EMERGENCY ACTION PLAN (EAP)

ABC DAM

(LOCAL/COMMON NAME OF DAM)

NAME OF COUNTY

TOWN/VILLAGE/CITY, WI

(River Name)

Dam Key Sequence Number (DKSN) ####

Field File (FF) Number ##.##

Insert photo of dam here by clicking in this text box, go to the “Insert” tab, click on “Pictures”, select photo, click “Insert”. Delete this text and resize photo and text box.

	Dam Owner	Dam Operator
Name		
Mailing Address		
Email Address		
Phone		

EAP prepared by:

Name (Title, Organization) Date

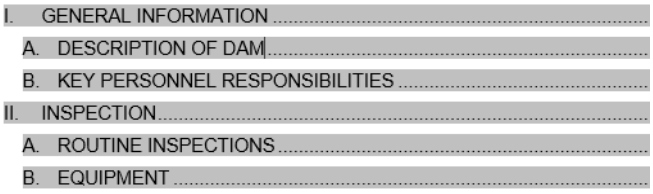
!!Instructional Information Only!!

Please delete THIS ENTIRE PAGE when EAP update/development is complete.

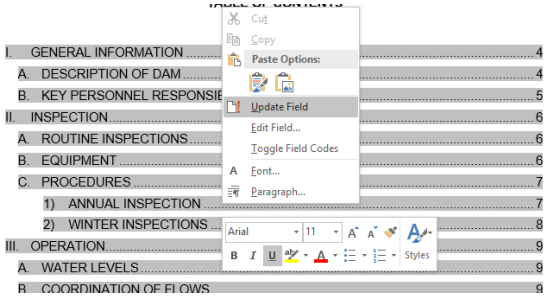
1. *Anything italicized and highlighted yellow is for instructions or suggested language only. Delete if not used or applicable to your dam.*
2. Anything with yellow highlight needs to be updated to match your dam.
3. No yellow highlights should be present in the final version of your EAPs.

After all updates are done you will need to update the table of contents. Because this is a linked document the information will update automatically when you tell it to do so:

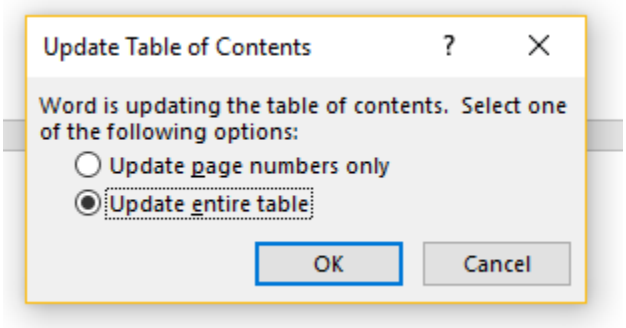
1. Click anywhere in the table of contents so that gray shows up behind the words.



2. Right click anywhere in the table of contents so that a window pops up. Select “Update Field”



3. Select “Update entire table” so that both the headings and page numbers update. If you changed heading names you may notice that some of the headings will not be capitalized correctly – you will need to find them in the document and type them in all caps and repeat steps 1-3.



4. If you make further changes (like deleting this page) and just need to update the page numbers, repeat steps 1-3 except select “Update page numbers only”

TABLE OF CONTENTS

I. LOCATION MAP

Insert location map of showing dam's location.

The map should clearly identify:

- The name and location of the dam access road. Note if key to locked gate is needed to access. If access to the dam is by some means other than a road, please describe and have route marked on the map.
- Public access points to the impoundment.
- The location of the water control structure; note if key is needed for fence, riser, etc. to access control mechanism (stop logs, gate, etc.).

The map should note:

- If a 4x4 vehicle is required to access the dam site.
- If there is poor cell phone reception at the dam site. If there is not reception at the site, mark the nearest location were cellular reception is possible.

II. CONCURRENCE

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

Edit list and renumber accordingly based on specific dam needs; 1-5 are typically required for all dams.

1._____
Tanya Lourigan, P.E. (State Dam Safety Engineer, DNR) Date

2._____
Name (Dam Owner) Date

3._____
Name (Dam Operator) Date

4._____
Name (Sheriff, Name of County) Date

5._____
Name (Director of Emergency Management, Name of County) Date

6._____
Name (Fire Chief, Name of City/Town/County) Date

7._____
Name (Highway Commissioner, Name of County) Date

8._____
Name (Chairman, Name of City/Town) Date

9._____
Name (Chairman, Name of County) Date

#._____
Name (Role, Organization) Date

III. PURPOSE AND INTENT

The purpose of this Emergency Action Plan (EAP) is to provide the owner and operator of the dam with a clear plan of action when a dam emergency arises. An emergency is identified as any condition which:

- develops unexpectedly;
- endangers the structural integrity of the dam; and
- could result in failure of the dam producing downstream flooding.

Having and implementing an EAP the can reduce the risk of human life loss or injury and minimize property damage during an emergency incident. The EAP provides a description of the dam and the area at risk as well as contact information for all parties involved in responding to or affected by an emergency at the dam. The EAP outlines what actions are required in the event of an emergency.

A copy of the EAP is located insert location and is posted insert location at the dam.

Definitions of commonly used dam terms are in Appendix H.

IV. DESCRIPTION OF DAM

The ABC Dam is located on the River Name in the quarter of Section #, Township #, Range #. The dam is accessed via insert access location information.

Type of dam	Embankment with whistle tube
Type of control	# slide/split leaf gates, #-foot wide stop logs
Structural height (feet)	##
Maximum storage capacity (ac-ft)	###
Surface area of impoundment (ac)	##
Primary use	Recreation, wildlife, fishery
Hazard rating	High, Significant or Low

Upstream and downstream land use consists of forestry/light residential/urban/etc. and forestry/residential/urban/etc., respectively. *Include any other information to describe dam.*

If the dam has an Early Warning System (a human observer-based flood notification system or an electronic flood notification system), briefly describe the warning system, the owner/operator responsibilities, the trigger for lowering pool levels, method for controlling flow, and level and type of monitoring.

Nearby dams include the DEF Dam located approximately # miles upstream and GHI Dam located approximately # miles downstream.

	Upstream Dam	Downstream Dam
Name	DEF	GHI
Field File Number	##.##	##.##

Location
Owner Name
Contact Information

A. HYDRAULIC SHADOW MAP

A hydraulic shadow map provides a picture of the area that would be inundated by a complete failure of the dam. This map helps inform who must be notified and/or evacuated in an emergency. The map can be found in Appendix C.

