

# EMERGENCY ACTION PLAN

## FAWN LAKE DAM

Spotsylvania County, Virginia

Inventory Number: 177009



*Fawn Lake*  
HISTORIC FREDERICKSBURG, VIRGINIA

Revision 14.1

January 2024

Volume I

## **DISTRIBUTION**

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Director of Community Safety (1)

Operations Manager (1)

Virginia Department of Conservation and Recreation, Division of Dam Safety

Region 2 Dam Safety Engineer (2)

Virginia Department of Emergency Management

Virginia Emergency Operations Center (3)

Spotsylvania County Emergency Management

Emergency Management Coordinator (1)

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Spotsylvania County Sheriff's Office

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Virginia Department of Transportation

Resident Engineer Fredericksburg Residency (1)

Superintendent, Chancellor Area Headquarters (1)

Superintendent, Post Oak Area Headquarters (1)

ECS Mid-Atlantic, LLC (1)

## REVISIONS

Revision Number	Date	Revisions made	By whom
1		Responses to DCR review comments.	P. O'Hara
2		Updates generated from EAP Drill held on 4/15/11	P. O'Hara
3		Change of ownership	P. O'Hara
4		Updates from EAP Tabletop Exercise held on 12/18/12	P. O'Hara
5		Updates from EAP Tabletop Exercise held on 10/20/14, EAP Drill held on 12/9/15 and replacement of low-level outlet gate.	P. O'Hara
6		Updates from EAP Tabletop Exercise held on October 15, 2016	P. O'Hara
7		Revise contact information for Region 2 Dam Safety Engineer	P. O'Hara
8	August 31, 2017	<ol style="list-style-type: none"> <li>1. Updated 911 overlay on inundation map</li> <li>2. Updated Contact Numbers</li> <li>3. Added weather and non-weather-related emergency terminology</li> <li>4. Added Emergency Levels</li> <li>5. Increased font size to make document more readable</li> </ol>	P. O'Hara
9	November 14, 2017	<ol style="list-style-type: none"> <li>1. Added 39 Waucoma Drive to properties in the inundation zone.</li> </ol>	P. O'Hara
10	November 6, 2018	<ol style="list-style-type: none"> <li>1. Updated participant contact data in Appendix D</li> </ol>	P. O'Hara
11	December 20, 2018	<ol style="list-style-type: none"> <li>1. Updated VDOT and VDEM Contacts</li> <li>2. Included use of SpotsyAlert.</li> <li>3. Added structures 101, 102 and 103 to inundation zone.</li> </ol>	P. O'Hara
12	March 3, 2020	<ol style="list-style-type: none"> <li>1. Updated participant contact data.</li> </ol>	P. O'Hara
13	January 16, 2021	<ol style="list-style-type: none"> <li>1. Updated participant contact data</li> <li>2. Replaced Executive Summary with a Quick Start Guide</li> <li>3. Added Section on the Emergency Action Plan Process</li> <li>4. Revised Project Description Section to be easier to read</li> <li>5. Added staffing requirements for the FLCA Command Post.</li> <li>6. Revised Potential Mitigating Action section to include recommending sandbagging boils first and constructing an inverted filter second. Also included Appendix O with sandbagging techniques.</li> <li>7. Revised Appendix M by adding Rain for Rent as a potential sources for pumps and lights and added a listing of supplies to be prepositioned at Fawn Lake.</li> <li>8. Added new resident addressed to Inundation Zone Maps</li> <li>9. Added National Weather Service to notification chart.</li> </ol>	P. O'Hara

Revision Number	Date	Revisions made	By whom
14	August 31, 2023	<ol style="list-style-type: none"> <li>1. Updated distribution list.</li> <li>2. Updated owner signature line.</li> <li>3. Updated names and contact information in Notification Flow Chart (Section II) and Emergency Response Participants (Appendix D).</li> <li>4. Updated Inundation Zone Maps (Appendix K).</li> <li>5. Updated Appendices F and G – Structures in Sunny Day and PMF Breach Inundation Zones.</li> <li>6. Created Volume II for Appendices N through Q.</li> </ol>	P. O'Hara
14.1	January 16, 2024	<ol style="list-style-type: none"> <li>1. Update participant's contact data</li> <li>2. Added rainfall amounts to reach Stage I, II and III.</li> <li>3. Updated equipment on hand</li> <li>4. Added discussion irt notification of lot owners at Indian Acres Club of Thornburg.</li> <li>5. Added requirements for notification of persons in the inundation zones when Stage II and Stage III emergency levels are declared.</li> <li>6. Added note recommending owner to consult PE and DCR before taking mitigating steps.</li> <li>7. Added distance downstream of dam, flood wave arrival times and peak water depths for each structure in the inundation zone. Three cases were reported – sunny day breach, spillway design flood with breach, probable maximum flood with breach.</li> <li>8. Removed Appendix O</li> </ol>	P. O'Hara

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Note: Appendices M through P are contained in a separate volume.

## QUICK START GUIDE

This Emergency Action Plan (EAP) is formatted to be used as a planning tool and meet regulatory requirements regarding the outline and presentation of these plans. This quick start guide is provided to make this document more user friendly for emergency use in the initial steps of the EAP Process

**Threat** – Fawn Lake Dam’s probable maximum flood (PMF)<sup>1</sup> inundation zone extends 24 miles downstream of the dam. This zone follows Greenfield Creek to the Po River and ends at the confluence of the Po and Ni Rivers 1.6 miles downstream of I-95. Inundation zone maps are contained within Section IX of this Emergency Action Plan. The maps show the area downstream of the Fawn Lake Dam that will be flooded in the event of a dam breach. Since there is a limited amount of time before the flood wave travels through this zone, it is, it is critical that this plan is implemented in a timely manner so as to prevent or mitigate injury to persons and damage of property in the inundation zone.

### Sunny Day Breach<sup>2</sup>

There are 11 occupied structures within the sunny day breach inundation zone. A list of structures that will be inundated due to a Sunny Day breach is included in Appendix F.

### PMF Breach

There are 83 occupied structures within the PMF breach inundation zone. *The initial and peak PMF flood wave arrival times (FWAT)<sup>3</sup> to the first structure (9811 Catharpin Road)*

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1 The probable maximum flood (PMF) is based on the probable maximum precipitation (PMP). It is assumed to be the worst-case scenario.

2 The sunny day breach scenario assumes the lake is at normal pool elevation at the time of a breach. Thus, the amount of uncontrolled release is significantly less than a PMF breach. The PMF breach is modelled with the assumption that the lake level is one foot above the crest of the dam along with storm flows from drainage areas below the dam.

3 The FWATs shown on the Inundation Zone Maps is based on a PMF breach. Although FWATs for a sunny day breach will be longer, the more conservative PMF FWATs are used for planning.

*are 15 minutes and 54 minutes, respectively.* The maximum flood depth is estimated to be 21.3 feet in this area. It is critical that the residents in this structure are notified quickly of a possible breach and are be prepared to move to high ground if necessary. The initial and peak FWAT at Route 1 and I-95 are approximately 3 hours 30 minutes and 6 hours 35 minutes, respectively. A list of structures that will be inundated due to a PMF breach is included in Appendix G.

### **EAP Process**

This EAP uses a five-step process – Event Detection, Emergency Level Determination, Notification and Communication, Expected Actions and Termination. The first three steps are the sole responsibility of the Fawn Lake Community Association (FLCA). The fourth is a shared responsibility of the FLCA and local and state government. It is imperative that FLCA work through these first three steps without delay. It is better to terminate an activation of this plan than it is to initiate and respond too late.

### **Event Detection**

If a condition is detected that might lead to dam failure, it should be reported immediately to the FLCA Community Safety Department, FLCA Maintenance Department and Community Manager. The FLCA Dam Engineer should also be contacted. Photographs and video should be used to better communicate the issue at hand and assist in timely assessment and follow-on actions.

### **Emergency Level Determination**

Once an event is detected, the emergency type needs to be determined. Appendix A provides guidance for determining the type of event as well as the emergency level. Appendix N provides sketches of potential problems as well as potential remedial actions.

### **Notification and Communication**

Once the emergency level is determined, notification should be made using the notification chart in Section II. This chart can be used for all four emergency levels with the only difference being contacts made by the Spotsylvania County Emergency Manager. Contact information for all emergency response participants are in **Appendix**



**D.** A notification flow chart is in Section II of this document.

After the initial notification, there should be frequent updates between FLCA and the Spotsylvania County Emergency Manager.

### Expected Actions

FLCA is responsible for mitigation and remedial actions within the confines of the Fawn Lake Community. Once the initial notifications are made, FLCA will stand up its command center and establish a direct line of communication with the Spotsylvania County Emergency Operations Center. FLCA will determine and implement actions to prevent or mitigate an uncontrolled release of water.

Spotsylvania County Emergency Management is responsible for coordinating with Spotsylvania County Sheriff's Office and Fire and Rescue, Virginia State Police, Virginia Department of Transportation and Virginia Department of Emergency management for notification and evacuation of affected structures and closure of affected roads and bridges downstream of the dam.

A section on potential mitigating actions is contained within Section VII – Preparedness. Appendix N contains a listing of potential problems and actions. The US Army Corps of Engineers brochure 'Sandbagging Techniques' is included as Appendix O.

### Termination

The Spotsylvania County Emergency Services Manager has the sole authority to terminate the emergency. The FLCA Dam Engineer will be available to consult regarding the dam's ability to safely impound water and, if necessary, any additional mitigation or remediation required.

## I. CERTIFICATIONS

### 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.



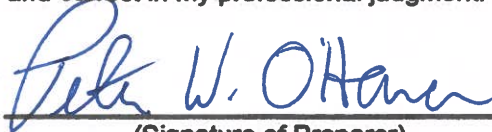
(Signature of Dam Owner/Operator)

This 16<sup>th</sup> day of January, 2024

Printed Name: Michael Edwards for the Fawn Lake Community Association

### 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.

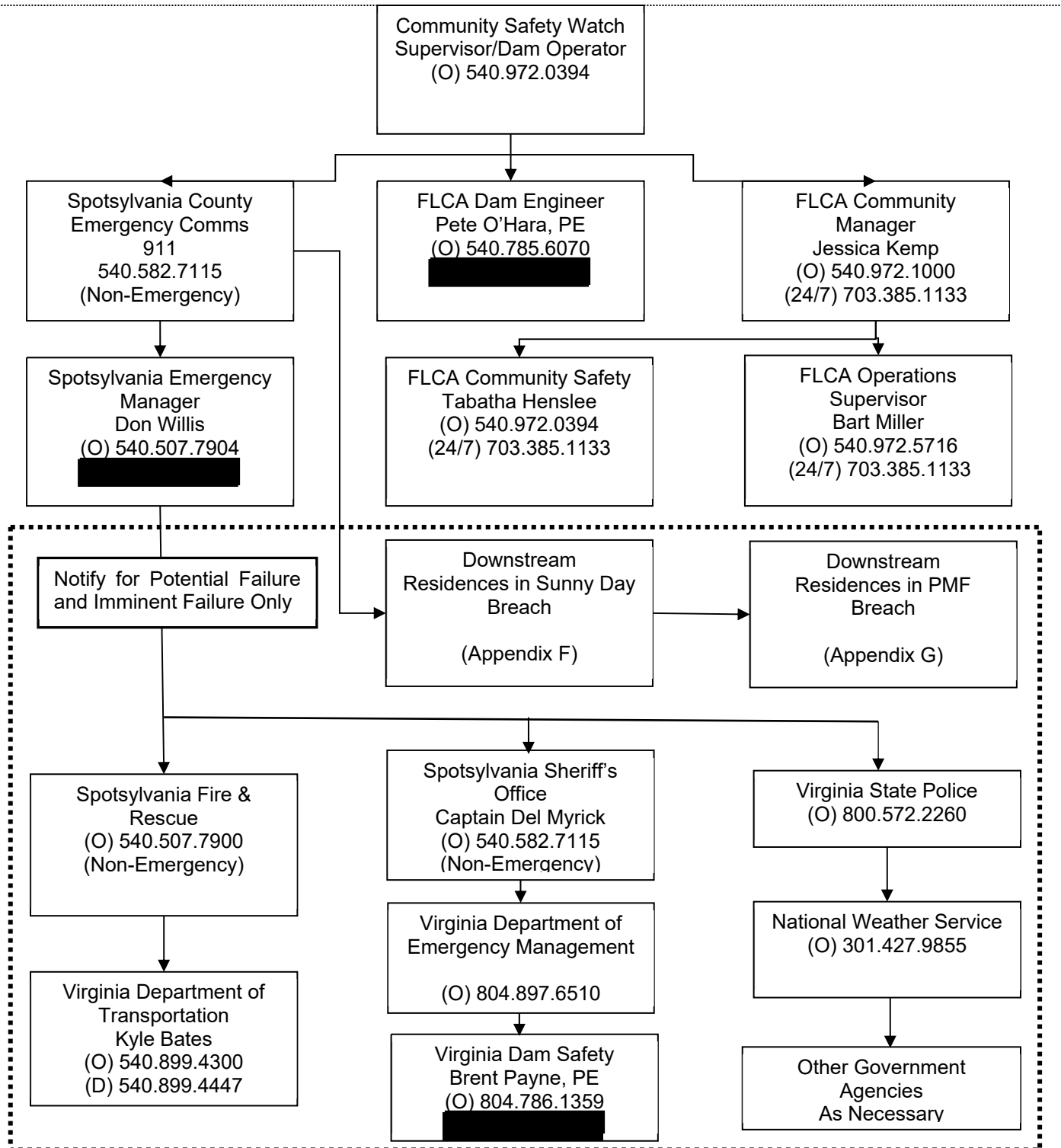


(Signature of Preparer)

This 16<sup>th</sup> day of January, 2024

Printed Name: Peter W. O'Hara, PE Title: Principal Engineer

## II. NOTIFICATION FLOW CHART



### **III. STATEMENT OF PURPOSE**

The purpose of this Emergency Action Plan (EAP) is to safeguard lives and reduce property damage downstream of the dam. This EAP provides the following:

1. Information about Fawn Lake Dam.
2. A basis for pre-planning the necessary response by the dam owner/operator and the responsible local, state, and federal emergency organizations.
3. Contact information for persons residing within the inundation zone of the dam in order to provide timely warning of a dam emergency, and
4. A listing of conditions which could lead to the failure of the dam and typical responses.

