EMERGENCY ACTION PLAN

CEDAR LAKE DAM
DEEP #16603 / HAZARD CLASS "B"

NORTH STREET
MAD RIVER
WOLCOTT, CONNECTICUT

PREPARED FOR:

CEDAR LAKE OWNERS ASSOCIATION

NOVEMBER 2020

Prepared by:

KARL F. ACIMOVIC, P.E.
588 Stonehouse Road
Coventry, CT 06238

Professional Engineer Certification

The following certification must be signed by a Professional Engineer

"I hereby certify that the inundation map and the monitoring intervals were prepared and determined by me and are true and correct to the best of my knowledge, belief, and professional judgment."

Signature of Professional Engineer | Date

Printed Name of Professional Engineer | Title | CT P.E. Number

Name of Firm

Address of Firm

Affix P.E. Stamp Here

Table of Contents

SECTION Page No.

1. EXECUTIVE SUMMARY

1.1 Purpose

The purpose of this Emergency Action Plan (EAP) is to reduce the risk of human life loss and injury and minimize property damage during an unusual or emergency event at Cedar Lake Dam. It is intended to provide guidance for proper monitoring of the dam during severe weather situations and for responding with appropriate emergency measures in the event of a potential failure of the spillway and / or the embankment section of the dam, or any other hazard that could endanger the general public downstream of this structure. Monitoring should be scheduled on a routine basis throughout the year and performed on a more intensive basis just prior to and during severe weather situations.

1.2 Facility Information

Cedar Lake Dam is located along the Mad River, in the northerly section of the Town of Wolcott (the northern half of the impoundment is within the City of Bristol). The dam is owned and operated by the Cedar Lake Owners Association for the purposes of recreation and aesthetics. The crest of the dam carries North Street over it; the road surface is owned by the Town of Wolcott, which is responsible for maintenance of said road. The dam is accessible for maintenance from both sides of the dam, adjacent to North Street, and from the right side for more extensive repairs, if necessary.

1.2.a Physical Description of the Dam

Cedar Lake Dam consists of an earth embankment approximately 300 feet long with a concrete drop inlet spillway near its left side. The spillway has a steel trash rack covering its top opening, and a weir board slot at its inlet. Flow passing over the spillway inlet is carried downstream by a 4' wide x 3.5' high stone discharge tunnel through the embankment and exits near the left end of the downstream embankment slope. The crest of the dam is traversed by North Street along its full length; there is a concrete retaining wall running along the road on the upstream side[1]. The downstream embankment slope is largely faced with intermediate-sized ungrouted riprap. There is a brick gatehouse in the approximate center of the upstream embankment, through which passes the 16" low level outlet pipe. The downstream end of this pipe exits near the center of the downstream embankment through a stone masonry discharge chamber with a concrete top.

[1] Note that the full base extent of this upstream shoreline wall is unknown.

Pertinent data includes the following:

Year Built:	Between 1874 & 1893 (modified 1907)
Owner:	Cedar Lake Owners Association
Dam Operator:	Cedar Lake Owners Association
Outflow Location:	Mad River
Height:	15 ft.
Drainage Area:	0.90 sq. mi.
Impoundment Area:	136 acres
Dam Length:	300 ft.
Spillway Length:	14 ft. (Semi-circular)
Spillway Height:	6 ft. (Spillway crest to the upstream base invert of the box culvert[2])
Spillway Type:	Drop inlet concrete weir
Spillway Crest Elev.:	892.0’
Spillway (Full) Capacity:	131 cfs[3]
Hazard Classification:	B
EAP Storm Analysis:	500-Year Storm
Top of Dam Elevation:	894.0’
500-Year Outflow:	250 cfs
500-year Water Surface Elev.:	894.14’
500-Year Overtopping:	0.14 ft.
Latitude:	N 41º 38' 10"
Longitude:	W 72º 58' 13"
Record Water Surface Elevation:	Unknown

1.2.b History of the Dam

Historical mapping indicates that Cedar Lake Dam was originally constructed for use in downstream manufacturing operations sometime between 1874 and 1893, impounding the area where Cedar Swamp previously existed. The dam was purchased in the early 1900s by the Mad River Company for use in their mill operations downstream along the Mad River in Waterbury. In 1907 the dam was raised and improvements were made to the outlet structure and embankment. The dam and lake were purchased by the Cedar Lake Owners Association in 1986. The lake – and since its purchase, the dam – have been maintained by this organization (and its predecessor organization) by agreement with the Mad River Co. since the 1960s for conservation and for the recreational use of its members living along the lake's shore. Improvements to the dam were performed in 1988 by D&V Morin (general contractor) per a design by Heynen

[2] Approximately 4 ft. high if measured from the bottom of the weir board slot to the upstream concrete base of the box culvert entrance.
[3] Capacity at top of dam (approximate road surface)

Engineers, which included repairs to concrete portions of the structure and improvements to the downstream riprap slope. Further repair and improvement work was performed in 1996 by D'Amato Construction, under design by this office.

1.2.c Drainage Area & Watercourse

The drainage area of Cedar Lake Dam is 0.90 sq. mi. in size. The watershed is generally characterized by hilly and wooded terrain, but with a significant amount of suburban housing spread mostly around the lake area. Soils in general have moderate to slow infiltration rates. The lake itself occupies a considerable amount of the watershed, approximately 24%, thus providing a substantial volume for flood storage during significant storm events.

Downstream of Cedar Lake Dam, the Mad River enters first a largely wooded area and then passes through a relatively dense commercial area as it flows along a path that threads through and along Wolcott Road (CT Route 69) on its way to a second large impoundment, Scoville Reservoir, and then continues on its way toward Waterbury. It should be noted that as the flow courses southward, it is joined by numerous small streams and other impoundments, all of which at one time supplied the water and flow needed to maintain large mills in the Waterbury area for mechanical power as well as drinking water needs.

1.3 Dam Breach Flood

An analysis has been performed for Cedar Lake Dam to estimate the downstream areas that could be inundated by flood waters in the event of a breach of this structure. The analysis was completed in 2020 by Karl Acimovic, P.E. The dam breach flood and downstream inundated areas were determined by use of the Corps of Engineers' HEC-1 computer model; this software was also used for the watershed's hydrologic assessment and hydraulic modeling for the dam's outflow and overflow.

The assumptions applied to the breach analysis and the potentially inundated areas are summarized below. Detailed information on the impacted areas, including inundation mapping and a listing of people at risk, is provided in Section 3.

Dam Breach Modeling Assumptions

The potential area of inundation due to a breach of Cedar Lake Dam as presented in this EAP is based on the following assumptions:

1. The pre-breach water level in the impoundment is at or just slightly over the top of the dam. The watershed and dam were analyzed for the occurrence of the 500-year storm

event, which resulted in a water surface elevation of 894.14 feet, approximately 0.14 feet over the top of the dam.

2. The pre-breach water level in the downstream reach is based on the same HEC-1 analysis of the conditions prior to the breach but at the same conditions noted in No. 1, above.

3. The time from breach initiation to full formation used for the purpose of this EAP is 3.0 hours.

4. The final breach bottom width is 30 feet, the depth from top of dam is 10 feet and the side slopes of the breach are 1H:1V.

5. Downstream bridge openings are assumed not to be blocked.

For the purposes of this EAP, breach initiation is defined as the beginning of uncontrolled growth of the breach, and full formation is defined as the point when significant lateral expansion has stopped. The bases of the assumptions used herein include the fact that the top of the dam is a paved road surface, that there is a concrete upstream cutoff wall[4], and that the depth of the breach is governed by the submerged upstream base elevations.[5]

This analysis provides a conservative estimate of the dam breach outflow and the potentially inundated downstream areas. However, the actual magnitude of the flood wave and the resulting downstream flood levels will be dependent on numerous factors that cannot be predicted in advance. For example, the dam breach flood wave would be greater in magnitude if the water level in the impoundment is higher at the beginning of the failure. Furthermore, downstream flood levels could be increased due to conditions such as debris clogging bridge/culvert crossings and others. If these conditions exist, additional nearby properties may need to be evacuated.

Although not used for this analysis, there is a possibility that overtopping and a potential breach of the dam could be significantly delayed by removal of the weir boards and opening of the low level outlet's gate valve. The current analysis has taken a conservative approach by assuming that the weir boards were not removed, either by intent or by the lack of operability or accessibility prior to the storm.[6]

---

[4] Although the full depth of this wall is not known, its existence on the full length of the upstream side of the dam, extending down to the upstream soil surface, would, at minimum, slow the ensuing erosive process. Noteworthy also is the fact that the upstream edge of the paved road surface abuts directly against this wall with no open joint, again preventing and delaying the full breakdown of the embankment.

[5] A photo from the early 1900's of the upstream intake area shows the then ground surface in relation to the base of the current intake structure.

[6] See additional information in the Guidance for Warnings on Page 13.

Potentially Impacted Downstream Areas

The area downstream of the dam that could potentially be impacted by a breach of the dam includes roads, bridges and commercial areas. Prime among these facilities are the several bridge crossings of Wolcott Road (CT Route 69) and those in close proximity thereto. There are six (6) road crossings prior to flow reaching Scoville Reservoir, situated in the south central portion of the Town of Wolcott. In total, there are two residential and three commercial building structures that could be impacted by the breach of the dam.

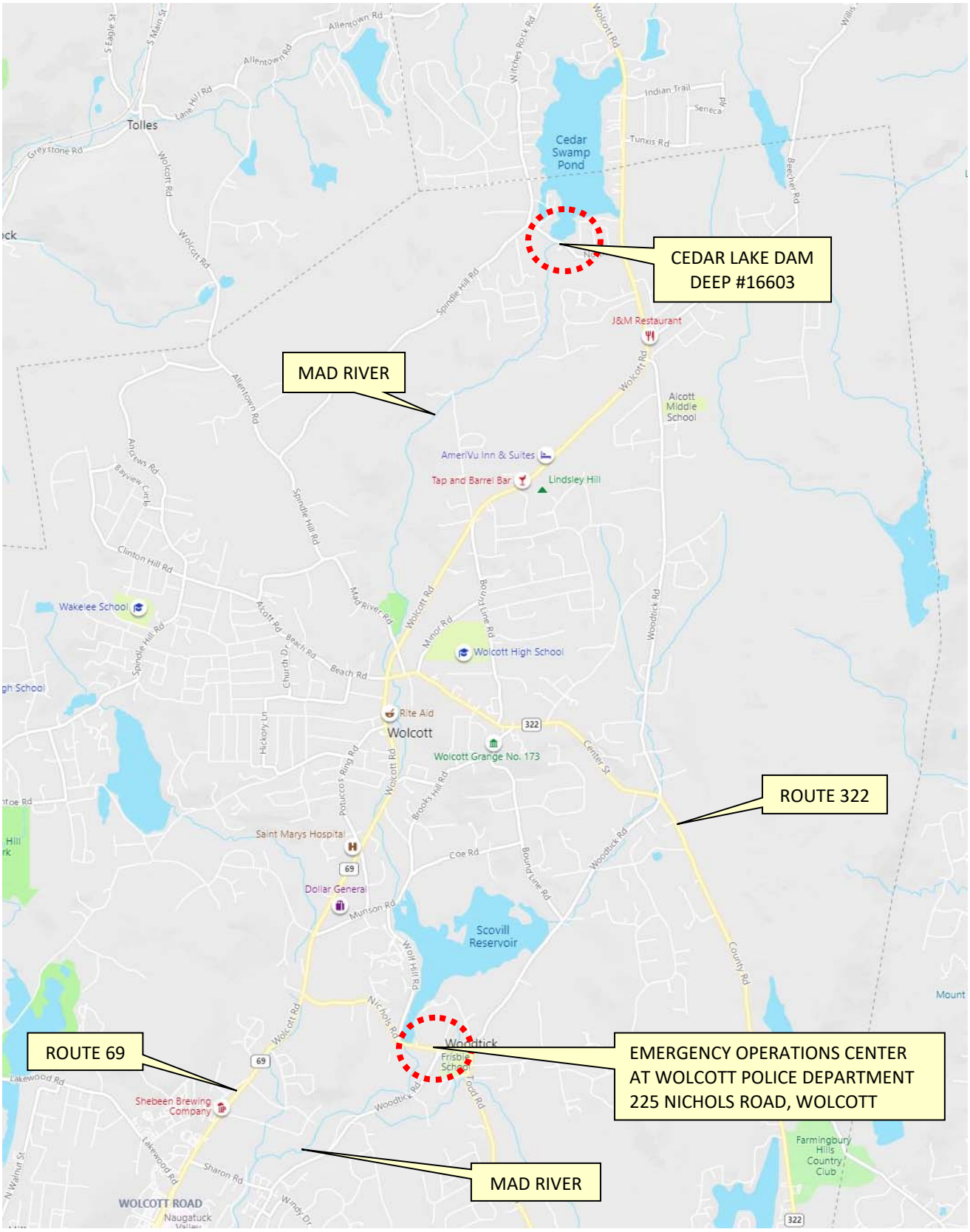
1.4 Location & Directions

Cedar Lake forms the headwaters of the Mad River and is situated in the northern part of the Town of Wolcott; the northern half of the impoundment is located within the neighboring City of Bristol. It is accessible for maintenance or repairs on both the right (west) and left (east) sides of the embankment, directly adjacent to North Street (which runs atop the crest of the dam).

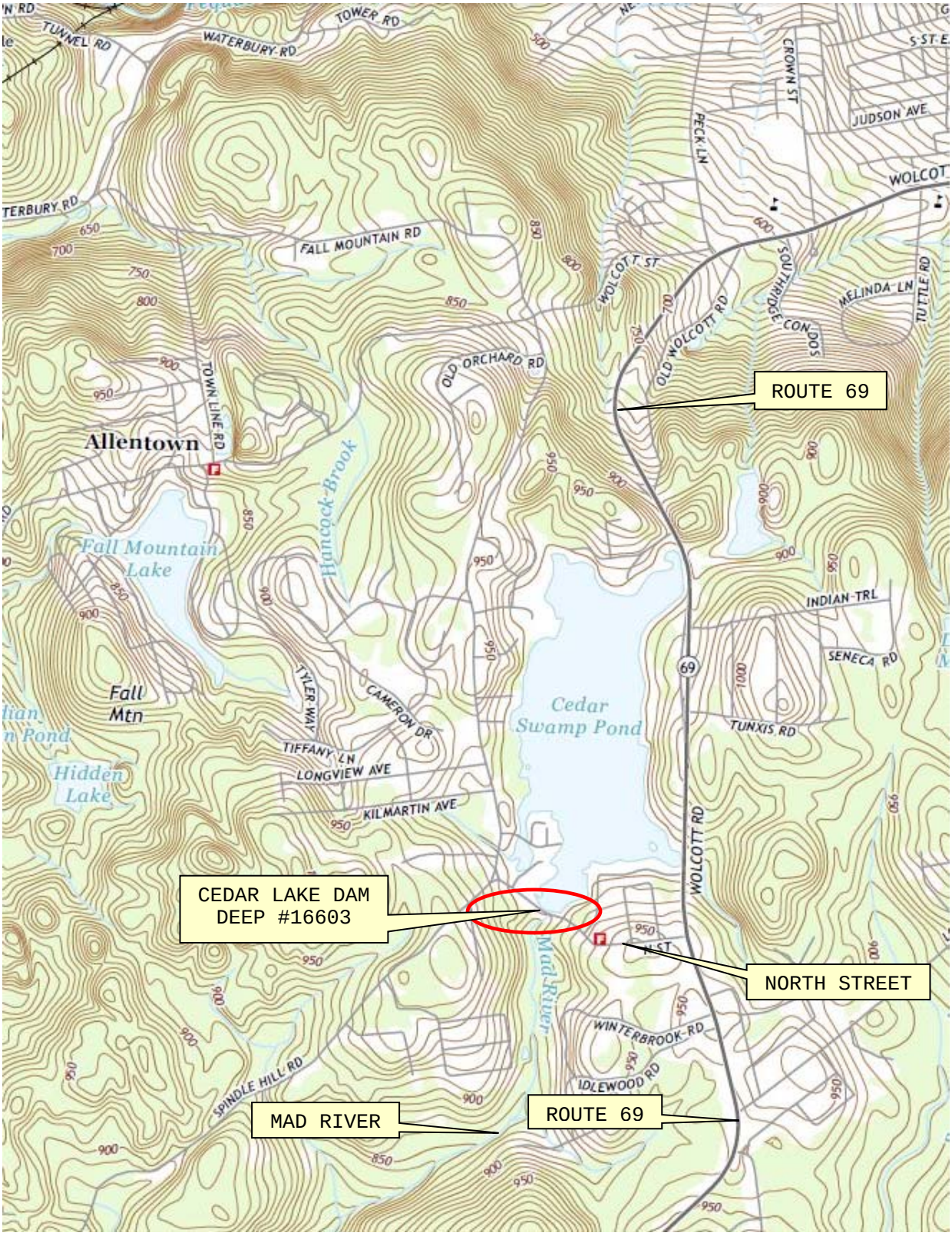
The main dam site is accessible from North Street (which runs along the top of the dam) and is located approximately 0.4 mile west of Wolcott Road (Route 69) and 0.25 mile east of Spindle Hill Road.

