

EMERGENCY ACTION PLAN

ROANOKE CREEK DAM #72A

VA DCR #037002

36.9916°N, 78.5564°W

Charlotte County, Virginia

July 2020

Updated Contact Names and Numbers Jan. 6, 2023



H&P PROJECT NO.

20222021

CONTACT:

Mike Wilson, PE
Project Manager
434.847.7796

SUBMITTED TO:

Town of Drakes Branch
4800 Main St., P.O. Box 191
Drakes Branch, VA 23937

2524 Langhorne Road | Lynchburg, VA 24501
(434) 847-7796 | www.HandP.com



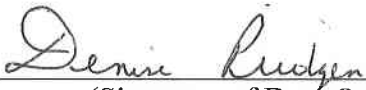
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Certification by Dam Owner/Operator

See new contacts on next sheet

I certify that procedures for implementation of this Emergency Action Plan have been coordinated with and a copy given to each local Emergency Services Coordinator serving the areas potentially impacted by the dam. Also, that a copy of this Emergency Action Plan has been filed with the Virginia Department of Emergency Management in Richmond and a copy of the Dam Break Inundation Map has been provided to the local government office with plat and plan approval authority or zoning responsibilities as designated by the locality for each locality in which the dam break inundation zone resides; that this plan shall be adhered to during the life of the project; and that the information contained herein is current and correct to the best of my knowledge.



(Signature of Dam Owner/Operator)

This 23rd day of July, 2020

Printed Name/Title: Denise Pridgen, Mayor
Town of Drakes Branch

Certification by Preparer

I certify that the information provided in this report has been examined by me and found to be true and correct in my professional judgment.



This 10th day of July, 2020

Printed Name: Michael D. Wilson, PE
Title: Director of Municipal & Government Engineering
Address: 2524 Langhorne Road Lynchburg, VA 24501
Phone: 434-847-7796 (office); 434-546-6156 (cell)

Certification by Dam Owner/Operator

I certify that procedures for implementation of this Emergency Action Plan have been coordinated with and a copy given to each local Emergency Services Coordinator serving the areas potentially impacted by the dam. Also, that a copy of this Emergency Action Plan has been filed with the Virginia Department of Emergency Management in Richmond and a copy of the Dam Break Inundation Map has been provided to the local government office with plat and plan approval authority or zoning responsibilities as designated by the locality for each locality in which the dam break inundation zone resides; that this plan shall be adhered to during the life of the project; and that the information contained herein is current and correct to the best of my knowledge.


(Signature of Dam Owner/Operator)

This 6th day of Jan., 2023

Printed Name/Title: Phillip D, Jackson, Mayor
Town of Drakes Branch

EMERGENCY ACTION PLAN FOR HIGH AND SIGNIFICANT HAZARD IMPOUNDING STRUCTURES

Reference: Impounding Structure Regulations, 4VAC 50-20-10 et seq., including 4VAC 50-20-175, Virginia Soil and Water Conservation Board

I. BASIC INFORMATION

A. Impounding Structure

Name: Roanoke Creek Dam #72A
Inventory Number: VA037002
Other Name (if any): Drakes Lake

B. Hazard Potential Classification, Virginia Dam Safety Regulations

Low Significant **High** (Circle One)

C. Dam Owner

Name: Town of Drakes Branch
Address: 4800 Main St., PO Box 191, Drakes Branch, VA 23937

D. Primary Dam Operator

Name: Isaac Napier
Address: 4800 Main St., PO Box 191, Drakes Branch, VA 23937
Telephone: Business: (434) 568-3600 Mobile: (434) 547-3301

Secondary Dam Operator

Name: James L. Webb
Telephone: Mobile: (434) 208-8470

E. Primary Rain/Staff Gage Observer

Name: Isaac Napier
Address: 4800 Main St., PO Box 191, Drakes Branch, VA 23937
Telephone: Work: (434) 568-3600 Mobile: (434) 547-3301

Secondary Rain/Staff Gage Observer

Name: James L. Webb
Telephone: Mobile: (434) 208-8470

F. 24-Hour Dispatch Center

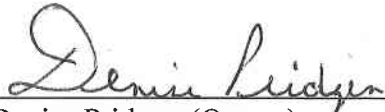
Name: Charlotte County Sheriff's Department
Telephone: Non-Emergency: (434) 542-5141 or emergency # 911

G. Local Government Emergency Services Coordinator

Name: Daniel Witt, Charlotte County Administrator
Telephone: Business: (434) 542-5117


II. CERTIFICATION See new contacts on next sheet

We, the undersigned, this date acknowledge the receipt of this plan as the Emergency Operations Plan to protect life and reduce property damage in case of a breach of the Roanoke Creek Dam #72A.




Denise Pridgen (Owner)
Town of Drakes Branch Mayor

7-23-2020
Date



James Napier
Primary Dam Operator / Primary Staff Gauge Observer

7-27-2020
Date



Matthew Beamish
Secondary Dam Operator / Secondary Staff Gauge Observer

7-24-2020
Date



Daniel Witt
Charlotte County Emergency Services Coordinator
Charlotte County Administrator

7-23-2020
Date



Sheriff Royal S. Freeman
Charlotte County Sheriff's Office


7-23-2020
Date

II. CERTIFICATION


We, the undersigned, this date acknowledge the receipt of this plan as the Emergency Operations Plan to protect life and reduce property damage in case of a breach of the Roanoke Creek Dam #72A.


Phillip D. Jackson (Owner)
Town of Drakes Branch Mayor

11/6/2023
Date


Isaac Napier
Primary Dam Operator / Primary Staff Gauge Observer

11/6/2023
Date


James L. Webb
Secondary Dam Operator / Secondary Staff Gauge Observer

1/9/2023
Date

II. CERTIFICATION

We, the undersigned, this date acknowledge the receipt of this plan as the Emergency Operations Plan to protect life and reduce property damage in case of a breach of the Roanoke Creek Dam #72A.

Phillip D. Jackson (Owner)
Town of Drakes Branch Mayor

Date

Isaac Napier
Primary Dam Operator / Primary Staff Gauge Observer

Date

James L. Webb
Secondary Dam Operator / Secondary Staff Gauge Observer

Date

III. EMERGENCY ACTION PLAN OVERVIEW

The Dam Owner, Dam Operator or Designee may use the following Table to weather conditions and operational conditions at the dam to determine the appropriate actions for notifying emergency personnel during potential and actual emergencies.

| | | | |
|---|---|--|--|
| Step 1: Emergency Condition Detection | Event Detection: See Section VII | | |
| Step 2: Emergency Level | Assess Situation: Determine Emergency Level Using Section VII | | |
| | Emergency Stage I Non-Emergency Incident Slowly developing situation See Definition Below | Emergency Stage II Potential dam failure situation Quickly developing situation See Definition Below | Emergency Stage III Urgent Dam failure is imminent or in progress See Definition Below |
| Step 3: Notification & Communication | Stage I Notification List See Section IV Subsection A | Stage II Notification List See Section IV Subsection B | Stage III Notification List See Section IV Subsection C |
| Step 4: Expected Action | Inspect Dam Every 6 to 12 hours: Monitor & Listen to Weather Forecasts | Inspect Dam Every 2 hours: Notify Emergency Responders | Constant inspection of Dam, Continuous contact with Emergency Responders |
| Step 5: Termination and Follow Up | Termination of Monitoring Conditions at the Dam and Proceed to evaluate damages and plan for repairs | | |

Surveillance monitoring and observing instrument readings at the dam will be the normal methods of detecting potential emergency situations. For conditions beyond the normal range of operations contact the Charlotte County Emergency Communication Center for assistance with evaluation of the conditions. Each event or situation will fall into one of the following Stages:

Emergency Definitions

Stage I – Non-emergency, failure unlikely, storm development or operational malfunctions are slow in escalation to a potential emergency. This Stage indicates a situation is developing such that the dam is not in danger of failing, but if it continues failure may be possible. This stage also includes initiation of a flood watch or flood warning by the National Weather Service in the watershed draining to the lake / dam in question.

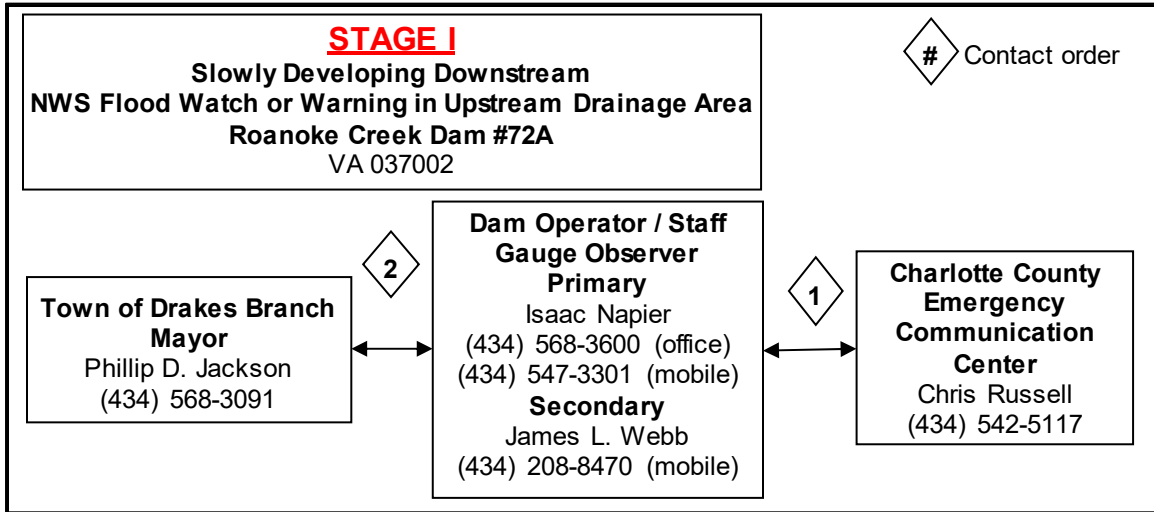
Stage II – Potential Failure, storm development or operational malfunction are quickly accelerating that could result in failure of the dam. This Stage indicates that a situation is developing that could result in a dam failure.

Stage III – Imminent Failure, storm or operational malfunction has reached a point that the failure of the dam has started or is imminent. This Stage indicates dam failure is expected or occurring and may result in flooding that will threaten life and/or property downstream of the dam.

IV. NOTIFICATION FLOW CHARTS

A. STAGE I NOTIFICATION

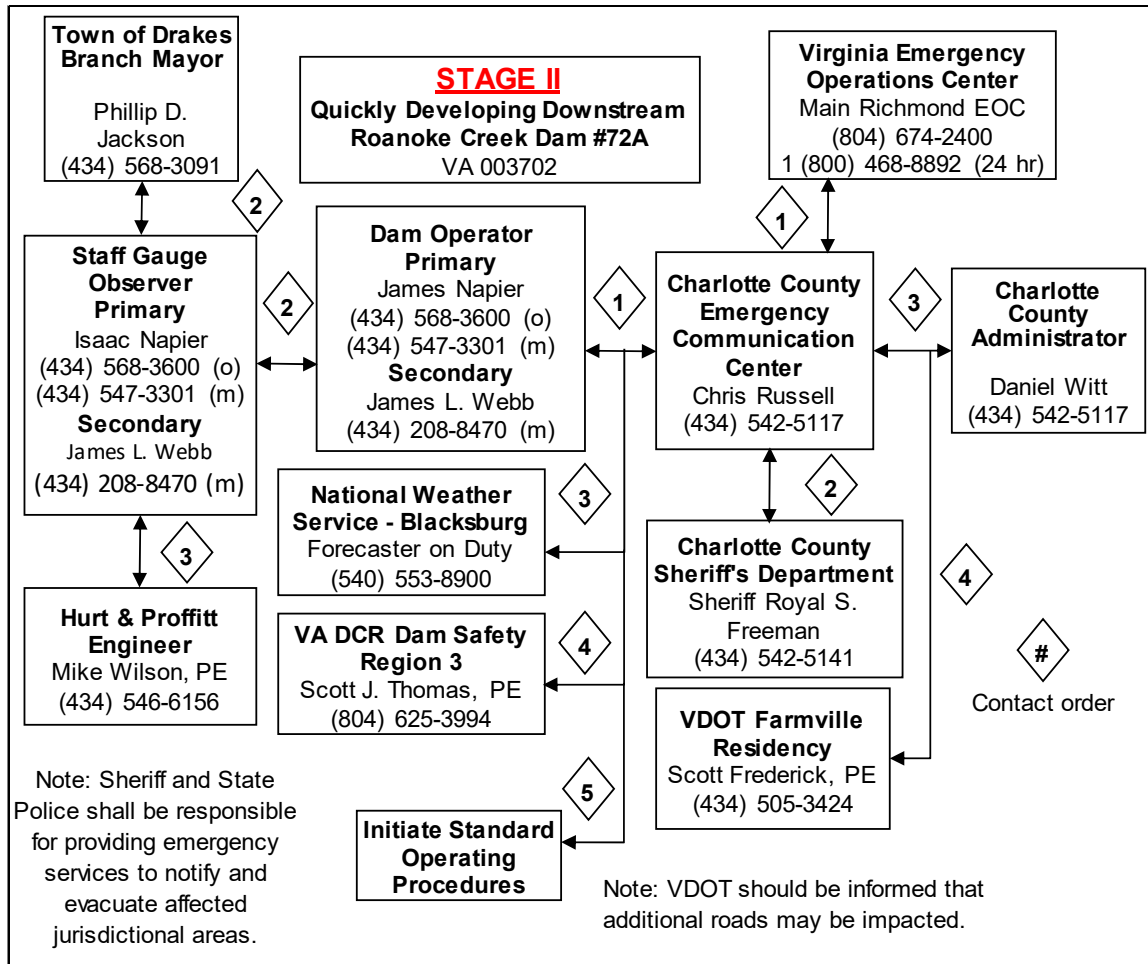
See Section VII, Subsection B for Stage activation thresholds and Section VII, Subsection C for response during darkness, adverse weather, weekends, and holidays.



Message from dam operator to Charlotte County Emergency Communication Center: *I am at **Roanoke Creek Dam #72A** evaluating the general conditions at the dam and coordinating with the staff gage observer as recommended in the emergency action plan. Based on the current situation, the dam is at a **STAGE I** condition. If the impending storm occurs, we may move to stage II and perform more frequent evaluations; otherwise we will visit and make observations at the dam and emergency spillway every six hours.*

B. STAGE II NOTIFICATION

See Section VII, Subsection B for Stage activation thresholds and Section VII, Subsection C for response during darkness, adverse weather, weekends, and holidays.

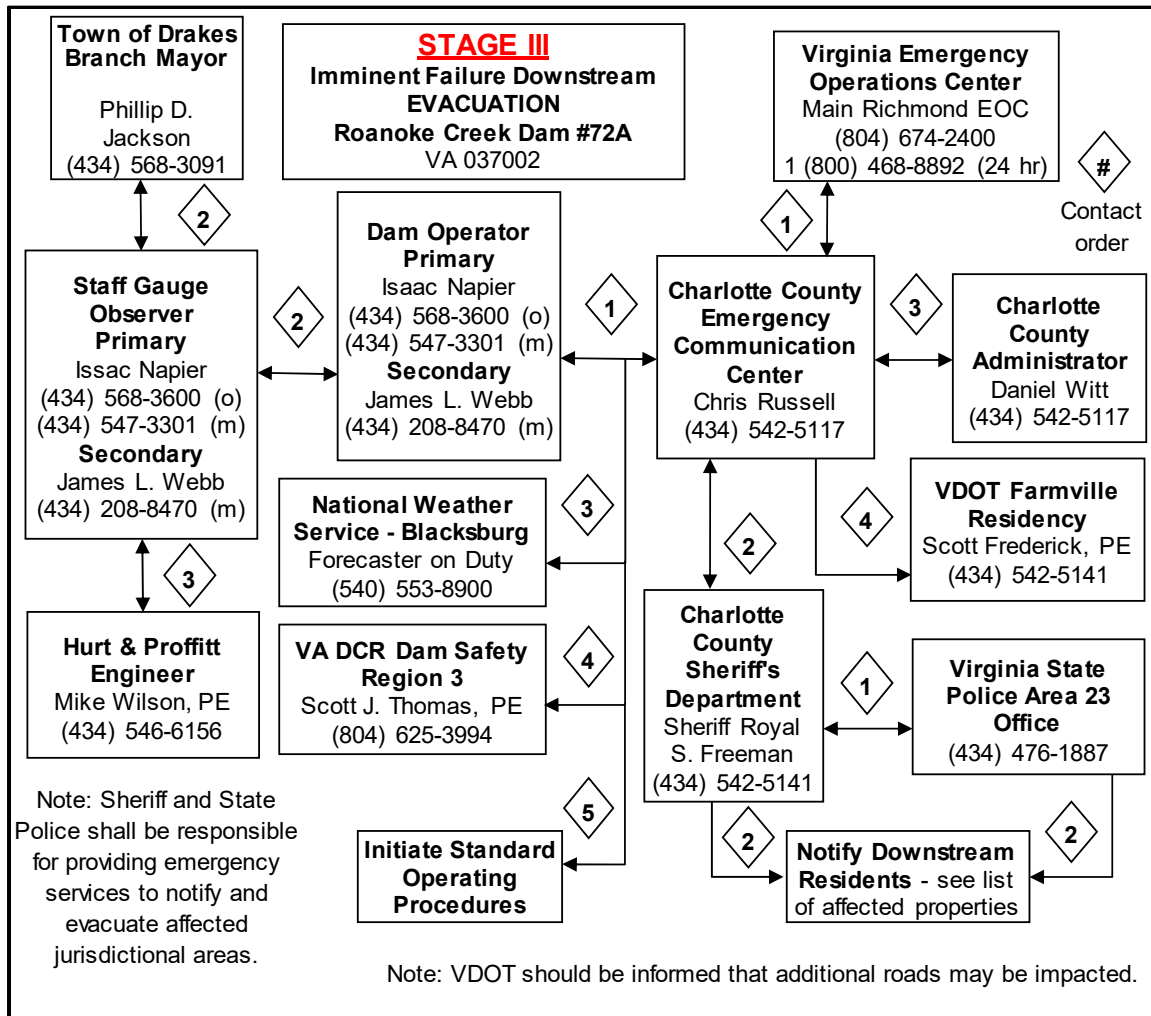


Message from dam operator to Charlotte County Emergency Communication Center: *I am at **Roanoke Creek Dam #72A** (or have been to the dam) and the water level has risen into the emergency spillway to the threshold established in the emergency action plan to move to the Stage II Emergency Level. Based on the current situation, the dam is at a **STAGE II** condition. Please prepare your personnel in case an evacuation is necessary and continue to initiate your standard operating procedures (SOP). I will be observing the dam and emergency spillway every 2 hours.*

Note: Standard Operating Procedures shall include notification of the evacuation team, contacting the National Weather Service for rainfall projections, and contacting the Virginia Emergency Operations Center. Charlotte County Emergency Communication Center is the local Emergency Operations Center.

C. STAGE III NOTIFICATION

See Section VII, Subsection B for Stage activation thresholds and Section VII, Subsection C for response during darkness, adverse weather, weekends, and holidays.



Message from dam operator to Charlotte County Emergency Communication Center: *I am at **Roanoke Creek Dam #72A** and the water level has risen in the emergency spillway to the threshold established in the emergency action plan to move to the Stage III Emergency level. Based on the current situation, the dam is at a **STAGE III** condition. Please proceed with the Standard Operating Procedures. I will remain at the dam to monitor continuously until the dam breaks or the water level recedes to safe levels and the Charlotte County Emergency Communication Center directs me to terminate my responsibility.*

Note: Charlotte County Emergency Communication Center is the local Emergency Operations Center.