## IV. PROJECT DESCRIPTION

### **Description of Dam**

Fawn Lake Dam is located on Greenfield Creek in Spotsylvania County, Virginia. The dam is owned by Fawn Lake Community Association.

Dam Inventory Number – 177009 (Legacy #17709)

Certificate Type – Six-year, Regular Special Criteria Operations and Maintenance

Spillway Capacity – 60% PMF

Type of Dam – Earthfill

Drainage Area – 4.14 square miles

Length – 2,230 feet

Total Height – 63 feet

Top of Dam El. – 343 feet MSL

Normal Pool Height – 55 feet

Normal Pool El – 335.5 feet MSL

Maximum Capacity – 7472 acre-ft

Maximum Area – 312 acres

Normal Capacity – 5113 acre-ft

Normal Area – 285 acres

Size Classification – Medium

Hazard Classification - High

### **Outletworks**

#### **Principal Spillway**

– Riser - NRCS Hammerhead, cast-in-place concrete with a weir crest at El.335.5.

- Conduit - 36-inch diameter prestressed concrete spillway conduit supported by cast-in-place anti-seep collars along the length and a concrete cradle at the downstream end.

**Emergency Spillway** – Two hundred feet wide vegetated earth channel with a control elevation of 339 ft.

**Mid-Level Drain** - A mid-level drain with a 10-inch diameter knife gate valve with an invert at elevation 325.5. This valve is primarily used to supply a downstream cattle farm with water when the lake level drops below the normal pool elevation. This valve is operated hydraulically from a control panel mounted on the upstream berm adjacent to the drop

inlet. The hydraulic pump can be operated with the 12V marine battery in the panel which is charged by a solar panel or by hand pump.

**Low-Level Drain** – The low-level drain is located approximately 112 feet upstream of the drop inlet. It has a 30-inch diameter knife gate valve is located at elevation 284. This valve can be used to lower the lake level. It can initially lower the lake at the normal pool elevation ~13 inches on the first day, with that rate decreasing as the pool elevation decreases. While it is safer to limit the draw down rate to 6 inches per day, when compared to the potential of downstream loss of life and damage due to a dam breach, any limited damage on the upstream slope of the embankment would likely be acceptable.

Original Design Plans (with some sheets missing) are contained in Appendix Q. All elevations are referenced to MSL.

### **Known Conditions**

Iron ocre is present in the discharge from the original and right toe drains. Although this material may look like soil, it is a waste product of iron bacteria. Iron ocre has been known to clog drains. If water flow through the toe drains decreases significantly, iron ocre should be considered as one of the potential causes.

## **Inundation Zone**

A breach analysis of the Fawn Lake Dam and a mapping of the downstream inundation zone were completed by Dewberry & Davis in March of 2010. A breach analysis is the modeling of how a breach of the embankment would affect the downstream floodplain. It considers the volume in the reservoir, the physical dimensions of the embankment, and the topography of the downstream floodplain. This model is used to determine the area which would be inundated if the embankment were to breach under several scenarios ranging from a “sunny day” failure where the embankment fails due to internal erosion to an overtopping of the embankment during a “probable maximum flood” (PMF). It should be noted that actual storms will vary from this design standard in duration and intensity. The area that is flooded (or inundated) due to these scenarios is mapped and presented as an inundation zone map.

The analysis extended from the Fawn Lake Dam to a point just approximately 1.6 miles downstream of Interstate 95 and approximately 1.6 miles upstream of the confluence of the Po and Ni Rivers. The inundation zone ends approximately 14 miles downstream of the dam at the confluence of the Po and Ni Rivers. Inundation maps showing the area that would be inundated by a sunny day breach and a PMF breach as well as failure flood profiles for the floodplain are included in Appendix G.

### Residences Affected by a Breach or Major Flooding

Based on our analysis, there are 11 residences that may be affected by floodwater during a sunny day breach and 83 residences (as well as several camping lots along the river at Indian Acres Campground) that may be affected by a PMF breach. A listing of structures affected by a **sunny day breach** is included in Appendix F and a listing of structures affected by a **PMF breach** is included in Appendix G.

### Public Roadways Affected

There are 31 roadways and eight bridges and culverts that are expected to be submerged or partially submerged during a PMF Breach. Their locations are included in Appendix H.

### ***Impoundments***

Wright's Pond is located on Mill Pond Road. It is the only impoundment within the inundation zone which has Fawn Lake Dam in its watershed. The dam at Wrights Pond will be overtopped during a dam breach. This dam should be inspected when the water recedes and prior to opening Mill Pond Road to traffic.

Jennings Pond and Lake Pocahontas (Indian Acres) may be inundated by the backwater during a dam breach. These dams should also be inspected after any upstream breach event.

### ***Critical Facilities***

No known critical facilities, such as hospitals, rescue and relief facilities, water supply facilities, or hazardous waste facilities are in the hazard area.

### ***Time Line***

The estimated travel times of the flood wave from the time of a PMF breach to the bridges along the main channel are as follows:

	<u>Initial Impact</u>	<u>Flood Peak</u>
Corbin Lane/Catharpin Road	15 min	54 min
Mill Pond Road	40 min	1hr 56min
Robert E. Lee Drive	1hr 30min	3hr 13min
XSEC 58352	2hr 40min	5hr 13min
Courthouse Road	2hr 55min	5hr 46min
Indian Acres	3hr 15min	6hr 28min
N. Roxbury Mill Road	3hr 40min	6hr 45min

*Because of method, procedures, and assumptions used to develop the flooded areas, the limits of flooding shown, and flood waver travel times are approximate and should be used only as a guideline for establishing evacuation zones. Actual areas inundated will depend on actual failure or flooding conditions and may differ from areas shown on maps.*



## V. EMERGENCY ACTION PLAN PROCESS

### The Five-Step EAP Process

#### ***Step 1 - Event Detection***

This step describes the detection of an unusual or emergency event and provides information to assist the dam operator in determining the appropriate emergency level for the event. Early detection of unusual events and evaluation of the condition of the dam is crucial.

#### ***Step 2 - Emergency Level Determination***

After an unusual or emergency event is detected or reported, owner is responsible for classifying the event into one of the following four emergency levels:

##### **High Flow Emergency Level — No dam failure expected, but flooding of downstream people or infrastructure possible:**

This situation indicates that the principal spillway or low-level outlet works is operating as intended with a large discharge that may cause flooding of downstream roads, homes, businesses, or other infrastructure, but there is no apparent threat to the integrity of the dam.

##### **Nonfailure Emergency Level — Nonemergency, unusual event, slowly developing:**

This situation is not normal, and although it has not yet threatened the operation or structural integrity of the dam, it could if it continues to develop. Closely monitor the condition of the dam, especially during storm events, to detect any development of a potential or imminent dam failure situation.

##### **Potential Failure Emergency Level — Potential dam failure situation, rapidly developing:**

This situation may eventually lead to dam failure and flash flooding downstream, but there is not an immediate threat of dam failure. However, a preparatory warning to prepare to evacuate should be issued. This would include issuing a dam failure watch to the population at risk downstream.

##### **Imminent Failure Emergency Level — Urgent; dam failure is imminent or is in progress:**

This is an extremely urgent situation when a dam has failed, is failing, or is about to fail. Flash flooding will occur downstream of the dam. This situation is also applicable when flow through the emergency spillway is causing downstream flooding of people and roads.

### ***Step 3 - Notification and Communication***

After the emergency level has been determined, notification of the situation is made by the owner to the local emergency manager (using 911 to have a recorded history of the call), who will in turn notify appropriate state and local authorities and initiate notification of persons in the inundation zone. It is important to speak in clear and nontechnical terms to ensure those being notified understand what is happening, what the emergency level is, and what action to take.

### ***Step 4 – Expected Actions***

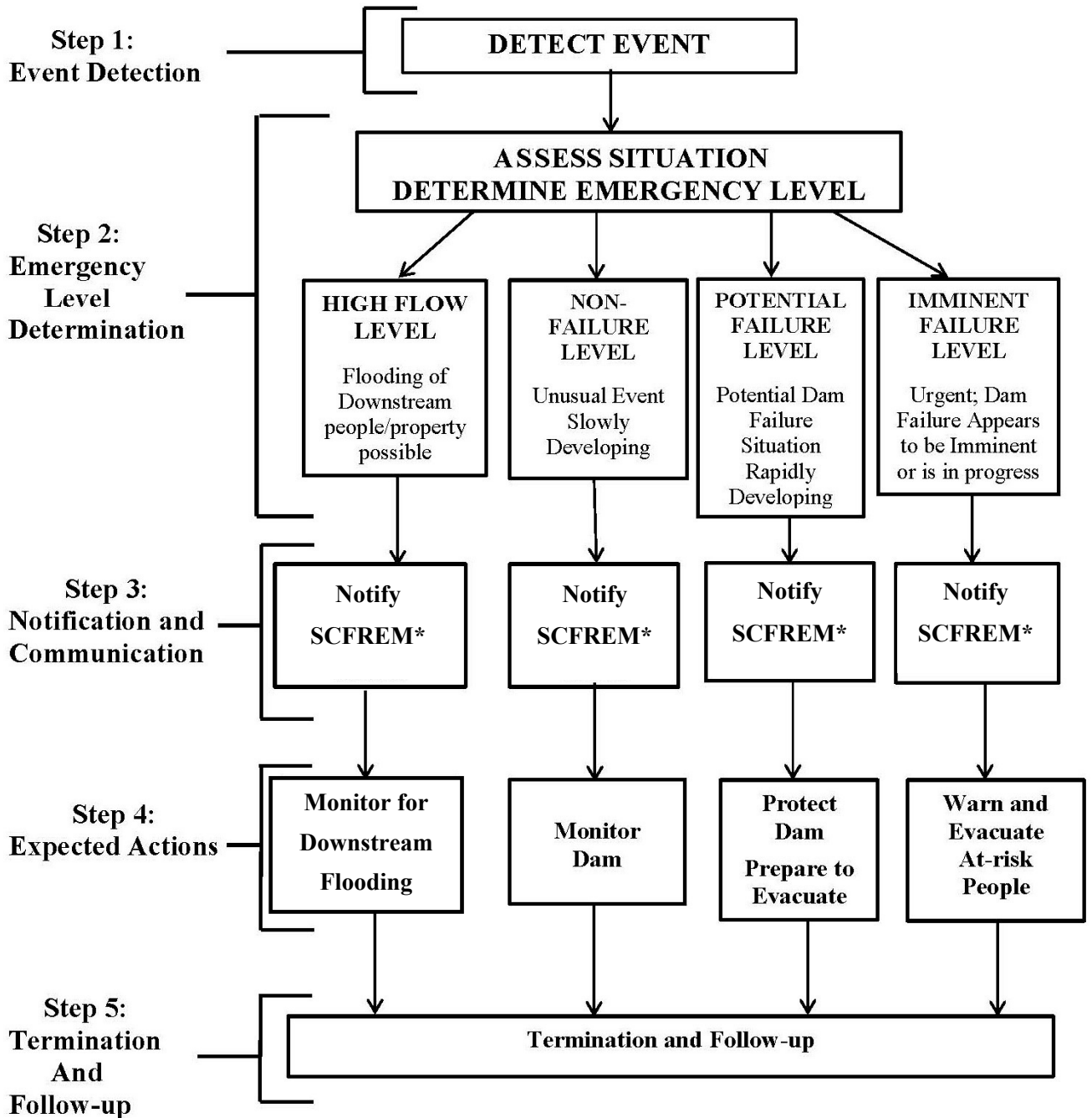
During this step, there is a continuous process of taking actions, assessing the status of the situation and keeping others informed through communication channels established during the initial notifications.

### ***Step 5 – Termination***

Whenever the EAP has been activated, an emergency level has been declared, all EAP actions have been completed, and the emergency is over, the EAP operations must eventually be terminated, and follow-up procedures completed.

The table below is a graphical depiction of these five steps.

## Emergency Action Plan Overview



\*Spotsylvania County Fire, Rescue and Emergency Management (SCFREM).

## **VI. Emergency Detection, Evaluation and Classification**

### **Detection**

Detection of a potential emergency is accomplished through daily routine patrols of FLCA's Community Safety Department, routine maintenance or Fawn Lake's Maintenance Department during routine maintenance and periodic inspections by the FLCA's dam engineer. Although not a formal part of this plan - observations by residents walking/running over the dam may also be the basis for detection also. Once a condition is detected, the FLCA community manager, president and dam engineer should be notified. Whenever possible, photographs and videos of the issue should be used to describe the situation.

### **Evaluation and Determination of Emergency Type**

This should be done using the table in Appendix A entitled 'Guidance for Determining the Emergency Level'. While the determination of the emergency level needs to be done in a timely manner, if time permits it is best to involve the FLCA's dam engineer and other knowledgeable persons in this process. If there is doubt as to the appropriate emergency level, it is best to assign the higher level. Begin to record all actions using Appendix C, Notification Worksheet – Unusual or Emergency Event Log.

There are two basic classifications of emergencies – weather related, and non-weather related. Weather related emergencies normally come with a warning from the National Weather Service allowing some level of preparation to mitigate an emergency. **Non-weather-related emergencies can start small but evolve into a catastrophic emergency within hours of initial detection.** This section addresses detection and evaluation of each emergency individually.