1.5 Location of Emergency Operations Center

The Emergency Operations Center for the Town of Wolcott is located at the Town of Wolcott Public Safety Facility, at 225 Nichols Road, Wolcott, CT 06716. (See following Location Map.)



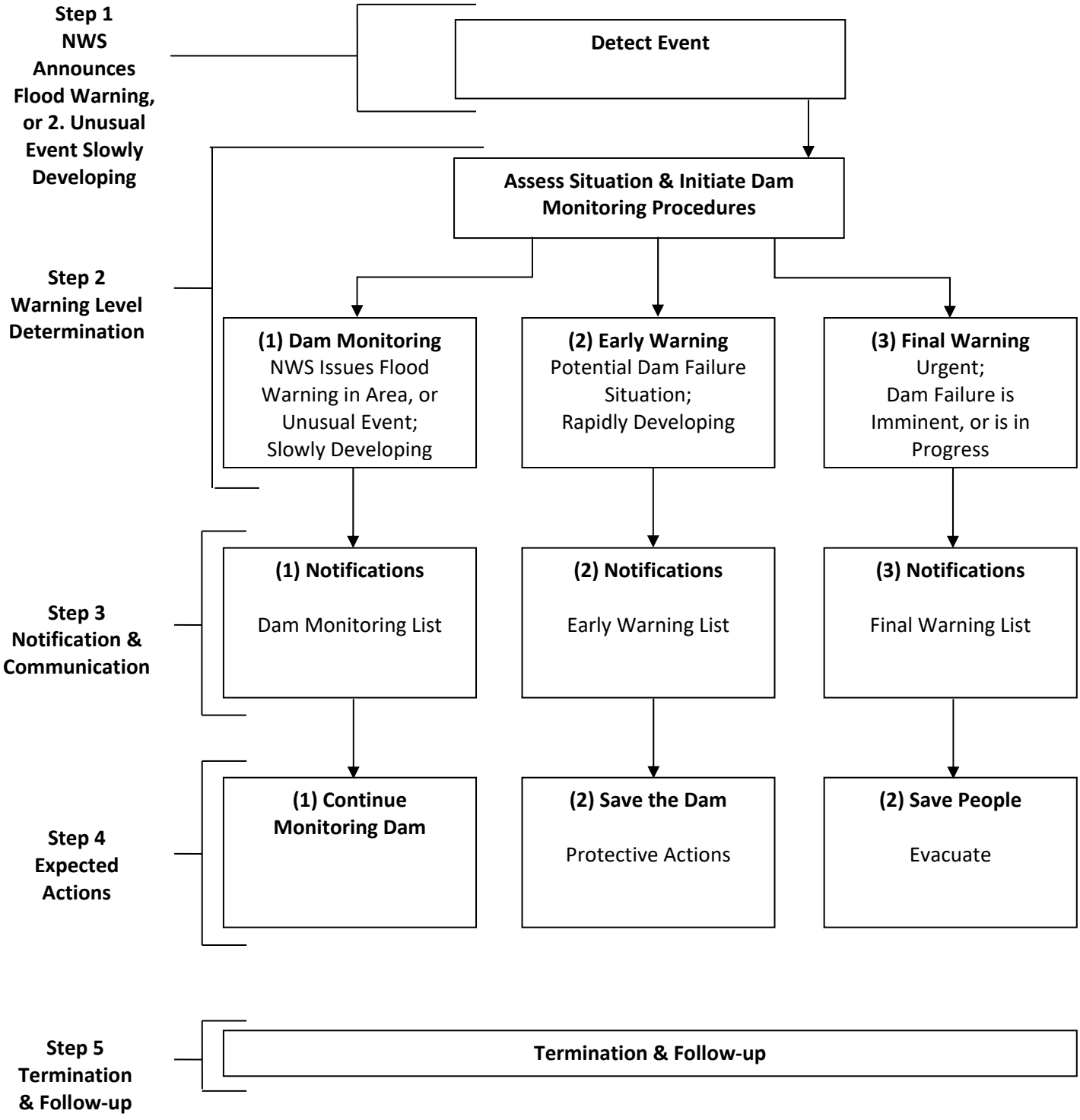
LOCATION MAP
CEDAR LAKE DAM & EMERGENCY OPERATIONS CENTER



CEDAR LAKE DAM / LOCATION MAP

2. The Five-step EAP Process

2.1 EAP Overview



2.2 Warning Level Determination

After monitoring of the dam has been initiated, the Cedar Lake Owners Association (CLOA – the dam owner), the designated operator, or their representative is responsible for determining if conditions warrant one of the following warning levels:

Level 1 / Dam Monitoring – Non-emergency event, slowly developing:

Monitoring of the dam shall be initiated when the National Weather Service announces a *Flood Warning* for the area or when the owner, operator, their representative, or engineer observes any of the following conditions:

- A marked increase in seepage through the embankment, particularly if evidence of a boil (release of seepage under pressure which tends to "float" away the material through which it flows) is observed at or near the downstream toe area.

- An increase in the rate of rise of the impoundment such that a non-overflow section(s) of the dam may be overtopped, i.e., the road surface of North Street.

- An instability along the spillway weir or adjacent abutment wall areas, such that a failure of such walls could occur imminently. This could potentially impede flow through the current box culvert outlet structure.

- There is a noticeable shift or misalignment along a section of the embankment, particularly at the deepest section adjacent to the gatehouse. Indications of such shift or misalignment would most likely appear as cracks or other imperfections on the road surface.

Responsible Personnel

The following individuals are responsible for monitoring activities, decision making, and coordinating and implementing emergency repairs at the dam:

Personnel	Affiliation / Responsibilities	Phone Number(s)
Mike Guerra	Cedar Lake Owners Association	Cell: (203) 206-6046
Matt Smith	Cedar Lake Owners Association	Cell: (860) 919-9554

Monitoring Procedures

The personnel listed in the *Notification Chart* shall be notified that monitoring procedures have been initiated in accordance with this EAP.

Monitoring activities shall include viewing the dam and, if it is safe to do so, walking the dam crest at regular intervals to determine if any sloughing of the embankment, cracking, settlement, or movement of the dam has occurred. This shall also include the inspection of the toe of the dam and the abutment contacts to detect any signs of deterioration of the dam or its components, and inspection of the spillway and outlet structure for accumulations of debris.

All monitoring activities shall be documented on the *Unusual or Emergency Event Log* provided as *Appendix B-2*. At a minimum, the documentation shall include the following:

- The date and time of each inspection interval, rainfall data, and reservoir level.
- Observation of any changes in the dam including sloughing of the embankment, cracking, settlement, movement, erosion, seepage, deterioration of abutment contacts, debris obstructing the spillway or outlet structure, or any other sign the dam is deteriorating.
- When observing seepage, the written record shall comment on location, amount of flow and whether the flow is clear, cloudy or muddy.
- The written record shall comment on the extent, depth, and location of said conditions when observing movement, sloughing, or erosion of the dam.

Intervals at which monitoring should be conducted for severe storm events should be as follows:

- Prior to the beginning of a severe storm as predicted and determined by the NWS (National Weather Service) or other reliable weather information provider. This will provide a base line of conditions prior to inclement conditions.
- At the beginning of the storm and then every hour thereafter until water level in the spillway reaches 1.5 feet above the weir crest.
- When water level begins to surpass the 1.5-foot level, then monitoring should be conducted on a continuous basis until further action is required or until water levels begin to subside.

Note: See following table, *Guidance for Warning Level Determination*, for assistance in evaluating specific events to determine if they are unusual or potential emergency situations.

<u>Level 2 / Early Warning</u> - 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. Remedial actions may be able to save the dam. If an engineer has been designated, time permitting, they should be contacted to evaluate the situation and recommend remedial actions to prevent failure of the dam. The Cedar Lake Owners Association (CLOA – the dam owner), the operator, or their representative should initiate remedial repairs (note local resources that may be available - see *Appendix A*) as recommended and as may be practical given time and circumstances.

This warning level is also applicable when the water level in the impoundment, as observed by levels in the spillway, is rising at a rate that **<u>may</u>** cause the outflow from the dam to increase significantly such that downstream areas and roads could be flooded, or people near the downstream channel could be endangered.

CLOA (the dam owner), the operator, their representative, or the engineer should closely monitor the condition of the dam and periodically report the status of the situation to the emergency management authority. If the condition worsens and failure becomes imminent, the owner, the operator, their representative, or the engineer must immediately notify the emergency management authority that conditions warrant issuing a *Final Warning*.

<u>Level 3 / Final Warning</u> - Urgent; dam failure appears imminent or is in progress:

This is an extremely urgent situation when a dam failure is about to occur or is occurring and cannot be prevented. Flash flooding will occur downstream of the dam.

Monitoring Equipment & Supplies

All inspections should be performed with proper safety equipment. Means of remote communication (e.g., mobile phone or two way radio) should be maintained to allow prompt contact with emergency officials if unsafe conditions are found at the dam. Additionally, the following steps will be taken to provide adequate lighting to view the dam at night. Because the CLOA does not have emergency lighting equipment available, it will make every effort to obtain such from local rental establishments and, if unable to do so in a reasonable period of time preceding a severe storm situation, will contact emergency services to obtain assistance for emergency lighting from the local fire department or other emergency organization (e.g., police department, National Guard, or Civil Defense).

Note: See *Appendix A* for an inventory of available equipment, materials and manpower that can be utilized to respond to emergencies at the site. This list should be maintained by the owner, the operator, or their representative and revised as necessary. It may be possible to enlist the service

of a reliable construction contractor(s) who can be made available to supply needed manpower and equipment for emergency situations. This equipment should be used to buttress the dam structure (e.g., buttress eroded embankment areas or reinforce wall areas that appear to be misaligned, etc.) before water levels rise appreciably, or if possible, to perform emergency repairs during flooding.

Guidance for Warning Level Determination

Guidance for determining the appropriate warning level for Cedar Lake Dam is provided in the table below.

Event	Situation	Warning Level
NWS Flood Warning	A flood warning has been issued by the National Weather Service for the area in the general vicinity of the dam.	1
Sustained Spillway Flow	Spillway flow that would result in flooding of people downstream if the reservoir level continues to rise.	3
Embankment Cracking	New cracks in the embankment greater than ¼"- inch wide without seepage	1*
	Cracks in the embankment with seepage	2
	Cracks in the embankment with significant outflow	3
Embankment Movement	Visual movement/slippage of the embankment slope	2*
	Sudden or rapidly proceeding slides of the embankment slopes	3
Embankment Overtopping[7]	Reservoir level is within 1.25 feet of the top of the embankment	1
	Reservoir level is 0.8 feet or less below the dam crest.	2
	Reservoir level 0.5 feet below the upstream dam crest (i.e. the upstream concrete wall), or overtopping the dam	3
Seepage	New seepage areas in or near the dam	1
	New seepage areas with cloudy discharge or increasing flow rate	2*
	Rapidly increasing seepage with discharge carrying soil particles	3
Sinkholes	Observation of new sinkhole in reservoir area or on embankment	2
	Rapidly enlarging sinkhole	3
Earthquake	Measurable earthquake felt or reported within 50 miles of the dam	1
	Earthquake resulting in visible damage to the dam or appurtenances	2*
	Earthquake resulting in uncontrolled release of water from the dam	3
Security Threat Sabotage Vandalism	Damage to dam or appurtenances with no impacts to the dam functions; damage does not present a downstream threat.	1*
	Vandals have made changes to the structure or controlled outflow mechanisms that could affect dam functions, but show no direct signs of imminent downstream threat	1
	Verified bomb threat that, if carried out, could result in damage to the dam	2
	Detonated bomb that has resulted in damage to the dam	2*
	Damage to dam or appurtenances from vandalism and / or a bomb that has resulted in uncontrolled water release from any portion of the structure	3

Note: Numbers for warning levels refer to the discussion on previous pages. An * denotes specific warning levels which could be moved to the next level if so deemed by supervisory personnel.

[7] This dam has a slot for weir boards. In the event of an impending storm warning from the National Weather Service, weir boards could be removed and the low level outlet valve could be opened prior to such storm in an effort to lower water level in the lake. Depending on the time period between lowering of the water level and the arrival of the storm, lowering the water level could significantly delay any potential overtopping or breach of the dam.

Examples of Emergency Situations

The following are examples of conditions that could constitute an emergency situation that may occur at this dam. Adverse or unusual conditions that can cause the failure of a dam are typically related to aging or design and construction oversights. Extreme weather events that exceed the original design conditions can cause significant flow through the spillway or overtopping of the embankment. However, accidental or intentional damage to the dam may also result in emergency conditions. The conditions have been grouped to identify the most likely emergency-level condition, in the same order as detailed in the previous table. The groupings are provided as guidance only. Not all emergency conditions may be listed, and the CLOA, the operator, or its representative is urged to use conservative judgment in determining whether a specific condition should be defined as an emergency situation at the dam. In the event that a judgment or decision may be difficult to assess, it is recommended that an upgrade to the next stage be implemented.

***Pre-existing conditions at this dam**:*

For pre-existing conditions that could have an impact on this dam during an emergency situation, one should look to the latest inspection report which lists then current conditions and, in particular, recommendations for repairs or improvements thereto. If recommendations for upgrades, maintenance and / or repairs have been carried out, then a greater degree of safety will have been attained. Those repairs or upgrades should be the first items inspected to check as to their sufficiency under severe conditions.