The hydraulic shadow map was produced by Consultant based on the information from the Dam Failure Analysis (DFA) *and correlated with Name of County Flood Insurance Study*. Associated dam failure maps, profiles and floodway data tables were adopted in the Community Name Floodplain Ordinance in date/year and approved by the DNR on date. For further information on the method used to produce the map, please contact the DNR State Dam Safety Engineer.

Critical downstream facilities include:

1. Residential homes or structures
    a. Insert street address (and Parcel ID ### - look up on County public land records)
    b. Insert street address (and Parcel ID ### - look up on County public land records)
2. Business name (insert address)
3. Storage facility (insert address)
4. Bridge or roads (insert location)
5. Gas, power, sewer, water lines (insert location)

The above listed critical facilities are included in the notification list in Appendix B.

Or this paragraph if the map is estimated

The hydraulic shadow map was produced by Consultant/Person and estimated based on insert method description. For further information on the method used to produce the map, please contact the DNR State Dam Safety Engineer.

Or this paragraph if the map is unavailable

A hydraulic shadow map is unavailable for this dam. For further information on the method used to produce the map, please contact the DNR State Dam Safety Engineer.

V. EMERGENCY LEVEL

It is important to determine the severity of the emergency when responding to an unusual event at a dam. The Guidance for Determining the Emergency Level chart can be used as a tool to guide the dam owner's actions during an emergency response. Emergency levels may change based on site-specific circumstances.

The Guidance for Determining the Emergency Level chart focuses primarily on the earthen components of a dam. Owners should discuss other possible failure scenarios with their consultant. Delete rows in the Guidance table that do not pertain to your dam and add rows within the different Observation categories as you see fit. Structural components may include concrete, wooden and metal components of a dam.

A. LEVEL 1: FAILURE IMMINENT OR HAS HAPPENED

Urgent situation where the dam failure appears to be imminent, in progress or has already happened.

B. LEVEL 2: POTENTIAL FAILURE

Situation that is developing rapidly where there is a high likelihood of potential failure.

The following criteria would cause a shift from a Level 2 emergency to a Level 1 emergency:

- *Criteria 1 – update with items specific to your dam*
- *Advancing erosion that is threatening the control section*
- *Seepage rate increasing*
- *Rapidly enlarging sinkhole*

C. LEVEL 3: UNUSUAL INCIDENT

Unusual incident that is developing slowly and may or is not be associated with a high flow event. *Examples include obstruction of the spillway due to debris that will cause embankment to overtop if not removed, floating bog movement toward the spillway, add or remove based on traits or situations unique to your dam.* The following criteria would cause a shift from a Level 3 emergency to a Level 2 emergency:

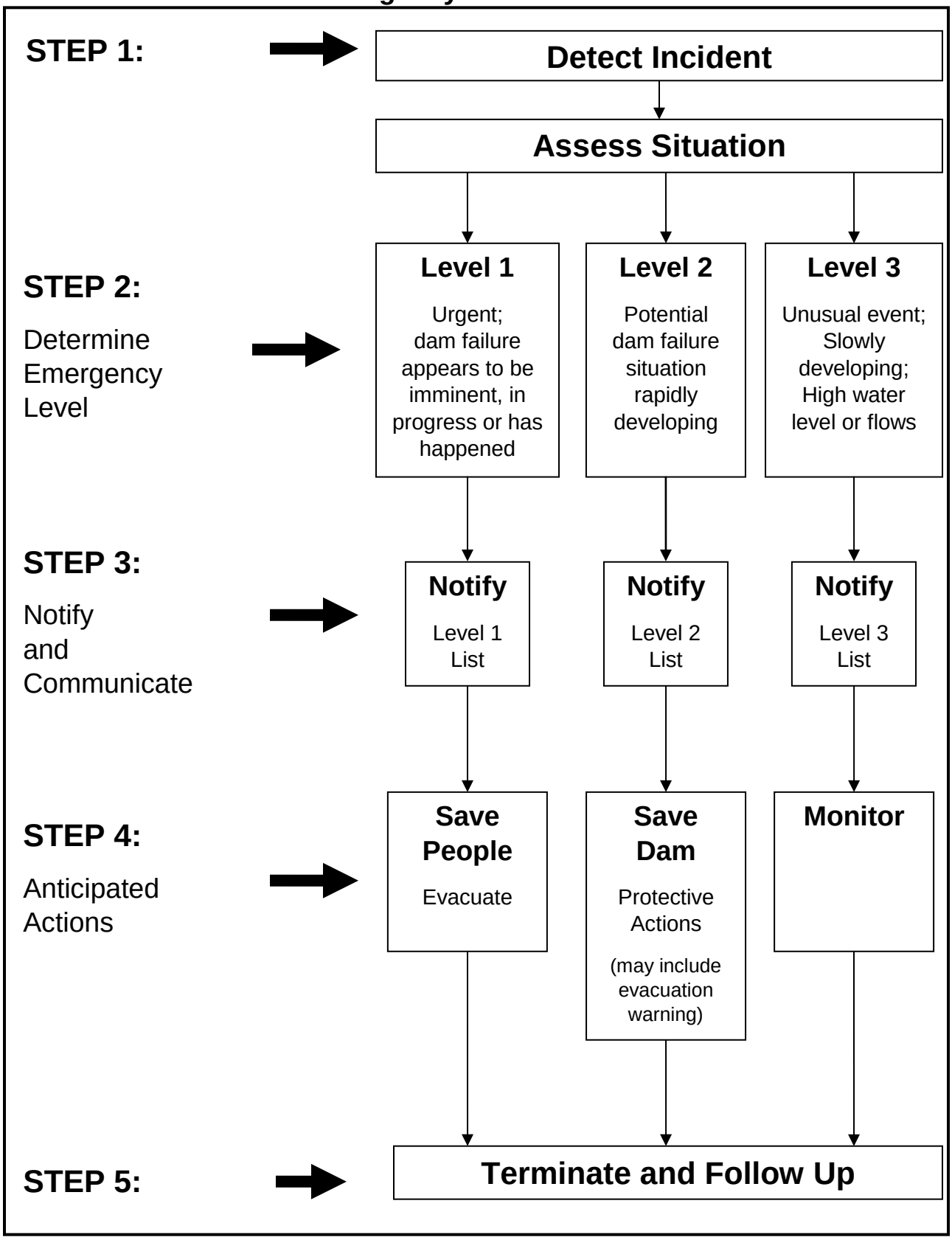
- *Criteria 1 – update with items specific to your dam*
- *Active erosion beginning to occur; soil is beginning to be transported*
- *Seepage water is no longer clear; sediment particles observed*
- *Gate inoperable with quickly rising water levels*