#### ***Non-Weather-Related Emergency (Sunny Day)***

Non-weather related (NWR) emergencies are typically referred to as a 'sunny day event'. NWRs are typically caused by internal erosion of the embankment or failure of the outlet works. Although these typically result in progressive failures over considerable time, an

earthquake can also instigate a NWR, potentially causing a rapid NWR. In terms of emergency action planning and response, NWR scenarios tend to have smaller inundation zones and longer timelines since flooding downstream due to other watersheds will be unlikely.

Possible NWR failure modes at Fawn Lake include: piping failure within the embankment, piping failure along the principal spillway conduit caused from infiltration or exfiltration, failure of the upstream outlet works (riser tower or drains). Any of these can cause a rapid progression from a stable condition to failure.

Although not technically an emergency, a sustained controlled release of water from the reservoir using the low-level drain can create flow conditions downstream that are significantly greater than normal. This creates the potential for clogging culverts and minor flooding of roadways. Damage of residential structures is not expected.

Non-weather-related emergencies may be detected by visual observation. Fawn Lake Dam has a three-tiered detection system. Their community safety patrols pass over the dam at least once a shift (three times a day), maintenance crews cut the grass every few weeks as needed and periodic inspections by the FLCA's dam engineer.

Seepage should be evaluated periodically based on quantity of flow as well as turbidity. Seepage that is essentially stagnant and clear in color is generally not an urgent condition. However, when the flow increases and becomes turbid, an emergency should be declared. It is important to note that seeps can change in character very quickly; hence they should be taken seriously.

Appendix N provides potential situations that might be encountered on an earth embankment dam.

### ***Weather Related***

Weather related (WR) emergencies are the result of rising lake levels that have the potential of activating the emergency spillway sending large volumes of water downstream in a controlled fashion or the breach of the dam embankment due to overtopping of the embankment.

The potential for weather-related emergencies is typically known a few days if not a week in advance. The National Hurricane Center ([www.nhc.noaa.gov](http://www.nhc.noaa.gov)) provides emails with public advisories including forecasted storm track, precipitation amounts and wind speeds. Once the potential for a storm event of greater than 10 inches of rain in 24 hours is detected, preparatory actions should be taken to evaluate and mitigate the situation. Based on empirical data, the lake level will rise approximately 3 inches for every inch of rain.

The potential for overtopping should be evaluated based on whether the reservoir level is rising, falling, or remaining steady as well as the current and forecast weather. Also, as the water level in the reservoir rises existing seeps may flow at a faster rate and begin to transport soil due to the increased head pressure. As stated above in the section regarding normal operating conditions, seepage should be taken seriously and monitored periodically for changes.

Flood or high-water events are to be tracked using a system of “stages” of lake elevation which are defined as follows:

Stage	Water El.	Water El. relative to Emergency Spillway	Rainfall to Reach Stage
I	338.5 feet	-0.5 feet	5.9 inches over 6 hours
		1.0 feet	6.3 inches over 12 hours
		2.0 feet	6.7 inches over 24 hours
II	340.0 feet	-0.5 feet	9.6 inches over 6 hours
		1.0 feet	10.6 inches over 12 hours
		2.0 feet	12.2 inches over 24 hours
III	341.0 feet	-0.5 feet	12.4 inches over 6 hours
		1.0 feet	14.6 inches over 12 hours
		2.0 feet	17.0 inches over 24 hours

Notes:

1. Water levels may vary significantly depending on temporal distribution of any given rainfall depth and antecedent soil moisture conditions.
2. Analysis is based on initial water level at the normal pool elevation with low- and mid-level drains closed.

The emergency spillway can convey up to 4 feet of water prior to overtopping the embankment (343' – 339'). The Surveillance section of this plan discusses the requirements for periodic monitoring of the water level.

## **VII. GENERAL RESPONSIBILITIES**

### **Impounding Structure Owner Responsibilities**

In the case of a dam emergency, the FLCA is responsible for detection of an emergency event, determination of the emergency level and notification of and communication with Spotsylvania County Emergency Management a using 911 to have a recording of the notification. Once notification has been made, the FLCA will be responsible for monitoring and communicating any changes in the condition of the dam to Spotsylvania County Emergency Management. It is also responsible for taking reasonable actions to mitigate or remediate the conditions causing the emergency.

### **Responsibility for Detection**

The FLCA is responsible for the detection of a condition or event that is the basis for implementing this EAP. If a condition is detected that might lead to dam failure, it should be reported immediately to the FLCA Community Safety Department, FLCA Maintenance Department and Community Manager. The FLCA Dam Engineer should also be contacted. Photographs and video should be used to better communicate the issue at hand and assist in timely assessment and follow-on actions. Concurrently, a separate log of communications, arrival of key participants and resources, and any other occurrences should be initiated and maintained until the emergency is terminated. A sample log is contained in Appendix C.

### **Responsibility for Evaluation and Determination of Emergency Level**

The FLCA is responsible for the evaluation of a detected condition or event. Once an event is detected, the emergency type needs to be determined. Appendix A provides guidance for determining the type of event as well as the emergency level. Appendix N provides sketches of potential problems as well as potential remedial actions.

### **Responsibility for Notification**

The FLCA is responsible for notifying Spotsylvania County Emergency Management of



an emergency condition at the dam. During normal working hours this notification will likely be made by the FLCA Community Manager or a designated member of the Board of Directors. During off hours and in the absence of the community manager or a BOD member, the FLCA Community Safety Shift Supervisor shall make such notification. In all cases, notification should be made in a timely manner by the available individual with the most knowledge of the dam and this emergency action plan at the time.

In the case that dam failure is imminent or has occurred, the initial notification to Spotsylvania County Emergency Communications Center should be made using 911. The caller should provide the following information – Fawn Lake Dam has failed or is about to fail, time of failure (if applicable), the emergency action plan has been implemented and ask for the emergency management to contact the caller immediately.

In the case of a high-flow or non-failure event, the initial notification should be made to the Spotsylvania County Emergency Communications Center using their non-emergency number. In this case, the caller should state that there is a dam emergency at Fawn Lake Dam and ask for the Emergency Manager to contact the caller.

When the Emergency Manager returns the call, provide the details of the emergency, current emergency level, any mitigating/remedial actions being undertaken as well as any outside resources required.

### **Responsibility for Monitoring/Mitigation/Remediation**

Once notification has been made, an initial site visit will be conducted by appropriate representatives of FLCA, their dam engineer and a representative of Spotsylvania County Fire, Rescue and Emergency Management (SCFREM).

FLCA shall establish a command post based on the nature of the emergency (NWR or WR). For a NWR event the command post will be established at its offices at the end of Longstreet Drive (from the Main Gate proceed straight to the end of the road). The Fawn Lake Country Club is the designated backup location. For a WR event, the command

post will be in the FLCA maintenance building (from the main gate, proceed straight to the four way stop, turn right onto Fawn Lake Parkway, turn left at the second left onto Baldy Ewell Way, proceed straight to the gate at the end). The Fawn Lake Real Estate office can be used as a backup if necessary. The locations of the clubhouse and maintenance building are shown on the area map contained in Appendix L of this report.

This command center shall be staffed with personnel with a manager with the authority to make decisions on behalf of FLCA, a communications manager (internal and external communications), a purchasing manager (authority to contract for supplies and services), a public affairs manager (authority to speak on behalf of FLCA) and a security officer to limit access to the command post.

A holding area for members of the media should also be established should the emergency condition attract media attention.

Fawn Lake Community Safety shall secure and control access to both ends of the dam and dam embankment for the duration of the emergency.

### **Responsibility for Evacuation**

Spotsylvania County Fire, Rescue and Emergency Management (SCFREM) is responsible for warning and evacuation of persons downstream. SCFREM will notify persons in the inundation zone to be prepared to evacuate if a potential failure situation (Stage II) is declared. If an imminent (or actual) dam failure (emergency level Stage III) is declared, SCFREM will notify persons in the inundation zone to evacuate immediately.

The primary modes for notifications are Spotsylvania County's automated phone call system and SpotsyAlert. Secondary modes include National Weather Service (NWS) flood watches and warnings as well as dispatching Sheriff's deputies or fire apparatus to use their public address systems to make notifications.

The first occupied structure is 9811 Catharpin Road (Map ID 1) has an initial and peak

FWAT for a PMF with Dam Breach of 15 minutes and 54 minutes, respectively. Priority should be given to making notification to this property. It may also be prudent to notify this property when a Stage 1 emergency level is declared.

Indian Acres Club of Thornburg (IACT) is a property owners association with small lots. The individual lots are mostly occupied by recreational vehicles (self-propelled or towed). This is not a tent camping facility. IACT has a peak FWAT for a PMP with dam breach of 6.14 hours. There should be adequate time to make notification to the property owners. IACT has a 24/7/365 security presence that should be capable of informing all owners on the property at the time.

### **Responsibility for Termination, and Follow-up**

The Spotsylvania County Manager in consultation with the Owner's Engineer and any other appropriate government agencies, shall be responsible for the decision to declare that the emergency is terminated.

A weather-related event should not be terminated until the lake level starts to recede (non-breach/no seepage situation) or the lake level has dropped and does not to present a continuing threat (breach situation). A non-weather-related event should not be terminated until the lake level has been sufficiently lowered as not to present a continued threat.

The Virginia Department of Transportation is responsible for inspection and reopening affected roads and structures prior to be opened to traffic. The Spotsylvania County Building Official shall inspect all affected buildings prior to being reoccupied. The Spotsylvania County Department of Utilities should inspect its affected utilities. Photographs and written logs should be used to document any damage. The Spotsylvania County Sheriff's department will control access into these areas until such time that these areas are declared safe.

The owner's engineer shall convene an initial emergency evaluation conference within

seven days of the termination of the emergency to be attended by representatives of all participants in the emergency event. A report detailing the nature of the emergency and a chronology of events during the response shall be prepared within 30 days of the termination of the emergency.

### **EAP Coordinator Responsibility**

The owner's engineer shall be the EAP Coordinator. Responsibilities of the EAP coordinator shall include preparing revisions to the EAP, establishing training seminars, and coordinating EAP exercises. The EAP Coordinator shall be the point of contact for any questions related to the plan. Bi-annual tabletop exercises conforming to 4VAC50-20-53 are required for this dam. Drills shall be conducted during alternate years.

Recommended topics to be consideration for addition to this EAP:

1. Criteria for evacuation of watercraft from the lake or relocation and securing of watercraft well away from the marina during an event emergency.
2. Consideration of establishing a mutual aid agreement between FLCA and other nearby dam owners (e.g. Lake Wilderness and Lake of the Woods.)
3. Enhancing communications between FLCA and SCFREM during an emergency using either ham radio or radios available through SCFREM.

## VIII. PREPAREDNESS

Actions can be taken that can help to mitigate the extent of damage resulting from any emergency events.

### Surveillance

The level of surveillance during an emergency event will depend on the severity and urgency of the condition.

Emergency Level	Stage	Storm Event Pool Elevations (Relative to Emergency Spillway)	Sunny Day Incident	Surveillance Frequency
None	0	Normal Pool	Normal Operation	Daily
High Flow	I	0.5 ft below and rising (El. 338.5 ft)	Low-level (30") valve open and lake level above 336.5 ft	Every 2 Hours
Non-failure	I	n/a	Unusual condition slowly developing	Every 2 Hours
Potential	II	1.0 ft above & rising (El. 340 ft)	Potential dam failure situation rapidly developing	Every 30 minutes
Imminent	III	2.0 ft above & rising (El. 341 ft)	Dam failure appears inevitable	Continuous

**Table 1.** Definition of stages, surveillance frequency and emergency levels for storm events and sunny day incidents.

It may be necessary to conduct surveillance more often when the reservoir level is rising rapidly.

### Pre-Event Preparation

When a watch or warning for a heavy precipitation event is issued that might cause flow through the emergency spillway, consideration should be given to lowering the lake level several feet below the normal pool using the low-level outlet valve. This will create extra storage for storm flows thus reducing or eliminating damage to the emergency spillway

as well as delaying and reducing flooding of properties downstream in a non-breach scenario. As a rule-of-thumb, each inch of precipitation that falls over Fawn Lake's drainage area will result in three inches increase in the lake's water level. A tabulation of discharge rates for spillways and valves is contained in Appendix P.

The FLCA Lake Level Management Plan contains information on actions and messages to the community to assist with preparation prior to a severe weather event.

In the case of a storm event that threatens activation of the emergency spillway; all boats at the marina shall be removed from the water or moved up stream and secured to a dock or securely beached so that they will not obstruct the flow of water through the emergency spillway.

### **Response During Periods of Darkness**

During periods of darkness, it will be necessary to light the affected areas of the dam with flashlights and car headlights. Light plants should be brought in if the situation is expected to occur over a long period of time. Potential sources are listed in Appendix M.

### **Access to the Site**

Access to either end of the dam will normally be by automobile along Fawn Lake Parkway. In the case where access to the low-level outlet valve control panel is necessary and the emergency spillway is either in operation or expected to operate, it will be necessary to access the dam from the west end using Fawn Lake Parkway. The map in Appendix L shows the primary and secondary access routes to the dam.

### **Response During Weekends and Holidays**

Fawn Lake Community Safety is available 24 hours a day, 7 days a week. Phone numbers are available for all key participants. Phone numbers are contained in Appendix D.

### **Response During Periods of Adverse Weather**

During flood watches, the dam operator will be available on property.

### **Alternate Systems of Communication**

The primary system of communication within the Fawn Lake Property will be by cell phone and Community Association portable radios operating on Channel 2. Fawn Lake Community Safety 'Base' will monitor this channel. Phone numbers are contained in Appendix D. Alternate systems will be either landline from a neighboring house or the Fawn Lake Community Association office.