Sustained Spillway Flow:

A National Weather Service Report has been issued for the general area of the dam, with impending severe weather conditions imminent. From the beginning of such storm events, observations must be made of the sustained severity of precipitation and wind and, in particular, rising water levels within the lake and in the spillway. Continued increases in spillway outflow will be the main and most straightforward conditions to monitor. Note should be taken of the elevations at which monitoring and emergency warnings are to be issued, as noted in the previous table, as well as the previous discussions concerning a reduction in the lake's water level prior to the storm event.

Embankment and / or Spillway Structural Conditions:

Cracks appearing on the dam, whether along the crest, the slopes or the toe, are a sign of issues within the embankment itself. In the case of Cedar Lake Dam, it would indicate, depending upon the severity, size and extent of such fissures, a potential problem with not only the soil materials making up the embankment fill, but also potentially the cutoff wall on the upstream side of the embankment and road, extending from the road surface to a depth at or

below the upstream submerged embankment. Should such cracks or gaps be observed, monitoring should be continuous. If the crack or cracks continue to widen, enlarge (deepen) or increase in length, then emergency actions and warnings will be necessary. Likewise, should cracks appear in the structural portions of the spillway or its adjacent walls, a loosening of the underlying stone masonry could lead to the dislodgment of individual stones and then entire walls sections. Should that occur, then it could likely lead to an earth embankment failure as well.

Embankment Movement:

As with cracking, moving or slippage of surface areas, such as unequal lateral movement along cracks, sloughing of slope areas, would indicate potential undue water and / or soil pressures forcing large segments of the earth embankment to move out of place. While small movements may be monitored, large or significant displacement (depending upon location) must be given to early warnings and, if they continue, would lead to final warnings for downstream evacuations or closure of roads where stream crossings occur.

Embankment Overtopping:

Embankment overtopping is a direct indication of one of the most severe situations encountered at an earth embankment dam such as Cedar Lake Dam. For this dam and impoundment, in particular, the precipitation leading to such an event would be the 500-Year Storm, producing approximately 13.4 inches of rainfall over a 24-hour period. While the beginning of overtopping should lead to immediate downstream evacuation and road closures, this will have been preceded by a rise in spillway elevation, which as previously indicated in the table, will have led to a final warning prior to water level reaching the top of the dam. In the case of Cedar Lake Dam, with its well-maintained slopes and riprap armoring, a small amount of overtopping would most likely not lead to immediate failure. However, given that an immense amount of rain will have fallen and then soaked into the soils of the embankment, a saturated slope condition will likely lead to a sloughing failure depending upon the duration of the overtopping.

Seepage:

The most common indicator of a situation showing problems with an earth embankment, particularly when associated with a storm event, is an increase in seepage as water levels rise. Increases in flow from a known discharge point could lead to sloughing of the embankment and internal erosion of soil materials, typically associated with piping of flow through the entire embankment of the dam. Such findings early in a storm should lead to continuous monitoring, and an increase in quantity or quality of flow (i.e., cloudy or silt laden water) should then precipitate appropriate warnings if and when an increase is noted in either amount.

Sinkholes:

Sinkholes, if they appear during an early or intermediate stage of a storm event, are a definite sign of internal problems in the case of a large soil embankment, as is the case with Cedar Lake Dam. This would be an indicator that a void has been created within the embankment, with an associated loss of soil materials. This often occurs in the vicinity of an outlet structure, in the case of this dam the current box culvert outlet structure along the left side of the embankment, and will most likely be the result of water moving through or along the outside of the outlet. In any case, no matter the location, these internal problems will only and most likely worsen. Any increase in size must be treated as a worsening situation, monitored accordingly and precipitate warnings as required.

Earthquake(s):

Earthquakes typically result in the movement of the earth's crust and, in the case of dams, in the movement of surficial and underlying soils of a dam, particularly with earth embankments. Such movements, if severe enough to impact a dam, would produce cracks, sinkholes and lateral shifts or displacements of embankment soils and open up potential seepage paths through the embankment. While these issues are addressed above, an earthquake is often unpredictable[8] and any response thereto must be immediate. Should one noticeable enough to cause concern in the general community occur, an immediate inspection must be performed to ascertain any potential issues, similar to the ones described above. If detected, monitoring and emergency warnings must be instituted as required by the circumstances.

Security Threats, Sabotage and Vandalism:

As with earthquakes, these scenarios are typically unpredictable unless preceded by threats issued through various public or private sources. Should such occur, police and emergency personnel should be notified immediately. Because it is difficult to impact a dam as large as this site, sabotage or vandalism will typically be directed at outlets or outlet structures. Only in the case of a large explosive device would the main embankment be in danger. To prevent such situations, in the case of this site, fencing and access gates should be kept as secure as possible, even under normal conditions.

"Sunny Day" Failure:

Although rarely discussed and encountered in our region of the country, dams have been known to fail, due to any of the foregoing reasons, on a clear, sunny day or a clear night without impending storms that include heavy precipitation or high winds. These most likely occur due to

[8] Because there is little if any forewarning for such an event, it will most likely occur on a clear day or night with no impending storm event.

a lack of maintenance or attention to problems which may have been predetermined, but not necessarily maintained. For this reason, normal inspections and regular maintenance must be sustained on a regular, routine and proactive basis.

2.3 Notification & Communication

After the warning level has been determined, the Town of Wolcott Department of Civil Preparedness shall be notified immediately.

Communication with Authorities

Emergency level 1 / Initiation of Dam Monitoring – The CLOA (the dam owner), the operator, their representative, or the Engineer should contact the Department of Civil Preparedness. Describe the situation, and request assistance on the next steps that should be taken.

Emergency Level 2 / Early Warning - Emergency event, potential dam failure situation; rapidly developing:

The following message may be used to help the dam owner, operator, representative or engineer to describe the emergency situation to emergency management authority:

"This is _____Give your name and title, and provide name of owner & operator, if different.

I am, OR [name of person is] presently on site monitoring the dam.

There is an emergency condition at Cedar Lake Dam, located along North Street, 0.4 mile west of its intersection with Wolcott Road (Route 69).

I have activated the Emergency Action Plan for this dam. The following conditions have been observed ***[identify the conditions]*** *and indicate the dam may be compromised and could lead to a potential failure.*

These conditions warrant an ***Early Warning*** *notification, i.e. residents within the limits of the inundation area as depicted in the EAP should be warned that an evacuation of this area* ***may*** *be necessary and first responders should be prepared to evacuate the inundation area.*

Reference the Inundation Map, People At-Risk Table and evacuation routes identified in your copy of the Emergency Action Plan.

I will advise you when the situation is resolved or if the situation gets worse.

I can be contacted at the following number _____. If you cannot reach me, please call the following alternative number _____."

<u>Emergency Level 3 / Final Warning</u> - Urgent event; dam failure appears imminent or is in progress:

The following message may be used to help the Cedar Lake Owners Association (the dam owner), the operator, its representative or the Engineer to describe the emergency situation to the Department of Civil Preparedness:

"This is _____<u>Give your name and title, and provide name of owner & operator, if different</u>.

I am, OR [name of person is] presently on site monitoring the dam. This is a Final Warning.

There is an emergency condition at Cedar Lake Dam, located along North Street, 0.4 mile west of its intersection with Wolcott Road (Route 69).

I have activated the Emergency Action Plan for this dam. The following conditions have been observed ***[identify the conditions]*** *and indicate the dam* ***<u>is in imminent danger of failing, or is failing.</u>***

This is a ***Final Warning****, i.e. residents within the limits of the inundation area as depicted in the EAP should be warned to evacuate the area immediately.*

Reference the Inundation Map, People At-Risk Table and evacuation routes identified in your copy of the Emergency Action Plan.

I will continue to contact you and keep you up to date on the condition of the dam.

I can be contacted at the following number _____. If you cannot reach me, please call the following alternative number _____."

SAMPLE MESSAGE FOR EMERGENCY MANAGEMENT AUTHORITY

The following prescribed messages **may** be used as a guide for the Emergency Management Authority to communicate the status of the emergency with the public:

EMERGENCY LEVEL 2 / EARLY WARNING
(Potential failure / Possible evacuation)

This is [Name and title of the Emergency Management Authority].

There is an emergency at Cedar Lake Dam, located along North Street, 0.4 mile west of its intersection with Wolcott Road (Route 69).

The Emergency Action Plan has been activated for this dam due to current conditions that may cause the dam to fail.

Please be prepared for a possible evacuation if conditions at the dam worsen. You will be notified when the situation is resolved or the situation gets worse.

EMERGENCY LEVEL 3 / FINAL WARNING
(Imminent Failure / Evacuate those at risk downstream)

This is [Name and title of the Emergency Management Authority]. This is a Final Warning.

This is an emergency. Cedar Lake Dam, located along North Street, 0.4 mile west of its intersection with Wolcott Road (Route 69), is failing / or has failed.

Residents located in the downstream area must evacuate immediately.

Repeat. This is a Final Warning. Cedar Lake Dam, located along North Street, 0.4 mile west of its intersection with Wolcott Road (Route 69), is failing / or has failed.

Evacuate immediately using the following evacuation route(s), or proceed immediately to high ground if you feel you can't get to the evacuation route in time.

Evacuations Routes are as follows[9]*:*

> ***Wolcott Road (Route 69) east of Mad River*** *– Evacuate south or north along this road to the closest emergency shelter that may be designated by the Town of Wolcott. Currently, as of the date of this emergency plan, no specific shelters have been so designated by the Town. It is recommended that as evacuations may become necessary, emergency services be contacted through calling 911 and asking for the nearest shelter for potential evacuees.*

[9] Subsequent to evacuation, emergency shelters will be open for use as stipulated in Section 3.3 of this plan.

The following roads may be closed due to flooding or washouts:

