	413.68	811.77	416.51	811.81	426.6	809.04
427.94	806.53	432	803.75	437.51	803.75	438	803.75	457.13	814.44
481.02	814.23	497.82	811.05	527.01	812.03	537.14	815.97		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	385.97	.03	457.13	.05

Bank Sta: Left   Right   Coeff Contr.   Expan.

```
           385.97  457.13              .3        .5
Ineffective Flow       num=        2
    Sta L    Sta R    Elev  Permanent
         0      424   816.4       F
       446   537.14   816.4       F
```

```
Upstream Embankment side slope                =        10 horiz. to 1.0 vertical
Downstream Embankment side slope              =        10 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins           =
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested
```

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
        Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
        Energy Only

Additional Bridge Parameters
        Add Friction component to Momentum
        Do not add Weight component to Momentum
        Class B flow critical depth computations use critical depth
            inside the bridge at the upstream end
        Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Douglas Run
REACH: Douglas Run   RS: 100

INPUT
Description: X Section 1
Station Elevation Data   num=   24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	817.45	35.04	817.31	105.95	816.87	155.53	815.59	231.27	813.28
294.71	811.66	303.6	814.35	328.17	815.55	359.35	813.8	374.52	813.63
385.97	814.05	402.98	813.28	413.68	811.77	416.51	811.81	426.6	809.04
427.94	806.53	432	803.75	437.51	803.75	438	803.75	457.13	814.44
481.02	814.23	497.82	811.05	527.01	812.03	537.14	815.97		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	385.97	.03	457.13	.05

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.
          385.97 457.13   98   85   113   .3   .5
Ineffective Flow   num=   2
    Sta L   Sta R   Elev Permanent
         0   424   816.4   F
       446   537.14   816.4   F
```

CROSS SECTION


RIVER: Douglas Run
REACH: Douglas Run          RS: 15

INPUT
Description: X Section 0

```
Station Elevation Data      num=     20
      Sta      Elev       Sta      Elev       Sta      Elev       Sta      Elev       Sta      Elev
        0    814.74     43.11    813.79     49.27    812.39     59.45    813.78      80.7    814.46
    94.78    814.44    298.89    808.23    306.37     806.3    312.97    807.41    329.24    806.14
   341.61    804.78       350    804.43    355.61    804.39     363.7    804.79     371.6   807.462
   385.67    812.22    396.25    815.03    406.28    816.69    416.86    816.67    442.46    812.16

Manning's n Values          num=      3
      Sta    n Val       Sta    n Val       Sta    n Val
        0      .05    312.97      .03     371.6      .05

Bank Sta: Left    Right    Lengths: Left Channel    Right      Coeff Contr.    Expan.
          312.97   371.6            0       0         0               .1        .3
```

SUMMARY OF MANNING'S N VALUES

River:Douglas Run

Reach	River Sta.	n1	n2	n3
Douglas Run	1048	.08	.04	.05
Douglas Run	843	.05	.04	.05
Douglas Run	657	.05	.04	.08
Douglas Run	451	.05	.04	.08
Douglas Run	161	.05	.04	.08
Douglas Run	108	Bridge		
Douglas Run	100	.05	.03	.05
Douglas Run	15	.05	.03	.05

SUMMARY OF REACH LENGTHS

River: Douglas Run

Reach	River Sta.	Left	Channel	Right
Douglas Run	1048	158	205	174
Douglas Run	843	159	186	142
Douglas Run	657	222	206	195
Douglas Run	451	223	290	247
Douglas Run	161	239	61	87
Douglas Run	108	Bridge		
Douglas Run	100	98	85	113
Douglas Run	15	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Douglas Run

Reach	River Sta.	Contr.	Expan.
Douglas Run	1048	.1	.3
Douglas Run	843	.1	.3
Douglas Run	657	.1	.3
Douglas Run	451	.1	.3
Douglas Run	161	.3	.5
Douglas Run	108	Bridge	
Douglas Run	100	.3	.5

Douglas Run   15   .1   .3

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
That the Accompanying Legal Notice
Entitled:

Floodplain Permit
#15-357

was published in said paper for . 2

successive weeks beginning with the issue

of ... *May 26th* ...... 2015 and

ending with the issue of

...... *June 2nd* ...... 2015 and

that said notice contains ... 2

WORD SPACE at ...... 115 ...... cents a word

amounts to the sum of $ ... 2.4.15

FOR FIRST PUBLICATION, SECOND
PUBLICATION IS 75% OF THE FIRST
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$ ... 18.12

and each publication thereafter

$ ... 42.27 ...... TOTAL

EDITOR

Virginia Nicholson

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BEFORE ME THIS THE ... 5 ...... DAY

OF ...... *June* 2015

NOTARY PUBLIC

Robert E Burnside