Roanoke Creek Dam #72A Emergency Contact List

Downstream Structures - JULY 2020

| Structure Number | Sheet Number | OWNER NAME | OWNER ADDRESS | PARCEL ADDRESS | CITY | STATE | ZIP | PHONE NUMBER* | Tax Map # |
|------------------|--------------|---------------------------------|--|--------------------------------|-----------------------|-------|-------|---------------|---------------|
| 3-1 | IND-MAP_03 | LEK Rentals, LLC | 4475 Highway 59 | 252 Westpoint Stevens Road | Keysville | VA | 23947 | 434-736-0206 | 63-1-5 |
| 3-2 | IND-MAP_03 | Wilmouth, Douglas & Sherry | 403 Old Kings Road | Westpoint Stevens Road | Drakes Branch | VA | 23937 | 434-568-5777 | 63-A4-3-7-1 |
| 3-3 | IND-MAP_03 | Beavers, Kenneth or Shaun | 124 Westpoint Stevens Road | 124 Westpoint Stevens Road | Drakes Branch | VA | 23937 | | 63-A4-A-53 |
| 3-4 | IND-MAP_03 | Kozlik, Lawrence & Angela | 160 Parker Street | 5035 Drakes Main Street | Jarvisburg | NC | 27947 | 434-202-5944 | 63-A4-A-55 |
| 3-5 | IND-MAP_03 | Wilmouth, Douglas & Sherry | 403 Old Kings Road | 150 Westpoint Stevens Road | Drakes Branch | VA | 23937 | 434-568-5777 | 63-A4-A-52 |
| 3-6 | IND-MAP_03 | Kozlik, Lawrence & Angela | 160 Parker Street | 5260 Drakes Main Street | Jarvisburg | NC | 27947 | 434-202-5944 | 63-A4-A-50 |
| 3-7 | IND-MAP_03 | Moiczek, Matthew | 1086 County Line Road | 5000 Drakes Main Street | Keysville | VA | 23947 | | 63-A4-A-92 |
| 3-8 | IND-MAP_03 | Moiczek, Matthew | 1086 County Line Road | 5000 Drakes Main Street | Keysville | VA | 23947 | | 63-A4-A-92 |
| 3-9 | IND-MAP_03 | Parker Oil Company, Inc | PO Box 120 | 4959 Drakes Main Street | South Hill | VA | 23970 | 434-568-2451 | 63-A4-A-49 |
| 3-10 | IND-MAP_03 | Irvine, Margaret Ann | C/O Margaret Irvine-Hull, 135 Westpoint Stevens Road | 135 Westpoint Stevens Road | Drakes Branch | VA | 23937 | 434-568-3051 | 63-A4-A-48 |
| 3-11 | IND-MAP_03 | Irvine, Margaret Ann | C/O Margaret Irvine-Hull, 135 Westpoint Stevens Road | 135 Westpoint Stevens Road | Drakes Branch | VA | 23937 | 434-568-3051 | 63-A4-A-48 |
| 3-12 | IND-MAP_03 | Bridge (Rte. 47) | | | | | | | |
| 3-13 | IND-MAP_03 | Town of Drakes Branch | PO Box 191 | Depot Street | Drakes Branch | VA | 23937 | 434-568-3091 | 63-A4-A-93-B |
| 3-14 | IND-MAP_03 | Gregory-Williams, Karen | 12301 Morning Creek Road | Proctor Street | Glen Allen | VA | 23059 | 804-221-4586 | 63-A4-A-100 |
| 3-14A | IND-MAP_03 | Winlock, Stephanie | PO Box 452 | 4870 Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-5868 | 63-A4-A-105 |
| 3-15 | IND-MAP_03 | Bunn, Jennifer | 8567 Trottnridge Road | Drakes Main Street | Skipwith | VA | 23968 | | 63-A4-A-101 |
| 3-16 | IND-MAP_03 | Hudson, Jimmie & Vicki | 844 Country Road | Drakes Main Street | Saxe | VA | 23967 | 434-568-5921 | 63-A4-A-30 |
| 3-17 | IND-MAP_03 | Griffith Heating & AC, Inc | 500 Scott Road | 4875 Drakes Main Street | Saxe | VA | 23967 | 434-315-3112 | 63-A4-A-27 |
| 3-17A | IND-MAP_03 | Masonic Lodge | 4871 Drakes Main Street | 4871 Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-4221 | 63-A4-A-26 |
| 3-17B | IND-MAP_03 | Winlock, Stephanie | PO Box 452 | 4869 Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-5868 | 63-A4-A-25 |
| 3-18 | IND-MAP_03 | Winlock, Stephanie | PO Box 452 | 4861 & 4865 Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-5868 | 63-A4-A-24 |
| 3-18A | IND-MAP_03 | Town of Drakes Branch | PO Box 191 | 4849 Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-3091 | 63-A4-A-23 |
| 3-19 | IND-MAP_03 | Town of Drakes Branch | PO Box 191 | Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-3091 | 63-A4-A-22 |
| 3-20 | IND-MAP_03 | Mittleman, Bruce | PO Box 95 | 4860 Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-2009 | 63-A4-A-106 |
| 3-21 | IND-MAP_03 | Griffith, Richard & Nora | 500 Scott Road | 404 Harold Street | Saxe | VA | 23967 | 434-315-3112 | 63-A4-A-116 |
| 3-22 | IND-MAP_03 | Robinson, Celina | 1401 Westpoint Stevens Road | 1401 Westpoint Stevens Road | Drakes Branch | VA | 23937 | 434-808-2434 | 63-A4-A-116-A |
| 3-22A | IND-MAP_03 | Town of Drakes Branch | PO Box 191 | 4818 Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-3091 | 63-A4-A-117 |
| 3-23 | IND-MAP_03 | Town of Drakes Branch | PO Box 191 | 4800 Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-3091 | 63-A4-A-118 |
| 3-24 | IND-MAP_03 | M S Rentals, LLC | 1736 Tollhouse Road | 4794 Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-6303 | 63-A4-A-119 |
| 3-25 | IND-MAP_03 | Khepre, Naguel Tribal Trust | PO Box 297 | 4819 Drakes Main Street | Charlotte Court House | VA | 23923 | 434-568-5868 | 63-A4-A-21 |
| 3-26 | IND-MAP_03 | Docsol, Isaac | 1011 Marion Church Road | Drakes Main Street | Salters | SC | 29590 | 804-405-1527 | 63-A4-A-120 |
| 3-27 | IND-MAP_03 | Atkins, Floyd & Annie | C/O Lydia Jackson, 156 W 141 St Apt 3-E | Drakes Main Street | New York | NY | 10026 | | 63-A4-A-125 |
| 3-28 | IND-MAP_03 | Shepherd, Norman | 146 Moss Creek Lane | 4768 Drakes Main Street | Keysville | VA | 23947 | | 63-A4-A-122 |
| 3-29 | IND-MAP_03 | Farmville Newsmedia LLC | PO Box 2590 | 4789 Main Street | Selma | AL | 36702 | 434-568-3341 | 63-A4-A-18 |
| 3-30 | IND-MAP_03 | First Citizens Bank & Trust Co. | PO Box 27131 | 4767 Main Street | Raleigh | NC | 27611 | 919-716-4640 | 63-A4-A-15 |
| 3-31 | IND-MAP_03 | Town of Drakes Branch | PO Box 191 | Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-3091 | 63-A4-A-94-A |
| 3-32 | IND-MAP_03 | Town of Drakes Branch | PO Box 191 | Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-3091 | 63-A4-A-94-A |
| 3-33 | IND-MAP_03 | Town of Drakes Branch | PO Box 191 | Drakes Main Street | Drakes Branch | VA | 23937 | 434-568-3091 | 63-A4-A-94-B |
| 3-34 | IND-MAP_03 | Abandoned Railroad Bed | | | | | | | 63-A4-A-93-A |

***NOTE: PHONE NUMBERS PROVIDED WERE NOT VERIFIED AS PART OF 2020 EAP REVISION (JULY 2020)**

Roanoke Creek Dam #72A Emergency Contact List

Downstream Structures - JULY 2020

| <i>Structure Number</i> | <i>Sheet Number</i> | <i>OWNER NAME</i> | <i>OWNER ADDRESS</i> | <i>PARCEL ADDRESS</i> | <i>CITY</i> | <i>STATE</i> | <i>ZIP</i> | <i>PHONE NUMBER*</i> | <i>Tax Map #</i> |
|-------------------------|---------------------|--|--|--------------------------|-------------|--------------|------------|----------------------|------------------|
| 5-1 | IND-MAP_05 | Bridge (Rte. 642) | | | | | | | |
| 6-1 | IND-MAP_06 | Osborne, Charles A | C/O Dorothy Osborne, 160 Harpster Avenue | 160 Harpster Avenue | Saxe | VA | 23967 | | 71-A-A-18 |
| 6-2 | IND-MAP_06 | Osborne, Charles A | C/O Dorothy Osborne, 160 Harpster Avenue | 160 Harpster Avenue | Saxe | VA | 23967 | | 71-A-A-18 |
| 6-3 | IND-MAP_06 | Gravel Hill LLC | C/O Teresa Flores, PO Box 7284 | 150 Harpster Avenue | Hampton | VA | 23666 | | 71-A-A-20 |
| 7-1 | IND-MAP_07 | Tucker, Ryvers & Patricia | C/O Winifred Dunn, 5025 Scuffletown Road | 135 Sylvan Hill Road | Saxe | VA | 23967 | | 71-A-A-30 |
| 7-2 | IND-MAP_07 | Tucker, Ryvers & Patricia | C/O Winifred Dunn, 5025 Scuffletown Road | Sylvan Hill Road | Saxe | VA | 23967 | | 71-A-A-29 |
| 7-3 | IND-MAP_07 | Toombs, Earl R | PO Box 59 | | Saxe | VA | 23967 | | 71-A-A-28-A |
| 7-4 | IND-MAP_07 | Carson, Jannette | 4023 King Street | 6395 Saxkey Road | Portsmouth | VA | 23707 | | 71-A-A-22 |
| 7-5 | IND-MAP_07 | Bridge (Rte. 612) | | | | | | | |
| 7-6 | IND-MAP_07 | Moon, James H & Rodney W | 618 Hermon Road | 724 Hermon Road | Saxe | VA | 23967 | 434-454-7501 | 71-A-A-29-B |
| 7-7 | IND-MAP_07 | Garrett, Nancy H | 9668 Manassas Forge Drive | | Manassas | VA | 20111 | | 71-A-A-26 |
| 7-8 | IND-MAP_07 | Garrett, Nancy H | 9668 Manassas Forge Drive | | Manassas | VA | 20111 | | 71-A-A-26 |
| 7-9 | IND-MAP_07 | Garrett, Nancy H | 9668 Manassas Forge Drive | | Manassas | VA | 20111 | | 71-A-A-26 |
| 9-1 | IND-MAP_09 | Owen, Calvin W & Lois M | PO Box 163 | | Skipwith | VA | 23968 | | 77-A-1-66 |
| 9-2 | IND-MAP_09 | Griffin, Bill & Doris B | PO Box 502 | 3700 Mullberry Hill Road | Easley | SC | 29641 | | 77-A-1-109 |
| 9-3 | IND-MAP_09 | Historic Staunton River Foundation, Inc. | PO Box 1 | | Randolph | VA | 23962 | | 77-A-1-102 |
| 9-4 | IND-MAP_09 | Bridge (Rte. 607) | | | | | | | |
| 9-5 | IND-MAP_09 | Unknown | | | Randolph | VA | 23962 | | R.O.W. |

***NOTE: PHONE NUMBERS PROVIDED WERE NOT VERIFIED AS PART OF 2020 EAP REVISION (JULY 2020)**

V. STATEMENT OF PURPOSE

This Emergency Action Plan (EAP) is an effort to safeguard the lives and reduce damage to the property of the citizens of Charlotte County living along Twittys Creek and downstream, in the unlikely event of failure of the Roanoke Creek Dam #72A or flooding caused by large runoff.

Impounded water upstream of a dam when released uncontrollably may threaten lives in the flow path downstream or cause damage to homes, roads, bridges and any other infrastructure(s) in its way. This uncontrolled release occurs when the dam or a part of the dam breaks and stored water is released.

VI. PROJECT DESCRIPTION & DAM ACCESS MAP

The impounding structure, known as Roanoke Creek Dam #72A or Inventory Number VA037002, is operated by the Town of Drakes Branch in Charlotte County, Virginia. The site is located along a private access road off of West Point Stevens Road (State Route 623) in Charlotte County, VA.

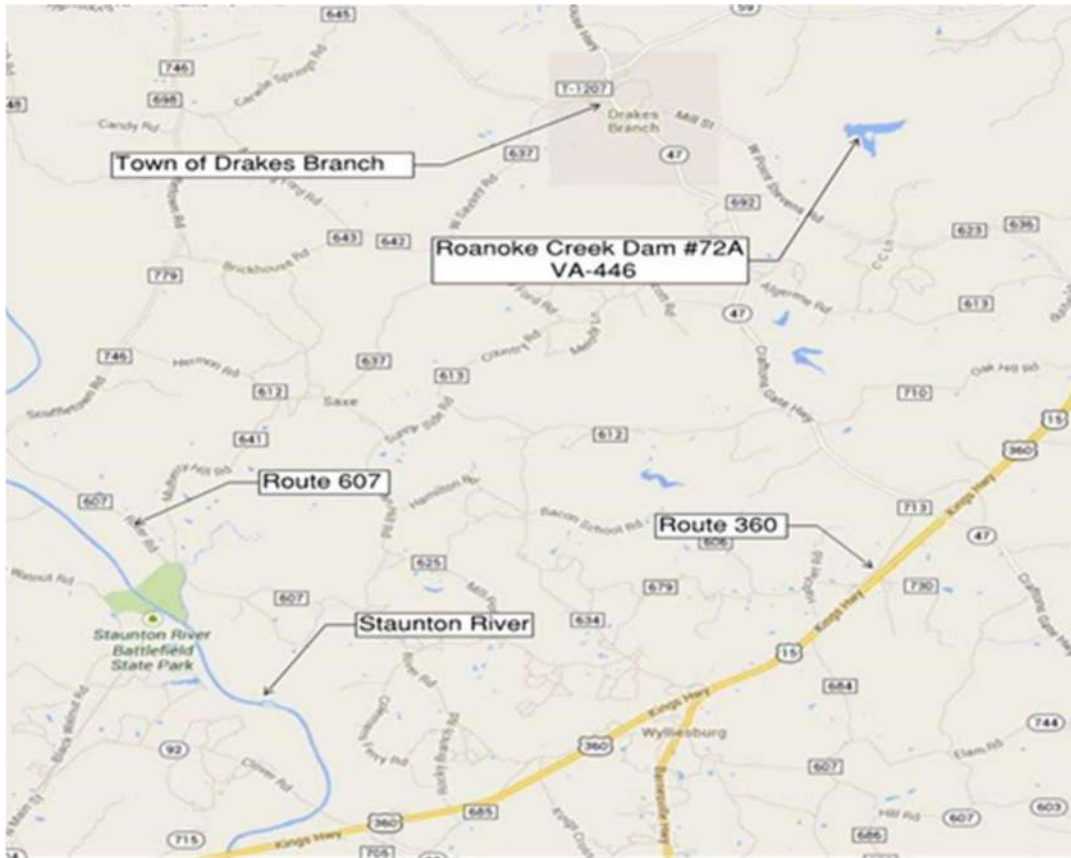
The dam is classified as a High Hazard Dam as determined by the Dam Break Inundation Zone Analysis performed by Hurt & Proffitt, Inc in December 2013. Multiple structures (residential / business) and six public roadways (Route #47, Route #642, Route #637, Route #612, Route #641, and Route #607) are impacted downstream of / on the dam during dam breach related emergency events.

Roanoke Creek Dam #72A creates an approximate 154 acre impoundment used for flood control / recreation. The drainage area is approximately 9,920 acres or 15.5 square miles. The normal pool flood capacity storage is 455 acre-feet at the normal pool elevation of 415.8 feet. The maximum storage capacity is approximately 5,535 acre-feet at top of dam elevation 444.1 feet.

Downstream of the dam, Twittys Creek flows through commercial and residential areas.

The main components of the dam are (information taken from Hurt & Proffitt, Inc. December 6, 2013 Roanoke Creek Dam #72A DBIZ Analysis and DCR Dam Safety's DSIS system):

- Homogenous earth embankment approximately 614 feet long with a crest elevation of approximately 444.1 feet. Dam is approximately 43.9 feet tall.
- 2.71H:1V upstream embankment slope, a 10.6 foot wide crest, and 2.62H:1V downstream embankment slope.
- NRCS designed intake tower with a 54" RCP outfall pipe at an elevation of 415.8 feet (normal pool elevation).
- Earthen broad-crested emergency spillway with a crest elevation of approximately 436.8 feet. The emergency spillway is 297 feet wide with a total depth of 7.3 feet.



VA037002 Roanoke Creek Dam #72A – EAP Dam Access Map

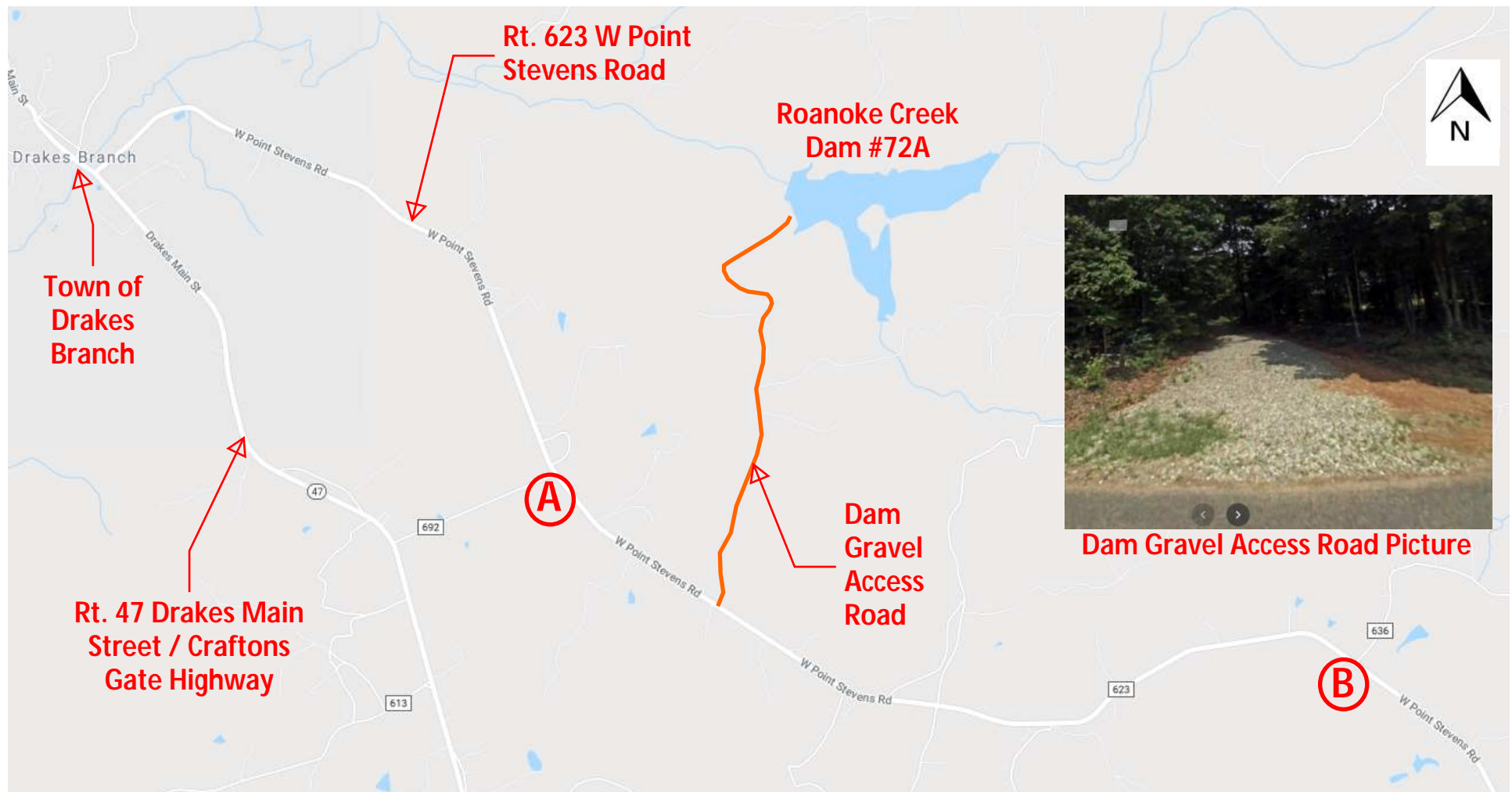
Created by: David P. Wilmoth, PE, CFM, PH; Hurt & Proffitt, Inc.

Date: 07/10/2020

Note: Map Not to Scale

Access to Dam from Town of Drakes Branch: Access road located approximately 0.7 miles southeast of the Route 623 W Point Stevens Road & Route 692 WPA Road intersection (**MAP POINT A**). Turn left (northeast) on the gravel road and follow approximately 1.7 miles to Dam. Please note gravel road is gated approximately half-way to the Dam.

Access to Dam from Rt. 623 W Point Stevens Road (heading northwest towards Drakes Branch from US 360): Access road located approximately 2.4 miles northwest of the Rt. 623 W Point Stevens Road & County Route 636 intersection (**MAP POINT B**). Turn right (northeast) on the gravel road and follow approximately 1.7 miles to Dam. Please note gravel road is gated approximately half-way to the Dam.



VII. EMERGENCY DETECTION, EVALUATION, AND CLASSIFICATION

A. Levels of Emergency

- a. **STAGE I** (Slowly Developing Situation) indicates a flood watch, flood warning, or heavy continuous rain or excessive flow of water from ice or snow melt. Dam should be inspected every **6 to 12 hours** and weather forecasts should be monitored for changing conditions. As mentioned above, this stage does include initiation of a flood watch or flood warning by the National Weather Service in the watershed draining to the lake / dam in question.

- b. **STAGE II** (Quickly Developing Situation) condition indicates that a potentially serious condition is developing and failure could occur if the condition does not improve. Upon initiation of a **STAGE II** condition the Operator is to activate the notification flowchart alerting them to the situation. Then begin **2-hour** monitoring conditions and take preventative actions as necessary.

- c. **STAGE III** (Imminent Failure Situation) condition indicates that a failure is imminent or has already occurred. During these conditions the full EAP should be initiated including evacuations and road closures, as well as **continuous** observation.

Use the following table to identify proper emergency levels:

| EVENT | SITUATION | EMERGENCY LEVEL |
|--------------------------------------|---|-----------------|
| National Weather Service (NWS) Event | NWS has issued a flood watch or hurricane watch for the watershed flowing directly to the dam | 1 |
| | NWS has issued a flood warning or hurricane warning for the watershed flowing directly to the dam | 1 |
| Emergency Spillway Flow | Debris blocking spillway causing lake level to rise | 1 |
| | Spillway flowing with active gully erosion | 2 |
| | Any spillway overtopping flow within 6.8 feet of the top of the dam (0.5 feet of water within the spillway) | 2 |
| | Spillway flowing with advancing head cut that is threatening the control section | 3 |

| | | |
|---------------------------------|--|---|
| | Any spillway overtopping flow within 1.3 feet of the top of the dam (6.0 feet of water within the spillway) | 3 |
| Dam Breach | Dam Breach in progress, uncontrolled release | 3 |
| Embankment Overtopping | Any overtopping flow or within 1.0 feet of the top of the dam, water level rising | 3 |
| Seepage | New seepage areas on or near the dam | 1 |
| | New seepage areas with cloudy discharge or increasing flow rate | 3 |
| | Rapid flow rate increase with cloudy discharge from existing seepage area(s) | 3 |
| Sinkholes | Observation of new sinkhole on embankment | 1 |
| | Rapidly enlarging sinkhole | 3 |
| Embankment Cracking | New cracks in the embankment greater than 1/4 inch wide without seepage | 1 |
| | Cracks with no seepage; water below cracked area | 1 |
| | Cracks in embankment with clear seepage | 2 |
| | Cracks in embankment with rapidly increasing or cloudy seepage | 3 |
| Principal Spillway / Structural | Cracks in concrete section greater than 1/4 inch wide without seepage | 1 |
| | Cracks in concrete section greater than 1/4 inch wide with cloudy seepage | 2 |
| | Mass movement of reinforced concrete pipe structure / riser | 3 |
| Low Flow Valve Operation | Low flow valve is stuck in the open condition / will not close resulting in uncontrolled release of water from the dam | 2 |
| Embankment Movement | Visual movement / slippage of the embankment slope | 1 |
| | Sudden or rapidly progressing slides of the slopes | 3 |
| Vortex in Pond | Whirlpool with discharge downstream | 3 |
| Earthquake | Measurable earthquake felt or reported on or within 50 miles of the dam | 1 |
| | Earthquake resulting in visible damage to the dam | 1 |

| | | |
|---------------------------------------|--|---|
| | Earthquake resulting in new seepage flow with cloudy discharge or increasing flow rate | 3 |
| | Earthquake resulting in potential uncontrolled release of water from the dam | 3 |
| Security Threat, Sabotage & Vandalism | Verified bomb threat that, if carried out, could result in damage to the dam | 1 |
| | Detonated bomb that has resulted in damage to the dam or its appurtenances | 1 |
| | Damage to the dam or appurtenances with no impacts to the functioning of the dam | 1 |
| | Damage to the dam or appurtenances that has resulted in seepage flow | 1 |
| | Damage to the dam or appurtenances that has resulted in seepage flow with cloudy discharge or increasing flow rate | 3 |
| | Damage to the dam or appurtenances that has resulted in a potential uncontrolled water release | 3 |

B. Emergency Level due to Risk of Overtopping

During a full 6-hour Probable Maximum Flood storm event, this dam does overtop. The modeled maximum water surface elevation during such a storm event would be **446.4'** (2.3 feet above the dam crest). Rainfall and monitoring condition for each emergency stage are listed below:

STAGE I EMERGENCY

During a **Stage I** Condition, monitoring / observations of the dam / emergency spillway by the Dam Operator / Staff Gauge Observer should be performed every **6 to 12 hours**.