***North Street** west and east of the Mad River at Cedar Lake Dam.*

***Mad River Road** at the Mad River Crossing, approximately 250 feet northwest of Wolcott Road.*

***Wolcott Road**, approximately 150 feet north of its intersection with Center Street and Beach Road.*

***Center Street**, about 130 feet east of its intersection with Wolcott Road.*

***Wolcott Road**, about 50 feet north of its intersection with Hillside Drive.*

***Wolcott Road**, approximately 450 feet south of the Munson Road intersection.*

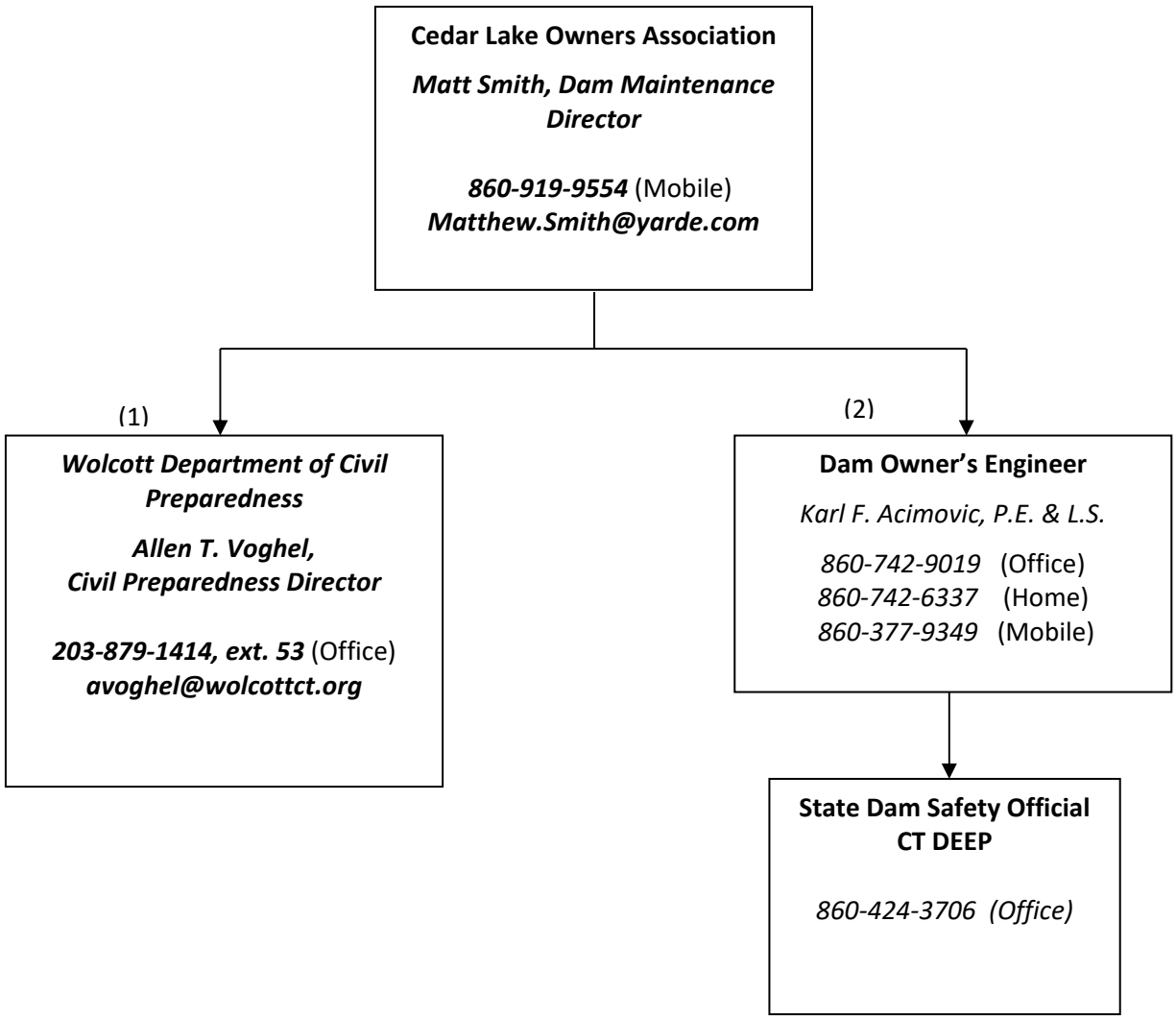
Dam Monitoring Notifications

Nonemergency

National Weather Service issues a Flood Warning for the Area,

OR

Unusual event; slowly developing

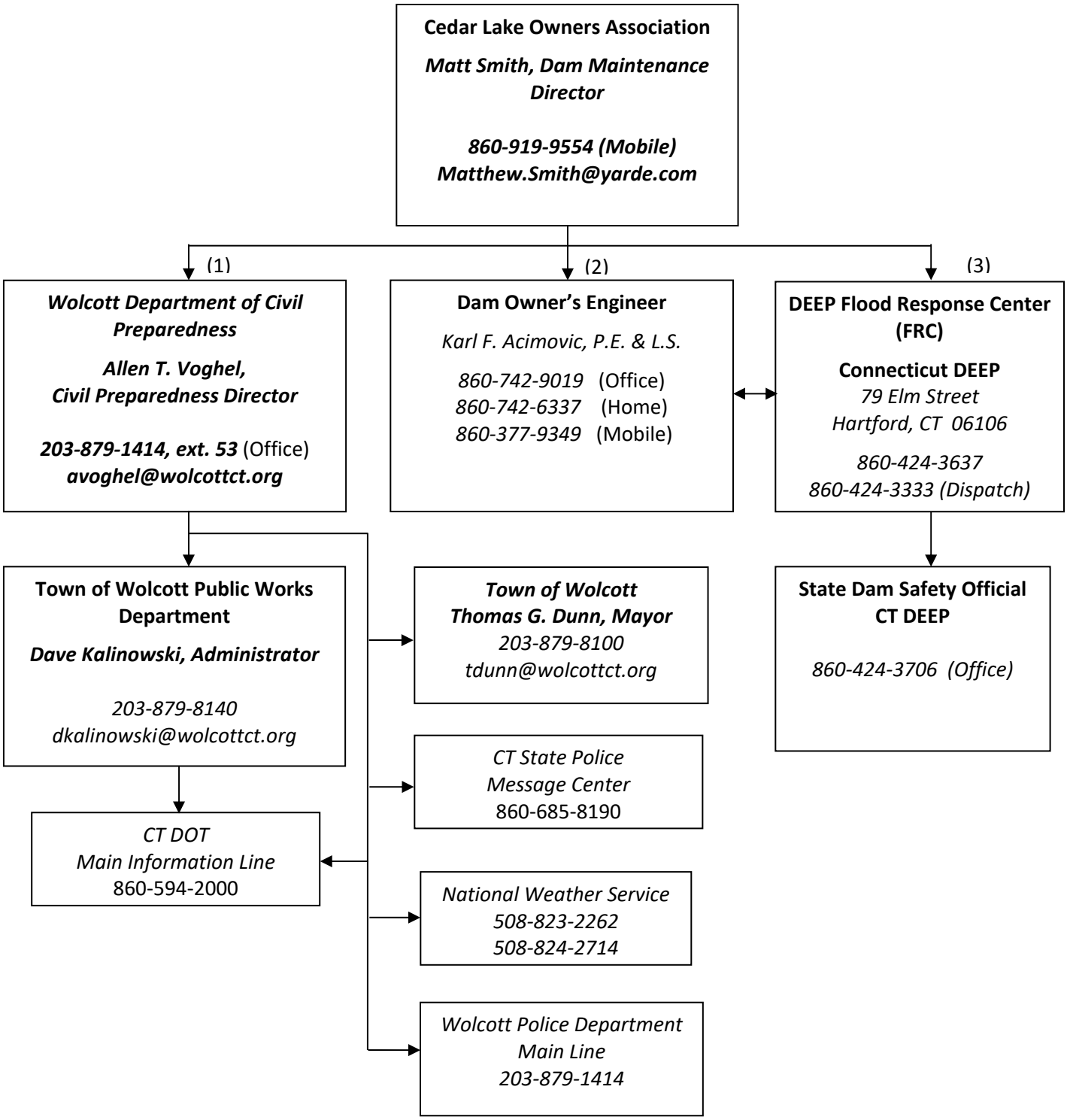


Early & Final Warning Notifications

(Call sequence is identical for both warning levels; nos. 1, 2, 3 denote call sequence)

Early Warning: Emergency event rapidly developing / Potential for dam failure

Final Warning: Imminent Failure / Evacuate those at risk downstream



2.4 Expected Actions

If the police or fire department receives a 911 call (or anyone else receives notice) regarding observations of an unusual or emergency event at the dam, they should immediately contact the Cedar Lake Owners Association (CLOA – the dam owner), its operator, representative, or engineer. After the owner, its operator, representative, or engineer determines the warning level, the actions listed below should be taken. If time permits, the owner, its operator, representative, or engineer should be contacted for consultation.

Dam Monitoring - Nonemergency, unusual event; slowly developing:

A. The CLOA, its operator, representative, or engineer should inspect the dam. At a minimum, inspect the full length of the upstream slope, crest, downstream toe, downstream slope and spillway area. Also, check the impoundment area, abutments, and downstream channel for signs of changing conditions. If increased seepage, erosion, cracking, or settlement are observed, refer to the *Guidance for Warning Level Determination* (*Section 2.2*) for guidance in determining the appropriate warning level for the new condition and recommended actions.

B. All contacts should be made per the Dam Monitoring notification chart.

C. Record all contacts that were made on the *Contact Checklist* (*Appendix B–1*). Record all information, observations, and actions taken in the *Unusual or Emergency Event Log* (*Appendix B–2*). Note the time of changing conditions. Document the situation with photographs and video, if possible.

Early Warning - Potential dam failure situation; rapidly developing:

A. All contacts should be made per the *Early Warning* notification chart. If an Engineer has been designated, and time permits, request that he / she investigate the situation and recommend corrective actions.

B. The CLOA, its operator, representative, or engineer should contact the Emergency Management Authority to inform him / her that conditions exist to warrant issuing an **EARLY WARNING** and if current conditions get worse, an emergency situation may require road closures and evacuation. The Emergency Management Authority should begin preparations for possible road closures and evacuations.

C. The CLOA, its operator, representative, or engineer should provide updates to the Emergency Management Authority. These updates can assist the Emergency Management Authority in making timely decisions concerning the need for warnings, road closures, and evacuations.

D. The Emergency Management Authority should issue the **EARLY WARNING** to residents and businesses in the inundation / evacuation area using local notification procedures.

E. The Emergency Management Authority should also issue an **EARLY WARNING** through the National Weather Service.

F. The Emergency Management Authority should warn the Connecticut Department of Transportation and the Wolcott Department of Public Works about possible impacts to bridges and roadways.

G. The Town of Wolcott Department of Public Works is responsible for local road closures and detours. The Connecticut Department of Transportation is responsible for State road closures and detours.

H. The CLOA, its operator, representative, or engineer should continue to inspect the dam. At a minimum, as previously noted, inspect the full length of the upstream slope, crest, downstream toe, downstream slope and spillway area. Also, check the impoundment area, abutments, and downstream channel for signs of changing conditions. If increased seepage, erosion, cracking, or settlement are observed, refer to the *Guidance for Warning Level Determination* table (*Section 2.2*) for guidance in determining the appropriate warning level for the new condition and recommended actions.

I. Record all contacts that were made on the *Contact Checklist* (*Appendix B–1*). Record all information, observations, and actions taken on the *Unusual or Emergency Event Log* (*Appendix B–2*). Note the time of changing conditions. Document the situation with photographs and video, if possible.

J. See the following discussion regarding possible remedial actions.

Possible Remedial Actions

If time and physical site conditions permit, the following emergency remedial actions should be considered for *Early Warning* conditions. Immediate implementation of these remedial actions may delay, moderate, or prevent the failure of the dam. Several of the listed adverse or unusual conditions may be apparent at the dam at the same time, requiring implementation of several modes of remedial actions. Following implementation, the dam must be closed monitored to confirm the success of the remedial actions. See *Appendix A* for sources of equipment and materials.

Lowering of Water Level in the Lake

As previously noted in this document, lowering of the water level in the lake prior to a storm event could prevent or slow overtopping of the dam embankment or the dam breach process. As such, it is advised, depending upon the severity of the impending event, and with the consultation of the Engineer and / or DEEP's Dam Safety Section, that the stoplogs be removed from the spillway weir slot and that the low level outlet valve be opened. Lowering the lake level by two feet could potentially provide an additional 240 acre-feet of storage volume for an impending storm. The valve could be closed and the weir boards replaced in the slot as soon as the storm dissipates and a clear signal is given by the Engineer and / or DEEP's Dam Safety Section.

Embankment Overtopping

1. If the water level in the impoundment is no longer rising, place sandbags along any low areas on the upstream side of the top of the dam to control wave action, reduce the likelihood of flow concentration in low areas during minor overtopping, and to safely direct more water through the spillway.

2. Cover any weak or eroded areas along the top of the dam and / or the downstream slope with riprap, sandbags, plastic sheeting, or other materials to provide erosion-resistant protection.

Seepage & Sinkholes

1. If the entrance to the seepage origination point is observed in the impoundment (possible whirlpool along the upstream embankment and shoreline) and if it is accessible, attempt to reduce the flow by plugging the entrance with readily available materials such as hay bales, bentonite, soil or rockfill, or plastic sheeting.

2. Cover the seepage exit area(s) with several feet of sand and / or gravel to hold fine-grained embankment or foundation soil materials in place. Alternatively, construct sandbag or other

types of ring dikes around seepage exit areas to retain a pool of water, providing backpressure and reducing the erosive nature of the seepage.

3. Prevent vehicles and equipment from driving between the seepage exit points and the embankment to avoid potential loss of embankment material from the collapse of an underground void.

Embankment Movement

1. Repair settlement of the crest by placing sandbags or earth and rockfill materials in the damaged area to restore freeboard.

2. Stabilize slides by placing a soil or rockfill buttress against the toe of the slide.

Earthquake

1. Immediately conduct a general overall visual inspection of the dam.

2. Perform a field survey to determine if there has been any settlement and movement of the dam embankment, spillway, and low-level outlet works.

3. Lower water level in the lake by use of the low level outlet or removal of weir boards, to the extent that it will help to lessen the water pressure on any vulnerable areas.

Final Warning - Urgent; dam failure appears imminent or is in progress:

A. All contacts should be made per the *Final Warning* notification chart.

B. The Emergency Management Authority must alert the public and immediately issue a **FINAL WARNING** to evacuate at-risk people and close roads as necessary using local notification procedures.

C. The emergency management authority shall lead the efforts to carry out warnings, close roads, and evacuate people at risk downstream from the dam.

D. The Cedar Lake Owners Association, its operator, representative, or engineer should provide updates to the Emergency Management Authority to help him / her make timely decisions concerning the need for warnings, road closures, and evacuations.

E. All parties should record all contacts that were made on the *Contact Checklist* (*Appendix B-1*).

F. The CLOA, its operator, representative, or engineer should record all information, observations, and actions taken on the *Unusual or Emergency Event Log* (*Appendix B–2*). Note the time of changing conditions. Document the situation with photographs and video, if possible.

G. Advise people monitoring the dam to follow safe procedures. Everyone should stay away from any of the failing structures or slopes and out of the potential breach inundation areas.

H. The Emergency Management Authority should also issue an **FINAL WARNING** through the National Weather Service.

I. The Emergency Management Authority should warn the CT Department of Transportation (DOT), if state-owned roads could be impacted, and the Wolcott Public Works Department about impacts to local bridges and roadways.

J. The CT DOT is responsible for state road closures and detours. The Wolcott Public Works Department is responsible for local road closures and detours.

2.5 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.

Termination Responsibilities
The Emergency Management Authority is responsible for terminating EAP operations and relaying this decision to the Wolcott Emergency Operations Center (EOC) and the State DEEP Flood Response Center (FRC). The following conditions and procedures are required prior to termination of a ***Final Warning*** event that has not caused the dam to fail:

- The event has passed (water level is receding).
- The dam has been inspected by the Cedar Lake Owners Association's engineer and deemed safe.
- The State DEEP Dam Safety Official has been contacted and agrees with the safe determination.
- The Emergency Management Authority has been informed of the engineer's determination and DEEP's concurrence.
- The Emergency Management Authority gives the all-clear notice.

It is then the responsibility of each group/person in the notification charts to make sure that the contacts listed above and below them are notified that the event has been terminated. The Emergency Management Authority should contact the following to terminate the emergency:

- The National Weather Service
- CT Department of Transportation
- Wolcott Public Works Department
- Any other private or public services that were assisting to issue warnings
- Downstream residents and business owners.

Note: The dam owner, operator, or their representative shall have the engineer who inspected the dam complete the Dam Safety Emergency Situation Report *(Appendix B–3)* to document the emergency event and all actions that were taken. The dam owner, operator, their representative, or engineer must distribute copies of the completed report to the State DEEP Dam Safety Official and the emergency management authority who coordinated the event.

3. INUNDATION AREAS

3.1 Residents, Businesses & Infrastructure at Risk

A major flood caused by a breach of the dam is estimated to inundate three (3) commercial sites, two (2) residential properties and five (5) roadway crossings. Because of bridge overtopping and roadway overflows, a number of residential and commercial properties may be isolated due to the loss of road connections.

Street Numbers	**Street Name**	**Property Type**	**Number of Properties**
Impacted and Evacuation Areas			
585	Wolcott Road	Commercial	1
593	Wolcott Road	Residential	1
605	Wolcott Road	Residential	1
650	Wolcott Road	Commercial	1
654	Wolcott Road	Commercial	1
Impacted Roadways	(See following table)		

Location	Distance from Dam (in feet)	Est. Peak Breach Travel Time (in min.)*	Est. Max. Water Depth Increase (feet)	Description of Est. Max. Water Depth Relative to Infrastructure
Cedar Lake Dam	0’	0	N / A	N / A
Mad River Road	13,804’	30	1.4’	2.0’ to Bridge Deck
Wolcott Road	14,837’	31	1.7’	2.2’ to Bridge Deck
Center Street	15,096’	32	2.3’	2.3’ To Bridge Deck
Wolcott Road	18,136’	35	2.1’	3.3’ To Bridge Deck
Wolcott Road	19,406’	40	0’	0.0’ No Overtopping[10]

*Estimated time for the peak of the breach flood wave to travel from the dam to downstream locations. The peak breach flood outflow will occur approximately 2 hours 46 minutes after the start of the breach.

3.2 Evacuation Routes & Road Closures

The following roads will serve as evacuation routes:

> ***Wolcott Road (Route 69) east of the Mad River*** *– Evacuate south or north along this road to the closest emergency shelter that may be designated by the Town of Wolcott. (See Section 3.3, below.)*

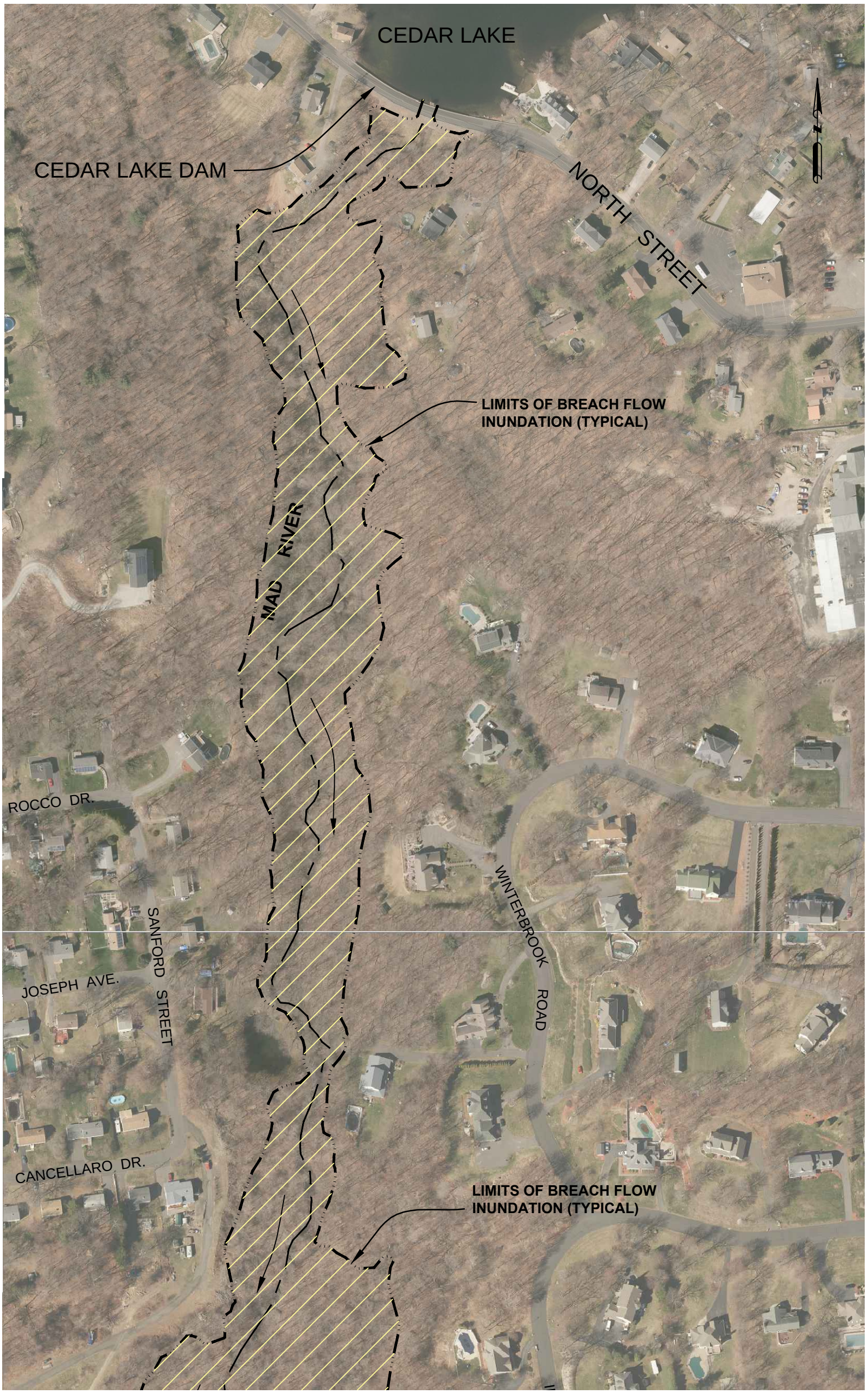
3.3 Emergency Shelter (*Town of Wolcott Emergency Shelter):*

Currently, as of the date of this emergency plan, no specific shelters have been so designated by the Town. It is recommended that as evacuations may become necessary, emergency services be contacted through calling 911 and asking for the nearest shelter for potential evacuees.