### **Emergency Supplies and Information**

#### ***Stockpiling Materials and Equipment***

The following equipment and materials are available on-site.

1. 1-Ton Dump Truck

Sand and stone can be obtained at a local quarry during business hours or possibly from the Virginia Department of Transportation after hours. Light plants can be rented from a local rental company. Contact information is contained in Appendix M.

### **Potential Mitigating Actions**

There are certain actions that can be taken to prevent a dam failure or mitigate damage if taken in a timely manner. However, it is important to note that these actions are not always appropriate in all situations. The owner should consult with the professional engineer of record and Virginia DCR whenever possible before taking mitigating steps.

#### ***Open Low-Level Outlet***

In most cases where the low-level outlet pipe and the principal spillway pipe are not affected by the emergency, the concept of reducing the amount of the water behind the dam is sound. This will have two results. First, it reduces the pool level by approximately

13 inches per day when starting at the normal pool elevation. Second, by decreasing the pressure head on any seeps, the velocity of water will be lowered which will eventually decrease below a point where it can no longer transport soil from the embankment.

However, care should be taken to ascertain if the spillway conduit is damaged prior to opening the outlet. If the principal spillway conduit became clogged with soil or debris, allowing a high volume of water under high pressure may cause further damage the conduit to a point where failure or piping could occur.

A secondary concern with rapid lowering of the reservoir is surficial slope failures on the upstream slope. Based on experience during the uncontrolled release in 2014, the upstream slope experienced very superficial movement of the slope with depths of only a few inches.

Finally, the potential of failure while personnel are opening the low-level outlet should be considered prior to conducting such an operation. If it is decided to open the outlet, it is suggested that two people be present. One person should operate the valve(s) while the other observes the embankment for changes. Also, an escape route should be planned prior to the operation should the need to evacuate the dam crest arise. The key for the control cabinet is kept at the Front Gatehouse.

### ***Reduction in Freeboard and/or Loss of Dam Crest Width***

1. Place additional rip rap or sandbags in damaged areas to prevent further embankment erosion.
2. Lower the water level to an elevation below the damaged area.
3. Restore freeboard with sandbags or earth and rockfill.
4. Continue close inspection of the damaged area until the storm is over.

### ***Slide on the Embankment Slope***

If a slide occurs on the embankment slope, initiate lowering the reservoir level to a level below the bottom of the failure. The slope should be protected from erosion during a



precipitation event using plastic sheeting.

### ***Piping through the Embankment, Foundation, or Abutments***

Open the low-level outlet to lower the reservoir level if it can be done without making the situation worse. Piping can be mitigated by either constructing a sandbag ring around the boil or an inverted filter. Since it is more practical to preposition sandbags, sandbag rings should be considered as a first action while marshalling labor, materials and equipment to haul and place sand and aggregate to create the inverted filter. The US Army Corps of Engineers' Sandbagging Techniques pamphlet is included in Appendix O. The ability to implement these remedial methods safely needs to be considered prior to and during these actions. If the water flow is rapidly increasing and muddy, operations should be suspended and the downstream should be evacuated.

### ***Failure of Outlet Works***

Implement temporary measures to protect the damaged structure, such as closing an outlet or providing temporary protection for a damaged spillway. Employ experienced, professional divers, if necessary, to assess the problem and possibly implement an expedient repair.

If possible, lower the water level to a safe elevation. If the outlet is inoperable, pumping, siphoning, or a controlled breach may be required.

Because of uncertainties about their effectiveness, these preventive actions should be carried out simultaneously with appropriate notification of an alert condition or warning condition.

## **IX. Appendices**

Appendix A – Guidance for Determining Emergency Level

Appendix B - Site-Specific Concerns

Appendix C – Notification Worksheet – Unusual or Emergency Event Log

Appendix D – Emergency Response Participants

Appendix E - Plans for Training, Exercising, Updating and Posting the EAP

Appendix F – Structures in Inundation Zones

Appendix G – Public Roadways, Bridges and Culverts Affected

Appendix H – Flood Depths

Appendix I – Investigation & Analysis of Impounding Structure Failure Floods

Appendix J – Inundation Maps

Appendix K – Fawn Lake Area Map

Appendix L – Emergency Supplies

Appendix M – Potential Problems and Actions

Appendix N – US Corps of Engineers – Sandbagging Techniques

Appendix O – Omitted

Appendix P – Original Dam Design Plans (Partial Set)

## Appendix A – Guidance for Determining Emergency Level

Event	Situation	Emergency Level
Spillway Flow	Low-level outlet open and lake level 336.5 ft or lower	None
	Stage I - Low-level outlet open and lake level above 336.5 ft	I - High Flow
	Stage I - Pool elevation 0.5 foot below emergency spillway control section & rising (El. 338.5 ft)	I - High Flow
	Stage II - Pool elevation 1 foot above emergency spillway control section & rising (El. 340.0 ft)	II - Potential
	Stage III - Pool elevation 2 feet above emergency spillway control section & rising (EL. 341.0 ft)	III - Imminent
Embankment Overtopping	Water is flowing over the crest of the dam	III - Imminent
Seepage	New seepage areas with clear discharge in or near the dam embankment	I – Non-Failure
	New seepage areas with turbid (cloudy) discharge or increasing flow rate	II - Potential
	Toe drains with turbid (cloudy) discharge or increasing flow rate	II - Potential
	Toe drains with significant reduction in flow rate of clear discharge	I – Non-Failure
Sinkholes	Observation of a sinkhole in the embankment, abutments or downstream toe.	II - Potential
	Rapidly enlarging sinkhole in the embankment, abutments or downstream toe.	III - Imminent
Embankment Cracking	Cracks (parallel or perpendicular to embankment) in the top third of the embankment without water flow	II - Potential
	Cracks (parallel or perpendicular to embankment) in the lower two-thirds of the embankment with or without water flow	III - Imminent
Embankment Movement	Visual movement/slippage of the embankment slope	II - Potential
	Sudden slides of embankment slope	III - Imminent
Earthquake	Measurable earthquake felt within 50 miles of the dam	I – Non-Failure
	Earthquake resulting in visible damage to the dam or appurtenances	II - Potential
	Earthquake resulting in uncontrolled release of water from the dam	III - Imminent
Security Threat	Credible threat (e.g. bomb) that could damage dam	II - Potential
	Detonated bomb that has resulted in damage to the dam.	III - Imminent
Sabotage/Vandalism	Damage to dam with no impacts to the functioning of the dam	I – Non-Failure
	Damage to the dam that could adversely impact the functioning of the dam (e.g. valve operating panel damaged)	I – Non-Failure
	Damage to the dam that has resulted in uncontrolled seepage flow	II - Potential
	Damage to the dam that resulted in uncontrolled water release	III - Imminent

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## Appendix B - Site-Specific Concerns

### Weir Boxes

There is a weir box located to the left the principal spillway that measures the quantity of flow from the left toe drain and lake pool elevations. Flows outside these ranges are a potential indicated of a developing problem and should be addressed in a timely manner.

Note: There is also a weir on the right but we do not have seasonal flow data for it yet.



<b>Flow Rates for a V Notch Weir</b>		
<b>H (in)</b>	<b>Q (cfs)</b>	<b>Q (gpm)</b>
0	0.0000	0.00
0.25	0.0002	0.07
0.5	0.0009	0.40
0.75	0.0024	1.10
1	0.0050	2.25
1.25	0.0088	3.93
1.5	0.0138	6.20
1.75	0.0203	9.11
2	0.0284	12.72
2.25	0.0381	17.08
2.5	0.0495	22.23
2.75	0.0629	28.21
3	0.0781	35.07
3.25	0.0954	42.83
3.5	0.1149	51.55
3.75	0.1365	61.26
4	0.1604	71.98
4.25	0.1866	83.76
4.5	0.2153	96.63
4.75	0.2464	110.61
5	0.2802	125.75
5.25	0.3165	142.06
H is depth of water through weir plate		

**Appendix C – Notification Worksheet – Unusual or Emergency Event Log**

**Unusual or Emergency Event Log**  
 (to be completed during the emergency)

Dam name: Fawn Lake Dam County: Spotsylvania County

When and how was the event detected?

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Weather conditions: \_\_\_\_\_

General description of the emergency situation:

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Emergency level determination: \_\_\_\_\_ Made by: \_\_\_\_\_

**Actions and Event Progression**

Include notes of all persons contacted, the person making the contacts, and the time of the contact.  
 See the Notification Charts and Emer. Services Contacts tabs for critical contact information.

Date	Time	Action/event progression	Taken by


Report prepared by: \_\_\_\_\_ Date: \_\_\_\_\_



**Appendix D – Emergency Response Participants**

Participant	Point of Contact	Contact Information
<p><b>Owner</b>            Fawn Lake Community Association (FLCA)            11300 Longstreet Drive            Spotsylvania, VA 22551</p>	<p>Michael Edwards            (FLCA President)</p> <p>Jessica Kemp            (FLCA General Manager)</p> <p>Tabatha Henslee            (Chief of Community Safety)</p> <p>Bart Miller            (FLCA Operations Director)</p> <p>Main Gate</p>	<p>██████████            edwardsmt54@msn.com</p> <p>540-972-1000 – Office            (24/7) 703-385-1133            Jessica.Kemp@fsresidential.com</p> <p>540-972-0394 - Office            (24/7) 703-385-1133            tabatha.henslee@aus.com</p> <p>540-972-5716 – Office            (24/7) 703-385-1133            Bart.Miller@fsresidential.com</p> <p>540-972-0394 – Office</p>
<p><b>Owner’s Engineer</b>            ECS Mid-Atlantic, LLC            915 Maple Grove Dr Ste 100            Fredericksburg, VA 22407</p>	<p>Peter O’Hara, P.E.</p> <p>William Gaspar, P.E.</p>	<p>540-785-6070 - Office            ██████████            pohara@ecslimited.com</p> <p>540-785-6100 – Office            ██████████            wgaspar@ecslimited.com</p>
<p><b>Dam Operator</b>            Fawn Lake Community Association            11300 Longstreet Drive            Spotsylvania, VA 22553</p>	<p>Bart Miller (Operations Director)</p>	<p>540-972-5716 - Office            ██████████            bart.miller@fsresidential.com</p>
<p><b>Dam Gauge Observer</b>            Fawn Lake Community Association</p>	<p>Fawn Lake Community Safety</p>	<p>540-972-0394 - Phone</p>

<p><b>Spotsylvania County Emergency Services</b>          Spotsylvania County Emergency          Communications          9119 Dean Ridings Lane          PO Box 818          Spotsylvania, VA 22553</p>	<p>Don Willis          Emergency Management          Coordinator</p>	<p>Non-Emergency          540-507-7904 – Office          [REDACTED]          Emergency – 911  <a href="mailto:dwillis@spotsylvania.va.us">dwillis@spotsylvania.va.us</a></p>
<p><b>Virginia Department of Transportation</b>          Virginia Department of Transportation          Fredericksburg Residency          87 Deacon Road          Fredericksburg, VA 22405</p>	<p>Kyle Bates – Resident Engineer          Tony Morton – Post Oak AHQ          Superintendent          Doug Payne – Chancellor AHQ          Superintendent</p>	<p>540-899-4300 - Main          [REDACTED]  <a href="mailto:tony.morton@vdot.virginia.gov">tony.morton@vdot.virginia.gov</a>          [REDACTED]  <a href="mailto:douglas.payne@vdot.virginia.gov">douglas.payne@vdot.virginia.gov</a></p>
<p><b>Spotsylvania County Sheriff's Office</b>          9119 Dean Ridings Lane          Spotsylvania, Virginia 22553</p>	<p>Captain Del Myrick – Special          Operations Commander</p>	<p>540-582-7115 – Non-Emergency  <a href="mailto:dmyrick@spotsylvania.va.us">dmyrick@spotsylvania.va.us</a></p>
<p><b>Division of Dam Safety</b>          Virginia Dept of Conservation &amp; Rec.          Division of Dam Safety          600 East Main Street, 24<sup>th</sup> Floor          Richmond, VA 23139</p>	<p>Brenton Payne, PE          Region 2 Dam Safety Engineer            Mark Killgore, PE          Lead Dam Safety Engineer</p>	<p>804-786-1359 – Office          [REDACTED]  <a href="mailto:brenton.payne@dcr.virginia.gov">brenton.payne@dcr.virginia.gov</a>          804-786-1359 – Office  <a href="mailto:mark.killgore@dcr.virginia.gov">mark.killgore@dcr.virginia.gov</a></p>
<p><b>State Emergency Operations Center</b>          Virginia Dept of Emergency Mgmt          7700 Midlothian Turnpike          Richmond, VA 23235</p>	<p>Daniel Bradway          IFLOWS Chief          (804) 674-2405          Mark Stone          Director of Response Programs          Alexa Boggs          Disaster Response and Recovery          Officer (DRRO)</p>	<p>804-674-2400 – 24/7 Phone          804-774-0519  <a href="mailto:Daniel.Bradway@vdem.virginia.gov">Daniel.Bradway@vdem.virginia.gov</a>          804-774-9271  <a href="mailto:Mark.Stone@vdem.virginia.gov">Mark.Stone@vdem.virginia.gov</a>  <a href="mailto:Alexa.boggs@vdem.virginia.gov">Alexa.boggs@vdem.virginia.gov</a></p>
<p><b>National Weather Service</b></p>	<p>Jeremy Geiger – AWIPS Operations          Program Leader</p>	<p>571-888-3500  <a href="mailto:jeremy.geiger@noaa.gov">jeremy.geiger@noaa.gov</a></p>

## **Appendix E - Plans for Training, Exercising, Updating and Posting the EAP**

### **Training**

Training Sessions should be conducted annually for participants located on the property. The content for these sessions should orientation to the EAP and detection and evaluation of emergency events and conditions.