STAGE II EMERGENCY

If the emergency spillway is flowing with **0.5 feet (6 inches)** of water (6.8 feet freeboard), a **STAGE II** Condition should be immediately initiated and monitoring / observations of the dam / emergency spillway will be performed **every 2 hours**.

The modeled rainfall for the dam's watershed (area draining to the dam) necessary to cause a **Stage II Emergency Condition** is:

- 8.90 inches per 6 hours
- 10.5 inches per 12 hours
- 11.8 inches per 24 hours

Conditions at the dam should be monitored and if deterioration of the embankment continues a **Stage III** condition should be initiated.

VIII. GENERAL RESPONSIBILITIES UNDER THE EAP

A. Dam Owner Responsibilities

The Town of Drakes Branch maintains the dam and Isaac Napier from the Town of Drakes Branch is the dam operator / staff gauge observer. The dam operator is an employee of the Owner (Town of Drakes Branch) and is part of the team that observes the dam yearly during inspections and routine maintenance. The operator is also on call during high water conditions. See the notification flowchart in Section II for emergency phone numbers.

If an observer notices the water elevation reaching the crest of the spillway or the potential failure of the dam, he/she should call the dam operator. At this time, Isaac Napier is both the dam operator and staff gauge observer. The operator will then be in charge of monitoring the situation, implementing the EAP, and informing the Charlotte County Emergency Communication Center.

The observer/operator shall first notify the Director of the Charlotte County Emergency Communication Center and then proceed to contact the appropriate personnel listed in the Notification Flowchart. The observer /operator shall coordinate all emergency procedures associated with the dam. He/she shall also update the emergency center if the situation changes.

The address / telephone number for the dam owner / dam operator:

| | |
|------------------------------|----------------------|
| <u>Town of Drakes Branch</u> | <u>Dam Operator</u> |
| 4800 Main Street | Isaac Napier |
| Drakes Branch, VA 23937 | |
| Business: (434) 568-3600 | Cell: (434) 547-3301 |

B. Responsibility for Notification

***SEE SECTION II FOR STAGES I, II & III NOTIFICATION CHARTS**

In an emergency situation, the dam operator will call the Director of the Charlotte County Emergency Communication Center, the National Weather Service, and Department of Conservation and Recreation (DCR) Dam Safety Office. The observer/operator shall also be the point of contact for coordinating all media information about the situation. The operator shall ensure that DCR Dam Safety Office, and VDOT are kept updated as the situation changes.

The local authorities will be responsible for initial emergency road closing, but VDOT will have to inspect the road(s) once the emergency has ended to determine if the road(s) was impacted. If the road(s) was impacted, VDOT will be responsible for the permanent closure while the road(s) is being repaired. When contacting VDOT, the operator shall inform them that additional roads may be impacted by the dam failure or high water. These include Route #47 (Main Street), Route #642 (Mossing Ford Road), Route #637 (West Saxkey Rd.), Route #612 (Hermon Road), Route #641 (Mulberry Hill Rd.), Route #607 (River Road), and preventing the public in the affected flood wave areas.

- ✓ Telephone/Reverse 911 automated warning systems
- ✓ Police/fire/sheriff radio dispatch vehicles with loudspeakers, bullhorns, etc.
- ✓ Personal runners from door-to-door alerting residents
- ✓ Radio/television broadcasts for area involved

C. Responsibility for Evacuation

Per the hazard classification report there are residential houses, public roads, and businesses in the inundated areas at this time. If a dam failure is imminent, any members of public that happen to be downstream of the dam should be advised to stay out of the inundation area or immediately move to higher ground.

Any additional notifications or evacuations should be determined by the Charlotte County Emergency Communication Center, Charlotte County Sheriff's Office, and the State Police. The dam owner shall not assume, or usurp, the responsibility of the government authorities for evacuation of people.

The Sheriff's Department shall implement an evacuation upon receiving the order from the Charlotte County Emergency Communication Center, or Charlotte County Emergency Communication Center's designated representative. Upon activation of the Emergency Siren, the Sheriff's Department shall give the order for all personnel to begin with evacuation procedures.

The following outline further explains the Evacuation procedure:

1. Monitoring the situation and, if time permits, review of evacuation plans.
2. Begin Stage I, II, and III
3. Evacuating the inundation areas, if conditions warrant.
4. Expanding Direction and Control as well as beginning Emergency Public Information and operating shelters.
5. Provide Situation Reports to the State Emergency Operations Center (804-674-2400 or 800-468-8892)

D. Responsibility for Duration, Security, Termination, and Follow-up

Only authorized personnel shall be allowed on the dam site. These personnel include the operator, and local authorities who have been cleared by the operator. Due to the nature of the facility, all personnel shall be cleared by the operator prior to accessing the site. All access gates to the dam shall be closed and locked.

The following DCR guideline should be followed:

1. Once the Stage III condition has been met the dam operator / staff gauge observer will continue to provide the Charlotte County Emergency Communication Center Director (CCECCD) with information concerning water level rise, erosion in the emergency spillway and/or dam overtopping. It is particularly important for the CCECCD to know when the breach is occurring to evacuate their rescue personnel. The dam operator / staff gauge observer will remain at the dam until the dam breaks and is released from duty by the CCECCD.
2. Regional flooding may occur prior to an incident at this dam and could continue for long periods of time. The dam operator / staff gauge observer needs to have plans for staying or returning to the dam as conditions worsen. The termination responsibility should be handled by the CCECCD (termination of disaster response activities).

The dam operator shall be on-site to monitor the developing conditions per Section VII, Subsection B Emergency Level due to Risk of Overtopping but shall in no way place themselves in harm's way during observations. The operator shall provide necessary updates to the Charlotte County Emergency Communication Center, DCR, VDOT, and NWS from the time the emergency starts to when it has been terminated.

The dam operator shall be responsible for determining when the dam related emergency is over. The state and local emergency management officials are responsible for termination of disaster response activities.

The dam owner will be responsible for setting up a meeting with all participants (DCR, Charlotte County, VDOT, etc.) to go over the event and determine what changes need to be made to the Emergency Action Plan. The results of the evaluation should be documented in a written report.

E. EAP Coordinator Responsibility

Isaac Napier with the Town of Drakes Branch is the EAP Coordinator and has overall responsibility for implementing the EAP, including training the key participants and periodic reviewing, test, and updating of the EAP.

The EAP Coordinator's Duties include the following:

- Training the key EAP participants to handle an emergency situation at the Roanoke Creek Dam #72A.
- Annually reviewing the EAP with the key EAP participants for any required changes to personnel or contact information and distributing copies of the revised plan.
- Testing the EAP.
- Submitting EAP revisions to the DCR Dam Safety Office

The key EAP participants are the following:

- Phillip D. Jackson – Dam Owner
- Isaac Napier – Primary Dam Operator / Primary Staff Gauge Observer
- James L. Webb –Secondary Dam Operator / Secondary Staff Gauge Observer
- Daniel Witt - Charlotte County Administrator
- Chris Russell - Charlotte County Emergency Communication Center
- Sheriff Royal S. Freeman - Charlotte County Sheriff's Office

The telephone numbers for the key participants are listed on the notification flowchart in Section II. The procedures for carrying out the phases of the EAP are described in the previous section.

IX. PREPAREDNESS

Levels of Emergency

The three levels of emergency are a Stage I, II or III Condition:

- A Slowly Developing Situation (Stage I) indicates a flood watch, flood warning, or heavy continuous rain or excessive flow of water from ice or melt. As mentioned above, this stage does include initiation of a flood watch or flood warning by the National Weather Service in the watershed draining to the lake / dam in question.
- A Quickly Developing Situation (Stage II) indicates that a potentially serious condition is developing and failure could occur if the condition does not improve. This means the emergency spillway is flowing with 0.5 feet (6 inches) of water. During a Stage II Condition downstream residents and the County's emergency communication office should be kept informed about the situation.
- An Imminent Failure Situation (Stage III) indicates that failure is imminent or has already occurred. The emergency spillway is flowing with 6.0 feet of water (1.3 feet freeboard). During Stage III Conditions the full EAP should be initiated.

A. Prevention of emergency conditions from developing, if possible during a Stage II Condition Emergency.

If there are signs of outside conditions developing that could cause a dam failure, such as a warning of upcoming large storm events (ie. hurricanes), an upstream dam failure is eminent, or signs of non-storm related dam failure the dam operator should contact the Charlotte County Emergency Communication Center and explain the situation and the potential for dam failure.

The following actions should also be taken by the dam operator to minimize the potential of dam failure:

- Removing debris from around the primary outlet structure.
- Removing debris found within the emergency spillway
- Installing a siphon or large scale pump to allow the water elevation to lower.
- Placing sandbags on the crest of the embankment.
- Bring in equipment needed to illuminate the spillway operating deck, or distress areas of the dams during adverse weather or periods of darkness.

Because of uncertainties about the effectiveness, these preventive actions should be carried out simultaneously with appropriate notification.

B. Surveillance

The operator and staff should monitor the status of weather fronts through the National Weather Service (NWS). The NWS maintains a hurricane center that reports on hurricanes, tropical storms & tropical depressions as they travel and affect coastal and inland areas. The web site address is:
<http://www.nhc.noaa.gov/>

The expected response time to the dam from the dam operator's / staff gauge observer's home should be less than one (1) hour from the time they receive the information that a flood watch has been declared. The dam operator and / or staff gauge observer should never put themselves in harm's way. In the event a hurricane or tropical depression occurs with high winds the dam operator / staff gauge observer shall use extreme caution monitoring conditions.

Preplanned access routes should be utilized given that small streams crossing under state roads may flood preventing safe access. The dam operators and gauge observers should never attempt to cross a road that has flood water crossing it at a depth greater than one half (0.5) foot (6 inches) unless the vehicle is specially designed for that purpose.

The dam operator and / or Staff Gauge Observer is responsible for monitoring the water elevation. Currently there is no existing staff gauge located at the dam in question. It is the responsibility of the Dam Operator / Staff Gauge Observer to be able to accurately read the flow depths within the existing emergency spillway for EAP stage trigger purposes. Prior to a Stage II emergency, the Dam Owner will be responsible for installing a device or identifying a way to accurately read water depths within the existing emergency spillway for EAP stage level purposes.

When the emergency spillway is flowing with 0.5 feet (6 inches) of water, the dam operator should initiate the EAP under a **Stage II Condition**. If the emergency spillway is flowing with 6.0 feet (1.3 feet of freeboard) of water, the condition should be upgraded to a **Stage III Condition**.

Currently there is no remote surveillance at the site.

C. Response during periods of darkness, adverse weather, weekends, and holidays

Currently there is no existing staff gauge located at the dam in question. It is the responsibility of the Dam Operator / Staff Gauge Observer to be able to accurately read the flow depths within the existing emergency spillway for EAP stage trigger purposes. Prior to a Stage II emergency, the Dam Owner will be responsible for installing a device or identifying a way to accurately read water depths within the existing emergency spillway for EAP stage level purposes.

The staff gauge (or Dam Owner's chosen method to accurately measure water depths within the existing emergency spillway) should be easily read from the location chosen by the staff gauge observer with a flashlight after dark. For periods of darkness or adverse weather, the operator shall have emergency equipment brought in to illuminate the spillway, operating deck, or distress areas of the dams as soon as activation of the spillway or potential dam failure is determined. These lights shall be installed with access to backup generators, if needed.

During weekends or holidays, there shall be an acceptable replacement designated to act as the dam operator and EAP Coordinator. This individual shall be trained in all the same procedure as the dam operator and EAP Coordinator.

D. Access to the site

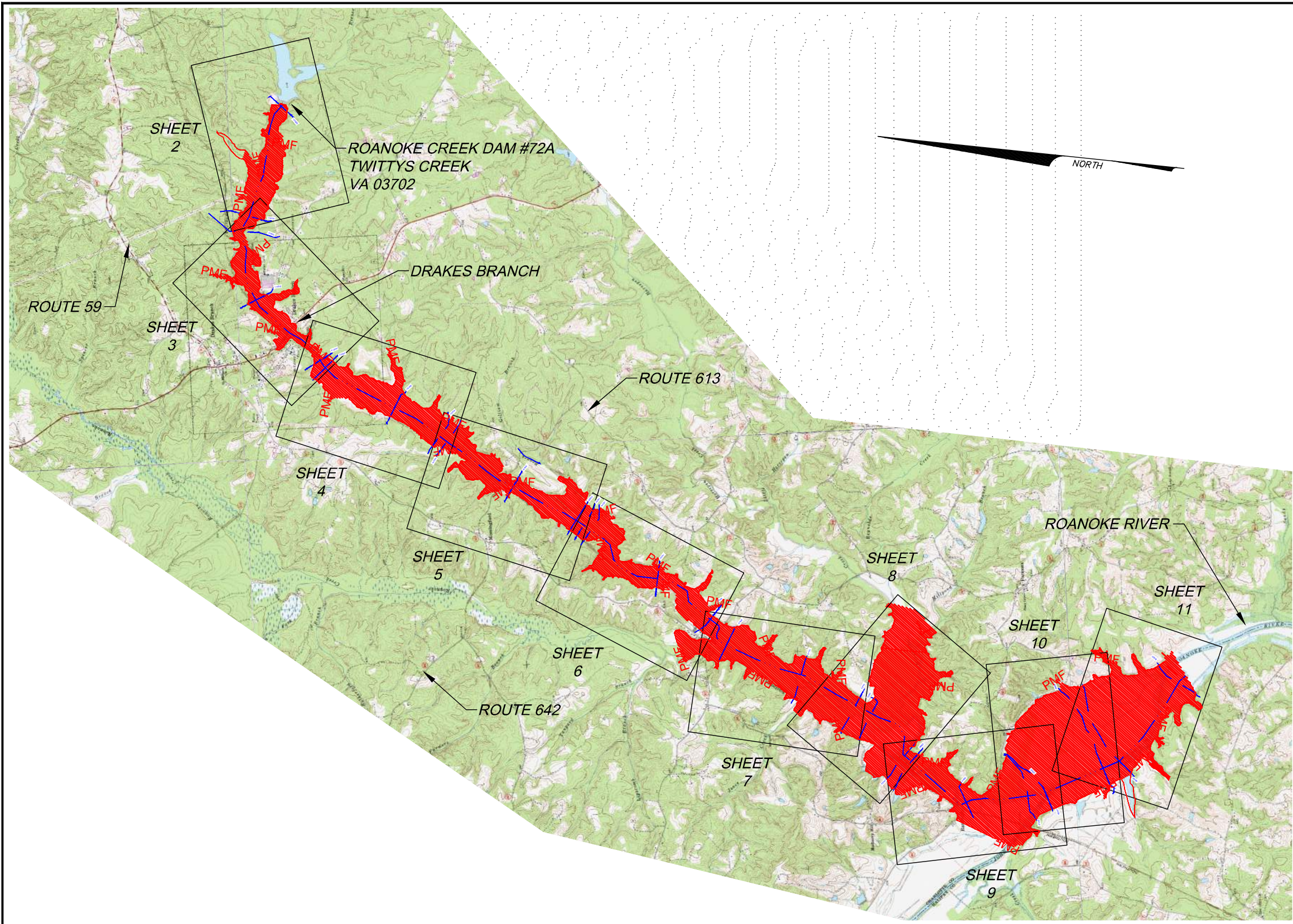
The dam site is accessed via an access road from West Point Stevens Road (State Route 623). Due to potential hazards with the access route, it is recommended that the dam be accessed and observed from "high ground." No vehicles are allowed on top of the dam during **Stage II** or **Stage III** conditions.

E. Alternative Systems of Communication


Communications during a major rainfall event may be problematic. Telephone land lines may be used as the first means of communication. Cellular telephones can be used to supplement the land lines. Unfortunately, telephone lines like electrical lines are subject to being broken by falling trees so radio communication during these events is normally required.

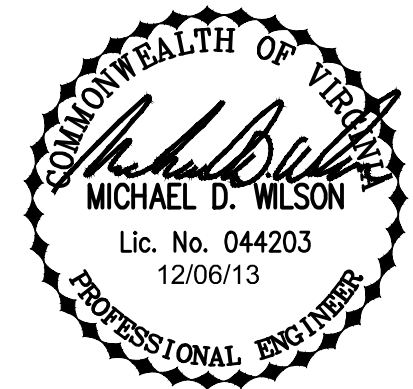
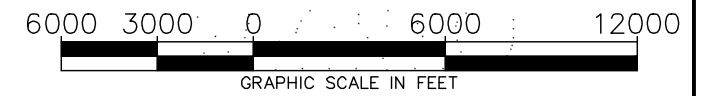
X. INUNDATION MAPS

A Dam Break Inundation Zone Study was completed by Hurt & Proffitt, Inc. in December of 2013 which included the development of dam break inundation maps (dated 12/06/13). Inundation maps on the following sheets were obtained from the December 2013 Hurt & Proffitt Dam Break Inundation Zone Study.



DESIGN FLOODS LEGEND

 100% PMF WITH BREACH




The information contained on this map is prepared for use in the notification of downstream property owners by emergency response personnel.

Aerial mapping and digital contours taken from GIS Information for Charlotte County, VA. Areas at dams and road crossings were field surveyed by Hurt & Proffitt, Inc.

Mapping of flooded areas and flood wave travel times are approximate. Timing and extent of actual inundation may differ from the information presented on this map, and summary table on sheet 12 - 15.

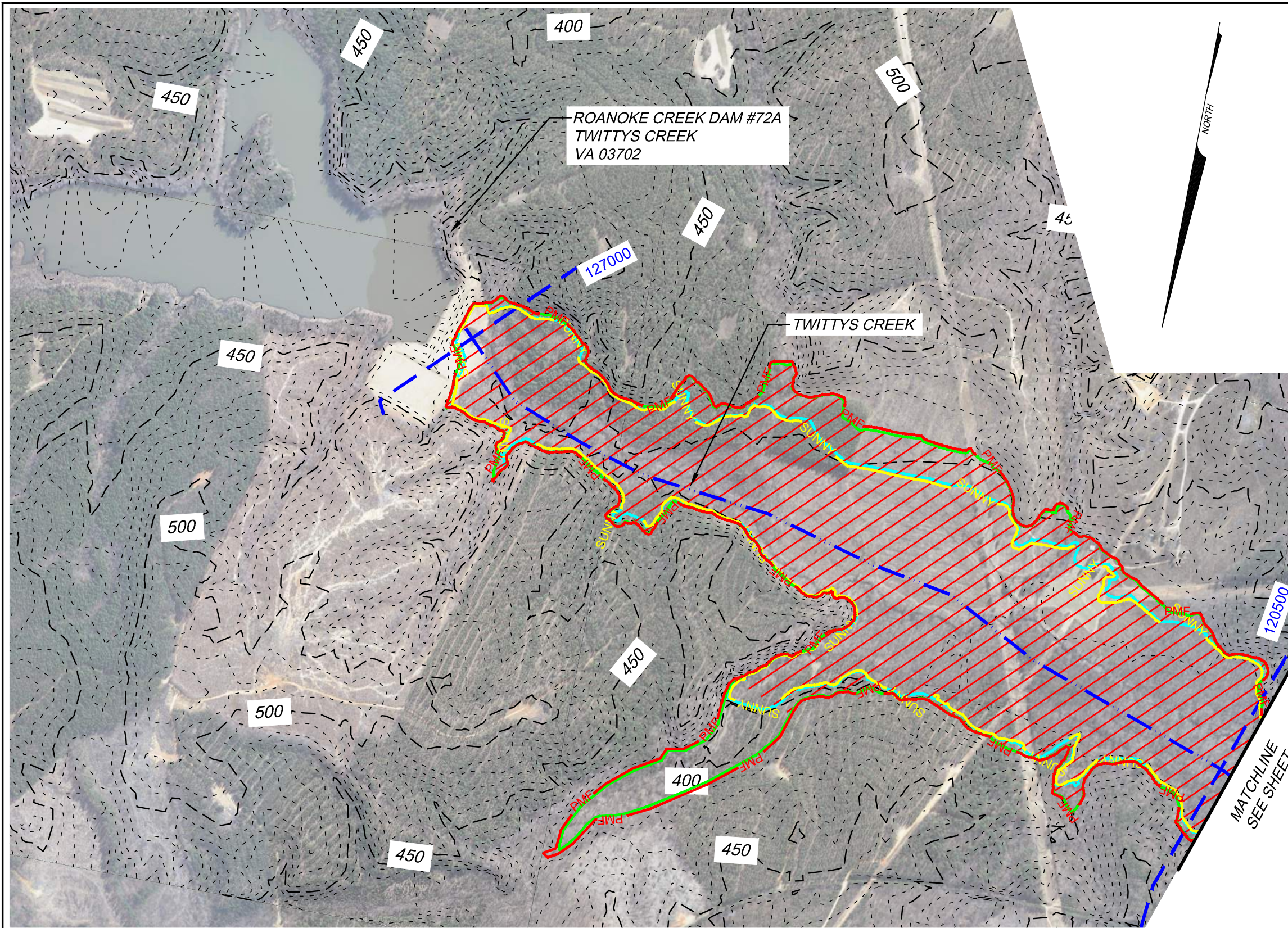
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INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