Guidance for Determining the Emergency Level

Observation	Situation	Level
High Flow	Impoundment water level at auxiliary spillway crest or auxiliary spillway is flowing with no active erosion	3
	Auxiliary spillway flowing with active gully erosion	2
	Primary and/or auxiliary spillway flow that could result in flooding of people downstream if the reservoir level continues to rise	2
	Auxiliary spillway flowing with advancing erosion that is threatening the embankment and/or control section	1
	Primary and/or auxiliary spillway flow that is flooding people downstream	1
Embankment Overtopping	Impoundment water level is 1 foot below the top of the dam	2
	Water from the impoundment is flowing over the top of the dam	1
Seepage	New seepage areas on or near the dam	3
	New seepage areas with cloudy discharge	2
	Seepage with cloudy discharge; increasing flow rate	1
Sinkholes	Observation of new sinkhole in impoundment area or on embankment	2
	Rapidly enlarging sinkhole	1
Cracking of Embankment or Other Structural Component	New cracks in the embankment or other structural component greater than ¼-inch wide without seepage	3
	Cracks in the embankment or other structural component with seepage	2
Movement of Embankment or Other Structural Component	Visual movement of the embankment slope or other structural component	2
	Sudden or rapidly proceeding slides of the embankment slopes or other structural component	1
Instruments	Instrumentation readings beyond predetermined or normal values	3
Security Threat	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 or appurtenances	1
Sabotage/Vandalism	Unauthorized operation of the dam	3
	Damage to dam with no impacts to the functioning of the dam	3

	Modification to the dam that could adversely impact the function or operation of the dam	2
	Damage to dam that has resulted in seepage flow	2
	Damage to dam that has resulted in uncontrolled water release	1

Level of Emergency Determination Chart



D. NOTIFICATION LISTS AND FLOWCHARTS

Notification lists identify the names and contact information for individuals involved in an emergency incident at the dam. Appendix B includes the notification lists that are associated with the notification flowcharts. Lists of upstream/downstream residents/businesses and/or dam owners potentially impacted by an incident, businesses storing hazardous materials, as well as special evacuation needs are also included in Appendix B.

Notification flowcharts provide a visual map of who is responsible for notifying various individuals, who to notify, and the order of notification for each emergency level. Notification flowcharts are found in Appendix B.

Notification flowcharts will be activated with a telephone call to the dam owner or operator, Town/Village/City, County Sheriff's Office, or 911. Contact will be maintained by cell phone throughout an emergency and communications can be tracked using the chart in Appendix D. *Add any other information about how dam owner and county emergency management will coordinate communications during an event (e.g., where the command center will be, who will be in charge during the emergency event/repairs, etc.). Consider the hazard rating of your dam and how that may influence who needs to be involved.*

VI. DURING THE INCIDENT

A. ACCESS POINTS

During an incident, unsafe conditions may develop on the impoundment upstream of the dam. During spring, summer and fall there may be people on the impoundment boating, swimming, fishing, hunting, or recreating that are unaware of the potential loss of water. During the winter, there may be people on the impoundment ice fishing, snowmobiling or recreating that are unaware of potential ice movement or breakup.

See access points noted on the Location Map in Section I.

Insert information associated with plan to shut down access points to the impoundment. Also, make sure that contact information for person/group (Lake Association/District, boat landing contacts, etc.) responsible for notifying people of unsafe conditions are included in the notification lists and flowcharts.

B. AVAILABLE RESOURCES

During an emergency, dam owners may need to bring in outside resources such as such as heavy equipment, sandbags, pumps, siphons, or divers.

A listing of the resources including provider names, addresses and telephone numbers are in Appendix D. Appendix D also includes a map of the available resources that can be referenced to determine routes if roads have been closed due to high water or other obstructions to traffic.

VII. AFTER THE INCIDENT

A. REENTRY AND RECOVERY

The emergency is not considered over until inspected by the dam owner's engineer for any damage and local Emergency Management and Sheriff have been consulted. Contact the DNR Water Management Engineer for technical assistance, if needed.

Evacuated residents will be allowed to return based on the plan developed by the local Emergency Management and Sheriff.

A post-disaster review of the inspection will be held with the dam owner, dam owner's engineer, and DNR Water Management Engineer to determine what actions are needed to ensure that the dam is in compliance with state standards. The review may result in formal orders issued to the dam owner and may require the submittal of plans and specifications for repair.

B. AFTER ACTION REVIEW

After a dam emergency is over, a review of the event should take place as soon as practicable (within 45-60 days). The review will help all parties identify what was done correctly during the EAP activation, what was done incorrectly, and what could be improved. Any needed changes to the EAP will be submitted to the DNR Water Management Engineer for review and approval.

VIII. UPDATING THE EAP

The EAP will be reviewed annually during/on month/date by the dam owner to ensure that:

- All contact information listed in the document is correct; consider calling each contact to determine or confirm the contact information. Contact information is located on the:
    1. Concurrence signature page
    2. Notification lists and flowcharts (Appendix B)
    3. Available resources chart (Appendix E)
- Any physical changes to the dam are added to the description of the dam
- New or updated information about the dam is incorporated (e.g., hydraulic shadow map)
- Dam personnel understand their role in responding to a dam emergency

If there are changes to the contact information, the document will be updated and provided to the DNR Water Management Engineer for review and approval. A general description of the change(s) will be tracked using the chart in Appendix G. Copies of the updated EAP will be provided to all EAP holders (Appendix F).

New signatures are required on the Concurrence page when an existing role is assumed by a new individual, changes occur to the dam or downstream of the dam that would change emergency response, or new individuals are added to the Concurrence page. These individuals can include those who:

- play a role in the emergency response or
- are requested by the dam owner or operator to sign the document

If no updates to the document are needed, the dam owner will send an email to the DNR Water Management Engineer indicating no changes were necessary.

This EAP document is stored at: Insert description of electronic and physical location

A. EMERGENCY MANAGEMENT

At least every five (5) years, the dam owner will meet with Emergency Management to discuss what changes have been made at the dam and to determine what opportunities exist to conduct or participate in dam-related for table top exercises.

The owner will also review the hydraulic shadow map to identify if any significant land use changes have occurred in the hazard area. If changes have occurred, the dam owner should notify the DNR Water Management Engineer.