### **Exercising**

In conjunction with the training sessions, either a drill or a tabletop exercise will be conducted as required by 4VAC50-20-175.

### **Updating**

This plan shall be reviewed annually, and changes distributed to all plan holders. Potential changes might include:

1. Changes in personnel.
2. Changes in telephone numbers.
3. Additions or deletions of structures and critical facilities within the danger reach.
4. New conditions that would affect flood flows or the extent of damage due to a dam failure.
5. Update 911 mapping overlay on inundation map.

### **Future Revisions**

1. Add section on evacuation of watercraft from the lake
2. Explore potential for mutual aid agreements with nearby dam owners (e.g. Lake Wilderness and Lake of the Woods).

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## **Appendix F – Structures in Inundation Zones**

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Fawn Lake Dam  
Emergency Action Plan  
Revision 14.1  
January 16, 2024

Map ID	Address	Map #	Distance from Dam (miles)	Sunny Day Breach		SDF w/ Breach		PMF w/Breach	
				Peak FWAT (Hours)	Max Depth (ft)	FWAT (Hours)	Max Depth (ft)	FWAT (Hours)	Max Depth (ft)
1	9811 Catharpin Road	2	2.06					0.93	2.0
2	9452 Mill Pond Road	3	4.93					1.42	4.5
3	9428 Mill Pond Road	3	5.01	2.43	5.0	1.63	13.0	1.44	19.5
4	9415 Mill Pond Road	3	5.06	2.45	4.0	1.63	12.0	1.45	18.0
5	9429 Mill Pond Road	3	5.11	2.45	3.5	1.63	11.5	1.45	17.5
6	9742 Beaver Lane	3	4.93					1.42	1.0
7	9842 Beaver Lane	3	4.7					1.37	0.5
8	9448 Mill Pond Road	3	4.93					1.42	4.5
9	9444 Mill Pond Road	3	4.93	2.39	0*	1.59	7.5	1.42	14.0
10	10024 Beaver Lane	3	4.45					1.34	0*
11	10530 Beaver Lane	3	4.12					1.3	4.5
12	9401 Mill Pond Road	3	5.06					1.45	0*
13	9621 Paradise Court	3	4.93			1.59	4.5	1.42	10.5
14	9409 Mill Pond Road	3	5.25					1.48	8.0
15	9490 VanReenan Way	3	5.16					1.48	3.5
16	8308 Singing Wood Lane	3	7.86					2.25	3.0
17	8304 Singing Wood Lane	3	7.86					2.25	1.0
18	8217 Singing Wood Lane	3	7.86					2.25	2.5
101	8216 Singing Wood LN	3	7.86			2.70	6.5	2.25	13.5
42	8521 Heron Pointe WAY	4	9.33			3.9	7.0	3.03	14.0

Fawn Lake Dam  
Emergency Action Plan  
Revision 14.1  
January 16, 2024

Map ID	Address	Map #	Distance from Dam (miles)	Sunny Day Breach		SDF w/ Breach		PMF w/Breach	
				Peak FWAT (Hours)	Max Depth (ft)	FWAT (Hours)	Max Depth (ft)	FWAT (Hours)	Max Depth (ft)
43	9510 Northlake Dr	4	10.44					3.4	0.5
44	9430 Northlake Dr	4	10.44					3.4	1.5
19	8136 Singing Wood Lane	5	8.02			2.7	8.5	2.25	16.0
20	8135 Singing Wood LN	5	8.02					2.25	9.5
21	8619 Robert E Lee DR	5	8.32					2.48	6.0
22	8114 Singing Wood LN	5	8.17					2.38	17.5
23	8100 Singing Wood LN	5	8.24	4.48	0.5	2.91	11.0	2.38	18.5
24	8921 River Valley LN	5	8.43					2.48	3.5
25	9001 River Valley LN	5	8.32					2.48	4.0
27	8926 River Valley LN	5	8.32			3.02	10.0	2.48	17.0
28	8517 Robert E Lee DR	5	8.55	4.60	0*	3.34	10.0	2.68	17.5
29	8911 River Valley LN	5	8.43					2.48	7.5
30	8425 Robert E Lee DR	5	8.55					2.68	11.5
31	8421 Robert E Lee DR	5	8.55					2.68	6.5
32	8415 Robert E Lee DR	5	8.55					2.68	4.0
33	8424 Robert E Lee DR	5	8.59					2.68	6.0
34	8700 Millwood DR	5	9.80					3.16	9.0
35	8510 Robert E Lee DR	5	8.59					2.68	2.0
36	8802 Millwood DR	5	9.91					3.26	11.0



Fawn Lake Dam  
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Map ID	Address	Map #	Distance from Dam (miles)	Sunny Day Breach		SDF w/ Breach		PMF w/Breach	
				Peak FWAT (Hours)	Max Depth (ft)	FWAT (Hours)	Max Depth (ft)	FWAT (Hours)	Max Depth (ft)
37	8804 Millwood DR	5	9.91					3.26	13.0
38	8806 Millwood DR	5	9.91					3.26	7.5
39	8808 Millwood DR	5	10.06					3.26	3.0
40	8810 Millwood DR	5	10.06					3.26	7.5
41	8812 Millwood DR	5	10.06					3.26	7.5
45	9003 Millwood CT	5	11.19			4.46	4.5	3.43	11.5
46	8323 Old Mill LN	5	12.11					3.64	2.5
47	8401 Old Mill LN	5	12.23					3.68	1.5
102	9001 Millwood CT	5	11.23			4.52	6.5	3.47	13.5
105	8800 Millwood DR	5	9.8			3.89	6.5	3.16	13.5
48	7722 Po River DR	6	14.28			6.35	5.0	4.68	12.0
49	7714 Po River DR	6	14.39					4.72	0*
50	7640 Po River DR	6	14.74					4.75	11.0
51	7630 Po River DR	6	14.83					4.75	9.0
52	7708 Hunter CV	6	15.18					4.96	2.5
53	7700 Hunter CV	6	15.32					5.12	0.5
54	7707 Hunter CV	6	15.64					5.18	0*
55	7741 Courthouse RD	6	15.64			7.12	0*	5.27	6.5
56	7737 Courthouse RD	6	15.64					5.27	0*

Fawn Lake Dam  
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Revision 14.1  
January 16, 2024

Map ID	Address	Map #	Distance from Dam (miles)	Sunny Day Breach		SDF w/ Breach		PMF w/Breach	
				Peak FWAT (Hours)	Max Depth (ft)	FWAT (Hours)	Max Depth (ft)	FWAT (Hours)	Max Depth (ft)
57	7801 Courthouse RD	6	15.62					5.27	10.0
58	7810 Courthouse RD	6	15.62			7.12	3.5	5.27	9.5
59	7732 Courthouse RD	6	15.62					5.27	0*
60	7736 Courthouse RD	6	15.62					5.27	3.5
61	7320 Snow Hill DR	6	15.86					5.35	1.5
62	7901 Melton LN	6	15.74			7.16	0*	5.31	3.5
63	7300 Snow Hill DR	6	16.22	10.83	0*	7.46	10.5	5.56	19.0
64	7240 Snow Hill DR	6	16.07	10.63	1.0	7.3	11.0	5.43	19.5
65	7315 Snow Hill DR	6	16.22					5.56	15.0
66	8004 Sourwood CT	6	16.22					5.56	1.0
67	4 Shetland CT	6	16.84					5.81	0*
68	230 Morgan LN	6	17.05					5.84	1.5
69	225 Morgan LN	6	17.05					5.84	8.0
70	223 Morgan LN	6	17.14					5.84	10.5
71	310 Clydesdale CT	6	17.23					5.87	6.5
79	7818 Courthouse RD	6	15.62	10.4	11.5	7.12	24.5	5.27	30.5
77	7225 Gardner Farm RD	6	16.29					5.56	0.5
78	7235 Gardner Farm RS	6	16.35					5.68	12.0
103	7669 Courthouse RD	6	16.01					5.38	0*

Map ID	Address	Map #	Distance from Dam (miles)	Sunny Day Breach		SDF w/ Breach		PMF w/Breach	
				Peak FWAT (Hours)	Max Depth (ft)	FWAT (Hours)	Max Depth (ft)	FWAT (Hours)	Max Depth (ft)
106	7731 Courthouse RD	6	15.78					5.31	13.5
107	7459 Azores Islands WAY	6	15.32			6.97	7.5	5.12	13.5
72	0 Indian Acres	7	18.71	11.64	0*	8.04	7.0	6.14	15.0
73	6437 Morris RD	7	19.09					6.25	2.5
74	47 Waucoma TRL	7	20.06					6.55	9.0
75	7001 Jefferson Davis HWY	7	20.67					6.65	2.5
76	6908 S Roxbury Mill RD	7	21.15					6.5	6.71
80	39 Waucoma TRL	7	20.20					6.58	14.0

Notes:

1. Empty cells with a grey background indicate the structure is not within the inundation zone of the specific breach case.
2. Maximum flood depths with a '0\*' value were found to have flood elevations below the first floor elevation of the structures. This is the result of using a topographic map with two-foot contours instead of ten-foot contour elevations. Mapping with two-foot contours was not available at the time of the initial inundation zone mapping.

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## **Appendix G – Public Roadways, Bridges and Culverts Affected**

Roadways that are expected to be submerged or partially submerged during a PMF Breach are as follows:

1. West Catharpin Road (Rte. 608) – From 11236 West Catharpin Road to 11670 West Catharpin Road. A length of approximately 3,000 ft.
2. Catharpin Road (Rte. 612) – 9768 Catharpin Road to intersection of Catharpin Road and Corbin Lane.
3. Corbin Lane - From intersection of Catharpin Road (Rte. 612) to 4,250 ft. west of intersection.
4. Mill Pond Road - from intersection with Beaver Lane to 2,000 ft. south of intersection.
5. Private Drive – Located on east side of Mill Pond Road between Fox Hunt Trail and Vanreenen Way. Beginning 530 ft. from intersection with Mill Pond Road and continuing past that point approximately 300ft.
6. Vanreenen Way – Beginning approximately 1,000 ft. east from intersection with Mill Pond Road and continuing past that point approximately 225 ft.
7. Mystic Lane – Beginning approximately 2,000 ft. north of the Intersection with Robert E. Lee Drive and Mystic Lane, and continuing past that point approximately 800 ft.
8. JR Montgomery Lane – Beginning approximately 900 ft. north of intersection with Robert E. Lee Drive and continuing north approximately 300 ft.
9. Robert E. Lee Drive (Rte. 608) – From 8974 Robert E. Lee Drive to 8528 Robert E. Lee Drive. A length of approximately 3,700 ft.
10. River Valley Lane – Beginning at the intersection with Robert E. Lee Drive (Rte. 608) and extending north on River Valley Lane approximately 1,100 ft.
11. Singing Wood Lane – Two areas along this road: (a) From approximately 8305 Singing Wood Lane to Singing Wood Lane 8100, (b) From approximately 8028 Singing Wood Lane to 8305 Singing Wood Lane.
12. Millwood Drive – Three areas along this road: (a) From approximately 8700 Millwood Dr. to 8802 Millwood Dr, (b) From approximately 8805 Millwood Dr to

8809 Millwood Dr, (c

- 13.) From approximately 8909 Millwood Dr to 8911 Millwood Dr.
14. Millwood Court – West of 9009 Millwood Ct.
15. North Lake Drive – Two areas along this road: (a) Beginning at the Intersection of Jennings Lane and Northlake Drive, (Two isolated areas), go approximately 528 ft. west on Northlake Drive to the beginning of the inundated area for the length of approximately 158 ft, (b) proceed approximately another 1,000 ft. to the beginning of the inundated area for the length of approximately 264 ft.
16. Southlake Drive – Two areas along this road: (a) Beginning at the intersection of Jennings Lane and Southlake Drive, go approximately 580 ft. south to the beginning of the inundated area for a length of approximately 425 ft. (b) proceed approximately another 850 feet to the beginning of the inundated area for the length of approximately 700 feet.
17. Millwood Drive – Two areas along this road: (a) Intersection of Millwood Drive, east to end of Millwood Drive at cul-de-sac, (b) from approximately 8810 Millwood Drive to 8812 Millwood Drive.
18. Old Mill Lane – From approximately 8312 Old Mill Lane to 8314 Old Mill Lane.
19. Block House Road (Rte. 648) From approximately 7893 Blockhouse Road to 7812 Blockhouse Road over the Poe River.
20. Courthouse Road (Rte. 208) - 8150 Courthouse Road to 8044 Courthouse Road, a length of approximately 1,400 feet.
21. Snow Hill Drive – From approximately 7142 Snow Hill Drive to 7240 Snow Hill Drive.
22. Garner Farm Road – Beginning approximately 1,250 ft east of intersection with Courthouse Road and extending 1,000 feet beyond that point.
23. Blackfish Lane – Two location on this road: (a) Between Iowa Lane and Ponca Lane, (b) Between Kusan Lane and Cornstalk.
24. Laughing Water Lane – From intersection with Fawnskin Lane, east to end of Laughing Water Lane.
25. Fawnskin Lane – From Laughing Water Lane to Canonchet Lane.
26. Naomi Lane – From Laughing Water Lane to Snow Bird Lane.

27. Blackfoot Lane – For its entire length.
28. Algonquin Drive – From Blackfoot Lane to Seneca Drive.
29. Maya Lane – From Cliff Dweller Lane to Kickapoo Lane
30. Jefferson Davis Highway (Rte. 1) - 6828 Jefferson Davis Highway South to 6636 Jefferson Davis Highway, length of approximately 1,200 ft over the Po River.
31. North Roxbury Mill Road (Rte. 632) – From 6906 North Roxbury Mill Road to 6973 North Roxbury Mill Road over the Po River
32. Interstate 95 - over the Po River at approximately mile marker 119.