3.4 Dam Breach Inundation Map

The following eight pages include maps of the approximate inundation areas

[10] Although there is no overtopping of the bridge at this location due to its hydraulic capacity, adjacent road areas may be flooded due to the overtopping and downward slope / grade of the road at the previous bridge crossing of Wolcott Road (see Inundation Map Sheets 7 and 8.)

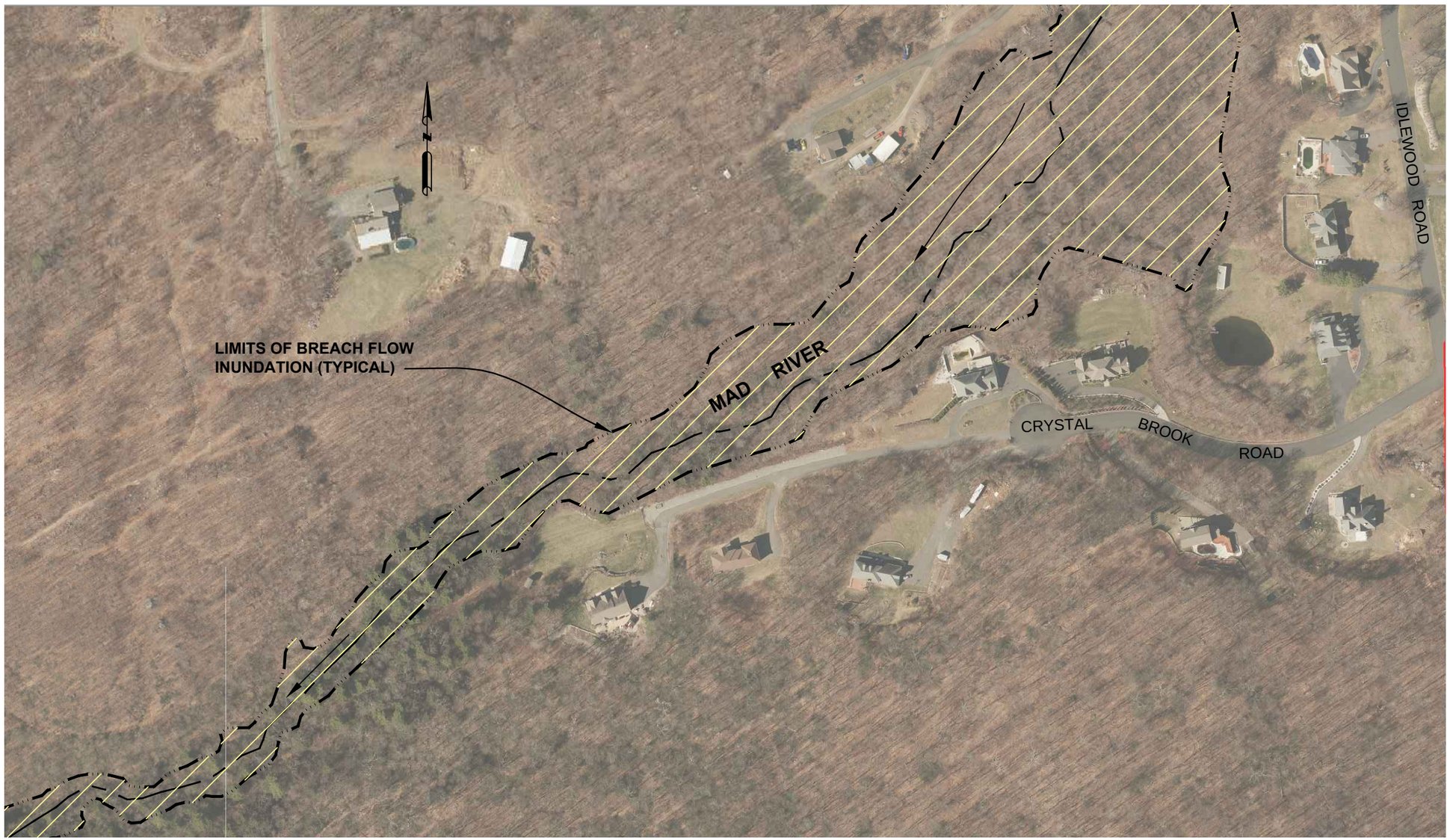


LIMITS OF POTENTIAL DAM BREACH IMPACT AREA
CEDAR LAKE DAM / WOLCOTT, CONNECTICUT
DEEP #16603 / HAZARD CLASS "B"

0' 100' 200' 300'

SCALE: 1" = 200'

MAP SOURCE: CT DEEP GIS
NAD 83 / NAVD 88

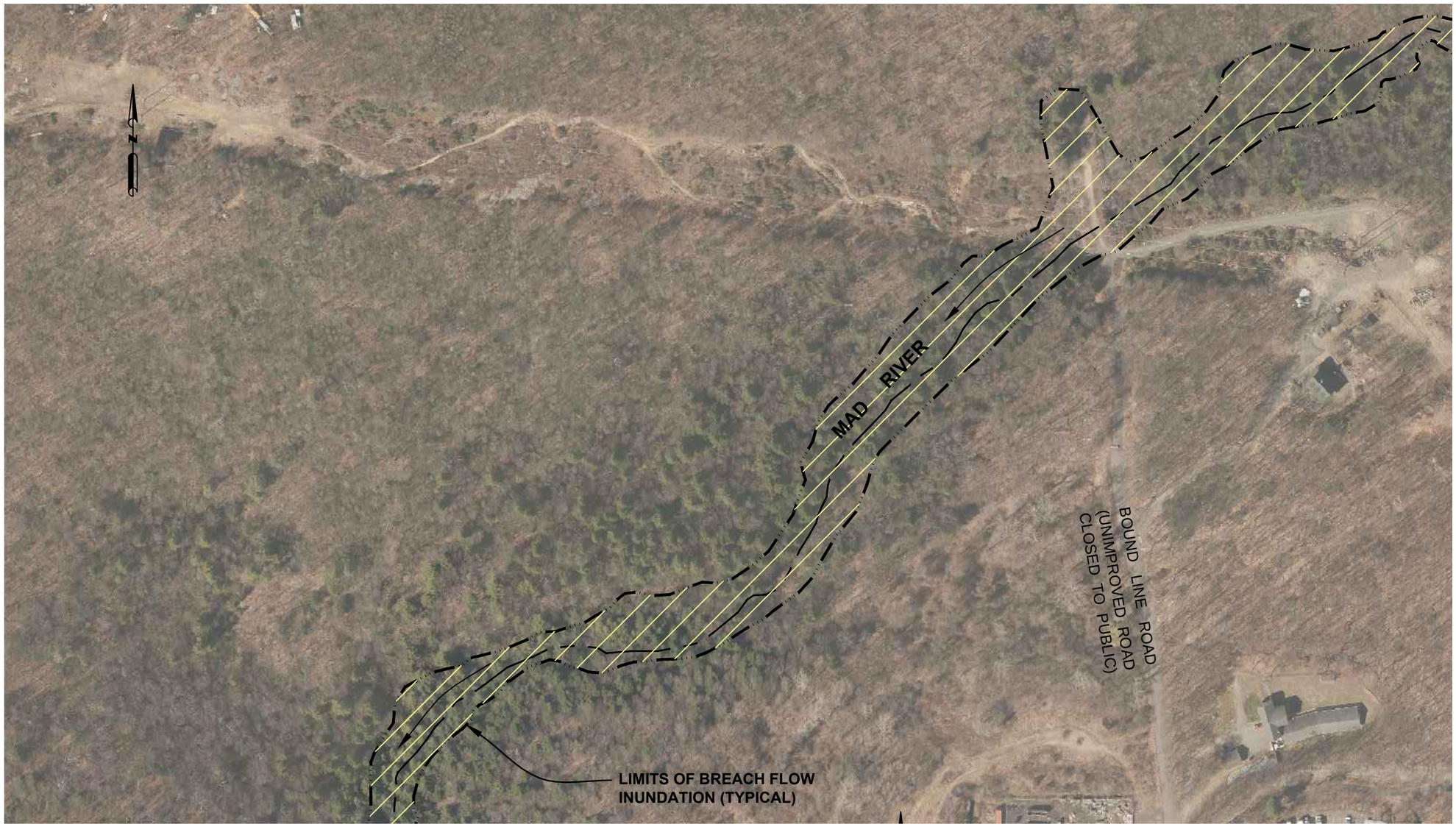


LIMITS OF POTENTIAL DAM BREACH IMPACT AREA
CEDAR LAKE DAM / WOLCOTT, CONNECTICUT
DEEP #16603 / HAZARD CLASS "B"

0' 100' 200' 300'

SCALE: 1" = 200'

MAP SOURCE: CT DEEP GIS
NAD 83 / NAVD 88



LIMITS OF POTENTIAL DAM BREACH IMPACT AREA
CEDAR LAKE DAM / WOLCOTT, CONNECTICUT
DEEP #16603 / HAZARD CLASS "B"

0' 100' 200' 300'

SCALE: 1" = 200'

MAP SOURCE: CT DEEP GIS
NAD 83 / NAVD 88

LIMITS OF POTENTIAL DAM BREACH IMPACT AREA
CEDAR LAKE DAM / WOLCOTT, CONNECTICUT
DEEP #16603 / HAZARD CLASS "B"

0' 100' 200' 300'

SCALE: 1" = 200'

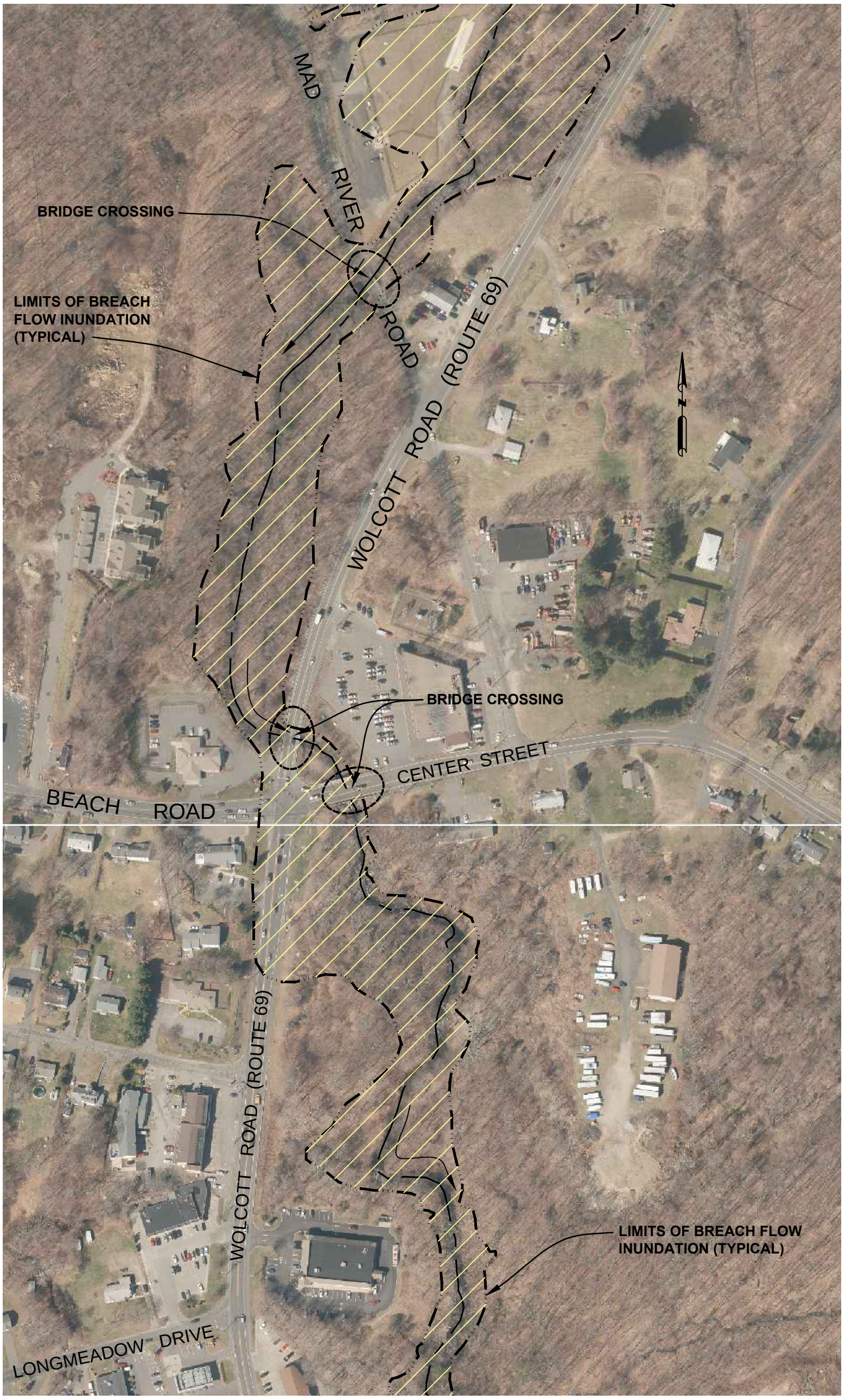
MAP SOURCE: CT DEEP GIS
NAD 83 / NAVD 88