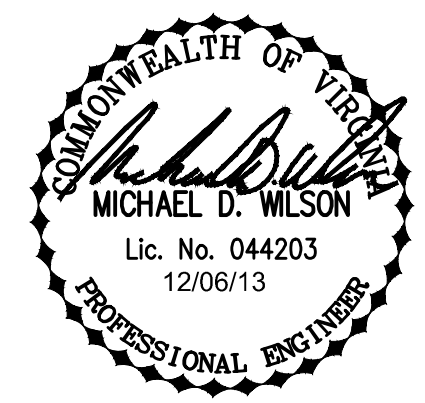
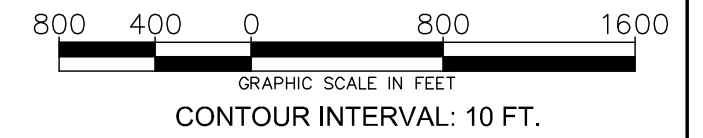
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| PROJECT NO. | 20130453 |
| G.L. NO. | 304-09-D3.7 |
| FILE NO. | G-13962 |
| DATE: | 12/06/13 |
| DRAWN BY: | SHC |
| CHECKED BY: | MDW |

SHEET NO.
1 OF 15



DESIGN FLOODS LEGEND

- **SDF** 90% PROBABLE MAXIMUM FLOOD (PMF) WITH BREACH OF DAM
- - - 90% PROBABLE MAXIMUM FLOOD (PMF) WITHOUT BREACH
- **SNY** SUNNY DAY BREACH
- ▨ **PMF** 100% PMF WITH BREACH
- - - MAJOR CONTOUR
- - - - MINOR CONTOUR
- - - - STREAM CENTER LINE
- - - - 2-1 IMPACTED STRUCTURES (SHEET #-STRUCTURE #)



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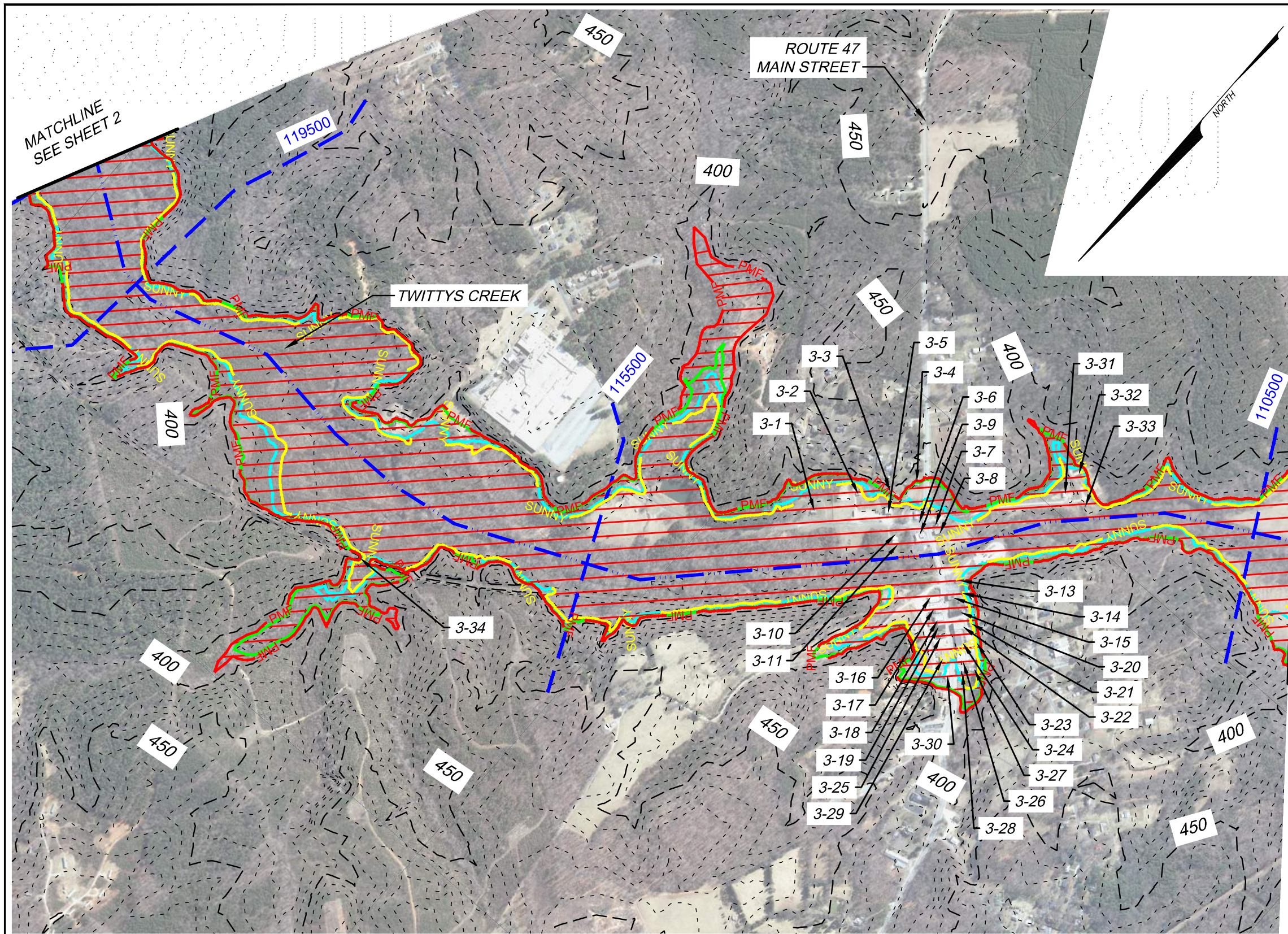
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INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

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| PROJECT NO. | 20130453 | SHEET NO. 2 OF 15 |
| G.L. NO. | 304-09-D3.7 | |
| FILE NO. | G-13962 | |
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| DRAWN BY: | SHC | |

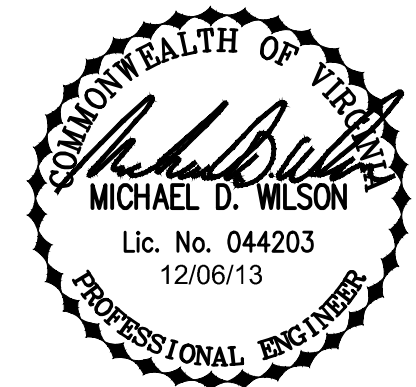


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GRAPHIC SCALE IN FEET
CONTOUR INTERVAL: 10 FT.



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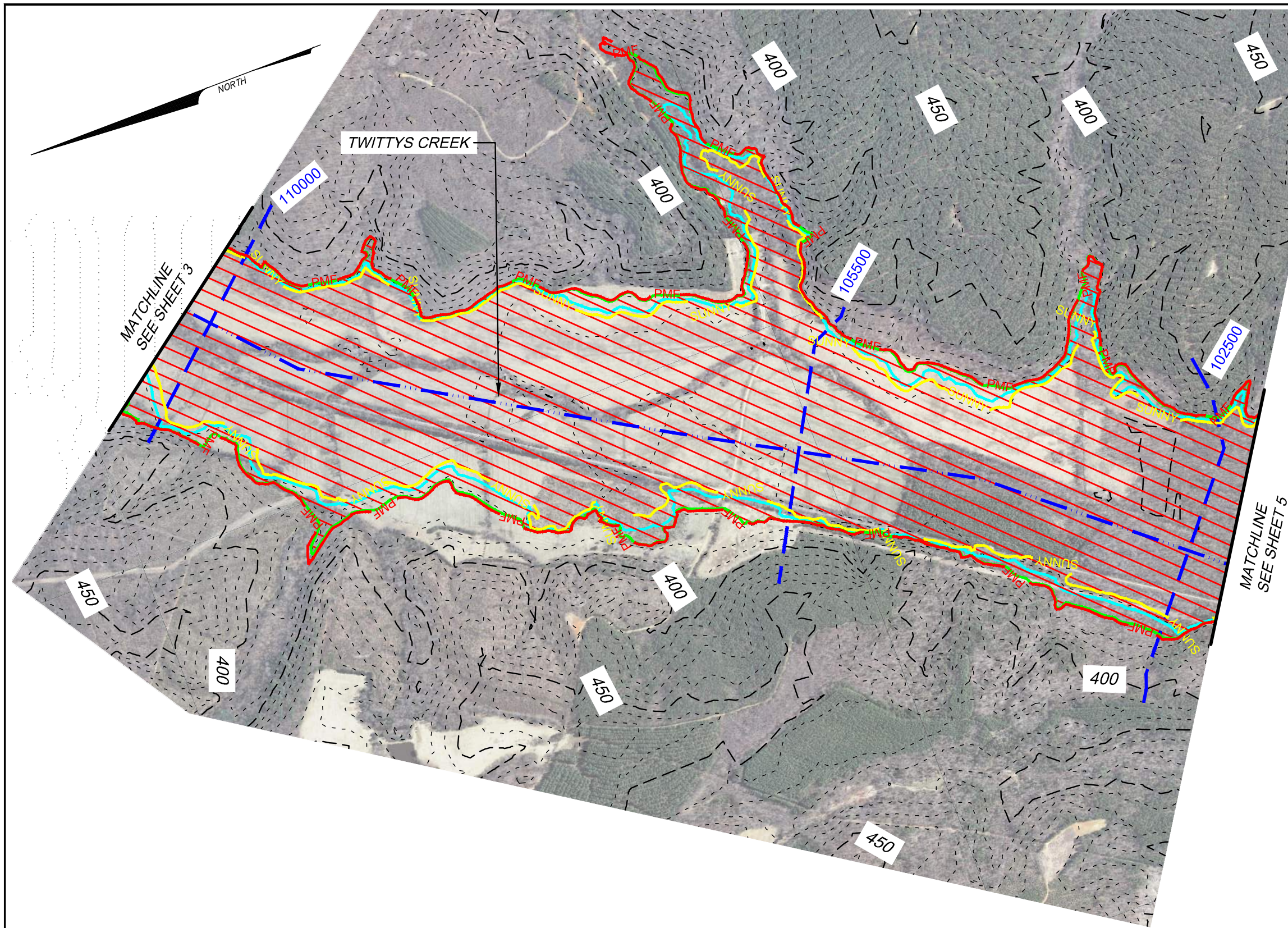
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INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

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SHEET NO.
3 OF 15



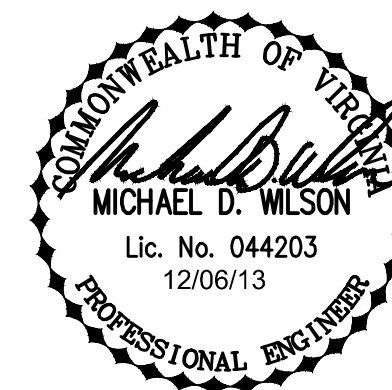
DESIGN FLOODS LEGEND

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GRAPHIC SCALE IN FEET

CONTOUR INTERVAL: 10 FT.



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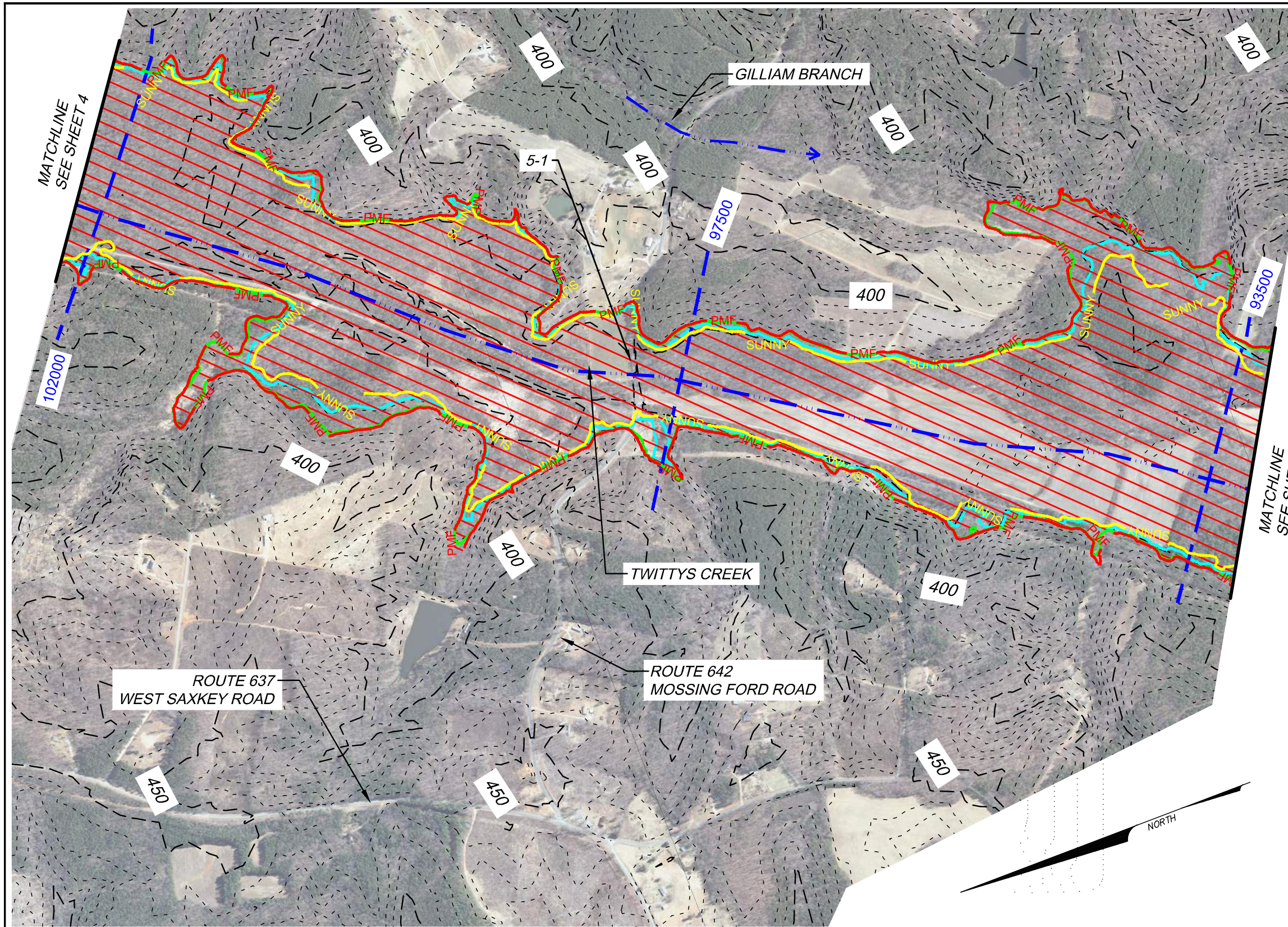
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INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

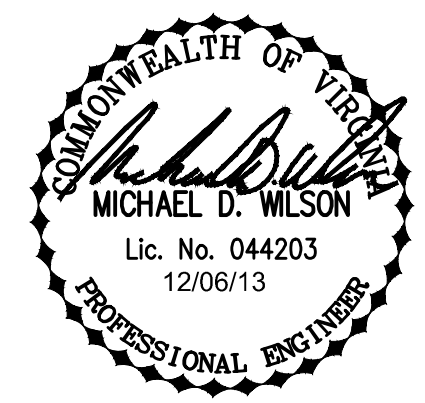
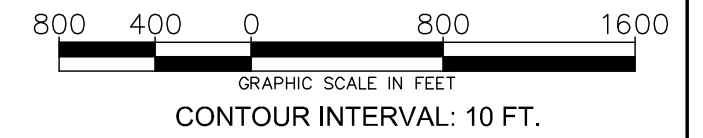
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SHEET NO.
4 OF 15



DESIGN FLOODS LEGEND

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- 2-1** IMPACTED STRUCTURES (SHEET #-STRUCTURE #)



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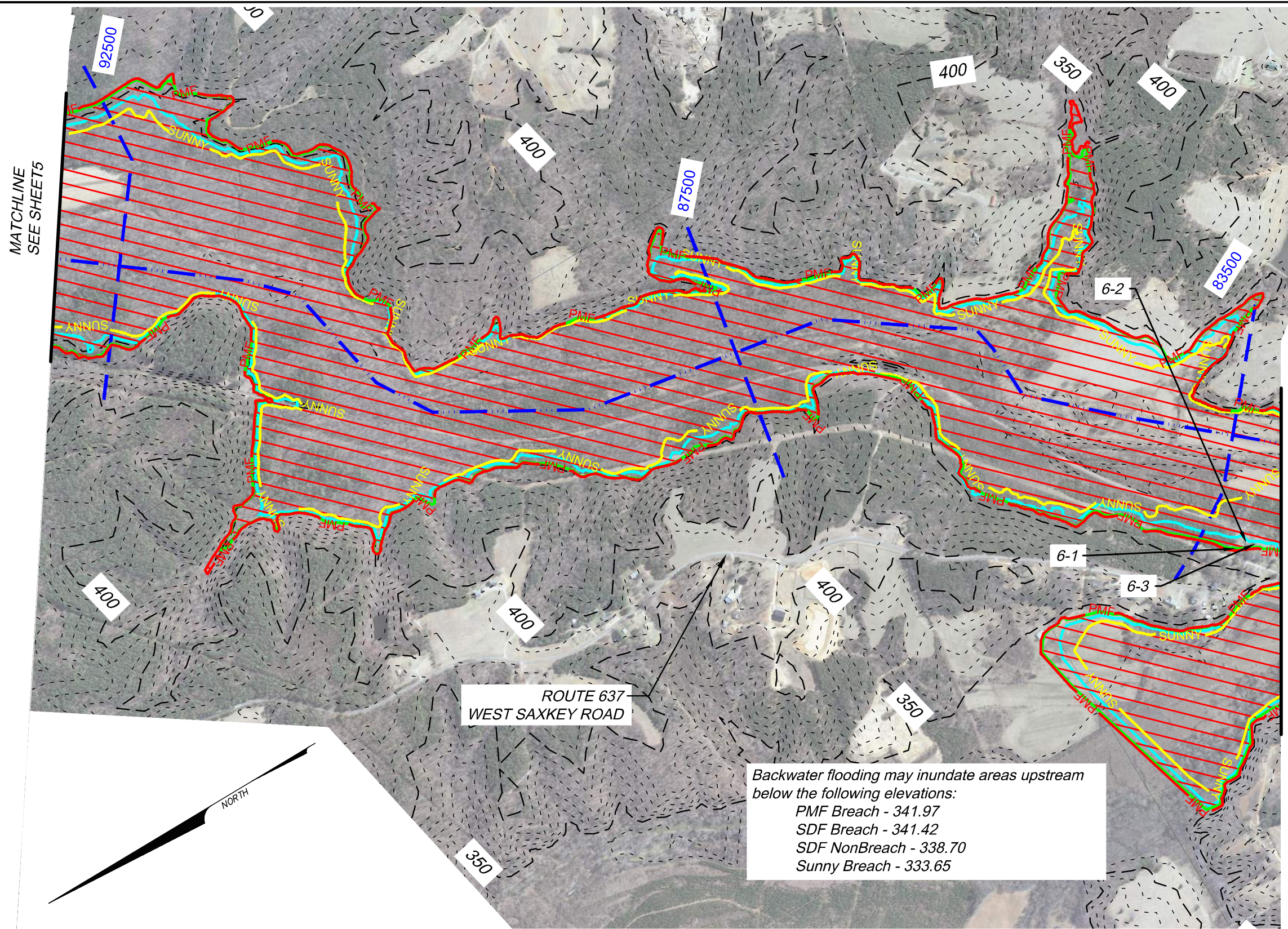
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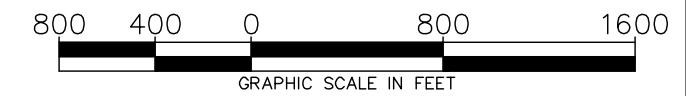
INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

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| PROJECT NO. | 20130453 | SHEET NO. 5 OF 15 |
| G.L. NO. | 304-09-D3.7 | |
| FILE NO. | G-13962 | |
| DATE: | 12/06/13 | |
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| CHECKED BY: | MDW | |

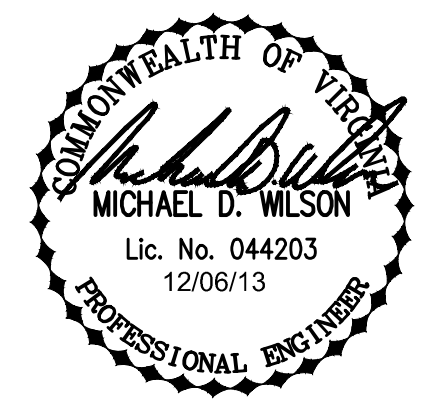


DESIGN FLOODS LEGEND

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- 2-1 IMPACTED STRUCTURES (SHEET #-STRUCTURE #)



CONTOUR INTERVAL: 10 FT.