APPENDIX A: DNR WME STAFF

For most current DNR Water Management Engineer staff list, check here:
https://dnr.wi.gov/topic/dams/regionalcontacts.html

If the DNR Water Management Engineer for the county that your dam is located is not available, contact an engineer assigned to a county adjacent to the county your dam is in.

APPENDIX B: NOTIFICATION LISTS AND FLOWCHARTS

Delete/add rows in the Contact table as you see fit.

Contact Name	Address	Phone	Email
Dam Owner Name	Address	Phone	Email
Dam Operator Name	Address	Phone	Email
Name County			
Emergency Management Name	Address	Phone	Email
Sheriff (Election Term 20xx – 20xx) Name	Address	Phone	Email
Highway Commission/Public Works Name	Address	Phone	Email
County Chairperson (Election Term 20xx – 20xx) Name	Address	Phone	Email
Town/Village/City			
Town/Village/City Chairperson/Executive (Election Term 20xx – 20xx) Name	Address	Phone	Email
Town/Village/City Clerk Name	Address	Phone	Email
Wisconsin Department of Natural Resources			
Name Boat Landing Name	Address	Phone	Email
Water Management Engineer Name Also see Appendix A	Address	Phone	Email
State Dam Safety Engineer Tanya Lourigan	101 S. Webster St. PO Box 7921 Madison, WI 53707-7921	608-444-2089	tanya.lourigan@wisconsin.gov
State Warning Center (24hr)		(800) 943-0003 Select option 1	
Other			
Access Point to Impoundment Name	Address	Phone	Email
Lake Association/District Chairperson (Election Term 20xx – 20xx) Name	Address	Phone	Email

National Weather Service Contact Name	Address	Phone	Email

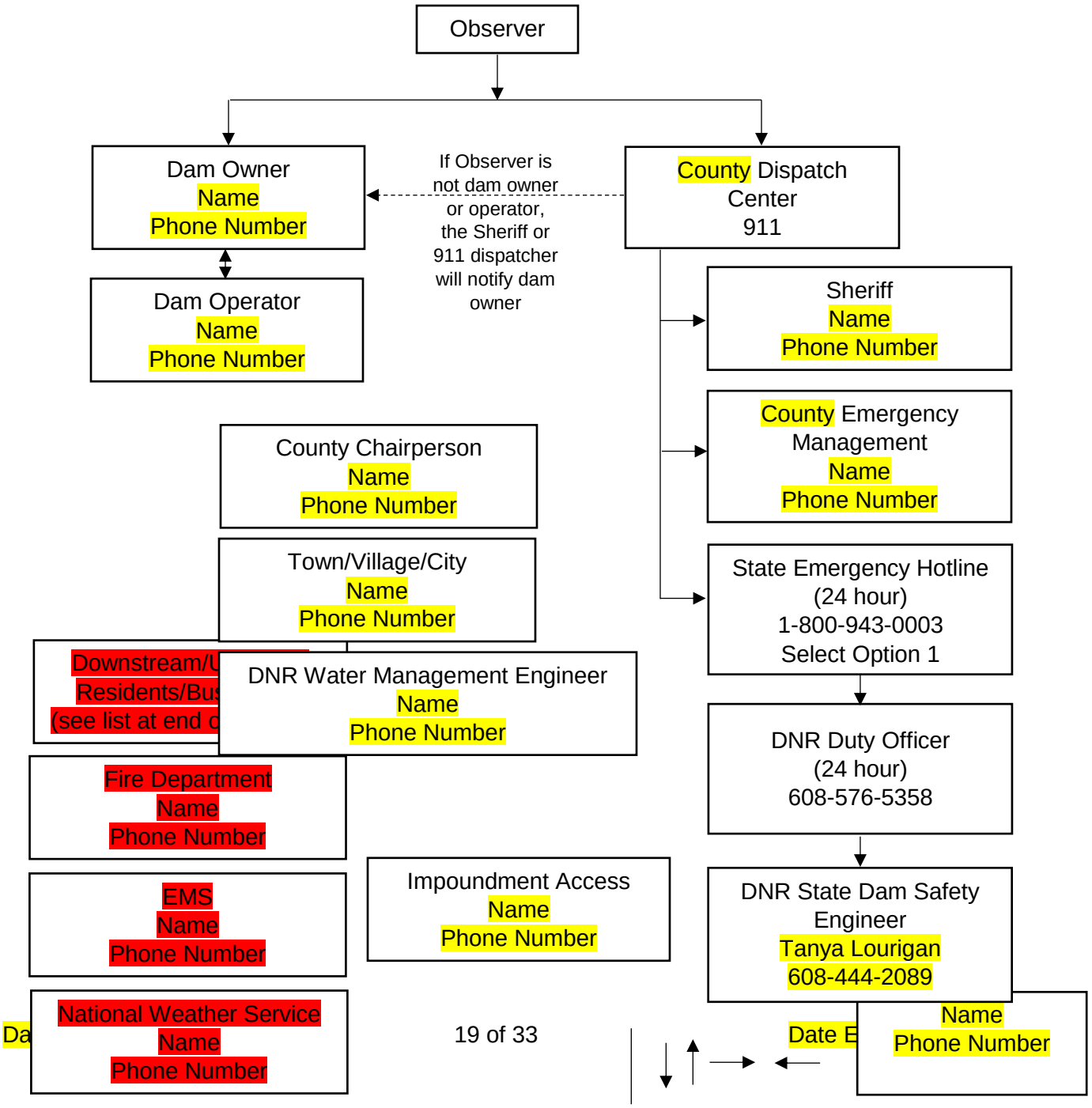
DOWNSTREAM/UPSTREAM RESIDENTIAL/BUSINESS CONTACT INFORMATION

Name	**Physical Address Parcel ID**	**Contact Information**	**Critical Facility (Y/N)** Reference list in Hydraulic Shadow (Section IV.A.)
Resident 1	Street City, WI ##### PID: get from County GIS map	Street City, WI ##### Telephone, if known Email, if known	
Business 1	Street City, WI ##### PID: get from County GIS map	Name Street City, WI ##### Telephone, if known Email, if known	
STH # Bridge	Short description of location	Name Street City, WI ##### Telephone, if known Email, if known	