Bridges and culverts that would be affected include:

1. Catharpin Road (Rte. 612) over the Po River
2. Mill Pond Road over Wright's Pond
3. Robert E. Lee Drive over the Po River between 8700 and 8517
4. Block House Road (Rte. 648) over Po River
5. Courthouse Road (Rte. 208) over the Po River
6. Jefferson Davis Highway (Rte.1) over the Po River
7. North Roxbury Mill Road (Rte. 632) over the Po River
8. Interstate 95 over the Po River

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### Appendix H – Flood Depths

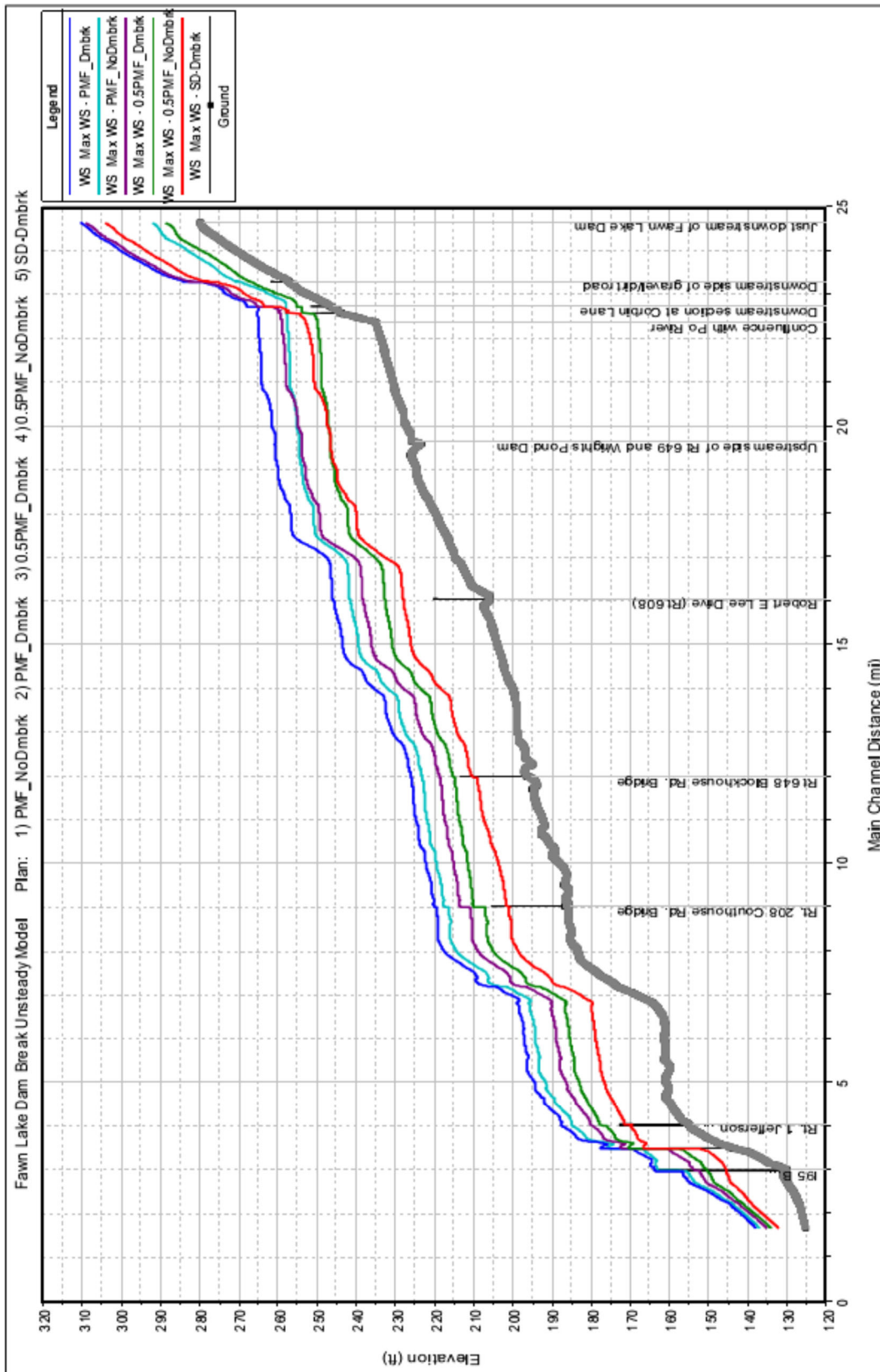


Figure 5. Maximum Water Surface Elevation Profiles.

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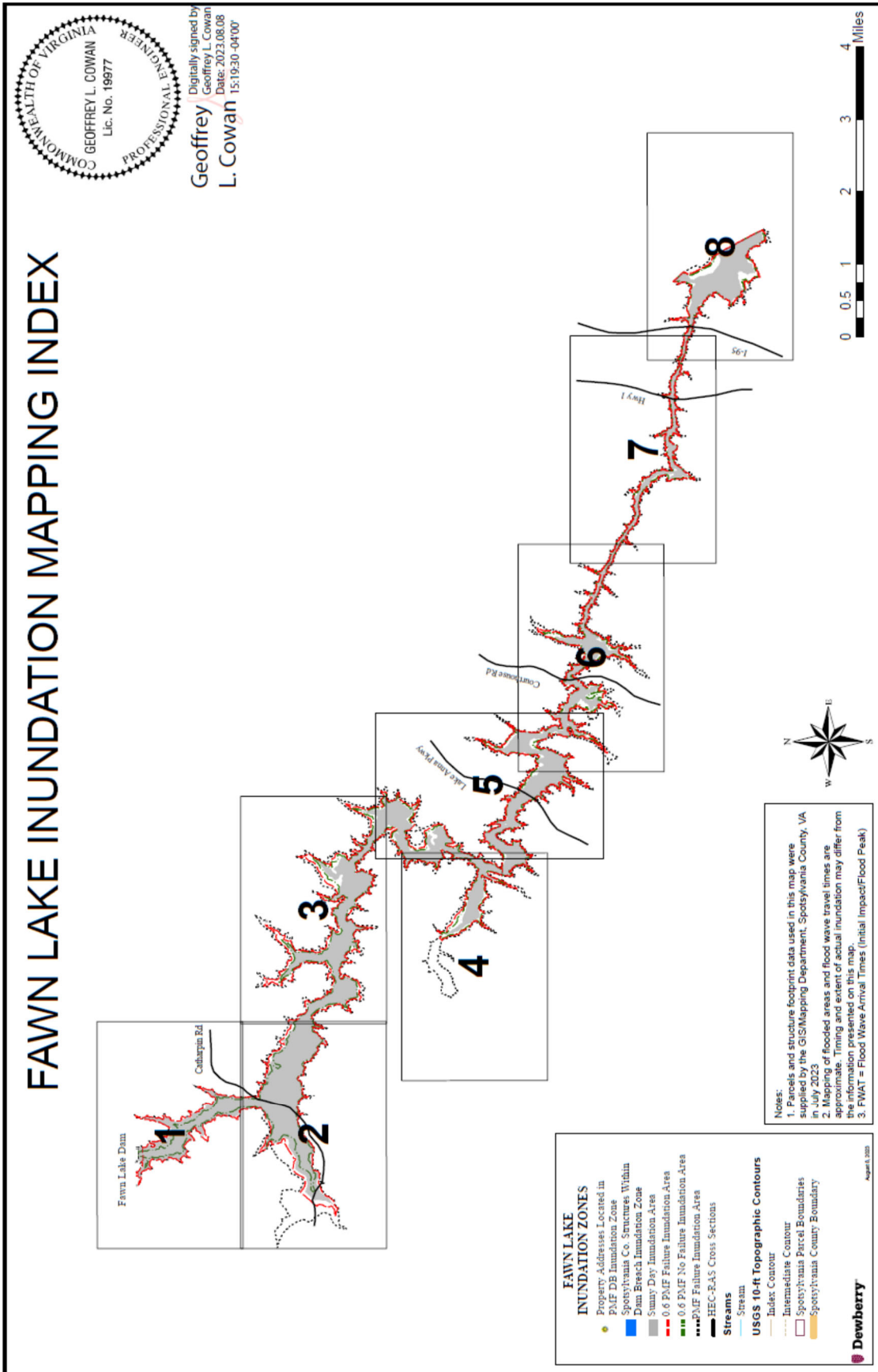
## **Appendix I – Investigation & Analysis of Impounding Structure Failure Floods**

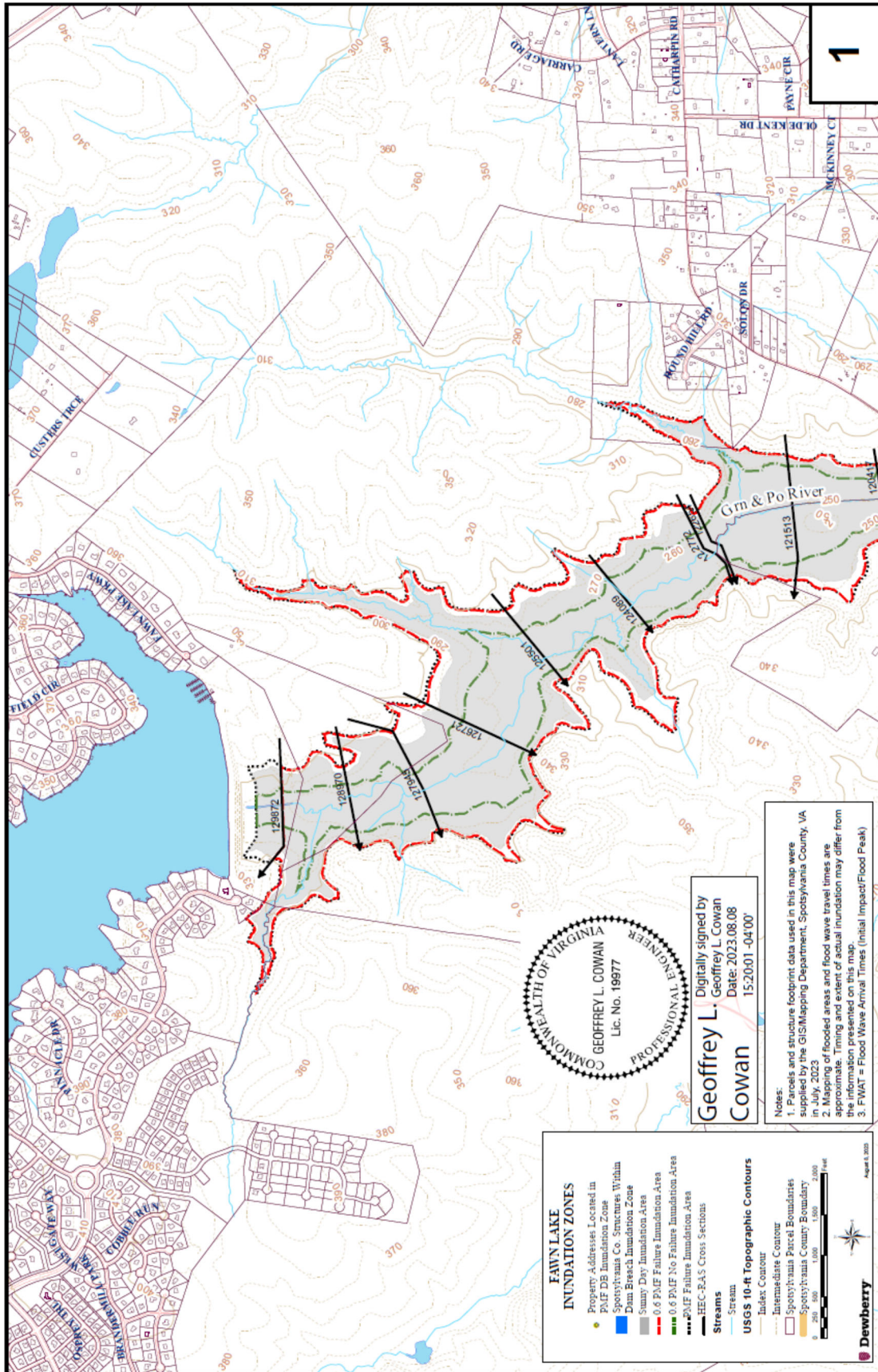
A dam breach analysis was performed for Fawn Lake Dam in accordance with the following procedures. Inflow and outflow hydrographs for Fawn Lake Dam and runoff hydrographs from downstream sub-basins were determined using the Corps of Engineers HEC-1 computer program. PMP rainfall amounts were taken from the National Weather Service (NWS) publication HMR-51 and distributed temporally in accordance with the Natural Resources Conservation Service (NRCS) publication TR-60 and spatially in accordance with NWS HMR-52. The resulting rainfall hyetographs were converted to runoff hydrographs using NRCS procedures for determination of runoff curve number, lag time, and unit hydrographs. The NRCS 24-hour, 5-point temporal rainfall distribution was determined to be the most conservative of all the NRCS temporal storm distributions and was selected for PMF development and subsequent dam break analysis. Dam breach simulation and determination of dam breach hydrographs was performed within HEC-1. The dam breach and no-breach hydrographs from HEC-1 were input into the Corps of Engineers HEC-RAS computer program (unsteady model simulation) to simulate passage of the flood waves through the stream valley downstream of the dam. Cross sections for the unsteady HEC-RAS model were developed based on USGS DRG topographic mapping. Peak water surface elevations from the unsteady HEC-RAS model for the dam breach and no-breach simulations were plotted on the USGS DRG topography in order to map the inundation zones. Spotsylvania GIS data was used to identify structures within the inundation zones.

