

**EMERGENCY ACTION PLAN
FOR**

_____ DAM
(FORMAL NAME)

_____ DAM
(LOCAL NAME)

(LOCATION INCLUDING STREET AND STREAM SYSTEM)

COUNTY: _____

OWNER: _____

TELEPHONE: _____

CELL: _____

OPERATOR: _____

TELEPHONE: _____

CELL: _____

OWNER MAILING ADDRESS: _____

_____ Date

Place

Dam

Location

Map

Here

The map should clearly point out the name and location of the dam access road. If access is to the dam is by some means other than a road, please describe and have it marked on the map.

Concurrence

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 (Dam Owner) *Date*

Printed name and title: _____

2. _____
Signature (Dam Operator) *Date*

Printed name and title: _____

3. _____
Signature (Local Law Enforcement) *Date*

Printed name and title: _____

4. _____
Signature (Local Emergency Management) *Date*

Printed name and title: _____

5. _____
Signature (Fire Chief) *Date*

Printed name and title: _____

6. _____
Signature (Director of Public Works) *Date*

Printed name and title: _____

7. _____
Approval Signature (State Dam Safety Engineer) *Date*

Printed name and title: _____

8. _____
Approval Signature (Regional Water Management Engineer) *Date*

Printed name and title: _____

Purpose and Intent

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

- develops unexpectedly;
- endangers the structural integrity of the dam; and
- could result in the dam's failure producing downstream flooding, requiring immediate action.

By writing and implementing an EAP the owner/operator of a dam can reduce the risk of human life loss or injury and minimize property damage during an unusual or emergency event.

This is an EAP for the _____ Dam located on _____
_____ Creek/River/Lake in _____. 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.

Description

[Please provide a brief description of dam. The description should include the type, location and components of the dam as well as the Hazard Rating.]

Type of dam: _____

Location of dam: _____

Height of dam: _____

Size of pool: _____

Number of gates: _____

Type of gates: _____

Use of dam: _____

Hazard Rating: _____

Determining the Level of Emergency

It is important to determine the severity of the emergency before responding to an unusual event at a dam. The charts on pages ___ and ___ are to be used to determine the severity of the emergency and to guide the dam owner/operator's actions during an emergency response.

Guidance for Determining the Emergency Level

Event	Situation	Emergency level *
Auxiliary/Earth spillway flow	Reservoir water surface elevation at auxiliary spillway crest or spillway is flowing with no active erosion	3
	Spillway flowing with active gully erosion	2
	Spillway flow that could result in flooding of people downstream if the reservoir level continues to rise	2
	Spillway flowing with an advancing headcut that is threatening the control section	1
	Spillway flow that is flooding people downstream	1
Embankment overtopping	Reservoir level is 1 foot below the top of the dam	2
	Water from the reservoir is flowing over the top of the dam	1
Seepage	New seepage areas in 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 reservoir area or on embankment	2
	Rapidly enlarging sinkhole	1
Embankment/ structural component cracking	New cracks in the embankment/structural component greater than ¼-inch wide without seepage	3
	Cracks in the embankment/structural component with seepage	2
Embankment/ structural component movement	Visual movement/slippage of the embankment slope/structural component	2
	Sudden or rapidly proceeding slides of the embankment slopes/structural component	1
Instruments	Instrumentation readings beyond predetermined 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 or appurtenance with no impacts to the functioning of the dam	3
	Modification to the dam or appurtenances that could adversely impact the functioning of the dam	2
	Damage to dam or appurtenances that has resulted in seepage flow	2
	Damage to dam or appurtenances that has resulted in uncontrolled water release	1