LIMITS OF POTENTIAL DAM BREACH IMPACT AREA
CEDAR LAKE DAM / WOLCOTT, CONNECTICUT
DEEP #16603 / HAZARD CLASS "B"

0' 100' 200' 300'

SCALE: 1" = 200'

MAP SOURCE: CT DEEP GIS
NAD 83 / NAVD 88

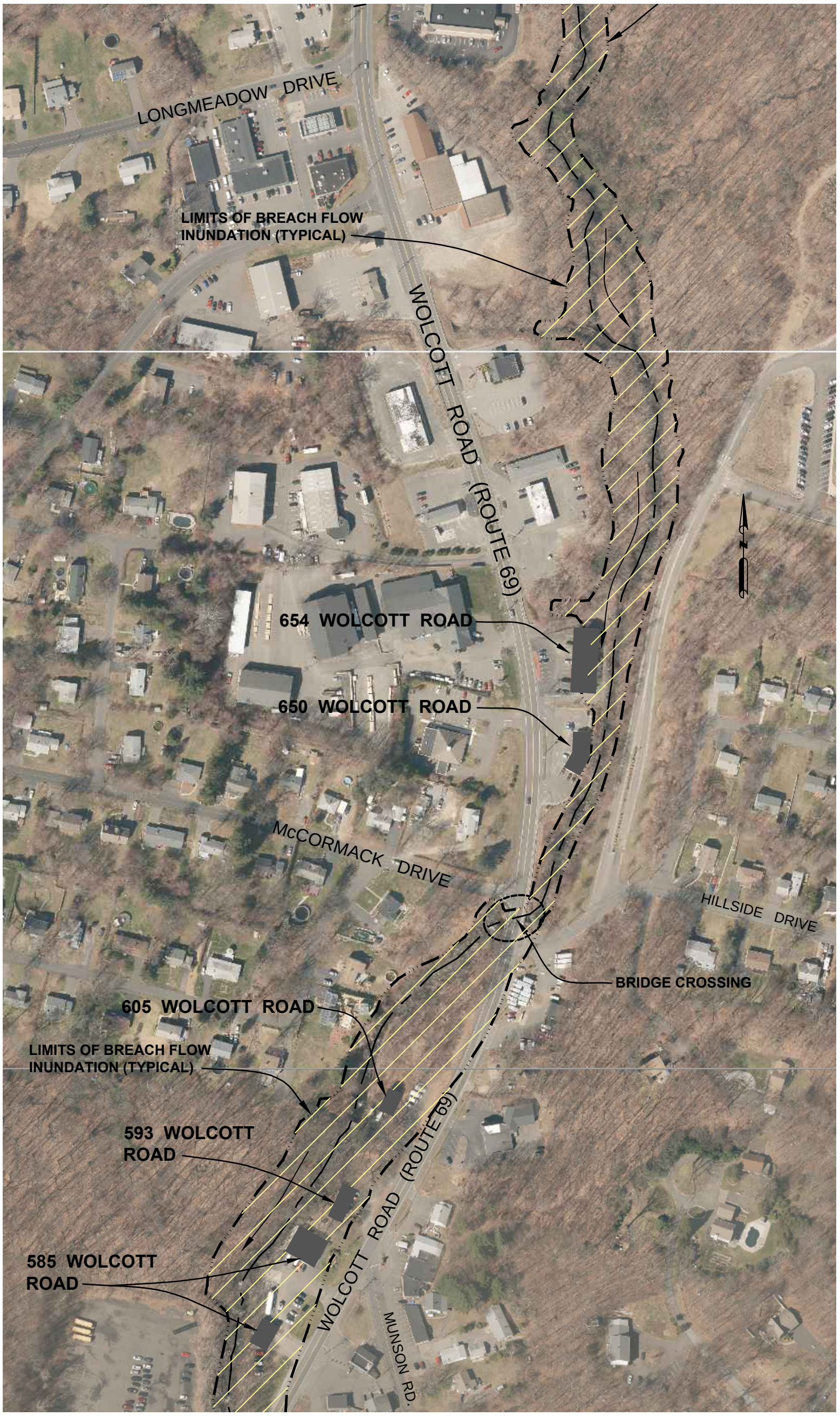


LIMITS OF POTENTIAL DAM BREACH IMPACT AREA
CEDAR LAKE DAM / WOLCOTT, CONNECTICUT
DEEP #16603 / HAZARD CLASS "B"

MAP SOURCE: CT DEEP GIS
NAD 83 / NAVD 88

0' 100' 200' 300'

SCALE: 1" = 200'



LIMITS OF POTENTIAL DAM BREACH IMPACT AREA
CEDAR LAKE DAM / WOLCOTT, CONNECTICUT
DEEP #16603 / HAZARD CLASS "B"

MAP SOURCE: CT DEEP GIS
NAD 83 / NAVD 88

0' 100' 200' 300'

SCALE: 1" = 200'

LIMITS OF POTENTIAL DAM BREACH IMPACT AREA
CEDAR LAKE DAM / WOLCOTT, CONNECTICUT
DEEP #16603 / HAZARD CLASS "B"

0' 100' 200' 300'

SCALE: 1" = 200'

MAP SOURCE: CT DEEP GIS
NAD 83 / NAVD 88

4. Maintenance - EAP Review & UPDATE

4.1 EAP Periodic Review

The CLOA or its representative will review and, if needed, update the EAP at least once every two years, or more frequently as necessary to reflect significant changes. The EAP review will include the following:

- Calling all contacts on the notification charts in the EAP to verify that the phone numbers and persons in the specified positions are current. The EAP will be updated if any of the contacts have changed.

- In addition, the CLOA or their representative will ask if the person contacted knows where the EAP is kept and if responsibilities described in the EAP are understood.

- Calling the locally available resources included on the Emergency Services Contacts list to verify that the phone numbers, addresses, and services are current.
- A review of any significant change in downstream conditions, particularly new construction (e.g., housing or infrastructure) which may impact flooding delineations or areas to be evacuated.

4.2 EAP Exercise

Section 22a-411a-2 RCSA requires EAPs to include a description of an exercise, or test to be conducted at a minimum of once every two years. The exercise shall include participation of all appropriate personnel identified in the EAP that are responsible for providing emergency services in the event the EAP is initiated.

For the purposes of the exercises described below ‘Cedar Lake Owners Association’, ‘CLOA’, ‘the dam owner’, or ‘the owner’ may refer to the Cedar Lake Owners Association, its Operator, Representative, or Engineer.

The Cedar Lake Owners Association has three optional methods of conducting periodic EAP exercises and will utilize that method which appears most appropriate at the scheduled time. For Cedar Lake Dam, a “B” hazard dam, as a general rule, a full tabletop or drill exercise will be conducted once every six (6) years starting two years from the currently dated plan. In intervening biennial years, the owner will conduct call-out exercises to confirm / verify then current personnel in responsible positions, phone numbers and other contact information. Schedule for the next 16 years is as follows:

October 2022 Call-Out exercise
October 2024 Tabletop or Drill Exercise
October 2026 Call-Out exercise
October 2028 Call-Out exercise
October 2030 Tabletop or Drill Exercise
October 2032 Call-Out exercise
October 2034 Call-Out exercise
October 2036 Tabletop or Drill Exercise

Call-Out Exercise

The Cedar Lake Owners Association will conduct the Call-Out Exercise. The dam owner will verify that all persons and telephone numbers on the Early Warning and Final Warning Notification Charts are current. In addition to verifying personnel and contact information, the dam owner will verify that each contact can locate their copy of the EAP and that they understand their roles and responsibilities in the event of an emergency, as described in the EAP.

The owner will contact the locally available resources provided in the EAP to verify contact information and ensure that the services are current.

The dam owner will review the most recent Dam Inspection Report, any significant development or construction activity downstream of the dam, and any modifications to the dam or spillway. The EAP must be updated to reflect any significant changes to the dam or downstream area and any changes in personnel or contact information.

Tabletop Exercise

The Tabletop Exercise will be facilitated by the dam owner. The exercise will consist of a meeting and subsequent review of the EAP. The owner, representatives from the relevant Town of Wolcott departments, and any others with key responsibilities as identified in the EAP, should be present at the exercise.

The Tabletop Exercise will begin with the facilitator presenting a scenario of an unusual or emergency event at the dam. The scenario will be developed prior to the exercise. Once the scenario has been presented, the participants will discuss the responses and actions that they would take to address, mitigate and resolve the scenario. The facilitator will control the discussion, ensuring realistic responses and developing the scenario throughout the exercise.

The dam owner will also verify that all persons and telephone numbers on the Early Warning and Final Warning Notification Charts are current. In addition to verifying personnel and contact information, the owner will verify that each contact can locate their copy of the EAP and that they understand their roles and responsibilities in the event of an emergency, as described in the EAP. The owner will also contact the locally available resources provided in the EAP in order to verify contact information and ensure the services are current.

The dam owner will review the most recent Dam Inspection Report, note any significant development or construction activity downstream of the dam, and any modifications to the dam or spillway. The EAP must be updated to reflect any significant changes to the dam or downstream area and any changes in personnel or contact information.

Drill Exercise

The Drill Exercise will be facilitated by the CLOA and will consist of a visit to the dam site, a simulated exercise, and subsequent review of the EAP. The dam owner, persons responsible for the Dam Monitoring Procedure, representative from the relevant Town of Wolcott departments, and any others with key responsibilities as identified in the EAP should be present at the Drill Exercise.

Participants of the Drill Exercise will visit the dam to familiarize themselves with the site prior to the initiation of the exercise. If a site visit is not possible to coordinate, exercise participants may familiarize themselves with the site through the use of aerial photographs or topographical maps, and a review of the most recent inspection report for the dam. Following the site visit, exercise participants will meet at the Town of Wolcott Emergency Operations Center (EOC) as identified in this EAP, to hold the exercise. If the EOC is not available, a mutually agreeable alternate location may be used.

The facilitator will present a scenario of an unusual or emergency event at the dam. The scenario will be developed prior to the exercise. Once the scenario has been presented, participants will respond and activate the EAP as if the scenario were a real-life event. The facilitator will develop the scenario throughout the exercise. Once the scenario has been completed, the participants will discuss the responses and actions taken to address, mitigate, and resolve the scenario. The facilitator will prepare a written summary of the exercise and the EAP should be updated as necessary.

Note: While the Drill Exercise should be treated as an actual event, participants should clearly verbalize that this is a drill and not a real life event while making phone calls. No actions should actually be taken (i.e. mobilizing emergency equipment, evacuations, etc.). The purpose of the Drill Exercise is to test the EAP and facilitate the response to an actual event.

4.3 Updates

The dam owner, operator, their representative, or engineer is responsible for updating the EAP document. The EAP document held by the dam owner, operator, their representative, or engineer is the master document. When revisions occur, the dam owner, operator, their representative, or engineer will provide an updated copy and an update summary page to all the EAP document holders (see *Appendix E-1*). The document holders are responsible for updating their outdated copy of the respective document(s) whenever revisions are received. Outdated copies shall be immediately discarded to avoid any confusion with the updates. Updates and revisions made to the EAP should be recorded on the form provided as *Appendix E-2*.

5. Roles and Responsibilities

Cedar Lake Owners Association (CLOA), Its Operator or Representative

- Distribute this EAP to appropriate Control Copy Holders *(see Appendix E-1)*.
- Review this EAP at least every two years and make revisions and updates as needed *(See Appendix E-2)*.
- Provide revised pages and a revision list to all EAP Control Copy Holders.
- Host and facilitate a periodic test of this EAP at least once every 2 years *(See Section 4.2)*
- Initiate monitoring of the dam at the onset of conditions identified in this EAP and notify the Emergency Management Authority that monitoring has begun (see notification charts).
- Provide a list identifying personnel and their alternate(s) that would be utilized by the dam owner or its operator(s) responsible for decision making and for implementing emergency repairs when the owner is absent.
- Determine if conditions warrant the notification of an *Early Warning* or *Final Warning*. If not, continue monitoring the dam.
- If an *Early Warning* or *Final Warning* is warranted, immediately notify the Emergency Management Authority (see notification charts).
- Provide updates of the situation to the Emergency Management Authority to help her / him make timely and accurate decisions regarding warnings and evacuations.
- Provide leadership to assure the EAP is reviewed and updated annually and copies of the revised EAP are distributed to all who received copies of the original EAP.

State Dam Safety Agency (CT DEEP, Dam Safety Section)

- State-wide monitoring during flood emergencies; provide support and communication with the local Emergency Management Authority(s).
- Prior to a *Final Warning* being terminated by the Emergency Management Authority, review and provide concurrence with the assessment provided by the Cedar Lake Owners Association (CLOA) engineer that the dam is in a safe condition.
- Contact the National Weather Service (NWS) to coordinate the state-wide flood outlook.

Town of Wolcott Emergency Management Authority
Allen T. Voghel, Town of Wolcott Director of Civil Preparedness

- Serve as the primary contact person responsible for coordination of all emergency actions.
- Maintain communications with the media.
- When an ***Early Warning*** is issued:
    - Prepare emergency management personnel to evacuate people at risk downstream if conditions worsen and a *Final Warning* is issued.
    - Initiate the warnings that an evacuation ***may*** be necessary to people at risk downstream of the dam.
    - Alert the general public.
- When a ***Final Warning*** is issued:
    - Initiate the order to emergency management personnel to begin evacuation of people at risk downstream of the dam.
    - Alert the general public.
- Decide when to terminate the emergency (see guidance provided in *Section 2.5*).
- Participate in a biennial review and update of the EAP.

APPENDIX A

Resources Available (Equipment, Materials & Manpower)

Locally available resources include:

Heavy Equipment Service & Rental	**Sand & Gravel Supply**	**Ready-mix Concrete Supply**
Martin Laviero Contractors *611 N. Main Street* *Bristol, CT 06010* *860-589-7579*	*To be provided through standby contractor.* *Martin Laviero Contractors*	*To be provided through standby contractor.* *Martin Laviero Contractors*
Pumps	**Diving Contractor**	**Sand Bags**
To be provided through standby contractor. *Martin Laviero Contractors*	*Will rely on Emergency Services Dive Team* *(The dam owner does not have a standby contractor for this service)*	*To be provided through standby contractor.* *Martin Laviero Contractors*

APPENDIX B-1

Contact Log

Dam name: ***Cedar Lake Dam***

Location: ***North Street, Wolcott, Connecticut*** Date _____

The following contacts should be made immediately after the dam monitoring has been initiated and/or when the warning level has been determined. (See *Section 2.2).* The person making the contacts should initial and record the time of the call and who was notified for each contact made. See the *Notification Charts* for critical contact information and *Emergency Services Contacts* for contact information for other possible emergency services.