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Backwater flooding may inundate areas upstream below the following elevations:
 PMF Breach - 341.97
 SDF Breach - 341.42
 SDF NonBreach - 338.70
 Sunny Breach - 333.65

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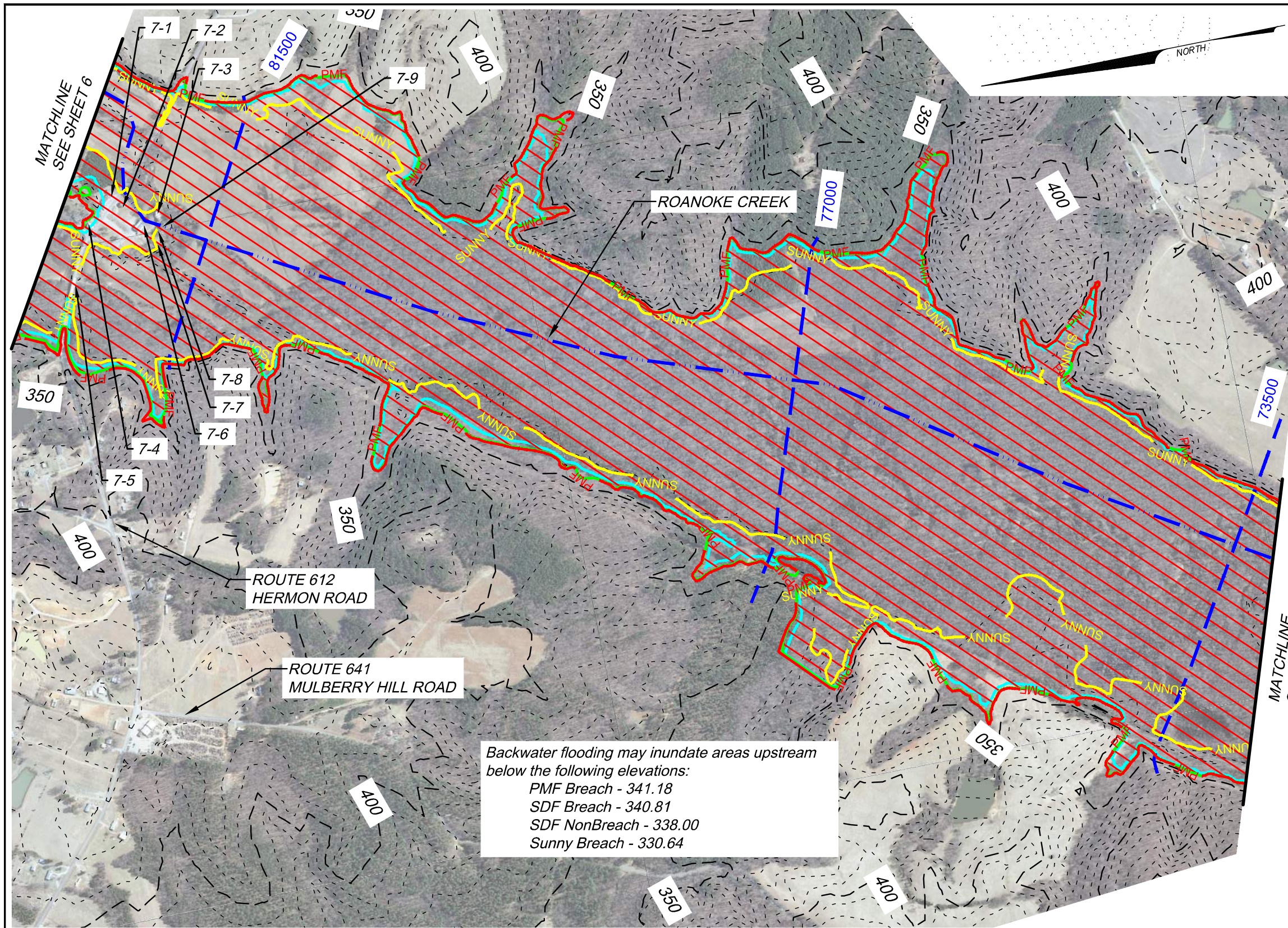
INUNDATION ZONE MAP

DAM BREACH FLOOD ELEVATIONS

ROANOKE CREEK DAM #72A

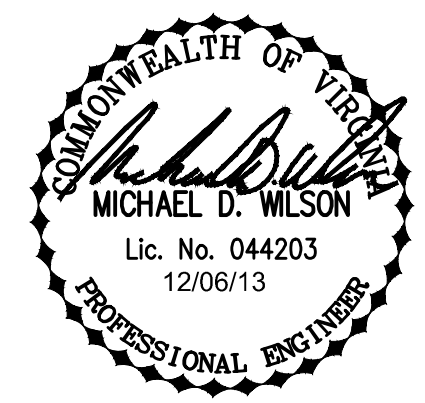
DRAKES BRANCH, VA

| | |
|----------------------|-----------------------------|
| PROJECT NO. 20130453 | SHEET NO. 6 OF 15 |
| G.L. NO. 304-09-D3.7 | |
| FILE NO. G-13962 | |
| DATE: 12/06/13 | |
| DRAWN BY: SHC | |
| CHECKED BY: MDW | |



DESIGN FLOODS LEGEND

- SDF 90% PROBABLE MAXIMUM FLOOD (PMF) WITH BREACH OF DAM
- 90% PROBABLE MAXIMUM FLOOD (PMF) WITHOUT BREACH
- SNY SUNNY DAY BREACH
- ▭ PMF 100% PMF WITH BREACH
- MAJOR CONTOUR
- MINOR CONTOUR
- STREAM CENTER LINE
- 2-1 IMPACTED STRUCTURES (SHEET #-STRUCTURE #)



The information contained on this map is prepared for use in the notification of downstream property owners by emergency response personnel.

Aerial mapping and digital contours taken from GIS Information for Charlotte County, VA. Areas at dams and road crossings were field surveyed by Hurt & Proffitt, Inc.

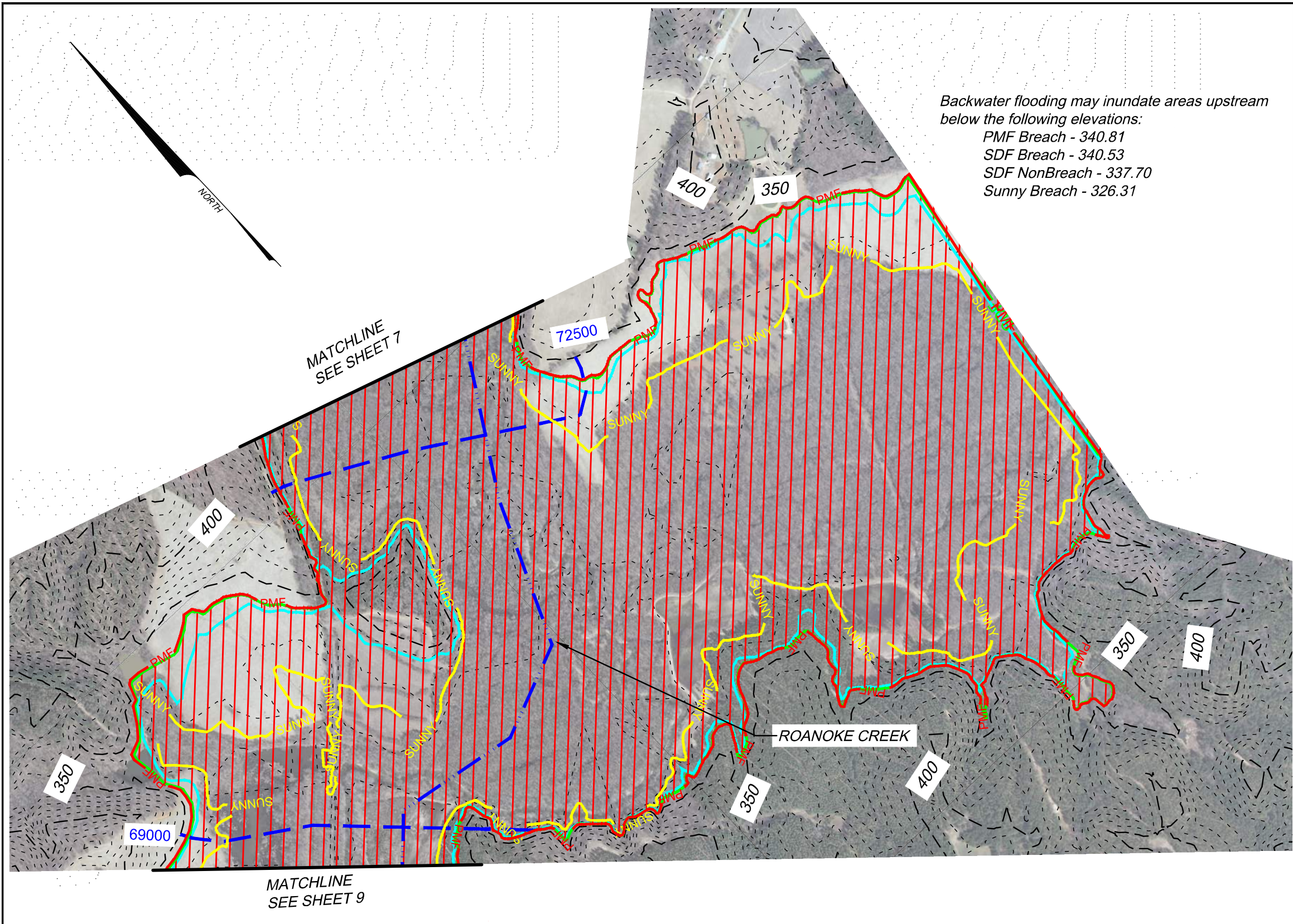
Mapping of flooded areas and flood wave travel times are approximate. Timing and extent of actual inundation may differ from the information presented on this map, and summary table on sheet 12 - 15.

Backwater flooding may inundate areas upstream below the following elevations:
 PMF Breach - 341.18
 SDF Breach - 340.81
 SDF NonBreach - 338.00
 Sunny Breach - 330.64

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INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

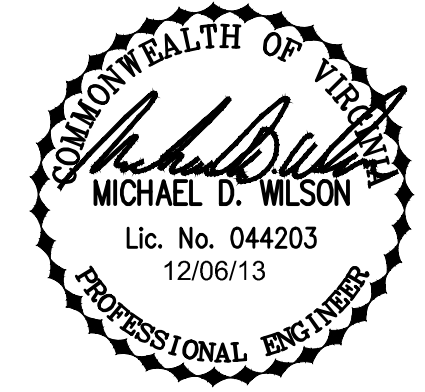
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|-------------|-------------|-----------------------------|
| PROJECT NO. | 20130453 | SHEET NO. 7 OF 15 |
| G.L. NO. | 304-09-D3.7 | |
| FILE NO. | G-13962 | |
| DATE: | 12/06/13 | |
| DRAWN BY: | SHC | |
| CHECKED BY: | MDW | |



Backwater flooding may inundate areas upstream below the following elevations:
 PMF Breach - 340.81
 SDF Breach - 340.53
 SDF NonBreach - 337.70
 Sunny Breach - 326.31

DESIGN FLOODS LEGEND

- **SDF** 90% PROBABLE MAXIMUM FLOOD (PMF) WITH BREACH OF DAM
- 90% PROBABLE MAXIMUM FLOOD (PMF) WITHOUT BREACH
- **SNY** SUNNY DAY BREACH
- ▨ **PMF** 100% PMF WITH BREACH
- MAJOR CONTOUR
- MINOR CONTOUR
- STREAM CENTER LINE
- 2-1 IMPACTED STRUCTURES (SHEET #-STRUCTURE #)



The information contained on this map is prepared for use in the notification of downstream property owners by emergency response personnel.

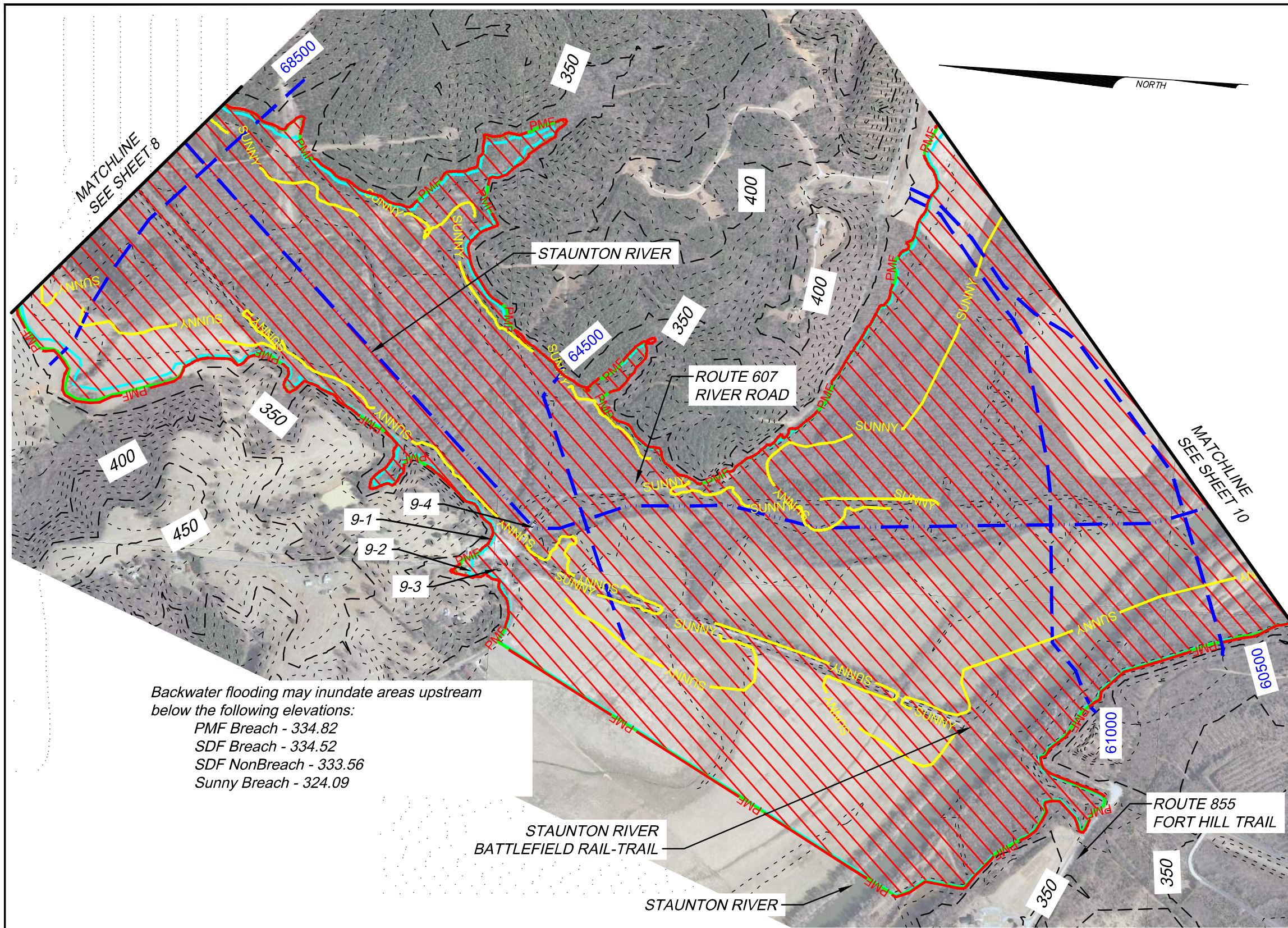
Aerial mapping and digital contours taken from GIS Information for Charlotte County, VA. Areas at dams and road crossings were field surveyed by Hurt & Proffitt, Inc.

Mapping of flooded areas and flood wave travel times are approximate. Timing and extent of actual inundation may differ from the information presented on this map, and summary table on sheet 12 - 15.

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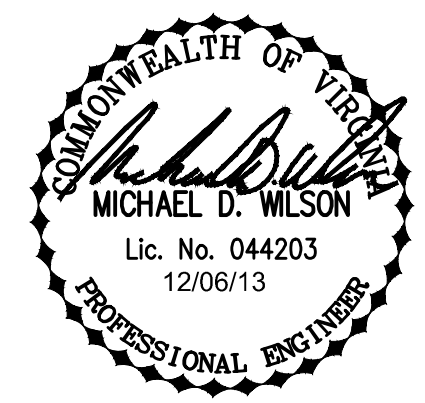
INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

| | |
|----------------------|------------------------------|
| PROJECT NO. 20130453 | SHEET NO. 8 OF 15 |
| G.L. NO. 304-09-D3.7 | |
| FILE NO. G-13962 | |
| DATE: 12/06/13 | |
| DRAWN BY: SHC | |
| CHECKED BY: MDW | |



DESIGN FLOODS LEGEND

- SDF 90% PROBABLE MAXIMUM FLOOD (PMF) WITH BREACH OF DAM
- 90% PROBABLE MAXIMUM FLOOD (PMF) WITHOUT BREACH
- SNY SUNNY DAY BREACH
- ▭ PMF 100% PMF WITH BREACH
- MAJOR CONTOUR
- MINOR CONTOUR
- STREAM CENTER LINE
- 2-1 IMPACTED STRUCTURES (SHEET #-STRUCTURE #)



Backwater flooding may inundate areas upstream below the following elevations:
 PMF Breach - 334.82
 SDF Breach - 334.52
 SDF NonBreach - 333.56
 Sunny Breach - 324.09

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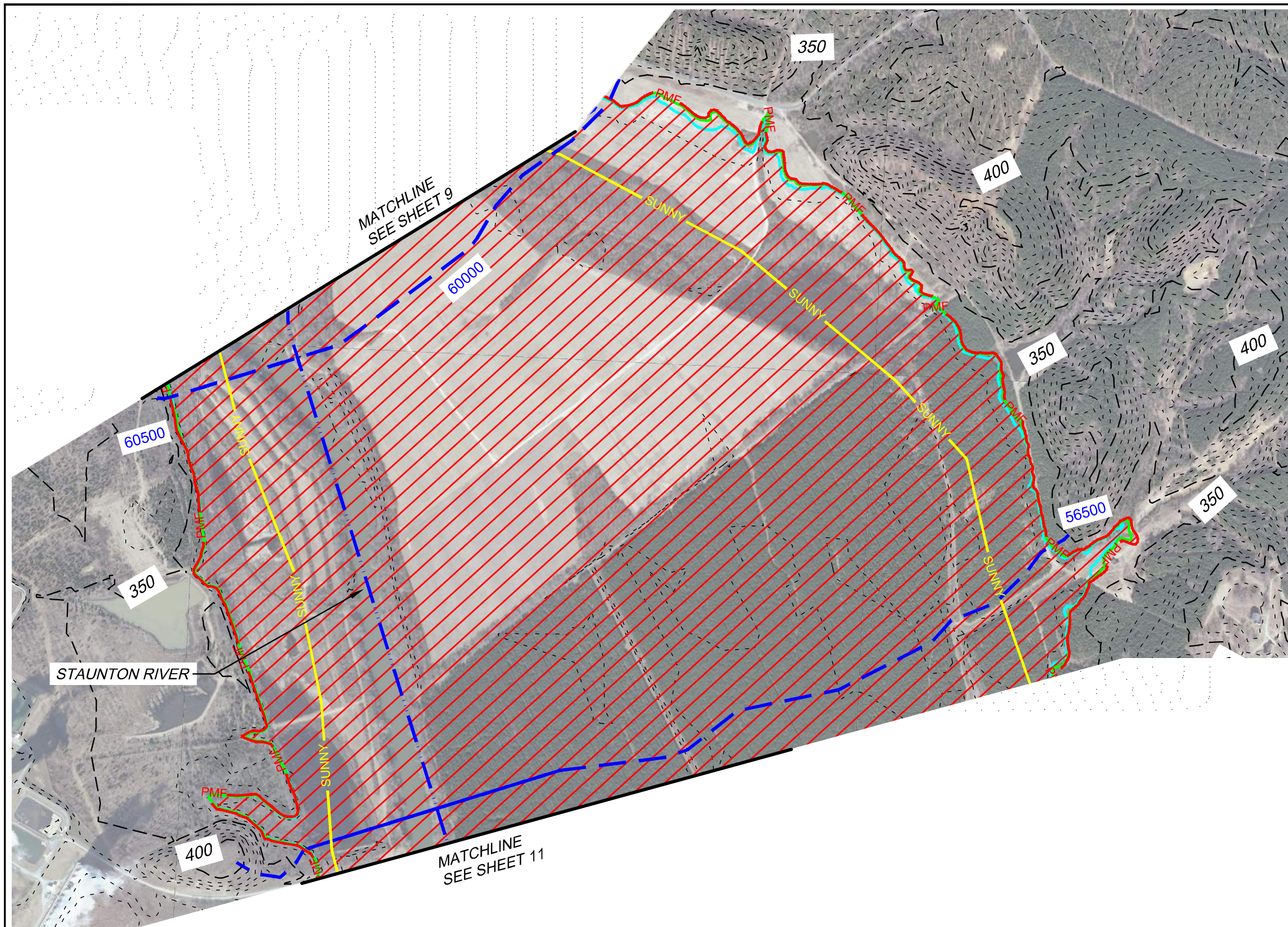
Aerial mapping and digital contours taken from GIS Information for Charlotte County, VA. Areas at dams and road crossings were field surveyed by Hurt & Proffitt, Inc.

Mapping of flooded areas and flood wave travel times are approximate. Timing and extent of actual inundation may differ from the information presented on this map, and summary table on sheet 12 - 15.

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INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

| | | |
|-------------|-------------|-----------------------------|
| PROJECT NO. | 20130453 | SHEET NO. 9 OF 15 |
| G.L. NO. | 304-09-D3.7 | |
| FILE NO. | G-13962 | |
| DATE: | 12/06/13 | |
| CHECKED BY: | MDW | |
| DRAWN BY: | SHC | |

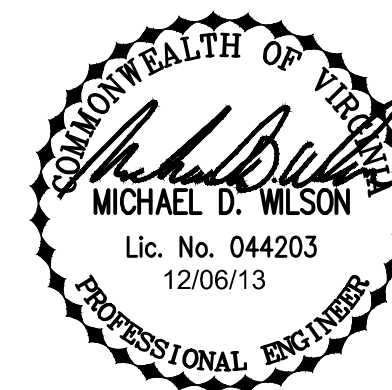


DESIGN FLOODS LEGEND

- **SDF** 90% PROBABLE MAXIMUM FLOOD (PMF) WITH BREACH OF DAM
- - - 90% PROBABLE MAXIMUM FLOOD (PMF) WITHOUT BREACH
- **SNY** SUNNY DAY BREACH
- ▨ **PMF** 100% PMF WITH BREACH
- - - MAJOR CONTOUR
- - - - MINOR CONTOUR
- · - · - STREAM CENTER LINE
- 2-1** IMPACTED STRUCTURES (SHEET #-STRUCTURE #)



GRAPHIC SCALE IN FEET
CONTOUR INTERVAL: 10 FT.



The information contained on this map is prepared for use in the notification of downstream property owners by emergency response personnel.

Aerial mapping and digital contours taken from GIS Information for Charlotte County, VA. Areas at dams and road crossings were field surveyed by Hurt & Proffitt, Inc.