EMERGENCY LEVEL 1: FAILURE IMMINENT

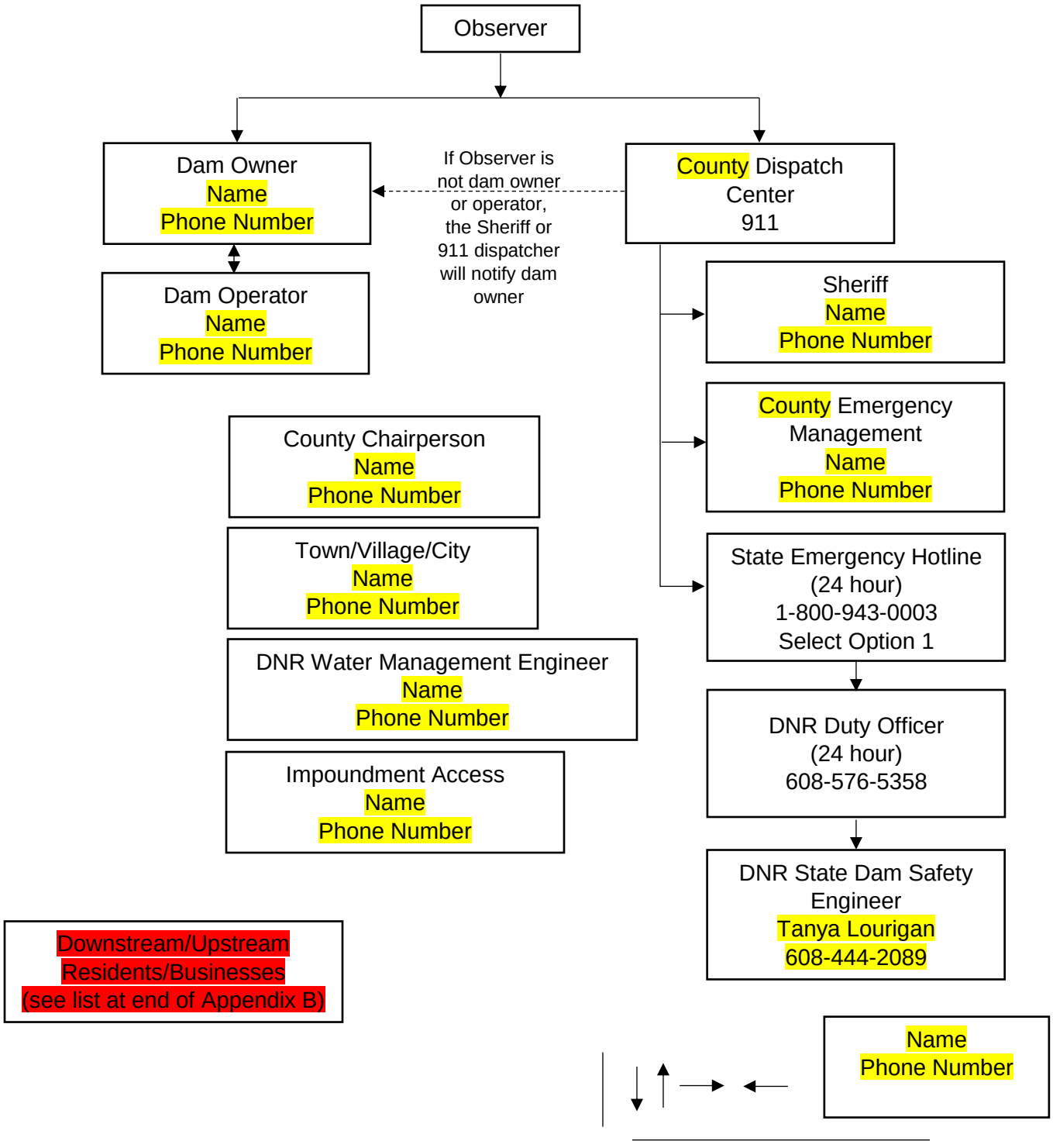
Move boxes and arrows around to match your notification process. Typical boxes have been created to start with; copy/delete boxes and shapes (at bottom right). Boxes with red highlighted may be needed for your dam (especially if high hazard), but final decision to be made by dam owner. Delete unused boxes/shapes. Once flowcharts are drafted contact County Emergency Management Director to review.

For more complicated, dams, see larger chart available at the end of this appendix (otherwise just delete entire page). Typically, the downstream/upstream residents, fire department, EMS and National Weather Service are ONLY needed for significant and high hazard dams; keep or delete boxes as necessary.