DAM MONITORING	Person Contacted	Time Contacted	Contacted by
___ Emergency Management Authority	_____	_____	_____
___ Dam Owner's Engineer (if needed)	_____	_____	_____

EARLY WARNING	Person Contacted	Time Contacted	Contacted by
____ Emergency Management Authority	_____	_____	_____
____ Dam Owner's Engineer	_____	_____	_____
____ DEEP Flood Response Center	_____	_____	_____
____ State Dam Safety Official	_____	_____	_____

FINAL WARNING	Person Contacted	Time Contacted	Contacted by
____ Emergency Management Authority	_____	_____	_____
____ Dam Owner's Engineer	_____	_____	_____
____ DEEP Flood Response Center	_____	_____	_____
____ State Dam Safety Official	_____	_____	_____

APPENDIX B-2

Unusual or Emergency Event Log

(to be completed during the emergency)

Dam name: ***Cedar Lake Dam*** [CT DEEP ID #16603]

Emergency Management Authority: Allen T. Voghel, Director of Civil Preparedness

When and how was the event detected? If the event started with a weather flood warning, then that should be listed here:

_____

_____

Weather conditions:

_____

General description of the emergency situation:

_____

_____

_____

Warning level determination: _____ Made by: _____

Actions & Event Progression

Date	Time	Rainfall Data	Reservoir Level	Action/Event Progression	Recorded By

Report prepared by: _____ Date: _____

APPENDIX B-3

Dam Emergency Situation Report

(Complete following the termination of the emergency)

Dam name: ***Cedar Lake Dam*** [CT DEEP ID #16603]

Emergency Management Authority: Allen T. Voghel, Director of Civil Preparedness

Dam location: ***North Street, Wolcott***, ***New Haven County, (Mad River)***

Date: _____ Time: _____

Weather conditions: _____

General description of emergency situation: _____

_____

_____

_____

Area(s) of dam affected: _____

_____

_____

_____

Extent of dam damage: _____

_____

_____

_____

Possible cause(s): _____

_____

_____

Effect on dam's operation: _____

_____

_____

Initial reservoir elevation: _____ Time: _____

Maximum reservoir elevation: _____ Time: _____

Final reservoir elevation: _____ Time: _____

Description of area flooded downstream/damages/injuries/loss of life: _____

_____

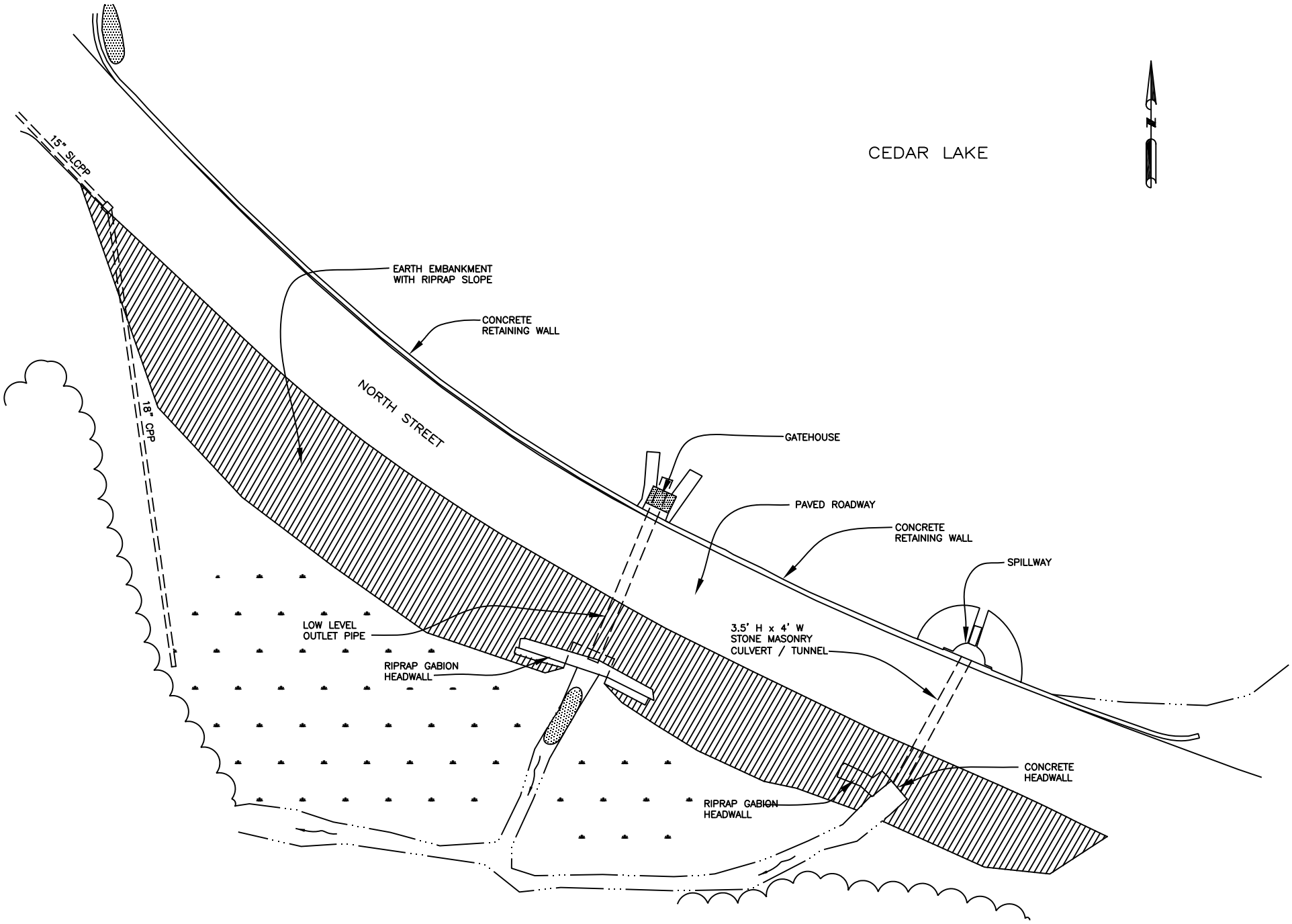
_____

Other data and comments: _____

Observer's name and telephone number:_____

Report prepared by: _____ Date: _____

APPENDIX C-1 / PLAN OF DAM



CEDAR LAKE DAM
EXISTING CONDITIONS

SCALE: 1" = 30'

APPENDIX C-2

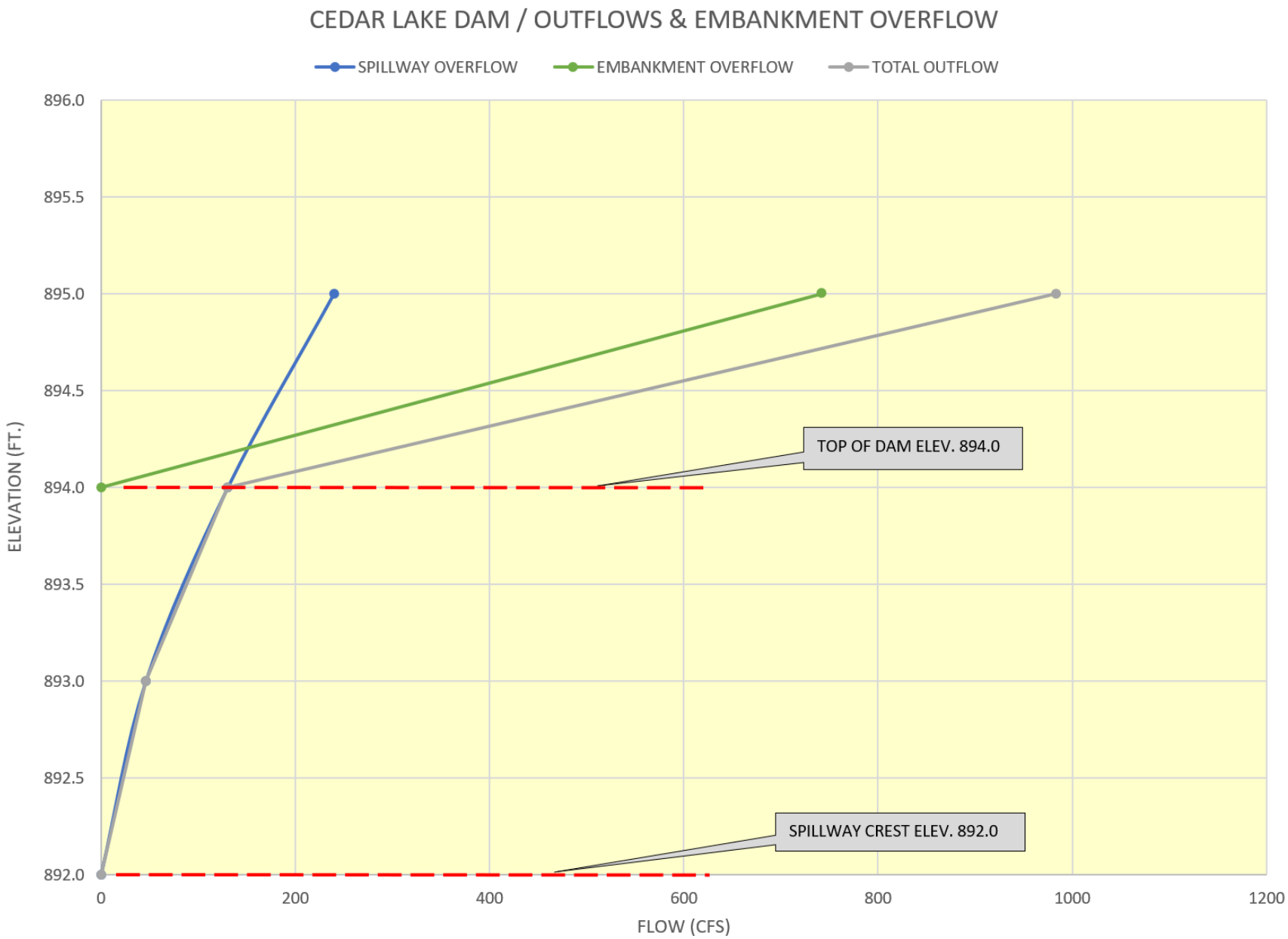
RESERVOIR ELEVATION-AREA-VOLUME & DISCHARGE CAPACITY DATA

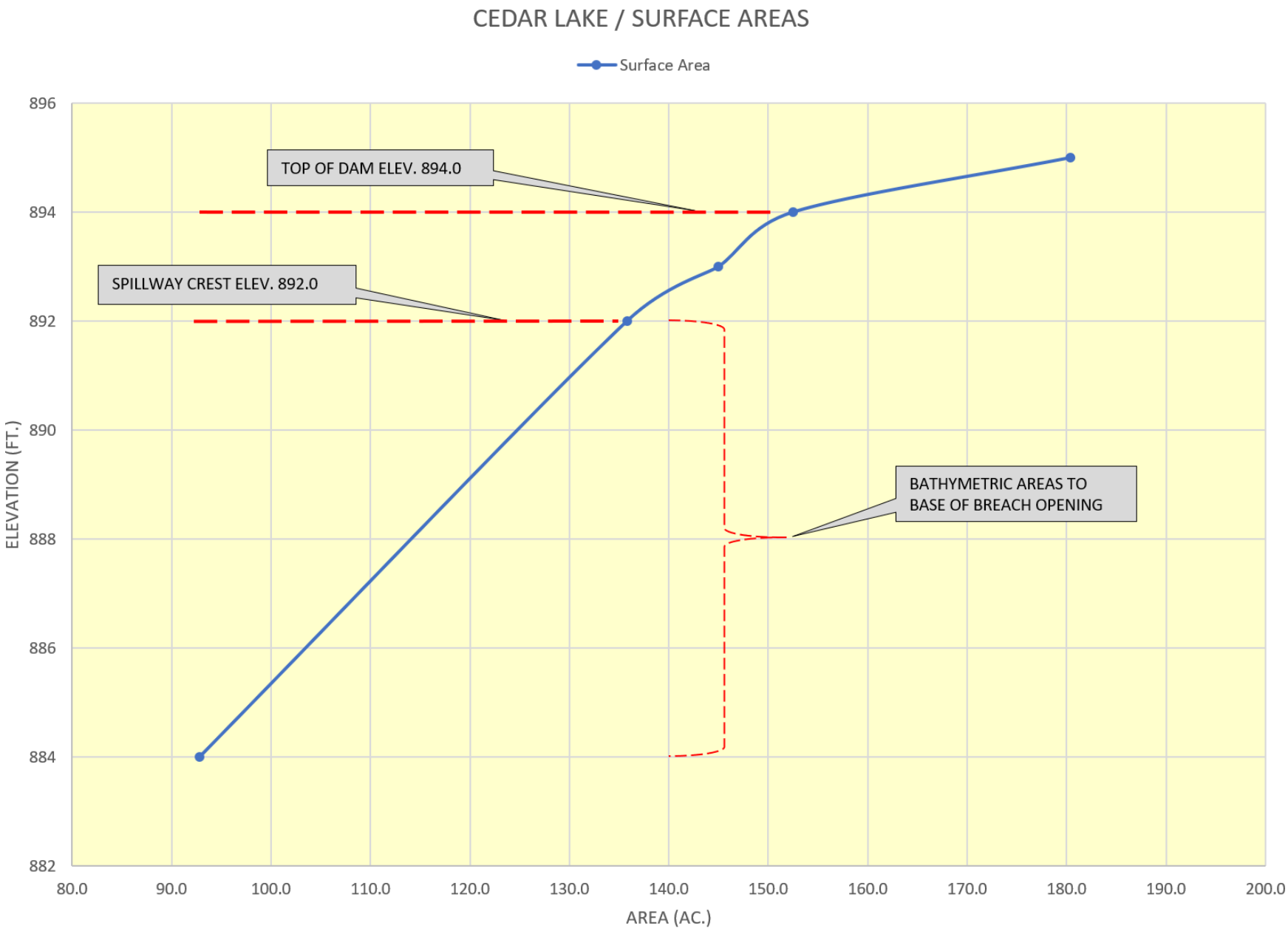
CEDAR LAKE DAM [CT DEEP ID #16603]