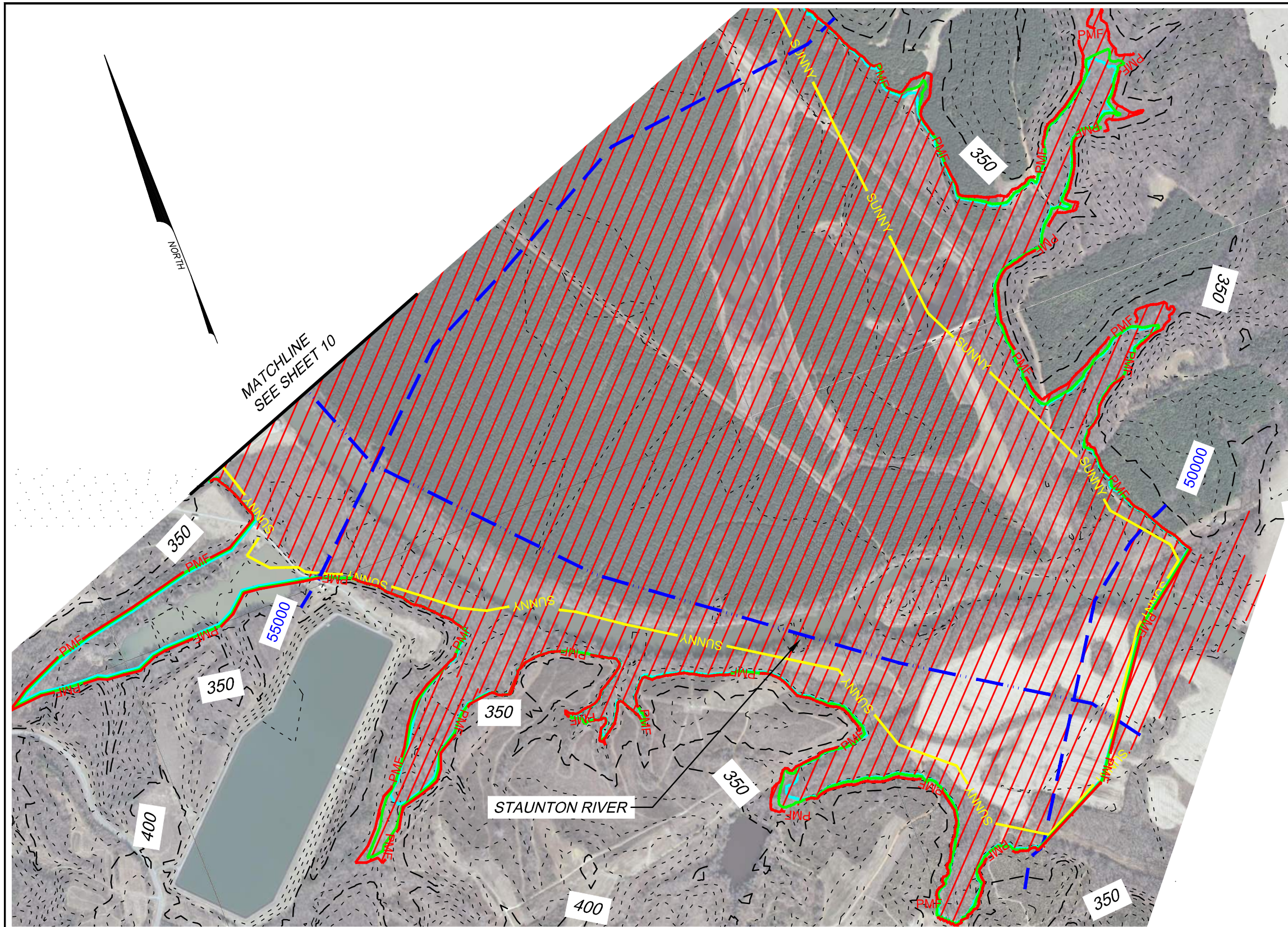
Mapping of flooded areas and flood wave travel times are approximate. Timing and extent of actual inundation may differ from the information presented on this map, and summary table on sheet 12 - 15.

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INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

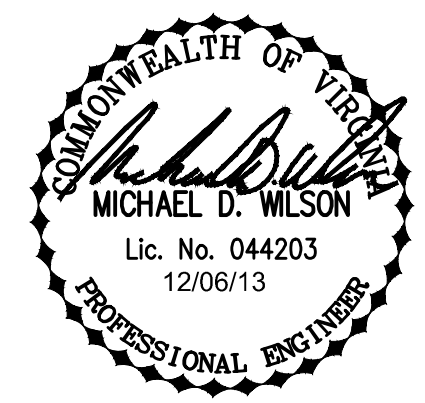
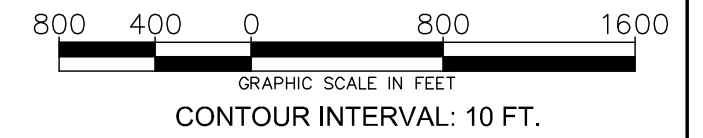
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|-------------|-------------|
| PROJECT NO. | 20130453 |
| G.L. NO. | 304-09-D3.7 |
| FILE NO. | G-13962 |
| DATE: | 12/06/13 |
| DRAWN BY: | SHC |
| CHECKED BY: | MDW |

SHEET NO.
10 OF 15



DESIGN FLOODS LEGEND

- SDF 90% PROBABLE MAXIMUM FLOOD (PMF) WITH BREACH OF DAM
- 90% PROBABLE MAXIMUM FLOOD (PMF) WITHOUT BREACH
- SNY SUNNY DAY BREACH
- ▭ PMF 100% PMF WITH BREACH
- MAJOR CONTOUR
- MINOR CONTOUR
- STREAM CENTER LINE
- 2-1 IMPACTED STRUCTURES (SHEET #-STRUCTURE #)



The information contained on this map is prepared for use in the notification of downstream property owners by emergency response personnel.

Aerial mapping and digital contours taken from GIS Information for Charlotte County, VA. Areas at dams and road crossings were field surveyed by Hurt & Proffitt, Inc.

Mapping of flooded areas and flood wave travel times are approximate. Timing and extent of actual inundation may differ from the information presented on this map, and summary table on sheet 12 - 15.

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INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

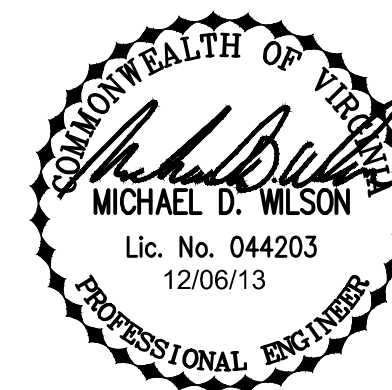
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|----------------------|-------------------------------------|
| PROJECT NO. 20130453 | SHEET NO. 11 OF 15 |
| G.L. NO. 304-09-D3.7 | |
| FILE NO. G-13962 | |
| DATE: 12/06/13 | |
| CHECKED BY: MDW | |
| DRAWN BY: SHC | |

Flood Wave Summary

| HEC-RAS Station | Map Sheet Number | Distance from Dam (Miles) | PMF Breach | | 90% PMF Breach | | 90% PMF Non Breach | | Sunny Breach | |
|-----------------|------------------|---------------------------|-----------------------------------|--------------------------------|-----------------------------------|--------------------------------|-----------------------------------|--------------------------------|-----------------------------------|--------------------------------|
| | | | Time to Initial Floodwaters (min) | Time to Peak Floodwaters (min) | Time to Initial Floodwaters (min) | Time to Peak Floodwaters (min) | Time to Initial Floodwaters (min) | Time to Peak Floodwaters (min) | Time to Initial Floodwaters (min) | Time to Peak Floodwaters (min) |
| 114000 | 3-1 | 2.46 | 28.00 | 40.00 | 31.00 | 39.00 | 32.00 | 41.00 | 43.00 | 60.00 |
| 113000 | 3-2 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-3 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-4 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-5 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-6 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-7 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-8 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-9 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-10 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-11 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-12 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-13 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-14 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-15 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-16 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-17 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-18 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-19 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-20 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-21 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-22 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-23 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-24 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-25 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-26 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-27 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-28 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-29 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-30 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-31 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |

DESIGN FLOODS LEGEND

- SDF** 90% PROBABLE MAXIMUM FLOOD (PMF) WITH BREACH OF DAM
- 90% PROBABLE MAXIMUM FLOOD (PMF) WITHOUT BREACH
- SNY** SUNNY DAY BREACH
- 100% PMF WITH BREACH
- MAJOR CONTOUR
- MINOR CONTOUR
- STREAM CENTER LINE
- IMPACTED STRUCTURES (SHEET #-STRUCTURE #)



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Aerial mapping and digital contours taken from GIS Information for Charlotte County, VA. Areas at dams and road crossings were field surveyed by Hurt & Proffitt, Inc.

Mapping of flooded areas and flood wave travel times are approximate. Timing and extent of actual inundation may differ from the information presented on this map, and summary table on sheet 12 - 15.





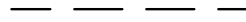
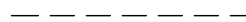

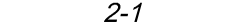
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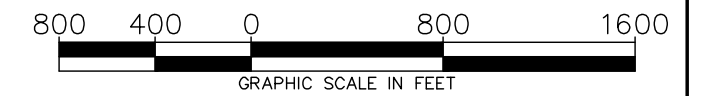
INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

PROJECT NO. 20130453
 G.L. NO. 304-09-D3.7
 FILE NO. G-13962
 DATE: 12/06/13
 DRAWN BY: SHC
 CHECKED BY: MDW

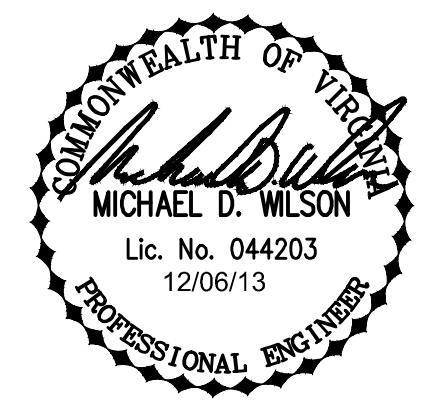
SHEET NO.
12 OF 15

DESIGN FLOODS LEGEND

-  **SDF** 90% PROBABLE MAXIMUM FLOOD (PMF) WITH BREACH OF DAM
-  90% PROBABLE MAXIMUM FLOOD (PMF) WITHOUT BREACH
-  **SNY** SUNNY DAY BREACH
-  100% PMF WITH BREACH
-  MAJOR CONTOUR
-  MINOR CONTOUR
-  STREAM CENTER LINE
-  IMPACTED STRUCTURES (SHEET #-STRUCTURE #)



CONTOUR INTERVAL: 10 FT.



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Aerial mapping and digital contours taken from GIS Information for Charlotte County, VA. Areas at dams and road crossings were field surveyed by Hurt & Proffitt, Inc.

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Flood Wave Summary

| HEC-RAS Station | Map Sheet Number | Distance from Dam (Miles) | PMF Breach | | 90% PMF Breach | | 90% PMF Non Breach | | Sunny Breach | |
|-----------------|------------------|---------------------------|-----------------------------------|--------------------------------|-----------------------------------|--------------------------------|-----------------------------------|--------------------------------|-----------------------------------|--------------------------------|
| | | | Time to Initial Floodwaters (min) | Time to Peak Floodwaters (min) | Time to Initial Floodwaters (min) | Time to Peak Floodwaters (min) | Time to Initial Floodwaters (min) | Time to Peak Floodwaters (min) | Time to Initial Floodwaters (min) | Time to Peak Floodwaters (min) |
| 113000 | 3-32 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 113000 | 3-33 | 2.65 | 32.00 | 40.00 | 35.00 | 39.00 | 36.00 | 41.00 | 46.00 | 60.00 |
| 112900 | 3-34 | 2.67 | 40.00 | 41.00 | 55.00 | 93.00 | 43.00 | 88.00 | 47.00 | 61.00 |
| 97800 | 5-1 | 5.53 | 99.00 | 163.00 | 113.00 | 193.00 | 109.00 | 175.00 | 136.00 | 179.00 |
| 83000 | 6-1 | 8.33 | 157.00 | 281.00 | 170.00 | 291.00 | 173.00 | 307.00 | 223.00 | 242.00 |
| 83000 | 6-2 | 8.33 | 157.00 | 281.00 | 170.00 | 291.00 | 173.00 | 307.00 | 223.00 | 242.00 |
| 82500 | 6-3 | 8.43 | 159.00 | 286.00 | 172.00 | 305.00 | 175.00 | 338.00 | 226.00 | 250.00 |
| 82000 | 7-1 | 8.52 | 161.00 | 287.00 | 174.00 | 311.00 | 178.00 | 347.00 | 229.00 | 260.00 |
| 82000 | 7-2 | 8.52 | 161.00 | 287.00 | 174.00 | 311.00 | 178.00 | 347.00 | 229.00 | 260.00 |
| 82000 | 7-3 | 8.52 | 161.00 | 287.00 | 174.00 | 311.00 | 178.00 | 347.00 | 229.00 | 260.00 |
| 82000 | 7-4 | 8.52 | 161.00 | 287.00 | 174.00 | 311.00 | 178.00 | 347.00 | 229.00 | 260.00 |
| 82000 | 7-5 | 8.52 | 161.00 | 287.00 | 174.00 | 311.00 | 178.00 | 347.00 | 229.00 | 260.00 |
| 82000 | 7-6 | 8.52 | 161.00 | 287.00 | 174.00 | 311.00 | 178.00 | 347.00 | 229.00 | 260.00 |
| 82000 | 7-7 | 8.52 | 161.00 | 287.00 | 174.00 | 311.00 | 178.00 | 347.00 | 229.00 | 260.00 |
| 82000 | 7-8 | 8.52 | 161.00 | 287.00 | 174.00 | 311.00 | 178.00 | 347.00 | 229.00 | 260.00 |
| 82000 | 7-9 | 8.52 | 161.00 | 287.00 | 174.00 | 311.00 | 178.00 | 347.00 | 229.00 | 260.00 |
| 65000 | 9-1 | 11.74 | 228.00 | 310.00 | 240.00 | 310.00 | 252.00 | 388.00 | 328.00 | 437.00 |
| 65000 | 9-2 | 11.74 | 228.00 | 310.00 | 240.00 | 310.00 | 252.00 | 388.00 | 328.00 | 437.00 |
| 65000 | 9-3 | 11.74 | 228.00 | 310.00 | 240.00 | 310.00 | 252.00 | 388.00 | 328.00 | 437.00 |
| 64800 | 9-4 | 11.78 | 230.00 | 313.00 | 242.00 | 313.00 | 256.00 | 391.00 | 328.00 | 449.00 |

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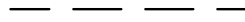
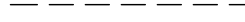

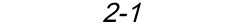


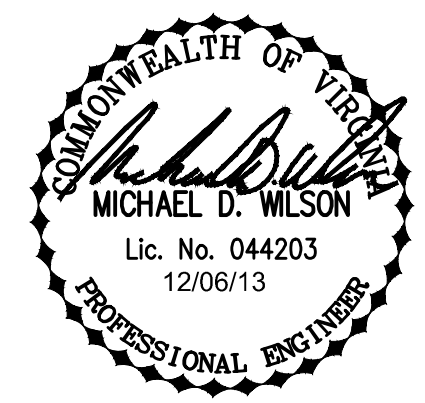
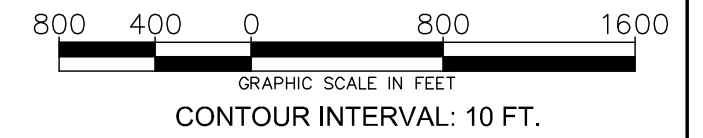
INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

| | |
|----------------------|------------------------------|
| PROJECT NO. 20130453 | SHEET NO. 13 OF 15 |
| G.L. NO. 304-09-D3.7 | |
| FILE NO. G-13962 | |
| DATE: 12/06/13 | |
| DRAWN BY: SHC | |
| CHECKED BY: MDW | |

| Maximum Water Elevation At Structures | | | | | | | |
|---------------------------------------|-----------|-----------------|--------------|--------|-------------------------|------------|-----------|
| HEC-RAS | Structure | Structure | Structure | | Maximum Water Elevation | | |
| Station No. | No. | | Ground Elev. | PMF-B | 90% PMF-B | 90% PMF-NB | Sunny Day |
| 114000 | 3-1 | House | 377.00 | 392.18 | 391.51 | 385.49 | 384.00 |
| 113000 | 3-2 | House | 382.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-3 | House | 378.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-4 | House | 390.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-5 | Business | 378.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-6 | Business | 377.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-7 | House | 376.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-8 | Business | 374.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-9 | Business | 375.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-10 | House | 374.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-11 | Shed | 372.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 112900 | 3-12 | Bridge (Rte 47) | 379.00 | 395.05 | 394.19 | 385.82 | 383.65 |
| 113000 | 3-13 | Pavillion | 376.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-14 | Business | 372.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-15 | Business | 376.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-16 | Business | 376.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-17 | Business | 375.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-18 | Business | 377.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-19 | Business | 378.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-20 | Business | 376.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-21 | Business | 377.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-22 | Business | 376.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-23 | Business | 378.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-24 | Business | 377.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-25 | Business | 380.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-26 | Business | 377.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-27 | Business | 378.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-28 | Business | 379.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-29 | Business | 383.00 | 391.83 | 391.15 | 385.15 | 383.74 |

DESIGN FLOODS LEGEND

-  **SDF** 90% PROBABLE MAXIMUM FLOOD (PMF) WITH BREACH OF DAM
-  90% PROBABLE MAXIMUM FLOOD (PMF) WITHOUT BREACH
-  **SNY** SUNNY DAY BREACH
-  100% PMF WITH BREACH
-  MAJOR CONTOUR
-  MINOR CONTOUR
-  STREAM CENTER LINE
-  IMPACTED STRUCTURES (SHEET #-STRUCTURE #)




The information contained on this map is prepared for use in the notification of downstream property owners by emergency response personnel.

Aerial mapping and digital contours taken from GIS Information for Charlotte County, VA. Areas at dams and road crossings were field surveyed by Hurt & Proffitt, Inc.

Mapping of flooded areas and flood wave travel times are approximate. Timing and extent of actual inundation may differ from the information presented on this map, and summary table on sheet 12 - 15.

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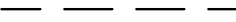
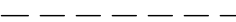

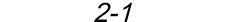


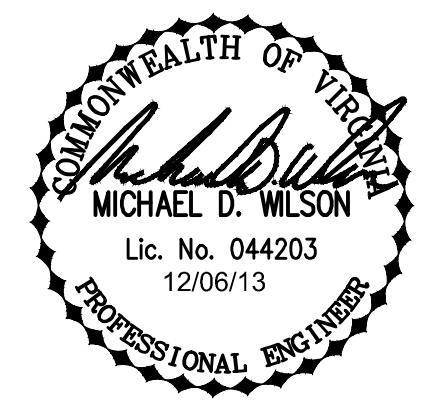
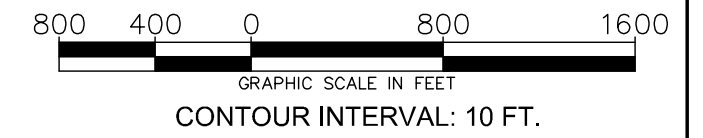
INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

| | |
|----------------------|------------------------------|
| PROJECT NO. 20130453 | SHEET NO. 14 OF 15 |
| G.L. NO. 304-09-D3.7 | |
| FILE NO. G-13962 | |
| DATE: 12/06/13 | |
| DRAWN BY: SHC | |
| CHECKED BY: MDW | |

| Maximum Water Elevation At Structures | | | | | | | |
|---------------------------------------|---------------|-------------------|------------------------|-------------------------------|-----------------------------------|------------------------------------|-----------|
| HEC-RAS Station No. | Structure No. | Structure | Structure Ground Elev. | Maximum Water Elevation PMF-B | Maximum Water Elevation 90% PMF-B | Maximum Water Elevation 90% PMF-NB | Sunny Day |
| 113000 | 3-30 | Business | 384.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-31 | Business | 372.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-32 | Business | 374.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 113000 | 3-33 | Business | 370.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 112900 | 3-34 | Bridge (R.R.) | 400.00 | 391.83 | 391.15 | 385.15 | 383.74 |
| 97800 | 5-1 | Bridge (Rte. 642) | 349.80 | 358.71 | 358.42 | 356.27 | 354.9 |
| 83000 | 6-1 | House | 344.00 | 342.35 | 341.72 | 339.10 | 335.78 |
| 83000 | 6-2 | House | 340.00 | 342.35 | 341.72 | 339.10 | 335.78 |
| 82500 | 6-3 | House | 340.00 | 342.09 | 341.51 | 338.80 | 334.43 |
| 82000 | 7-1 | Business | 336.00 | 341.97 | 341.42 | 338.70 | 333.65 |
| 82000 | 7-2 | House | 335.00 | 341.97 | 341.42 | 338.70 | 333.65 |
| 82000 | 7-3 | House | 334.00 | 341.97 | 341.42 | 338.70 | 333.65 |
| 82000 | 7-4 | Business | 338.00 | 341.97 | 341.42 | 338.70 | 333.65 |
| 82000 | 7-5 | Bridge (Rte. 612) | 339.66 | 341.97 | 341.42 | 338.70 | 333.65 |
| 82000 | 7-6 | Business | 336.00 | 341.97 | 341.42 | 338.70 | 333.65 |
| 82000 | 7-7 | House | 334.00 | 341.97 | 341.42 | 338.70 | 333.65 |
| 82000 | 7-8 | House | 333.00 | 341.97 | 341.42 | 338.70 | 333.65 |
| 82000 | 7-9 | House | 333.00 | 341.97 | 341.42 | 338.70 | 333.65 |
| 65000 | 9-1 | Business | 334.00 | 340.19 | 340.03 | 337.20 | 325.16 |
| 65000 | 9-2 | Business | 335.00 | 340.19 | 340.03 | 337.20 | 325.16 |
| 65000 | 9-3 | House | 332.00 | 340.19 | 340.03 | 337.20 | 325.16 |
| 64800 | 9-4 | Bridge (Rte. 607) | 332.99 | 340.19 | 340.03 | 337.20 | 325.16 |

DESIGN FLOODS LEGEND

-  **SDF** 90% PROBABLE MAXIMUM FLOOD (PMF) WITH BREACH OF DAM
-  90% PROBABLE MAXIMUM FLOOD (PMF) WITHOUT BREACH
-  **SNY** SUNNY DAY BREACH
-  100% PMF WITH BREACH
-  MAJOR CONTOUR
-  MINOR CONTOUR
-  STREAM CENTER LINE
-  IMPACTED STRUCTURES (SHEET #-STRUCTURE #)



The information contained on this map is prepared for use in the notification of downstream property owners by emergency response personnel.