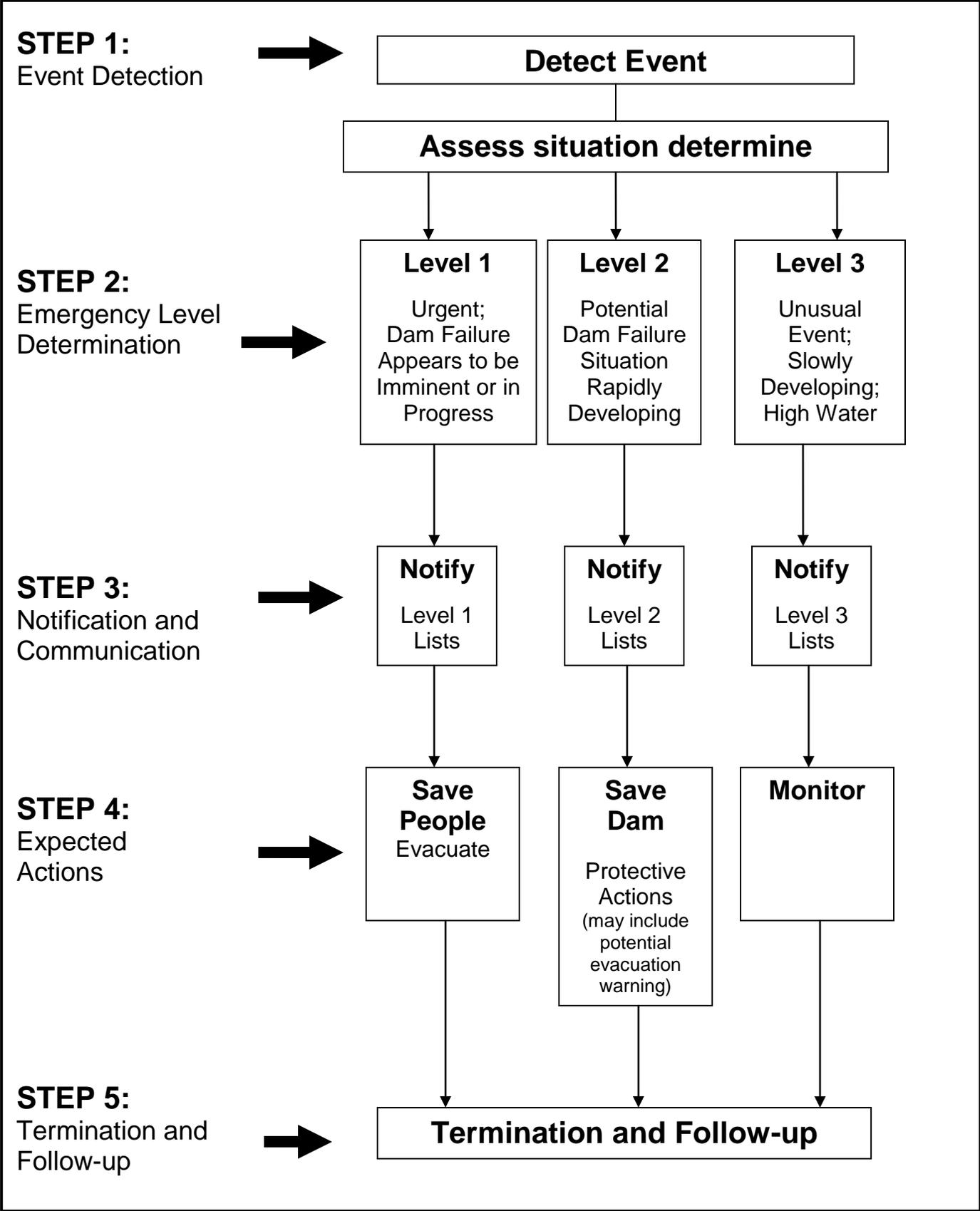
* Emergency Level 1: Urgent; dam failure appears imminent or is in progress

* Emergency Level 2: Potential dam failure situation, rapidly developing

* Emergency Level 3: Non-emergency unusual event, slowly developing; high water

NOTE: 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. Also, emergency levels may change based on site specific circumstances and discussions with the dam owner's consultant. Structural components may include concrete, wooden and metal components of a dam.

Level of Emergency Determination Chart



Emergency Action Plan Notification Flowchart

The purpose of the EAP Notification Flowchart is to provide a visual map of who is to be notified, the order of notification and who is responsible for notifying various individuals and agencies/organizations. The Notification Flowchart can be customized based on the level of emergency as determined under the Level of Emergency Determination Chart.