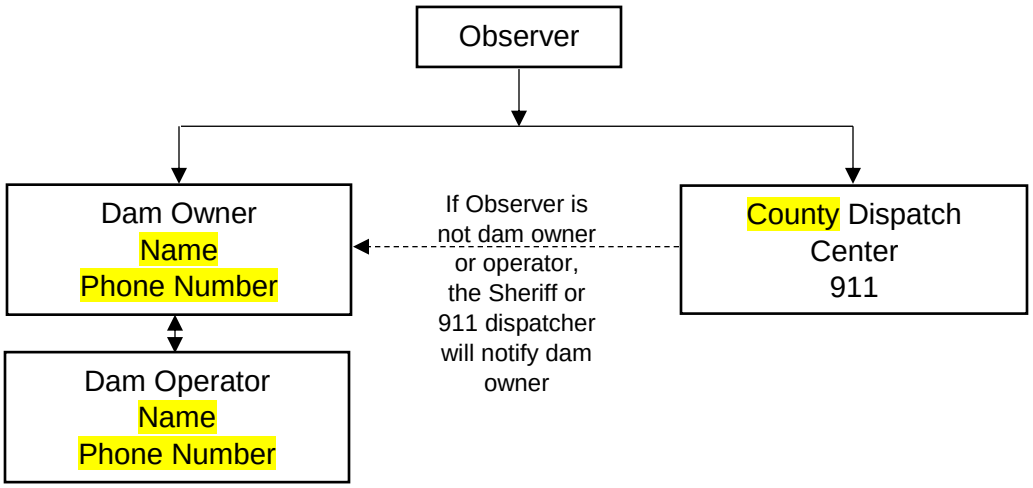
EMERGENCY LEVEL 2: POTENTIAL FAILURE

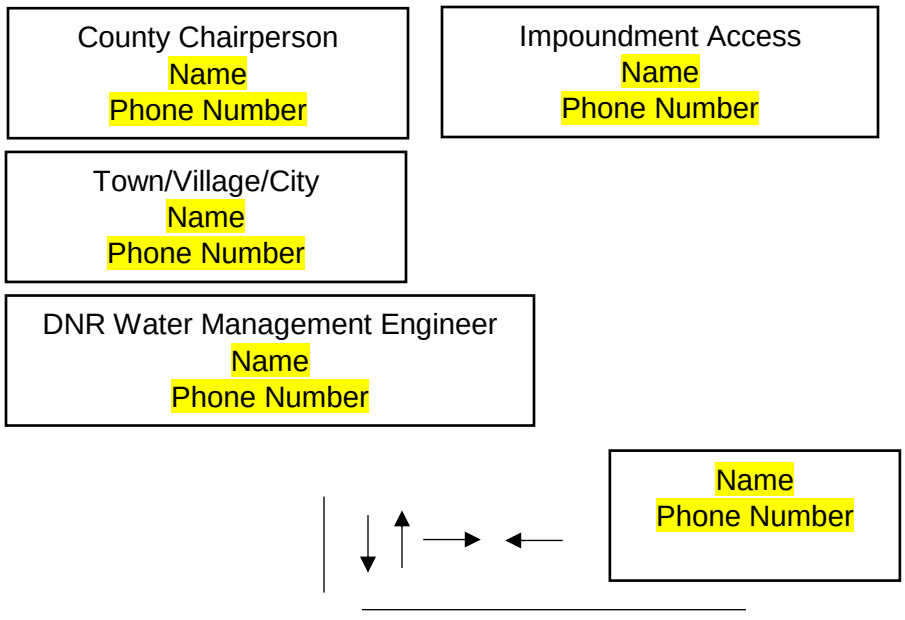
Move boxes and arrows around to match your notification process. Typical boxes have been created to start with; copy/delete boxes and shapes (at bottom right).

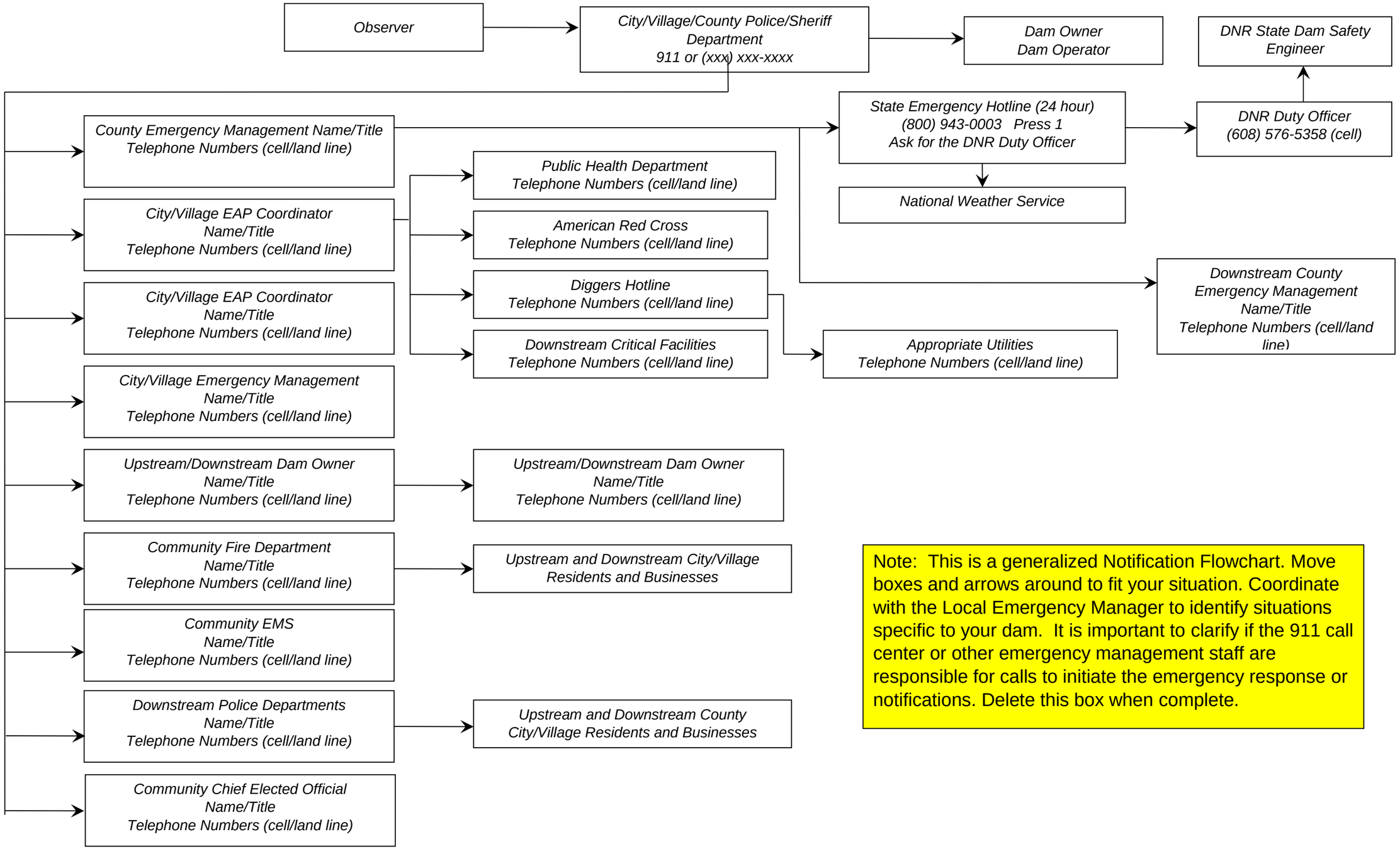


EMERGENCY LEVEL 3: UNUSUAL INCIDENT

Move boxes and arrows around to match your notification process. Typical boxes have been created to start with; copy/delete boxes and shapes (at bottom right).







Note: This is a generalized Notification Flowchart. Move boxes and arrows around to fit your situation. Coordinate with the Local Emergency Manager to identify situations specific to your dam. It is important to clarify if the 911 call center or other emergency management staff are responsible for calls to initiate the emergency response or notifications. Delete this box when complete.

APPENDIX C: HYDRAULIC SHADOW MAP

APPENDIX D: COMMUNICATION DOCUMENTATION CHART

Date	Time	Person Contacted	Method of Contact	Reason for Contact

APPENDIX E: AVAILABLE RESOURCES

Insert map showing available resources.