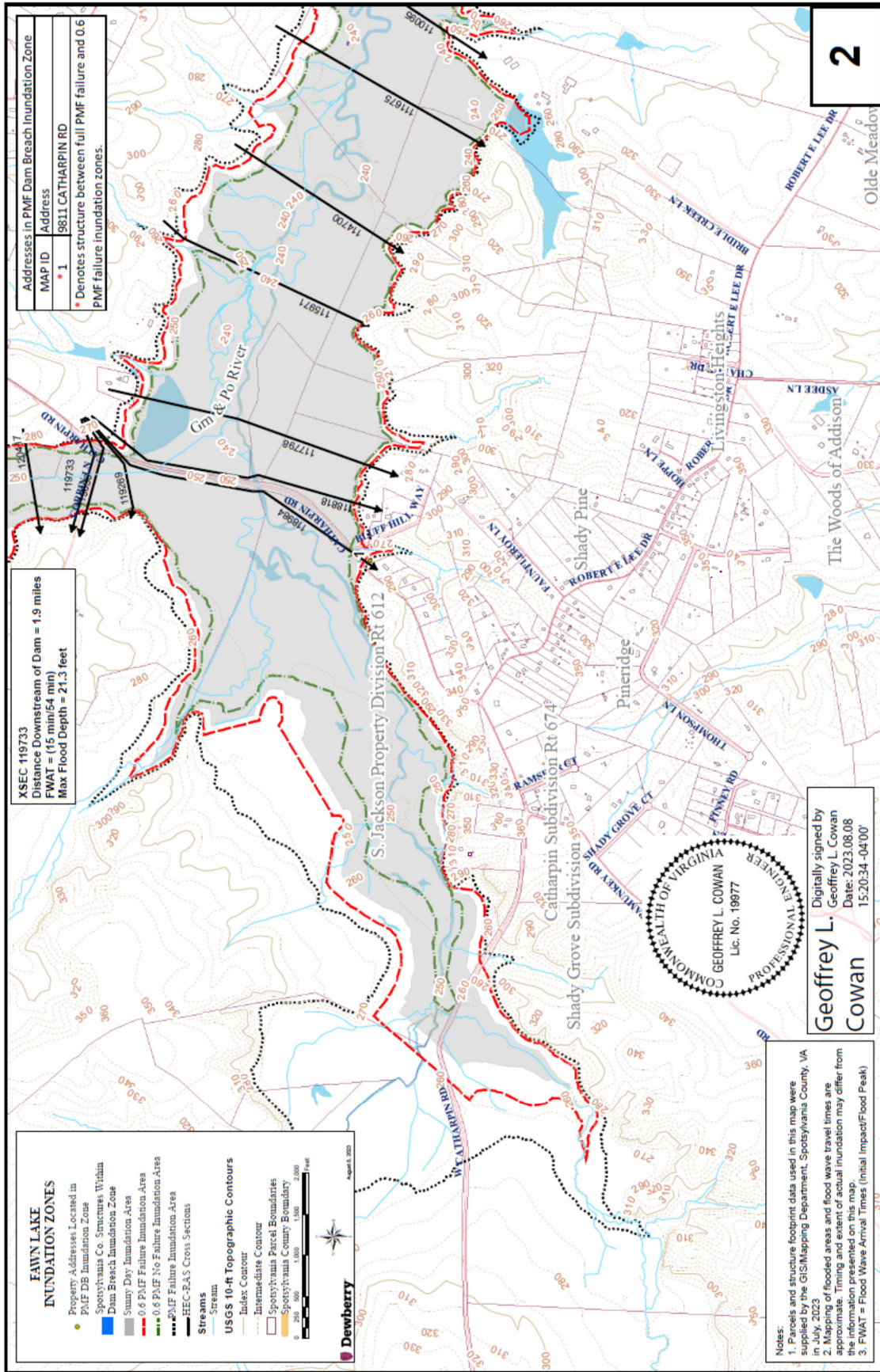
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## **Appendix J – Inundation Maps**

The inundation maps were updated in August 2023 as part of the six-year update cycle.