Aerial mapping and digital contours taken from GIS Information for Charlotte County, VA. Areas at dams and road crossings were field surveyed by Hurt & Proffitt, Inc.

Mapping of flooded areas and flood wave travel times are approximate. Timing and extent of actual inundation may differ from the information presented on this map, and summary table on sheet 12 - 15.

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INUNDATION ZONE MAP
DAM BREACH FLOOD ELEVATIONS
ROANOKE CREEK DAM #72A
DRAKES BRANCH, VA

| | |
|----------------------|------------------------------|
| PROJECT NO. 20130453 | SHEET NO. 15 OF 15 |
| G.L. NO. 304-09-D3.7 | |
| FILE NO. G-13962 | |
| DATE: 12/06/13 | |
| DRAWN BY: SHC | |
| CHECKED BY: MDW | |

Appendix A

Investigation and Analyses of Dam Break Floods

**Roanoke Creek Dam #72A
Hazard Classification**

December 6, 2013

*Charlotte County, VA
Dam Inventory # VA03702
H&P Project Commission # 20130453*



*Submitted to:
Town of Drakes Branch
4800 Main Street
PO Box 191
Drakes Branch, VA 23937*

*Submitted by:
Michael D. Wilson, P.E.
Project Manager*



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INCORPORATED**

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COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

600 East Main Street, 24th Floor
Richmond, Virginia 23219
(804) 786-6124

February 26, 2014

Town of Drakes Branch
ATTN: Mary Sands
PO Box 191
Drakes Branch, VA 23937

RE: Roanoke Creek 72A, Inventory Number 03702

Review of the above referenced inundation study dated December 6, 2013 has been completed. The report is considered complete and acceptable.

- Hazard Classification-High Hazard
- Required Spillway Design Flood (SDF)-0.9 PMP
- Existing spillway capacity-0.7PMF

The existing spillway does not currently have the capacity to pass the required SDF, therefore, upgrades are required.

Thank you for your cooperation during this process. If you should have any questions or concerns, please do not hesitate to contact me at 804-786-0113.

Sincerely,

A handwritten signature in cursive script that reads "Amanda Pennington".

Amanda S. Pennington, PE
Regional Engineer
Division of Dam Safety and Floodplain Management

Table of Contents

Executive Summary..... 1
 1. General..... 2
 2. Description of Dam..... 2
 3. Development Upstream of the Dam..... 3
 4. Development Downstream of the Dam..... 3
 5. PMF and Sunny Day Dam Breach Analysis..... 6
 6. Hazard Classification Recommendation..... 8
 7. Inundation Zone Mapping..... 14

Appendix A - Site Map and Cross Section Stations

Appendix B - Drainage Area Map

Appendix C - Calculations

Appendix D - Hydrologic Soil Group Data

Appendix E - Land Use

Appendix F - HEC-HMS Model

Appendix G - HEC-RAS Model Output (Comparison of Water Surface Elevations
 Spillway Design Flood, With Breach Vs. Without Breach; 6-Hour
 PMF with Breach; Sunny Day Breach)

Appendix H – Water Surface Elevation Profiles

Appendix I – Inundation Zone Maps

**Due to their size, the following Appendices were not printed, but are included
 in the attached compact disk.**

Appendix J - HEC-RAS Model Input Data (Geometry Data, Manning’s “n”
 Values, Contraction and Expansion Coefficients)

Appendix K - HEC-RAS Model Output (Sunny Day Breach (Piping Breach)

Appendix L - HEC-RAS Model Output (6-Hour PMF, Without Breach)

Appendix M - HEC-RAS Model Output (6-Hour PMF, With Breach)

Appendix N - HEC-RAS Model Output (90 % 6-Hour PMF, Without Breach)

Appendix O - HEC-RAS Model Output (90 % 6-Hour PMF, With Breach)

Appendix P - HEC-RAS Model Output (Comparison of Water Surface Elevations
Spillway Design Flood, With Breach Vs. Without Breach)

EXECUTIVE SUMMARY

Hurt & Proffitt was under contract with the Town of Drakes Branch to perform dam breach analysis, hazard classification, and inundation zone mapping for Roanoke Creek Dam #72A. This analysis and mapping is required under the Virginia Impounding Structure Regulations section 4VAC50-20 which went into effect September 26, 2008.

Roanoke Creek Dam #72A is a 43.2 foot tall impounding structure, designed for flood control purposes. It is located on Twittys Creek, a tributary to the Staunton River, in Charlotte County, Virginia. There are multiple streets and residences in the study area, downstream of the dam, which are subject to inundation for all of the breach scenarios.

The design does not meet the requirements of the September 26, 2008 revisions to the regulations with respect to dam breach analysis, which has necessitated this study.

The findings of this study indicate that Roanoke Creek Dam #72A should be classified as High Hazard Potential. During PMF storm events, several roads and structures downstream of the dam will be impacted. These include River Road (Route 607), Hermon Road (Route 612), Main Street (Route 47), Mossing Ford Road (Route 642), West Saxkey Road (Route 637), and Mulberry Hill Road (Route 641).

An Incremental Damage Analysis was performed. Based on model output, the Roanoke Creek Dam #72A is overtopped during the 100% PMF and capable of passing the 70% PMF Storm without overtopping. The Virginia Impounding Structure Regulations section 4VAC50-20-50 define the Spillway Design Flood (SDF) as the 90% PMF. Due to the impacts of structures downstream of the dam, the Spillway Design Flood for this dam is 90% of the PMF.

1. GENERAL

The dam is located on Twittys Creek, a tributary to the Staunton River, in Charlotte County, Virginia. From the dam, Twittys Creek flows south approximately 10.6 miles before joining the Staunton River.

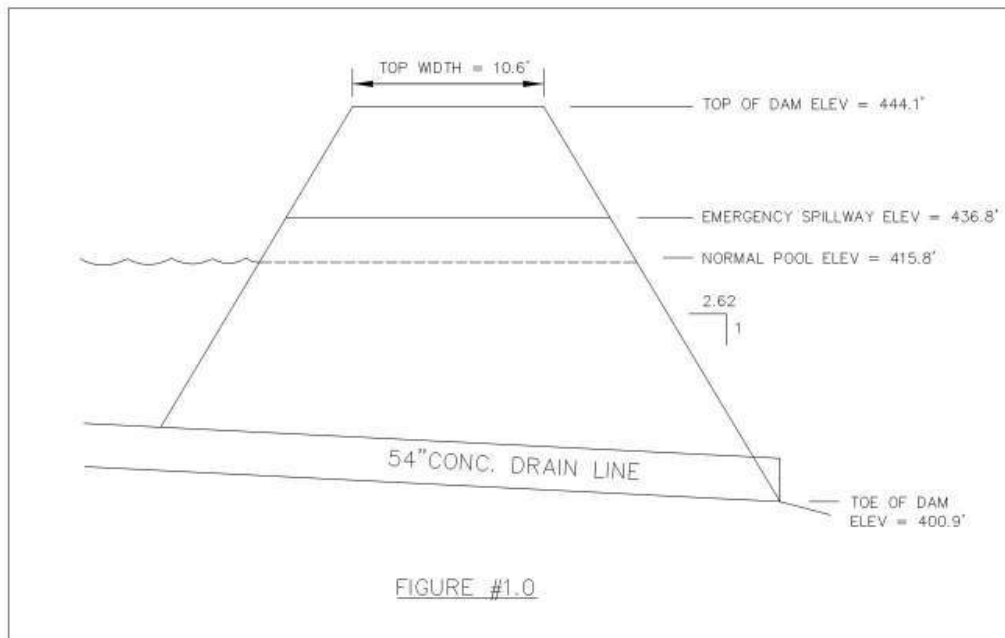
2. DESCRIPTION OF DAM

DESCRIPTION OF DAM

Inventory Number: VA03702
 Latitude: 36°54'29.9"N (USACE National Inventory of Dams)
 Longitude: 78°33'59.8"W (USACE National Inventory of Dams)
 Owner: Town of Drakes Branch
 Located: Charlotte County, Virginia

DAM GEOMETRICS

| | | |
|-------------------|--------|-----------------------------------|
| Top of Dam: | 444.1 | (Field Survey September 26, 2013) |
| Downstream Toe: | 400.9 | (Field Survey September 26, 2013) |
| Height of Dam: | 43.2' | (Calculated) |
| Crest Length: | 614' | (Field Survey September 26, 2013) |
| Crest Width: | 10.6' | (Field Survey September 26, 2013) |
| Upstream Slope: | 2.71:1 | (Calculated) |
| Downstream Slope: | 2.62:1 | (Calculated) |



RESERVOIR

| | |
|--|------------------------------------|
| Drainage Area: 15.5 square miles | (USACE National Inventory of Dams) |
| Maximum Capacity: 5,535 Acre Feet | (USACE National Inventory of Dams) |
| Maximum Pool Elevation: 436.8 | (Field Survey September 26, 2013) |
| Maximum Pool Surface Area: 444.1 Acres | (VGIN Data) |
| Normal Capacity: 455 Acre Feet | (USACE National Inventory of Dams) |
| Normal Pool Elevation: 415.8 | (Field Survey September 26, 2013) |
| Normal Pool Surface Area: 154 Acres | (USACE National Inventory of Dams) |
| Freeboard: 21.0 feet | (Calculated) |

SPILLWAY

Principle Spillway Orifice:

The spillway has a crest elevation of 415.8.

Emergency Spillway:

297' earth channel crest at elevation 436.8 (Field Survey September 26, 2013)

Drain Line:

54" concrete outlet invert 400.2. (Field Survey September 26, 2013)

3. DEVELOPMENT UPSTREAM OF THE DAM

The upstream inundation zone caused by the dam is primarily agricultural area. There are no occupied structures in the upstream inundation area.

The current level of development in the 15.5 square mile drainage area is generally low. This area is located in Charlotte County. According to the land use map found in the Charlotte County GIS website, the majority of the area located in Charlotte County is designated as General Agricultural. Based on land use, the portion of the drainage area in Charlotte County is composed of the following types:

| | |
|----------------------|-----|
| General Agricultural | 90% |
| General Residential | 10% |

4. DEVELOPMENT DOWNSTREAM OF DAM

Within the study area, there are multiple roads that parallel or cross the river and will be affected by a PMF event and a subsequent failure of the dam. In addition, there are multiple residences and business structures downstream of the dam that would be inundated by a PMF storm. See Appendix A for detailed Map of the area. Notable characteristics of the model include the following:

Dam: The outlet from the dam is cross section 127000 in the HEC-RAS Model.

Route 47: Secondary road represented by cross section 113000 in the HEC-RAS Model. The bridge is located approximately 2.65 miles downstream of the dam. Roadway deck elevation 377.3.

Route 642: Secondary road represented by cross section 98000 in the HEC-RAS Model. The bridge is located approximately 5.49 miles downstream of the dam. Roadway deck elevation 351.8.

Route 607: Secondary road represented by cross section 65000 in the HEC-RAS Model. The bridge is located approximately 11.7 miles downstream of the dam. Roadway deck elevation 333.59.



5. PMF AND SUNNY DAY DAM BREACH ANALYSIS

SELECTION OF DESIGN STORM DURATION

A hydrologic model of the drainage area was developed in Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS version 3.3) (See Appendix F) using the Soil Conservation Service Curve Number methodology (See Appendix C), PMF precipitation values from Hydro Meteorological Report-51 published by the U.S. Army Corps of Engineers (USACE) (See Appendix C). This dam was constructed for flood control purposes. Therefore, for the Sunny Day Breach analysis, the starting water surface elevation is set at the crest of the emergency spillway elevation at 436.8. For all other scenarios, the starting water surface elevation is set at the normal pool elevation of 415.8.

The 6-Hour, 12-Hour, and 24-Hour PMF storm events were modeled in HEC-HMS (See Appendix F) and the peak flow values were determined to be as follows:

6-Hour PMF: $Q_{\text{peak}} = 31,275$ CFS
12-Hour PMF: $Q_{\text{peak}} = 31,149$ CFS
24-Hour PMF: $Q_{\text{peak}} = 26,860$ CFS

These storm events were then routed through the dam using HEC-HMS (see Appendix F) and the peak water surface elevation at the dam was determined for each storm as follows:

6-Hour PMF water surface elevation at dam: 446.4
12-Hour PMF water surface elevation at dam: 446.4
24-Hour PMF water surface elevation at dam: 445.8

The 6-Hour PMF event has the highest peak flow and water surface elevation at the dam and was selected as the critical storm event for the dam breach analysis.

DAM BREACH ANALYSIS

The 6-Hour PMF outflow hydrograph developed in HEC-HMS, as described above, was used as the inflow hydrograph to the reservoir. HEC-HMS was used to model the reservoir (using a stage storage curve), dam, and breaching of the dam (Appendices K through P on disk).

In HEC-RAS, the river is represented by a series of cross sections which were cut from the topographic mapping (VGIN) of the area at locations and at an interval sufficient to represent the river. During low flow conditions at the bridges, both the energy and momentum methods were computed and the solution with the highest energy answer was selected. In all cases, the energy method resulted in the highest energy solution. During high flow conditions, the energy method was used, as the bridge decks represented a small obstruction to flow relative to the overall cross sections and none of the bridge openings were acting as a pressurized orifice.

To increase stability of the model, an initial flow of 1,000 CFS was set to flood all of the cross sections. A minimum flow volume of 1,000 CFS was set to improve the stability of the model. At lower flows, the model became unstable. However, the purpose of this work is to determine the peak water surface elevation from PMF flows and during breach conditions. Therefore, little effort was spent to stabilize the model at low flows. The peak inflow from the PMF was 31,275CFS, and during the breach the peak flow was 71,883 CFS. During the Sunny Day (Piping Breach) Breach the peak flow was 24,557 CFS.

The dam breach parameters were selected based on the existing dam geometry, topography, and iteration within the Corps of Engineer (COE) guidelines to determine the worst case scenario. The bottom width was selected based on the topography at the toe of the dam. In order to produce the worst case flooding, the breach side slopes were set as the largest value and the breach formation time set for the shortest duration recommended by the COE guidelines. These breach parameters used are within the guidelines of USACE-HEC Research Document-13.

Breach Parameters from USACE-HEC Research Document-13

- Breach Bottom Width: ½ to 3 dam heights
- Side Slope of Breach: 0:1 to 1:1
- Breach Formation Time: 0.5 – 4 hours

BREACH ANALYSIS OF 6-HOUR PMF

Dam Breach Parameters (Overtopping)

- Breach Bottom Width: 43 feet
- Side Slope of Breach: 1:1
- Breach Formation Time: 0.75 Hour
- Trigger Elevation: 444.6 (0.5 feet above crest)

Analysis of the 6-Hour PMF with and with out failure of the dam due to overtopping (See Appendices L and M), revealed the following:

| Site | Elevation (ft) | Cross Section | 6 Hour - PMF Without Breach | |
|---------------|----------------|---------------|------------------------------|-------------------------|
| | | | Max Water Surface Elev. (ft) | Depth at Structure (ft) |
| Dam | 444.1 | | 446.4 | 2.3 |
| Dam Toe Slope | 400.9 | 127000 | 411.99 | 11.09 |
| Route 47 | 377.3 | 112900 | 386.10 | 8.8 |
| Route 642 | 351.8 | 97800 | 358.98 | 7.18 |
| Route 612 | 339.02 | 82000 | 339.62 | 0.6 |
| Route 607 | 333.59 | 64800 | 338.20 | 4.61 |

| Site | Elevation (ft) | Cross Section | 6 Hour - PMF With Breach | |
|---------------|----------------|---------------|------------------------------|-------------------------|
| | | | Max Water Surface Elev. (ft) | Depth at Structure (ft) |
| Dam | 444.1 | | 446.4 | 2.3 |
| Dam Toe Slope | 400.9 | 127000 | 417.11 | 16.21 |
| Route 47 | 377.3 | 112900 | 391.83 | 14.53 |
| Route 642 | 351.8 | 97800 | 361.39 | 9.59 |
| Route 612 | 339.02 | 82000 | 341.97 | 2.95 |
| Route 607 | 333.59 | 64800 | 340.19 | 6.6 |

There are multiple roads and structures within the inundation zone caused by a dam breach during the 6-Hour PMF.

SUNNY DAY (PIPING) BREACH ANALYSIS

Dam Breach Parameters (Overtopping)

Breach Bottom Width: 43 feet
 Breach Formation Time: 0.75 Hour
 Side Slope of Breach: 1:1
 Trigger Time: 04:00

Analysis of a breach of the dam with the starting water surface at the emergency spillway and with minimal inflow (See Appendix K), revealed the following:

| Site | Elevation (ft) | Cross Section | Sunny Day With Breach | |
|---------------|----------------|---------------|------------------------------|-------------------------|
| | | | Max Water Surface Elev. (ft) | Depth at Structure (ft) |
| Dam | 444.1 | | 415.9 | -28.2 |
| Dam Toe Slope | 400.9 | 127000 | 410.81 | 9.91 |
| Route 47 | 377.3 | 112900 | 383.65 | 6.35 |
| Route 642 | 351.8 | 97800 | 354.90 | 3.1 |
| Route 612 | 339.02 | 82000 | 333.65 | -5.37 |
| Route 607 | 333.59 | 64800 | 323.74 | -9.85 |

There are multiple roads and structures within the inundation zone caused by a dam breach during the Sunny Day scenario.

6. HAZARD CLASSIFICATION RECOMMENDATION AND INCREMENTAL DAMAGE ANALYSIS

In The Virginia Impounding Structure Regulations section 4VAC50-20-40, High Hazard Potential is defined as where an impounding structure failure will cause probable loss of life or serious economic damage. Probable loss of life is further clarified in the

regulations to mean impacts which will occur that are likely to cause loss of human life, including but not limited to impacts to residences, businesses, other occupied structures, or major roadways.

The water depth at primary roads, secondary roads, and other structures in the inundation zone predicted in the above models “will cause loss of life” if people are present during the inundation. Therefore, this dam is recommended to be classified as High Hazard Potential.

Spillway Design Flood Recommendation

The Impounding Structure Regulations establish that the Spillway Design Flood for an existing High Hazard Dam is 90% of the PMF, as shown on the following table from 4VAC50-20-50.

Table – Performance Standards for Impounding Structures

| Hazard Potential Class of Dam | Spillway Design Flood (SDF) ^B for Existing Impounding Structures ^F | Spillway Design Flood (SDF) ^B for Existing Impounding Structures ^{F,G} | Minimum Threshold for Incremental Damage Analysis |
|-------------------------------|--|--|---|
| High | PMF ^C | 0.9 PMP ^H | 100-YR ^D |
| Significant | .50 PMF | .50 PMF | 100-YR ^D |
| Low | 100-YR ^D | 100-YR ^D | 50-YR ^E |

Based on data from HEC-HMS modeling, the Roanoke Creek Dam #72A is capable of passing the 70% PMF without overtopping.

| | |
|--------------------|----------------------|
| Top of Dam | Elevation 444.1 feet |
| Auxiliary Spillway | Elevation 436.8 feet |
| 100 % PMF | Elevation 445.5 feet |
| 90% PMF | Elevation 445.3 feet |
| 80% PMF | Elevation 444.8 feet |
| 70% PMF | Elevation 444.1 feet |

Under the Virginia Impounding Structure Regulations (Dated 12/22/2010), the Spillway Design Storm (SDF) for a dam was established by the Hazard Classification of the dam. The SDF can be reduced through an Incremental Damage Analysis (IDA) in accordance with 4VAC50-20-50.

Using ACER 11 and the IDA, Hurt & Proffitt has analyzed incremental flooding events with and without breach of the Roanoke Creek Dam #72A. Based on the results of this analysis the minimum allowable SDF for this dam would be the 90% Probable Maximum Flood (PMF). Below is a summary of reasoning for this determination.

Structures within Inundation Zone

There are thirty-one impacted structures within the Inundation Zone created by a breach

of the dam during a full PMF event, or in close proximity to it. Table 1 below lists the structures. Elevations for bridges listed are the lowest elevation on the bridge deck.