The Agency/Organization Notification List should be used as a quick reference for contact information for the Notification Flowchart. It can be customized based on the level of the emergency.

The _____ Dam Emergency Action Plan Notification Flowchart can be found on page _____ and was last updated on the date shown on the bottom of the page. The Agency/Organization Notification List can be found on page _____ and was last updated on the date shown on the bottom of the page. The Notification Flowchart will be activated with a telephone call to _____.

Contact with _____ (local law enforcement) and _____ (alternative contact) will be maintained throughout the dam emergency by _____ (cell phone/radio/other). See Appendix B for the Emergency Communication Plan.

Hydraulic Shadow Map

The purpose of the Hydraulic Shadow Map is to provide a picture of the area that would be affected by a complete failure of the dam in order to determine who must be notified and/or evacuated in an emergency. The Hydraulic Shadow Map should clearly identify residences, businesses, storage facilities, bridges, downstream dams and other structures such as roads, power lines, sewer, gas and water lines and other infrastructure that could be affected by the failure of the dam.

The Hydraulic Shadow Map for _____ Dam was produced by _____ based on the information from the Dam Failure Analysis and correlated with _____ County Flood Insurance Study dated _____, if available. The Map can be found on page _____ and was last updated on the date shown on the bottom of the page. For further information on the method used to produce the map, please contact: _____.

(If map is estimated) The Hydraulic Shadow Map for _____
Dam was produced by _____ and estimated based
on _____. The Map can be found on page ____ and was
last updated on the date shown on the bottom of the page. For further information on the
method used to produce the map, please contact: _____.

Emergency Notification Lists

Emergency Notification Lists are lists of the names, addresses and telephone numbers of individuals, businesses, critical facilities and other entities who would be affected by a failure of the dam and who must be notified and/or evacuated in an emergency. The lists have been grouped based on the severity of the emergency. The Emergency Notification Lists for the _____ Dam can be found on page(s) _____ and were last updated on the date shown on the bottom of the page.

Available Resources Chart

During an emergency, dam owners/operators may need to bring in outside resources such as heavy equipment, sandbags, pumps, siphons or divers. A listing of the resources including provider names, addresses and telephone numbers available to the owner/operator of the _____ Dam can be found on page ____ and was last updated on the date shown on the bottom of the page. A map showing the location of the available resources can be found on page ____ and was last updated on the date shown on the bottom of the page. A map of the available resources can be used to determine alternative transportation routes if roads have been closed due to high water or other obstructions to traffic.

Place Notification Flowchart Here

Blank Notification Flowchart can be found in attachment to this document.

Agency/Organization Notification List for Notification Flowchart

Agency/Organization	Principal contact	Address	Office telephone #	Alternate telephone #	Email Address

Place

Hydraulic

Shadow

Map

Here

Available Resources Chart

Heavy equipment service and rental	Sand and gravel supply	Ready-mix concrete supply
Pumps/Siphons	Diving Contractor	Sand Bags
Additional Resources	Additional Resources	Additional Resources

Place Available Resources Location Map Here

This map may be placed in the Appendix.

Reentry and Recovery

The emergency at the _____ Dam will not be considered over until inspected by _____ (dam owner’s engineer) and the Village/City/County of _____ Emergency Management Official and the Village/City/County of _____ police department have been consulted. The DNR Regional Water Management Engineer _____ will be contacted for technical assistance if needed. Evacuated residents will be allowed to return based on the plan developed by the Village/City/County of _____ Emergency Management Official and the Village/City/County of _____ police department.

Once the emergency is declared over, _____ (dam owner’s engineer) will inspect the dam for any damage. A post-disaster review of the inspection will be held with the DNR Regional Water Management Engineer _____ to determine what actions may be 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.

After Action Review

After a dam emergency is ended, a review of the event should take place as soon as practicable. (If the review does not take place within 45 days of the dam emergency, valuable data may be lost.) The review will determine what was done correctly during the EAP activation, what was done incorrectly and what could be improved. Any needed changes to the _____ Dam EAP will be made by _____ (dam owner). An updated EAP including an updated Approval/Concurrence will be provided to all holders of the EAP, the State Dam Safety Engineer and the DNR Regional Water Management Engineer _____. A copy of the updated EAP will be kept by _____, owner of the _____ Dam and _____, operator of the _____ Dam. A copy of the updated EAP will be posted in any structure located at the _____ Dam.