Available Resources Chart				
Resource	**Provider/Supplier Name**	**Address**	**Phone Number Email Address**	**Notes** (e.g., type of equipment, estimated quantity of material, etc.)
Heavy equipment service and rental				
Heavy equipment (secondary contact)				
Sand and gravel				
Concrete				
Pumps/Siphons				
Diver (if necessary for this dam)				
Add any upstream or additional resources needed				

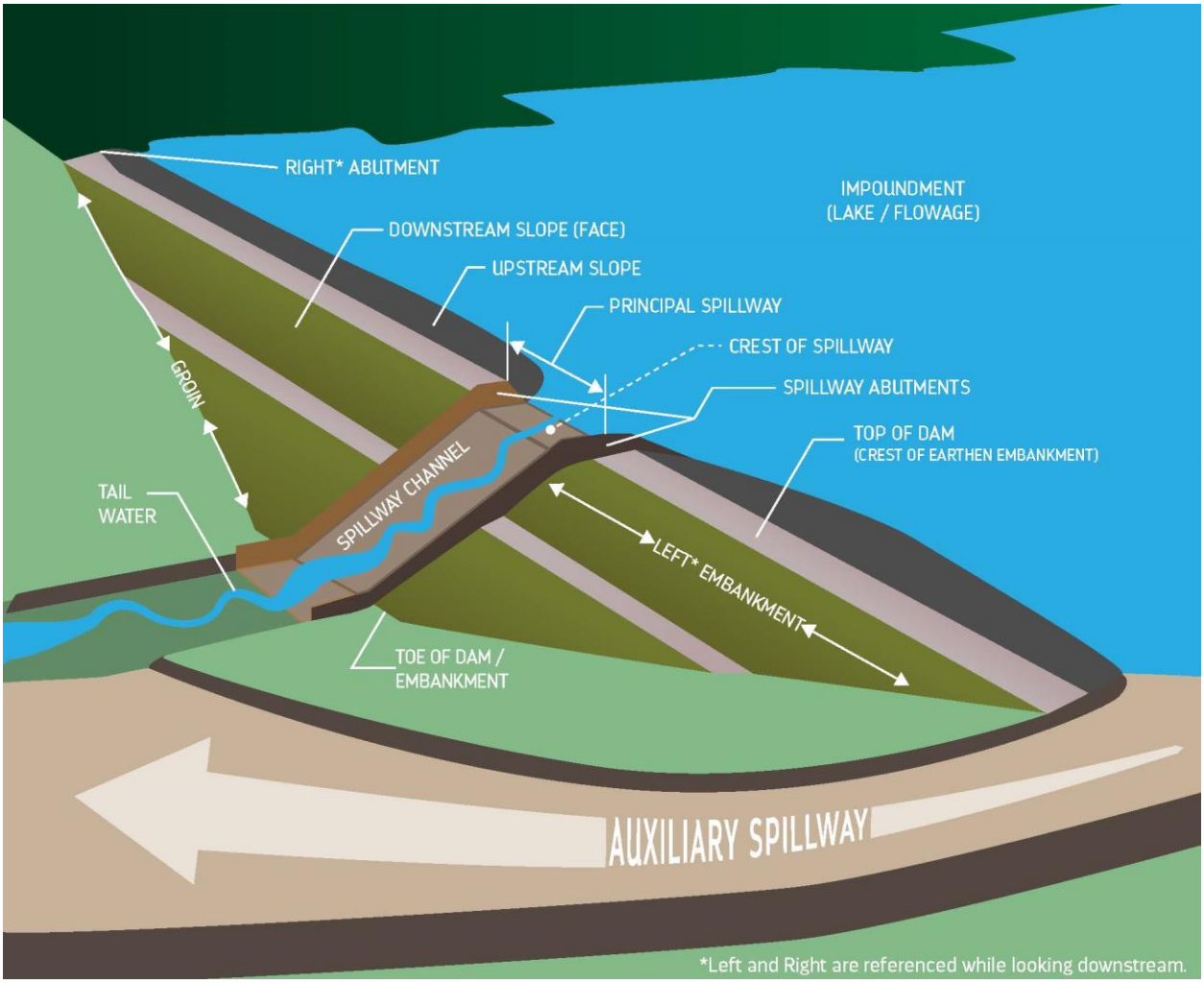
APPENDIX F: LIST OF EAP HOLDERS

Name	Address	Telephone Number Email Address

APPENDIX G: EAP UPDATE CHART

Date of Update	General Description of Update	Date Sent to EAP Holders

APPENDIX H: GLOSSARY OF TERMS



Abutment – That part of the valley side or concrete walls against which the dam is constructed. An artificial abutment is sometimes constructed where there is no suitable natural abutment. The wall between a spillway or gate structure and the embankment can also be referred to as an abutment. (Also see Spillway Abutment)

Alterations – Changes in the design or configuration of the dam that may affect the integrity or operation of the dam and thereby have a potential to affect the safety of persons, property, or natural resources. (Also see Reconstruction)

Appurtenant Works – Structures or machinery auxiliary to dams which are built for operation and maintenance purposes (e.g., outlet works, spillway, powerhouse, tunnels, etc.).

Auxiliary Spillway (Emergency Spillway) – A secondary spillway designed to operate only during large flood events; an auxiliary gate is a standby or reserve gate only used when the normal means to control water are not available or at capacity.

Boil – An upward disturbance in the surface layer of soil caused by water escaping under pressure from behind or under a dam or a levee. The boil may be accompanied by deposition of soil particles (usually silt) in the form of a ring around the area where the water escapes.

Breach – An opening or a breakthrough of a dam sometimes caused by rapid erosion of a section of earth embankment by water; dams can be breached intentionally to render them incapable of impounding water.

Capacity (Hydraulic Capacity) – Amount of water a dam can convey through designed spillway structures, typically expressed in cubic feet per second (cfs).

Conduit – Closed channel (e.g., pipe) to convey the discharge of water through or under a dam.

Core/Corewall – Vertical zone of material of low permeability (e.g., compacted clay) typically in the center of an embankment dam to prevent seepage.

Crest of Dam (Top of Dam) – The top of the dam not designed to flow water; also known as the top of dam.

Crest of Spillway – The top of the spillway where water flows over.

Cutoff Wall – A wall of impervious material (e.g., concrete, asphaltic concrete, steel sheet piling) built into the foundation to reduce seepage through the dam.

Dam – Artificial barrier built for impounding or diverting the flow of water; see NR 333.03(3).

Dam Failure Analysis (DFA) – Analysis completed by an engineer/consultant to estimate the downstream impact if the dam were to fail during a 100-year event; results of analysis used to assign hazard rating. (Also see Hydraulic Shadow Map)

Design Spillway Capacity – The largest storm event or flowrate that a given dam/project is designed to pass safely. The inflow hydrograph (graph showing how inflow to an impoundment changes over time) is used to estimate the amount of water that the spillway needs to convey and maximum water surface elevation of the impoundment.