Table 1 – Structures Evaluated for Breach Impacts

| Structure No. | Structure Type | Structure Elevation (ft) | Cross Section | 6 Hour - PMF With Breach | | | Meets (1) 2' Rule and 7' Rule |
|---------------|------------------|--------------------------|---------------|-----------------------------|-------------------------|---------------|-------------------------------|
| | | | | Max W.S. Surface Elev. (ft) | Depth at Structure (ft) | Velocity ft/s | |
| 3-1 | House | 377 | 114000 | 392.18 | 15.1 | 0.89 | NO |
| 3-2 | House | 382 | 113000 | 391.83 | 9.83 | 1.18 | NO |
| 3-3 | House | 391 | 113000 | 391.83 | 0.83 | 1.18 | YES |
| 3-4 | House | 389 | 113000 | 391.83 | 2.83 | 1.18 | NO |
| 3-5 | Business | 378 | 113000 | 391.83 | 13.83 | 1.18 | NO |
| 3-6 | Business | 377 | 113000 | 391.83 | 14.83 | 1.18 | NO |
| 3-7 | House | 376 | 113000 | 391.83 | 15.83 | 1.18 | NO |
| 3-8 | Business | 374 | 113000 | 391.83 | 17.83 | 1.18 | NO |
| 3-9 | Business | 375 | 113000 | 391.83 | 16.83 | 1.18 | NO |
| 3-10 | House | 374 | 113000 | 391.83 | 17.83 | 1.18 | NO |
| 3-11 | Shed | 370 | 113000 | 391.83 | 21.83 | 1.18 | NO |
| 3-12 | Bridge (Rte. 47) | 379 | 113000 | 391.83 | 12.83 | 2.32 | NO |
| 3-13 | Pavillion | 377 | 113000 | 391.83 | 14.83 | 1.27 | NO |
| 3-14 | Business | 372 | 113000 | 391.83 | 19.83 | 1.27 | NO |
| 3-15 | Business | 376 | 113000 | 391.83 | 15.83 | 1.27 | NO |
| 3-16 | Business | 376 | 113000 | 391.83 | 15.83 | 1.27 | NO |
| 3-17 | Business | 375 | 113000 | 391.83 | 16.83 | 1.27 | NO |
| 3-18 | Business | 377 | 113000 | 391.83 | 14.83 | 1.27 | NO |
| 3-19 | Business | 378 | 113000 | 391.83 | 13.83 | 1.27 | NO |
| 3-20 | Business | 376 | 113000 | 391.83 | 15.83 | 1.27 | NO |
| 3-21 | Business | 377 | 113000 | 391.83 | 14.83 | 1.27 | NO |
| 3-22 | Business | 376 | 113000 | 391.83 | 15.83 | 1.27 | NO |
| 3-23 | Business | 378 | 113000 | 391.83 | 13.83 | 1.27 | NO |
| 3-24 | Business | 377 | 113000 | 391.83 | 14.83 | 1.27 | NO |
| 3-25 | Business | 380 | 113000 | 391.83 | 11.83 | 1.27 | NO |
| 3-26 | Business | 377 | 113000 | 391.83 | 14.83 | 1.27 | NO |
| 3-27 | Business | 378 | 113000 | 391.83 | 13.83 | 1.27 | NO |
| 3-28 | Business | 379 | 113000 | 391.83 | 12.83 | 1.27 | NO |
| 3-29 | Business | 383 | 113000 | 391.83 | 8.83 | 1.27 | NO |
| 3-30 | Business | 384 | 113000 | 391.83 | 7.83 | 1.27 | NO |
| 3-31 | House | 372 | 113000 | 391.83 | 19.83 | 1.18 | NO |
| 3-32 | House | 374 | 113000 | 391.83 | 17.83 | 1.18 | NO |
| 3-33 | House | 370 | 113000 | 391.83 | 21.83 | 1.18 | NO |
| 3-34 | Bridge (R.R) | 400 | 113000 | 391.83 | -8.17 | 1.18 | NO |

| Structure No. | Structure Type | Structure Elevation (ft) | Cross Section | Max W.S. Surface Elev. (ft) | Depth at Structure (ft) | Velocity ft/s | Meets (1) 2' Rule and 7' Rule |
|---------------|-------------------|--------------------------|---------------|-----------------------------|-------------------------|---------------|-------------------------------|
| 5-1 | Bridge (Rt.642) | 349.8 | 98000 | 361.39 | 11.59 | 9.06 | NO |
| 6-1 | House | 344 | 83000 | 342.35 | -1.65 | 1.6 | YES |
| 6-2 | House | 340 | 83000 | 342.35 | 2.35 | 1.6 | NO |
| 6-3 | House | 340 | 83000 | 342.35 | 2.35 | 1.6 | NO |
| 7-1 | Business | 336 | 82000 | 341.97 | 5.97 | 3.73 | NO |
| 7-2 | House | 335 | 82000 | 341.97 | 6.97 | 3.73 | NO |
| 7-3 | House | 334 | 82000 | 341.97 | 7.97 | 3.73 | NO |
| 7-4 | Business | 338 | 82000 | 341.97 | 3.97 | 0.59 | NO |
| 7-5 | Bridge (Rte. 612) | 339.66 | 82000 | 341.97 | 2.31 | 0.59 | NO |
| 7-6 | Business | 336 | 82000 | 341.97 | 5.97 | 3.73 | NO |
| 7-7 | House | 334 | 82000 | 341.97 | 7.97 | 3.73 | NO |
| 7-8 | House | 333 | 82000 | 341.97 | 8.97 | 3.73 | NO |
| 7-9 | House | 333 | 82000 | 341.97 | 8.97 | 3.73 | NO |
| 9-1 | Business | 334 | 65000 | 340.19 | 6.19 | 0.45 | NO |
| 9-2 | Business | 335 | 65000 | 340.19 | 5.19 | 0.45 | NO |
| 9-3 | House | 332 | 65000 | 340.19 | 8.19 | 0.45 | NO |
| 9-4 | Bridge (Rte. 607) | 332.99 | 64800 | 340.19 | 7.2 | 5.41 | NO |

Note 1 – Depth less than 2 feet and Depth * Velocity less than 7

Incipient Danger Flood

The Incipient Danger Flood defined by ACER 11 is the flood which just touches the foundation of a structure or begins to overtop a road. The structures from Table 1 meeting the 2' Rule and the Rule of 7 have not been considered. In addition, the barns and sheds have not been considered since they are unoccupied structures with an insignificant economic impact. Table 2 below lists the approximate Incipient Danger Flood relevant to this analysis.

Table 2 – Structures Evaluated in Incremental Damage Analysis

| Structure No. | Structure Type | Structure Elevation (ft) | Cross Section | Incipient Flood | Max Water Surface Elev. (ft) | Depth at Structure (ft) | Water Velocity at Structure (ft/s) |
|---------------|----------------|--------------------------|---------------|-----------------|------------------------------|-------------------------|------------------------------------|
| 3-1 | House | 377 | 114000 | 50%PMF | 377.06 | 0.06 | 0.32 |
| | | | | Breach | 382.20 | 5.2 | 0.37 |
| 3-2 | House | 382 | 113000 | 64% PMF | 382.19 | 0.19 | 0.51 |
| | | | | Breach | 383.50 | 1.50 | 0.66 |

| Structure No. | Structure Type | Structure Elevation (ft) | Cross Section | Incipient Flood | Max Water Surface Elev. (ft) | Depth at Structure (ft) | Water Velocity at Structure (ft/s) |
|---------------|-----------------|--------------------------|---------------|-----------------|------------------------------|-------------------------|------------------------------------|
| 3-3 | House | 391 | 113000 | 100% PMF | 386.10 | -4.9 | 0.93 |
| | | | | Breach | 391.83 | 0.83 | 1.18 |
| 3-4 | House | 389 | 113000 | 100% PMF | 386.10 | -2.9 | 0.93 |
| | | | | Breach | 391.83 | 2.83 | 1.18 |
| 3-5 | Business | 378 | 113000 | 55% PMF | 379.05 | 1.05 | 0.34 |
| | | | | Breach | 382.72 | 4.72 | 4.54 |
| 3-6 | Business | 377 | 113000 | 50% PMF | 376.74 | -0.26 | 0.35 |
| | | | | Breach | 382.01 | 5.01 | 0.42 |
| 3-7 | House | 376 | 113000 | 50% PMF | 376.74 | 0.74 | 0.35 |
| | | | | Breach | 382.01 | 6.01 | 0.42 |
| 3-8 | Business | 374 | 113000 | 45% PMF | 374.40 | 0.4 | 0.12 |
| | | | | Breach | 380.84 | 6.84 | 0.43 |
| 3-9 | Business | 375 | 113000 | 45% PMF | 374.40 | -0.6 | 0.12 |
| | | | | Breach | 380.84 | 5.84 | 0.43 |
| 3-10 | House | 374 | 113000 | 50% PMF | 374.40 | 0.4 | 0.12 |
| | | | | Breach | 380.84 | 6.84 | 0.43 |
| 3-11 | Shed | 370 | 113000 | 40% PMF | 371.83 | 1.83 | NA |
| | | | | Breach | 379.53 | 9.53 | 0.35 |
| 3-12 | Bridge (Rte 47) | 379 | 113000 | 55% PMF | 379.05 | 0.05 | 0.34 |
| | | | | Breach | 382.72 | 3.72 | 4.54 |
| 3-13 | Pavillion | 377 | 113000 | 50% PMF | 376.74 | -0.26 | 0.35 |
| | | | | Breach | 382.01 | 5.01 | 0.42 |
| 3-14 | Business | 372 | 113000 | 40% PMF | 371.83 | -0.17 | NA |
| | | | | Breach | 379.53 | 7.53 | 0.35 |
| 3-15 | Business | 376 | 113000 | 50% PMF | 376.74 | 0.74 | 0.35 |
| | | | | Breach | 382.01 | 6.01 | 0.42 |
| 3-16 | Business | 376 | 113000 | 50% PMF | 376.74 | 0.74 | 0.35 |
| | | | | Breach | 382.01 | 6.01 | 0.42 |
| 3-17 | Business | 375 | 113000 | 45% PMF | 374.40 | -0.6 | 0.12 |
| | | | | Breach | 380.84 | 5.84 | 0.43 |
| 3-18 | Business | 377 | 113000 | 50% PMF | 376.74 | -0.26 | 0.35 |
| | | | | Breach | 382.01 | 5.01 | 0.42 |
| 3-19 | Business | 378 | 113000 | 50% PMF | 376.74 | -1.26 | 0.35 |
| | | | | Breach | 382.01 | 4.01 | 0.42 |
| 3-20 | Business | 376 | 113000 | 50% PMF | 376.74 | 0.74 | 0.35 |
| | | | | Breach | 382.01 | 6.01 | 0.42 |
| 3-21 | Business | 377 | 113000 | 50% PMF | 376.74 | -0.26 | 0.35 |
| | | | | Breach | 382.01 | 5.01 | 0.42 |

| Structure No. | Structure Type | Structure Elevation (ft) | Cross Section | Incipient Flood | Max Water Surface Elev. (ft) | Depth at Structure (ft) | Water Velocity at Structure (ft/s) |
|---------------|------------------|--------------------------|---------------|-----------------|------------------------------|-------------------------|------------------------------------|
| 3-22 | Business | 376 | 113000 | 50% PMF | 376.74 | 0.74 | 0.35 |
| | | | | Breach | 382.01 | 6.01 | 0.42 |
| 3-23 | Business | 378 | 113000 | 55% PMF | 379.05 | 1.05 | 0.40 |
| | | | | Breach | 382.72 | 4.72 | 0.48 |
| 3-24 | Business | 377 | 113000 | 50% PMF | 376.74 | -0.26 | 0.35 |
| | | | | Breach | 382.01 | 5.01 | 0.42 |
| 3-25 | Business | 380 | 113000 | 60% PMF | 380.74 | 0.74 | 0.43 |
| | | | | Breach | 381.09 | 1.09 | 0.44 |
| 3-26 | Business | 377 | 113000 | 50% PMF | 376.74 | -0.26 | 0.35 |
| | | | | Breach | 382.01 | 5.01 | 0.42 |
| 3-27 | Business | 378 | 113000 | 55% PMF | 379.05 | 1.05 | 0.40 |
| | | | | Breach | 382.72 | 4.72 | 0.48 |
| 3-28 | Business | 379 | 113000 | 64% PMF | 382.19 | 3.19 | 0.51 |
| | | | | Breach | 383.50 | 4.5 | 0.66 |
| 3-29 | Business | 383 | 113000 | 70% PMF | 383.06 | 0.06 | 0.60 |
| | | | | Breach | 384.02 | 1.02 | 0.72 |
| 3-30 | Business | 384 | 113000 | 70% PMF | 383.06 | -0.94 | 0.60 |
| | | | | Breach | 384.02 | 0.02 | 0.72 |
| 3-31 | House | 372 | 113000 | 40% PMF | 371.83 | -0.17 | NA |
| | | | | Breach | 379.30 | 7.30 | 0.35 |
| 3-32 | House | 374 | 113000 | 50% PMF | 374.40 | 0.4 | 0.12 |
| | | | | Breach | 380.84 | 6.84 | 0.43 |
| 3-33 | House | 370 | 113000 | 40% PMF | 371.83 | 1.83 | NA |
| | | | | Breach | 379.30 | 9.30 | 0.35 |
| 3-34 | House | 400 | 113000 | 100% PMF | 386.10 | -13.90 | 0.88 |
| | | | | Breach | 391.83 | -8.17 | 1.27 |
| 5-1 | Bridge (Rte 642) | 349.8 | 98000 | 45% PMF | 351.48 | 1.68 | 1.59 |
| | | | | Breach | 355.75 | 5.95 | 4.17 |
| 6-1 | House | 344 | 83000 | 100% PMF | 339.98 | -4.02 | 1.27 |
| | | | | Breach | 342.35 | -1.65 | 1.60 |
| 6-2 | House | 340 | 83000 | 90% PMF | 339.10 | -0.90 | 1.22 |
| | | | | Breach | 341.72 | 1.72 | 1.42 |
| 6-3 | House | 340 | 83000 | 90% PMF | 339.10 | -0.90 | 1.22 |
| | | | | Breach | 341.72 | 1.72 | 1.42 |
| 7-1 | Business | 336 | 82000 | 68% PMF | 334.72 | -1.28 | 1.12 |
| | | | | Breach | 338.27 | 2.27 | 0.39 |
| 7-2 | House | 335 | 82000 | 68% PMF | 334.72 | -0.28 | 1.12 |
| | | | | Breach | 338.27 | 3.27 | 0.39 |

| Structure No. | Structure Type | Structure Elevation (ft) | Cross Section | Incipient Flood | Max Water Surface Elev. (ft) | Depth at Structure (ft) | Water Velocity at Structure (ft/s) |
|---------------|------------------|--------------------------|---------------|-----------------|------------------------------|-------------------------|------------------------------------|
| 7-3 | House | 334 | 82000 | 64% PMF | 334.09 | 0.09 | 0.45 |
| | | | | Breach | 336.43 | 2.43 | 0.49 |
| 7-4 | Business | 338 | 82000 | 80% PMF | 337.83 | -0.17 | 0.38 |
| | | | | Breach | 340.66 | 2.66 | 0.48 |
| 7-5 | Bridge (Rte 612) | 339.66 | 82000 | 100% PMF | 339.62 | -0.04 | 0.44 |
| | | | | Breach | 341.97 | 2.31 | 0.59 |
| 7-6 | Business | 336 | 82000 | 70% PMF | 336.95 | 0.95 | 0.34 |
| | | | | Breach | 338.46 | 2.46 | 0.40 |
| 7-7 | House | 334 | 82000 | 64% PMF | 334.09 | 0.09 | 0.45 |
| | | | | Breach | 336.43 | 2.43 | 0.49 |
| 7-8 | House | 333 | 82000 | 45% PMF | 333.29 | 0.29 | 0.09 |
| | | | | Breach | 334.75 | 1.75 | 0.23 |
| 7-9 | House | 333 | 82000 | 45% PMF | 333.29 | 0.29 | 0.09 |
| | | | | Breach | 334.75 | 1.75 | 0.23 |
| 9-1 | Business | 334 | 65000 | 70% PMF | 335.29 | 1.29 | 0.21 |
| | | | | Breach | 336.94 | 2.94 | 0.27 |
| 9-2 | Business | 335 | 65000 | 70% PMF | 335.29 | 0.29 | 0.21 |
| | | | | Breach | 336.94 | 1.94 | 0.27 |
| 9-3 | House | 332 | 65000 | 45% PMF | 331.63 | -0.37 | 0.36 |
| | | | | Breach | 334.58 | 2.58 | 0.24 |
| 9-4 | Bridge (Rte 607) | 332.99 | 64800 | 50% PMF | 333.51 | 0.52 | 3.88 |
| | | | | Breach | 335.06 | 2.07 | 4.15 |

Recommended Spillway Design Flood

Based on the analysis above, the recommended Spillway Design Flood for this dam is the 90% PMF based on Structure 6-2.

7. INUNDATION ZONE MAPPING

Appendix I contains maps of the inundation zones for the PMF, Spillway Design Flood, and Sunny Day conditions. The water surface elevation profiles can be found in Appendices K-P.

Base mapping was developed from Virginia Geographic Information Network (VGIN) 2011 aerial mapping data set. Field survey of areas at dams and road crossings was done by Hurt and Proffitt, Inc.

The Virginia Impounding Structure Regulations section 4VAC50-20-54 require that inundation zone mapping be developed from the dam to a point at which the water surface elevation of a dam breach during the SDF and the water surface elevation from

the SDF without a dam breach converge to within one foot. As seen in Appendix P, approximately 11.8 miles below the dam, at section 64500, the SDF models converge to within one foot.

Appendix B

Plans for Training, Exercising, Updating and Posting EAP

APPENDIX B - Plans for Training, Exercising, Updating, and Posting the EAP

A. Reviewing and Updating

Annually the EAP Coordinator verbally reviews the plan with the key EAP participants to explain the procedure to follow in the event of an emergency, address any changes that need to be made in the plan, answer questions regarding the procedure, and test their understanding of the plan. The key EAP participants review the plan for possible changes including:

- Change in personnel.
- Change in telephone numbers.
- New conditions that would affect flood flow or the extent of damage due to a dam failure.

The EAP Coordinator promptly makes the needed changes in the EAP and distributes, electronically, a revised plan to all participants listed below via their consulting engineer. If changes are made in the EAP at any other time, the EAP Coordinator also verbally reviews these changes with the participants and distributes a revised plan.

B. Testing

The EAP Coordinator is responsible for conducting a test (table top exercise) simulating a dam failure at least once, at a minimum, every 2 years. These table top exercises are to include both the dam owner and local emergency management officials. The purpose of these exercises is to familiarize the key EAP participants with the plan, helps estimate the time needed for notification, and helps reveal any plan deficiencies. The EAP Coordinator initiates the test and the key EAP participants must call all participants on the notification flowchart as if in a real emergency. When executing the test, each participant states their name and position and indicates that this is only a test. Drills should also be conducted each year by the owner unless an EAP test (table top exercise) is scheduled. During a drill, participants will perform an in-house exercise that tests, develops, or maintains skills in an emergency response situation. Participants will also verify telephone numbers and other necessary contact information.

The key EAP participants are the following:

- Charlotte County Administrator
- Dam Operator/Observer
- Charlotte County Emergency Communication Center
- Charlotte County Sheriff's Department
- Virginia Department of Transportation (VDOT)
- Department of Conservation and Recreation (DCR), Division of Dam Safety
- Hurt & Proffitt Engineer (Virginia Professional Engineer)

To determine the degree of success of the test, each participant comments about the execution of the notification procedure, discusses any problems encountered, and suggest any changes that would improve the EAP. The EAP Coordinator will keep this information on file for comparison with future test and revise the EAP as needed.

C. Posting

The EAP will become part of the overall Emergency Action Plan for Charlotte County and be posted with that plan.

The flowchart should be posted at each phone and radio transmitter at the main administrator's office. The dam operator shall have the flowchart posted in their office as well.

A copy of the complete, up-to-date EAP shall be sent to all the key EAP participants previously listed. The EAP should be kept on file in a location easily accessible for use during an emergency.

Appendix C

Site Specific Concerns

APPENDIX C - Site-Specific Concerns

The following are site specific concerns that need to be addressed during an emergency:

- Currently there are multiple residential and business structures impacted by this dam during a failure event. Please see the main narrative portion of the EAP for a list of impacts (mapping and table).
- An existing **abandoned** railroad bed is located within the defined inundation limits for the dam in question (see Appendix A). At one time it was a functioning railroad line but is now non-functioning (abandoned). As of June 2020, there are no downstream railroad impacts during any of the analyzed storm events for Roanoke Creek Dam #72A.
- An existing bridge crossing along Main Street (Route 47) at approximately 36° 59' 33" N & 78° 36' 02" W.
- An existing bridge crossing along Mousing Ford Road (Route 642) at approximately 36° 57' 36.30" N & 78° 37' 54.28" W.
- An existing bridge crossing along Hermon Road (Route 612) at approximately 36° 55' 50" N & 78° 39' 53.85" W.
- An existing bridge crossing along River Road (Route 607) at approximately 36° 53' 35.68" N & 78° 41' 49.42" W.
- Currently there is no existing staff gauge located at the dam in question. It is the responsibility of the Dam Operator / Staff Gauge Observer to be able to accurately read the flow depths within the existing emergency spillway for EAP stage trigger purposes. Prior to a Stage II emergency, the Dam Owner will be responsible for installing a device or identifying a way to accurately read water depths within the existing emergency spillway for EAP stage level purposes.
- During a dam failure or flood event, bridges and culverts may be adversely impacted. The roads should be closed off to ensure that no one is harmed during a culvert/bridge failure. Prior to reopening the road, VDOT should be contacted to inspect the bridges and roads.
- No unauthorized personnel shall be allowed on site. Also, prior to accessing the site all emergency personnel shall verify the procedure for accessing the site with the director.

Appendix D

Emergency Contractor List

APPENDIX D – Emergency Contractor List

DIRECTORY OF ADDITIONAL PERSONNEL WITH DAM SAFETY EXPERTISE

In addition to personnel shown elsewhere in this plan, the following list identifies other individuals with expertise in dam safety, design & construction that may be consulted about taking specific actions at the dam when there is an emergency situation:

| Name | Telephone | Responsibility |
|--|------------------|---|
| Bander Smith Cameron Smith Austin Bander | 804-212-2898 | Underwater work, Riser/outlet pipe |
| Smiley’s Construction Jamie Smiley | 434-447-9286 | General Contractor w/ Dam Experience (South Hill, VA) |
| | | |
| | | |

SUPPLIES AND RESOURCES

In an emergency situation, equipment, supplies & other resources might be needed on short notice, such as sandbags, rip rap, fill material, & heavy equipment. The table below lists resources that may be helpful & indicates contacts to access them.

| | | |
|---------------------------|-----------------|------------------------|
| Earth Moving Equip | Rip Rap | Sand and Gravel |
| | | |
| | | |
| | | |
| Sand Bags | Pumps | Pipe |
| | | |
| | | |
| | | |
| Lighting Equip | Laborers | Other |
| | | |
| | | |

Appendix E
EAP Review & Testing Documentation

Roanoke Creek Dam #72A
 DCR Inventory #VA037002

Emergency Action Plan Schedule

| Year | EAP Review & Update | EAP Tabletop Exercise (Annually) | VA DCR Dam Safety O&M Application | Comments |
|------|----------------------|----------------------------------|-----------------------------------|--|
| 2020 | | EAP TTE | Conditional Certificate | EAP Submitted June / July 2020 |
| 2021 | | EAP TTE | | EAP TTE required each year due to 2/3 SDF Rule (see Regulations) |
| 2022 | | EAP TTE | | |
| 2023 | | EAP TTE | | |
| 2024 | | EAP TTE | | |
| 2025 | | EAP TTE | | |
| 2026 | EAP Expires: July 31 | EAP TTE | | |
| 2027 | | EAP TTE | | |
| 2028 | | EAP TTE | | |
| 2029 | | EAP TTE | | |
| 2030 | | EAP TTE | | |
| 2031 | | EAP TTE | | |
| 2032 | EAP Expires: July 31 | EAP TTE | | |

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