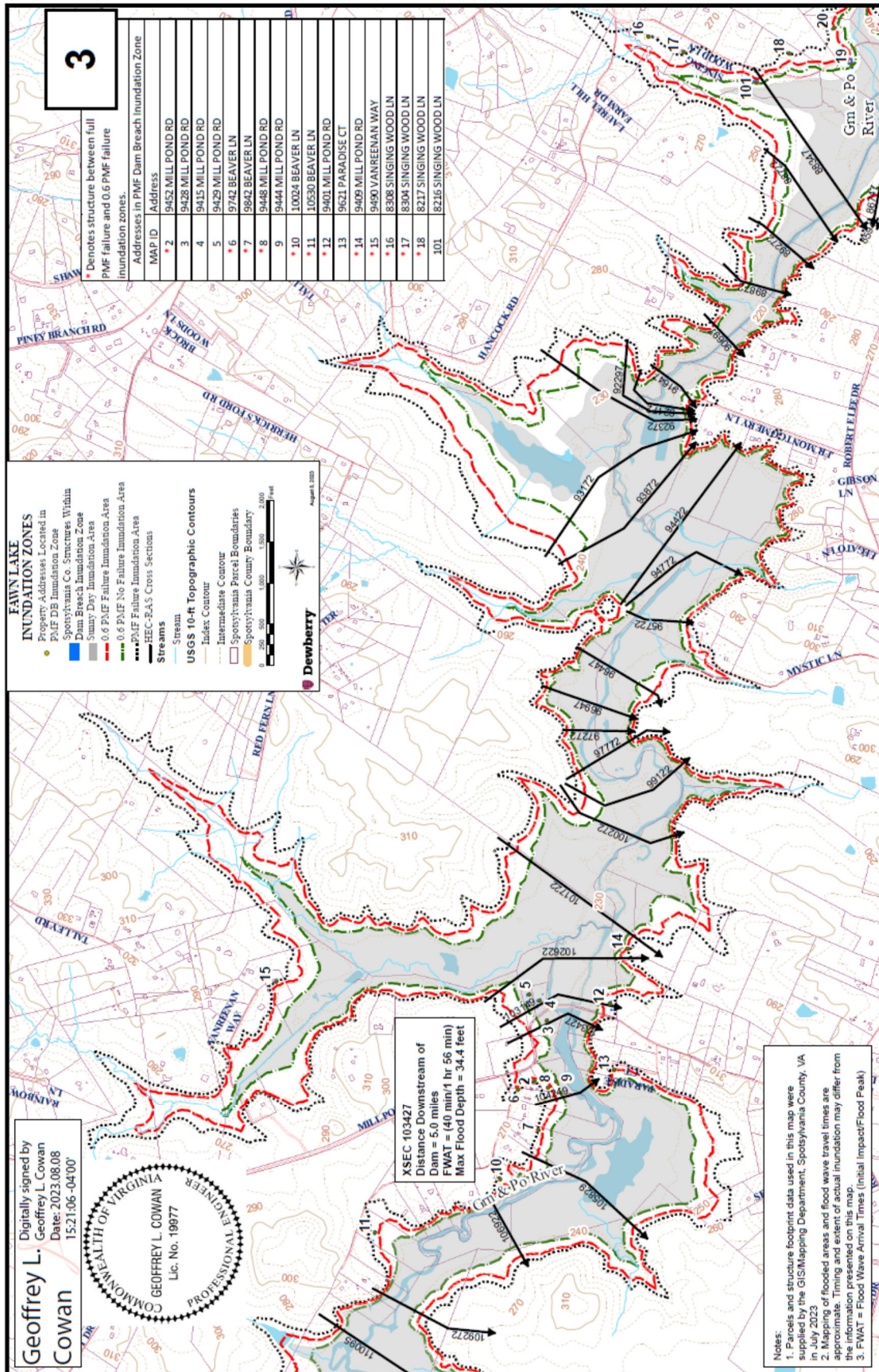


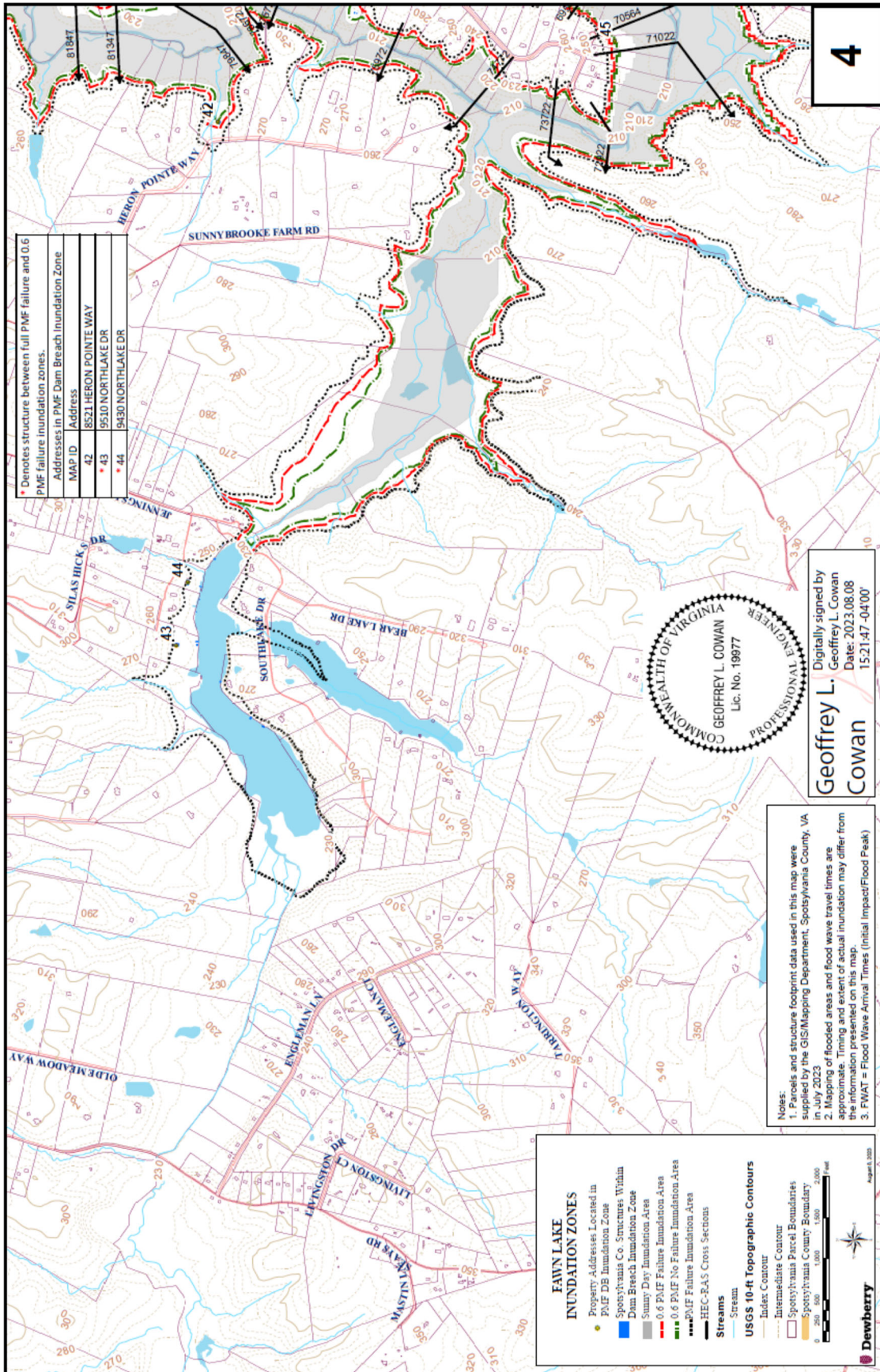


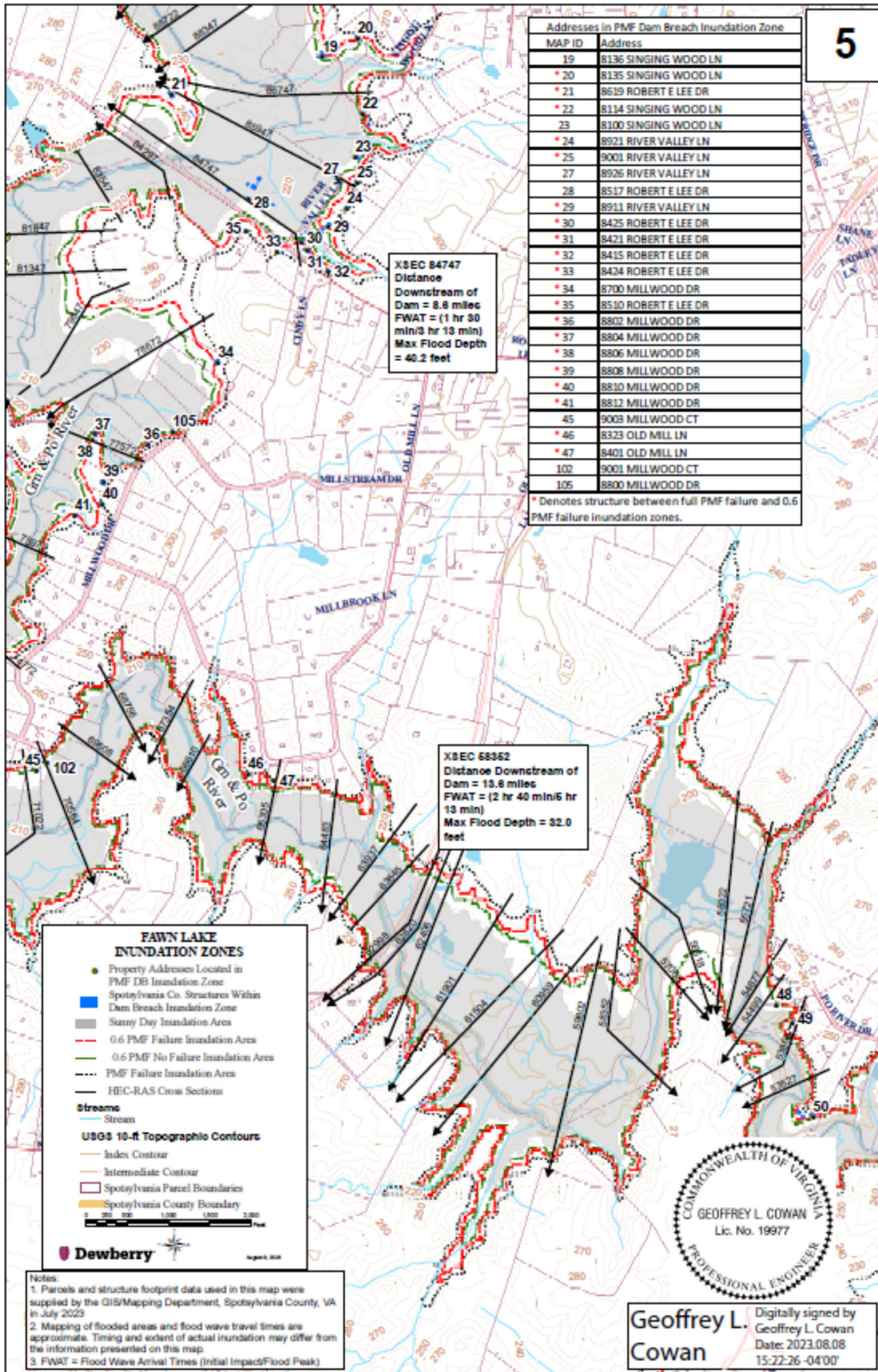


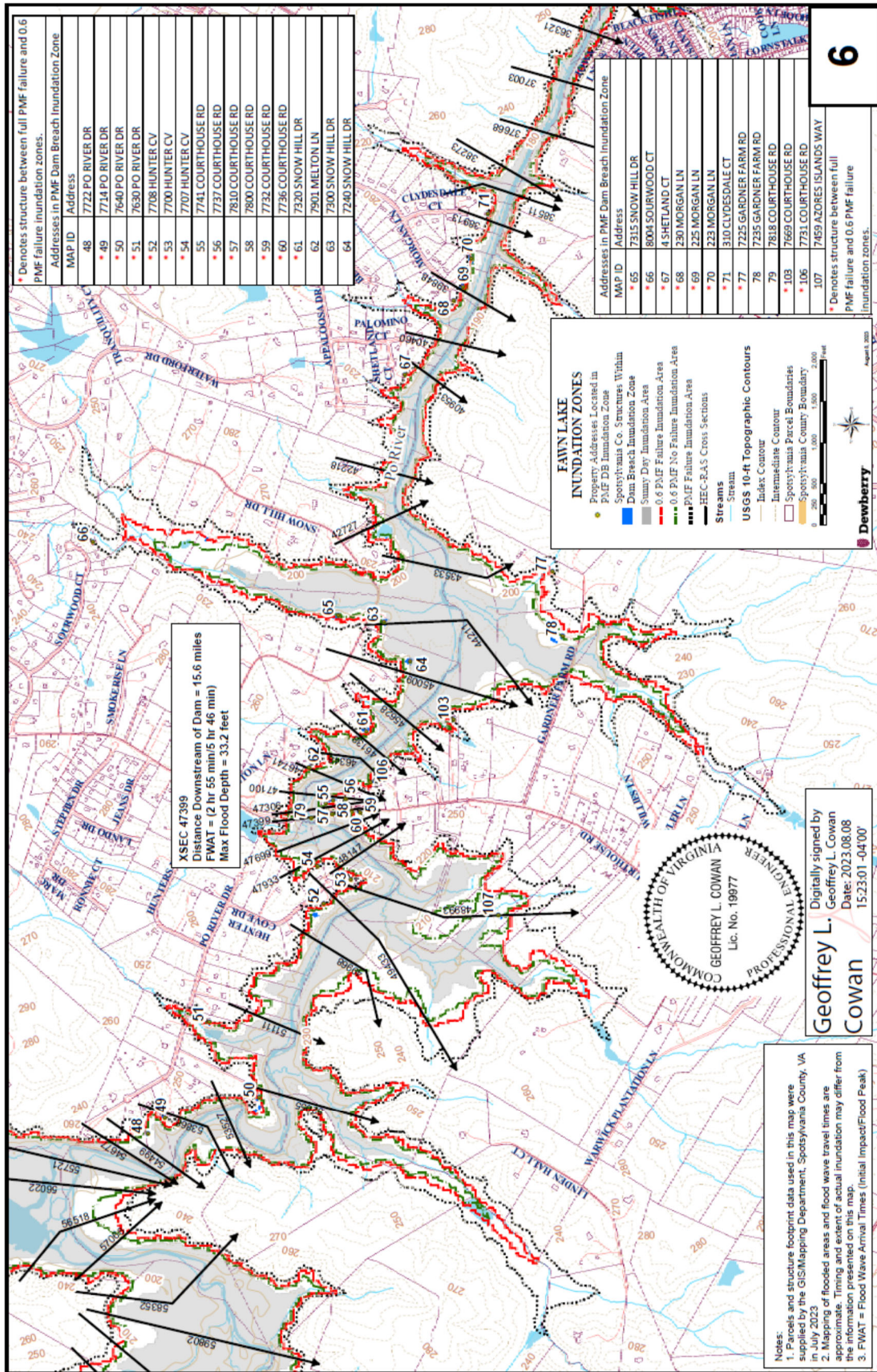
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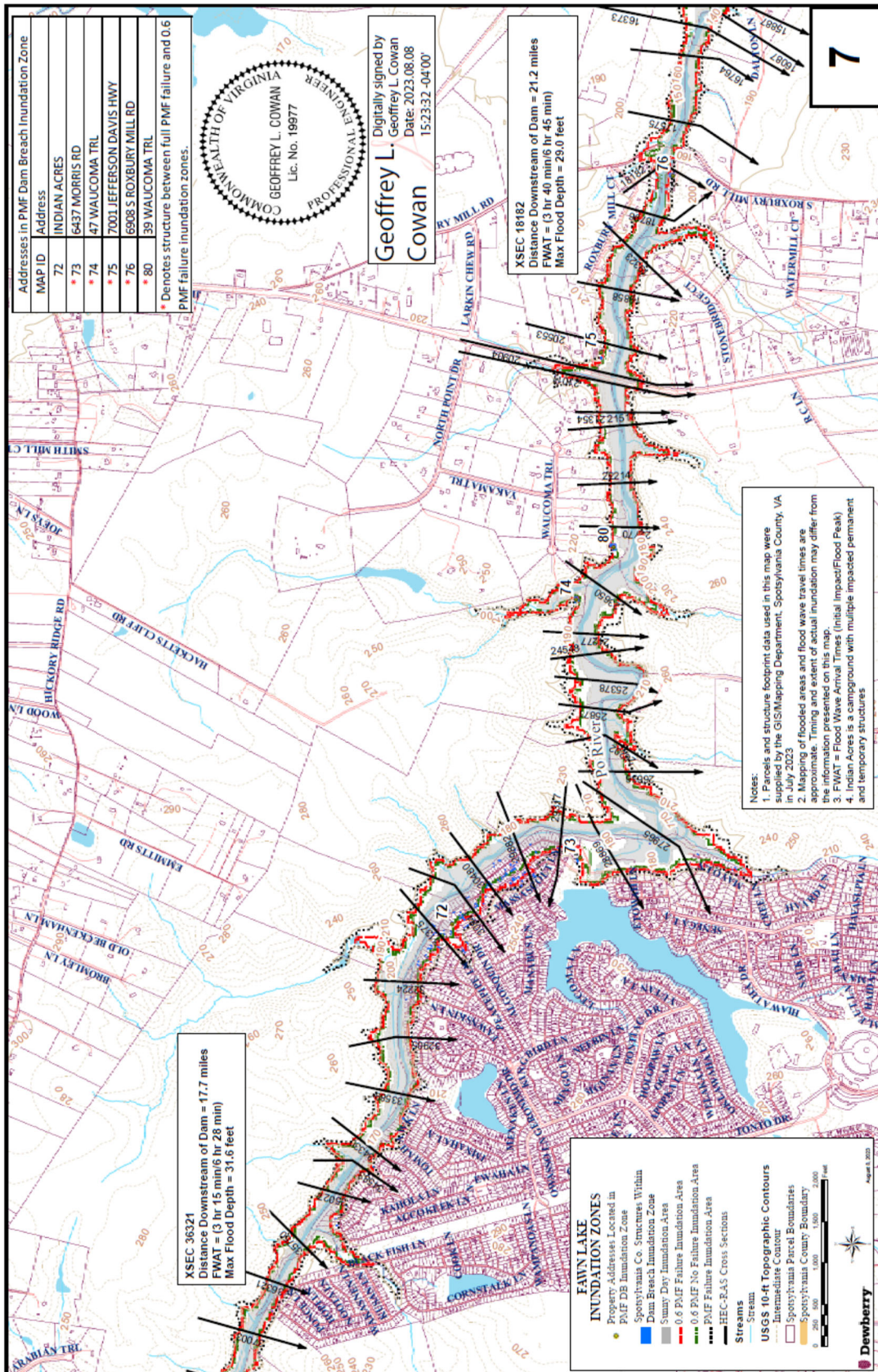


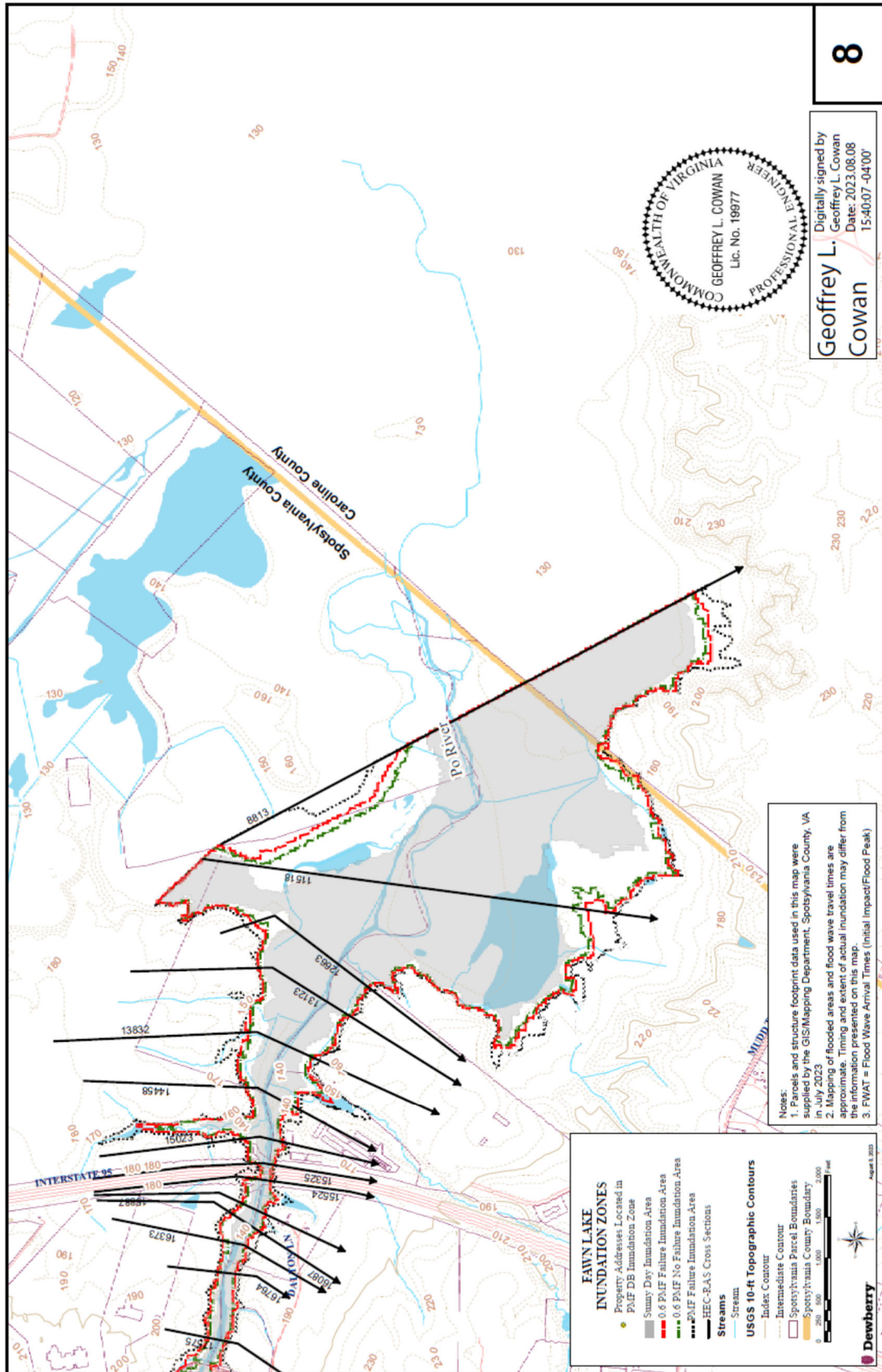












## **Appendix K – Fawn Lake Community Map**

The current map of the Fawn Lake community, including future development areas is provided in the following link. This link is for the full size PDF file which can be printed on large size paper, or displayed on a computer screen so you can zoom in on particular areas of the map.

[Fawn-Lake-Site-Plan-2020.4.30](#) - master plan map 2020

The following page shows a reduced size map for convenience.