Dike (Levee/Berm) – An embankment built to protect land from flooding; no water control structure present.

Drain, Layer, or Filter Blanket – A layer of pervious material in a dam to facilitate controlled drainage and reduce seepage velocities; includes toe drain, weepholes, chimney drains, etc.

Drainage Area – The area that drains naturally to a specified point on a river/stream.

Drawdown – Intentional lowering of water surface level due to a controlled release of water from an impoundment; maximum drawdown rate is typically no more than 6 inches per day.

Embankment – A constructed bank of material, commonly earth or rock, to hold back water.

Embankment Dam (Earth Dam/Earthfill Dam) – Any dam primarily constructed of excavated natural materials, usually earth or rock, with sloping sides and a designated water control structure.

Emergency Action Plan (EAP) – A predetermined plan of action to be taken to reduce the potential for property damage and loss of life associated with a dam emergency or failure; EAP includes details specific to each dam.

Energy Dissipater – Device constructed within or at the outlet of a spillway to reduce energy of fast-flowing water.

Engineer/Consultant – Licensed or registered professional engineer (PE) in a given state; offers experience and expertise in the design and inspection of dams.

Face – Upstream or downstream side slope of dam.

Failure – Incident resulting in an uncontrolled release of water from a dam.

Flashboards – Boards, often constructed of wood or steel, used for increasing the depth of water behind a dam that are designed to deploy (break away) at a designed height of water.

Foundation of Dam – Natural material on which the dam structure is placed.

Freeboard – Vertical distance between the upstream water level (headwater) and the top of a dam.

Gate – Device which can be operated across the waterway to control or stop the flow. Common types of gates include slide (sluice), split-leaf, crest, and tainter (radial).

Gravity Dam – Dam constructed of concrete and/or masonry that relies on its weight for stability.

Groin – Area along the contact (or intersection) of the face of a dam with the abutments.

Headwater – Water surface elevation of the impoundment on the upstream side of the dam.

Height of Dam (Structural Height) – Difference in elevation between the point of lowest elevation on the top of the dam before overtopping and the lowest elevation of the natural stream or lake bed at the downstream toe of the dam; see NR 333.03(24).

Hydraulic Height – Difference in elevation between the headwater and tailwater.

Hydraulic Shadow Map – Map delineating the area that would be inundated due to a dam failure during a 100-year flood event; see NR 333.03(8).

Impoundment (Pool/Lake/Reservoir) – Water held back by a dam; water on the upstream side of the dam.

Intake – Any structure in an impoundment which water can be drawn through the dam.

Maintenance – The upkeep necessary for efficient operation and safety of dam and appurtenance works; involves labor and materials but is not to be confused with alterations or repairs.

Ogee Spillway (Ogee Section) – A weir where the spillway crest, slope, and bottom form an "S" or ogee curve.

One percent (1%)/One Hundred Year (100-year)/Regional Flood The regional flood is based upon a statistical analysis of stream flow records available for the watershed or an analysis of rainfall or runoff characteristics in the watershed or both. In any given year, there is a 1% chance that the regional flood may occur or be exceeded.; see NR 333.03(23).

Operator – The owner, designated agent, or employee of the owner charged with overseeing and physically operating the dam.

Outlet – An opening through which water discharges from an impoundment.

Overtopping – Uncontrolled release of water over parts of the dam that are not designed to pass flow; overtopping does not necessarily mean that the dam has failed.

Owner – A person, or group of people (e.g., Lake District), utility, corporation who is responsible for operating, maintaining, and managing a dam.

Phreatic Surface – Upper surface of saturation in an embankment.

Piping – The progressive development of internal erosion by seepage; appears on the downstream side of the dam as a hole or seam where water containing soil particles is discharged.

Plunge Pool (Stilling Basin) – A natural or sometimes artificially created pool that dissipates the energy of free-flowing water.

Primary Spillway (Principal Spillway) – Main spillway designed to convey water during normal flows; see NR 333.03(16).

Reconstruction – Altering an existing dam in a way that affects its hydraulic capacity or structural integrity; see NR 333.03(22).

Repair – Activity to restore a dam to its approved design condition.

Riprap – Large stones placed to protect against wave action, ice action and scour.

Scarp – Nearly vertical, exposed earth surface created at the upper edge of a slide or a breach.

Seepage – Movement of water through the dam foundation, abutments, or embankment.

Slide – Movement of a mass of earth fill down a slope along the failure plane for a considerable distance. In embankments and abutments, this involves a surficial separation of a portion of the slope from the surrounding material.

Slump – A portion of earth embankment which moves downslope, often along a curved surface; sometimes happens suddenly, often with cracks developing.

Spillway – Structure over or through which flows are discharged. If the flow and level are controlled by gates it is considered a controlled spillway, but if the spillway crest is at a fixed elevation (and cannot be changed) it is considered an uncontrolled spillway.

Spillway Abutment – Wall between a spillway or gate structure and the embankment.

Spillway Channel – Channel conveying water from the impoundment to the river downstream.

Stop Log – Logs, timbers, steel beams, or concrete beams placed on top of each other with their ends held in channels/guides/brackets on each side of a channel or conduit; stop logs may be added or removed to raise or lower the impoundment water level.

Storage – Volume of water held behind a dam, typically expressed in units of acre-feet. Maximum storage capacity means the volume of water stored before overtopping occurs; see NR 333.03(11).

Tailwater – The level of water in the discharge channel immediately downstream of the dam.

Toe Drain – Drains installed at the toe of the dam to collect and convey seepage that occurs through embankment.

Toe of Dam (Toe of Embankment) – The junction of the downstream face of a dam with the ground surface, also referred to as the downstream toe. For an embankment dam, the junction of the upstream face with the ground surface is called the upstream toe.

Trash Rack –Metal or concrete bars located in the waterway across the upstream end of a conduit or spillway channel to prevent the entry of floating or submerged debris.

Valve – Device fitted to a conduit in which the closure member is either rotated or moved transversely or longitudinally in the waterway to control or stop the flow.

Weir –A barrier built across the width of a stream to raise the upstream water level; called a fixed-crest weir; when top is at a permanent elevation and cannot be moved up or down. Weirs can also be built across a stream, channel or discharge point to measure or gauge flow. Types of weirs include broad crested, sharp crested, ogee, and V-notched weirs.