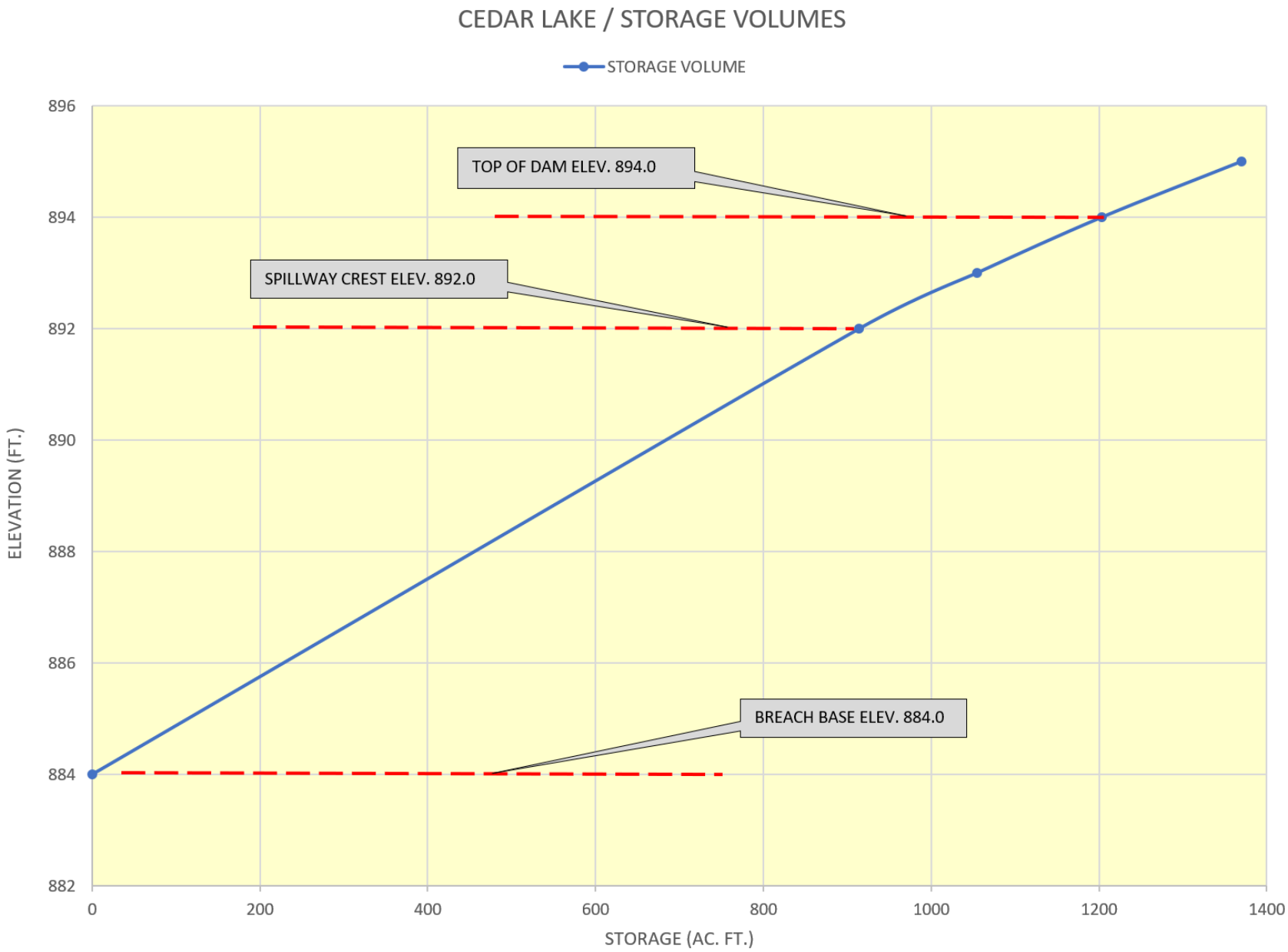
CEDAR LAKE DAM / WOLCOTT / #16603 / HAZARD CLASS "B"					
CEDAR LAKE / AREAS & STORAGE					
ELEV.	HEIGHT	AREA	VOLUME	∑ Volume	DESCRIPTION
884	0.0	92.8	0.0	0	Original Swamp Area &Breach Base
892	8.0	135.8	914.4	914	Spillway Crest
893	9.0	145.0	140.4	1055	Elevation
894	10.0	152.5	148.8	1204	Top of Dam
895	11.0	180.4	166.5	1370	Overtopping Elevation

SPILLWAY & EMBANKMENT OUTFLOW & OVERFLOW

ELEV.	$H_{SPILLWAY}$	$Q_{SPILLWAY}$	$H_{EMBANKMENT}$	Q_{ROAD}	Q_{TOTAL}
892	0	0		0	0
893	1	46		0	46
894	2	131	0	0	131
895	3	240	1	743	984


CEDAR LAKE DAM / OUTFLOWS & EMBANKMENT OVERFLOW
SPILLWAY OVERFLOW
EMBANKMENT OVERFLOW
TOTAL OUTFLOW
896.0
895.5
895.0
894.5
894.0
893.5
893.0
892.5
892.0
ELEVATION (FT.)
TOP OF DAM ELEV. 894.0
SPILLWAY CREST ELEV. 892.0
0
200
400
600
800
1000
1200
FLOW (CFS)


CEDAR LAKE / SURFACE AREAS
Surface Area
TOP OF DAM ELEV. 894.0
SPILLWAY CREST ELEV. 892.0
BATHYMETRIC AREAS TO
BASE OF BREACH OPENING
ELEVATION (FT.)
AREA (AC.)
896
894
892
890
888
886
884
882
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
190.0
200.0


CEDAR LAKE / STORAGE VOLUMES
STORAGE VOLUME
TOP OF DAM ELEV. 894.0
SPILLWAY CREST ELEV. 892.0
BREACH BASE ELEV. 884.0
ELEVATION (FT.)
STORAGE (AC. FT.)
896
894
892
890
888
886
884
882
0
200
400
600
800
1000
1200
1400

APPENDIX D

Dam Breach Inundation Analysis

The potential area of inundation due to a breach of Cedar Lake Dam as presented in this EAP is based on the following assumptions:

1. The pre-breach water level in the impoundment is at or just slightly over the top of the dam. The watershed and dam were analyzed for the occurrence of the 500-year storm event, which resulted in a water surface elevation of 894.14 feet, approximately 0.14 feet over the top of the dam.

2. The pre-breach water level in the downstream reach is based on the same HEC-1 analysis of the conditions prior to the breach but at the same conditions noted in No. 1, above.

3. The time from breach initiation to full formation used for the purpose of this EAP is 3.0 hours.

4. The final breach bottom width is 30 feet, the depth from top of dam is 10 feet and the side slopes of the breach are 1H:1V.

5. Downstream bridge openings are assumed not to be blocked.

For the purposes of this EAP, breach initiation is defined as the beginning of uncontrolled growth of the breach, and full formation is defined as the point when significant lateral expansion has stopped. The bases of the assumptions used herein include the fact that the top of the dam is a paved road surface, that there is a concrete upstream cutoff wall[11], and that the depth of the breach is governed by the submerged upstream base elevations.[12]

This analysis provides a conservative estimate of the dam breach outflow and the potentially inundated downstream areas. However, the actual magnitude of the flood wave and the resulting downstream flood levels will be dependent on numerous factors that cannot be predicted in advance. For example, the dam breach flood wave would be greater in magnitude if the water level in the impoundment is higher at the beginning of the failure. Furthermore, downstream flood levels could be increased due to conditions such as debris clogging

[11] Although the full depth of this wall is not known, its existence on the full length of the upstream side of the dam, extending down to the upstream soil surface, would, at minimum, slow the ensuing erosive process. Noteworthy also is the fact that the upstream edge of the paved road surface butts directly against this wall with no open joint, again preventing and delaying the full breakdown of the embankment.

[12] A photo from the early 1900's of the upstream intake area shows the then ground surface in relation to the base of the current intake structure.

bridge/culvert crossings and others. If these conditions exist, additional nearby properties may need to be evacuated.

Although not used for this analysis, there is a possibility that overtopping and a potential breach of the dam could be significantly delayed by removal of the weir boards and opening of the low level outlet's gate valve. The current analysis has taken a conservative approach by assuming that the weir boards were not removed, either by intent or by the lack of operability or accessibility prior to the storm.[13]

[13] See additional information in the Guidance for Warnings on Page 13.

APPENDIX E-1

Record Holders of EAP Control Copies

Copy Number	Organization	Person Receiving Copy
1	*Cedar Lake Owners Association* *P.O. Box 2152* *Bristol, CT 06011*	*Matt Smith* *Dam Maintenance* *Director*
2	*Town of Wolcott* *225 Nichols Road* *Wolcott, CT 06716*	*Allen T. Voghel* *Director of Civil Preparedness*
3	*Karl F. Acimovic, P.E. & L.S.* *588 Stonehouse Road* *Coventry, CT 06238*	*Karl Acimovic* *Consulting Engineer*
4	*Connecticut DEEP* *79 Elm Street* *Hartford, CT 06106*	*Dam Safety Section*
5		
6		
7		
8		

APPENDIX E-2

Record of Reviews / Updates to EAP

Update Number	Date	Revisions Made	By Whom
1			

APPENDIX E-3

Concurrences

By my signature, I acknowledge that I, or my representative, have reviewed this plan and concur with the tasks and responsibilities assigned herein for me and my organization.

1._____
Signature *Organization* *Date*

Printed name and title:

2.

_____
Signature *Organization* *Date*

Printed name and title:

3._____
Signature *Organization* *Date*

Printed name and title:

4._____
Signature *Organization* *Date*

Printed name and title:

5._____
Signature *Organization* *Date*

Printed name and title:

6._____
Signature *Organization* *Date*

APPENDIX F / Glossary of Terms

Abutment	The natural ground that borders on either end of the dam structure.
Appurtenance	Any structure or mechanism other than the dam itself which is associated with its operation.
Arterial Roadway	A roadway that provides a high level of mobility and that is frequently the route of choice for buses and trucks, as provided in the U.S. Department of Transportation document entitled "Highway Functional Classification Concepts, Criteria and Procedures, 2013 edition".
Boil	A disruption of the soil surface due to water discharging from below the surface. Eroded soil may be deposited in the form of a ring (miniature volcano) around the disruption.
Breach	An alteration of a dam either deliberately or accidentally in such a way as to release its impounded waters resulting in partial or total failure of the dam.
Class B Dam	A significant hazard potential dam which, if it were to fail, would result in any of the following: (i) possible loss of life; (ii) minor damage to habitable structures, residences, including but not limited to, industrial or commercial buildings, hospitals, convalescent homes, or schools; (iii) damage to local utility facilities including water supply, sewage treatment plants, fuel storage facilities, power plants, cable or telephone infrastructure, causing localized interruption of these services; (iv) damage to collector roadways and railroads; or (v) significant economic loss.
Class C Dam	A Class C dam is a high hazard potential dam which, if it were to fail, would result in any of the following: (i) probable loss of life; (ii) major damage to habitable structures, residences, including, but not limited to, industrial or commercial buildings, hospitals, convalescent homes, or schools; (iii) damage to major facilities, including public water supply, sewage treatment plants, fuel storage facilities, power plants, or electrical substations causing widespread interruption of these services; (iv) damage to arterial roadways; or (v) great economic loss.
Collector Roadway	A roadway that collects traffic from local roadways and connects traffic to arterial roadways, as provided in the U.S. Department of Transportation document entitled "Highway Functional Classification Concepts, Criteria and Procedures, 2013 edition".
Conduit	A closed channel (round pipe or rectangular box) that conveys water through, around, or under the dam.
Control Section	A usually level segment in the profile of an open channel spillway above which water in the reservoir discharges through the spillway.
Cross Section	A slice through the dam showing elevation vertically and direction of natural water flow horizontally from left to right. Also, a slice through a spillway

	showing elevation vertically and left and right, looking downstream.
CT ID Number	A unique identifying number assigned to a dam registered and regulated by the State of Connecticut.
Dam	Any barrier of any kind whatsoever which is capable of impounding or controlling the flow of water, including but not limited to storm water retention or detention dams, flood control structures, dikes, and incompletely breached dams.
Dam Failure	A catastrophic breach characterized by the sudden, rapid, and uncontrolled release of impounded water, or a lesser breach that adversely affects the dam's primary function of impounding water.
Dam Height	The vertical distance from the crest of the dam or similar structure to the downstream toe of such dam or similar structure.
Dam Operator	The person(s) in control of, or having responsibility for, the daily operation of the dam as designated by the owner on the dam registration form required by Section 22a-409-1(b) of the Regulations of Connecticut State Agencies (RCSA).
Dam Owner	The person(s) having legal ownership of the dam.
Drains: toe, foundation, or blanket	A water collection system of sand and gravel that typically pipes along the downstream portion of the dam to collect seepage and convey it to a safe outlet.
Drainage Area (watershed)	The geographic area on which rainfall flows into the dam. The drainage area can be delineated using USGS StreamStats. StreamStats is an on-line GIS application that is available to the public free-of-charge. http://water.usgs.gov/osw/streamstats/connecticut.html
Drawdown	The lowering or releasing of the water level in a reservoir over time or the volume lowered or released over a particular period of time.
Early Warning Notification	An alert stage in which the local authorities are informed by the dam owner that a situation exists at a dam that could develop into a serious hazard to downstream inhabitants, making evacuation necessary.
Emergency	A condition of a serious nature which develops unexpectedly, endangers the structural integrity of a Class C or Class B dam, and requires immediate action.
Emergency Action Plan (EAP)	A formal document required to be submitted to the commissioner in accordance with section 22a-411a-2 of the Regulations of Connecticut State Agencies.
Emergency Management Authority	Any local, state, federal, or tribal agency responsible for emergency operations, planning, mitigation, preparedness, response, and recovery for all hazards.
Emergency Operations Center	The location or facility where responsible officials gather during an emergency to direct and coordinate emergency operations, to communicate with other

(EOC)	jurisdictions and with field emergency forces, and to formulate protective action decisions and recommendations during an emergency.
Evacuation Map	A map showing the geographic area downstream of a dam that should be evacuated if it is threatened to be flooded by a breach of the dam or other large discharge.
Final Warning Notification	A warning in which the local authorities are informed by the dam owner that a failure of the dam is a likely possibility and residents downstream should be evacuated immediately.
Flood	Any high flow, overflow, or inundation by water which causes or threatens damage to persons or property.
Flood Response Center (FRC)	The state DEEP coordination center for major flood events affecting the State of CT.
Freeboard	Vertical distance between a stated water level in the reservoir and the top of dam.
Gate, slide or sluice	An operable, watertight valve to manage the discharge of water from the dam.
Groin	The area along the intersection of the face of a dam and the abutment.
Hazard Potential	The probable damage that would occur if the structure failed, in terms of loss of human life and economic loss or environmental damage.
Instantaneous Sunny Day Breach	A condition where there is a dam breach with no concurrent flooding from other sources. This is considered a dangerous breach event because people are not expecting a flood without a storm or snowmelt. For modeling purposes, instantaneous means that the full breach of the dam occurs with zero formation time.
Instrumentation	An arrangement of devices installed into or near dams that provide measurements to evaluate the structural behavior and other performance parameters of the dam and appurtenant structures.
Inundation Map	A map sufficient in graphic detail and of a scale that clearly shows the downstream inhabited areas and the inundation zones with features and other related information required in section 22a-411a-2(b) of the Regulations of Connecticut State Agencies.
Outlet Works (principal spillway)	An appurtenant structure that provides for controlled passage of normal water flows through the dam.
Piping	The progressive development of internal erosion through a dam by water, appearing downstream as a hole or seam discharging water that contains soil particles.
Probable Maximum, Precipitation (PMP),	The theoretically greatest precipitation or resulting flood that is meteorologically feasible for a given duration over specific drainage area at a

or Flood (PMF)	particular geographical location.
Riprap	A layer of large angular rock generally placed on an embankment or along a watercourse as protection against wave action, erosion, or scour.
Risk	A measure of the likelihood and severity of an adverse consequence.
Seepage	The natural movement of water through the embankment, foundation, or abutments of the dam.
Slide	The movement of a mass of earth down a slope on the embankment or abutment of the dam.
Spillway (auxiliary or emergency)	The appurtenant structure that provides the controlled conveyance of excess water through, over, or around the dam.
Spillway Capacity	The maximum discharge the spillway can safely convey with the reservoir at the maximum design elevation.
Spillway Design Flood or "SDF"	The largest flood that a given structure is designed to pass safely.
Spillway Crest	The lowest level at which impoundment water can flow through/over the spillway.
State Emergency Operations Center (SEOC)	The State's coordination center for emergency services during any major emergency affecting the State of Connecticut.
Structure	The dam, its appurtenances, abutments and foundation.
Tailwater	The body of water immediately downstream of the embankment at a specific point in time.
Toe of Dam	The base portion of the impounding structure which intersects with natural ground at the upstream and downstream sides.
Top of Dam (crest of dam)	The elevation of the uppermost surface of a dam embankment which can impound water.