Training, Testing and Annual Review

The purpose of an annual review of the EAP and training for dam owners and operators is to ensure that all contact information listed is accurate and that dam personnel are familiar with the EAP and understand their role in responding to a dam emergency. The annual review of and training for the _____ Dam's EAP will occur during the month of _____. Based on changes identified in the annual review, copies of updated pages will be provided to all holders of the EAP. A copy of the most current EAP will be kept by _____, owner of the _____ Dam and _____, operator of the _____ Dam. A copy of the most current EAP will be posted in any structure located at the _____ Dam.

At least every five (5) years, the owner/operator of the _____ Dam will meet with the Village/City/County of _____ Emergency Management Official to discuss what changes have been made to the _____ County All Hazards Emergency Response/ Operations Plan and to determine what opportunities exist for exercises. Also, the owner/operator of the _____ Dam will review the dam failure (hydraulic shadow) map to identify any significant land use changes in the hazard area. If changes have occurred then the dam owner/operator should notify the DNR Regional Water Management Engineer, _____.

The dam owner/operator should work with local emergency management to determine what opportunities exist to conduct or participate in dam related EAP exercises.

RECOMMENDED EAP APPENDICES

Supporting Narrative and Documentation
IOM
Dam plan and section
Dam Failure Analysis Profiles
Emergency Communication Plan
Glossary of Terms

DOCUMENT APPENDICES

Appendix A: DNR Regional Water Management Engineers
Appendix B: Communication Documentation Chart
List of Holders of the Emergency Action Plan
Receipt of the Emergency Action Plan/Emergency Action Plan Updates
Chart
Glossary of Terms

Communication Documentation Chart for _____ Dam

Date	Time	Person contacted	Method of contact	Reason for contact
	AM PM			

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. Right and left abutments are those on respective sides of an observer when viewed looking downstream. The wall between a spillway or gate structure and the embankment can also be referred to as an abutment.

Alterations – Such changes in the design of the dam as may directly affect the integrity of the dam and thereby affect the safety of persons, property or natural resources.

Appurtenant Structures – The structures or machinery auxiliary to dams which are built to operate and maintain dams; such as outlet works, spillway, powerhouse, tunnels, etc.

Auxiliary Gate- A stand by or reserve gate used only when the normal means of water control is not available or at capacity.

Auxiliary Spillway (Emergency Spillway) - A secondary spillway designed to operate only during exceptionally large floods.

Boil - An upward disturbance in the surface layer of soil caused by water escaping under pressure from behind or under a water-retaining structure such as a dam or a levee. The boil may be accompanied by deposition of soil particles (usually silt) in the form of a ring (miniature volcano) 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.

Conduit - A closed channel to convey the discharge of water through or under a dam.

Core – A zone of material of low permeability in an embankment dam.

Corewall - A wall built of impervious material, usually of concrete or asphaltic concrete in the body of an embankment dam to prevent leakage.

Crest of Dam - The crown of an overflow section of the dam. In the United States, the term "crest of dam" is often used when "top of dam" is intended. To avoid confusion, the terms crest of spillway and top of dam should be used in referring to the overflow section and dam proper, respectively.

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

Dam – A barrier built for impounding or diverting the flow of water.

Dike (Levee) – An embankment, usually applied to embankments or structures built to protect land from flooding.

Drain, Layer or Blanket – A layer of pervious material in a dam to facilitate drainage. Includes toe drain, weep hole and chimney drain.

Drawdown – The resultant lowering of water surface level due to release of water from the impoundment.

Embankment – Fill material, usually earth or rock, placed with sloping sides.

Embankment Dam (Earth Dam / Earthfill Dam) - Any dam constructed of excavated natural materials, usually earth or rock, placed with sloping sides.

Emergency Action Plan – A predetermined plan of action to be taken to reduce the potential for property damage and loss of lives.

Energy Dissipater - Any device constructed in a waterway to reduce or destroy the energy of fast-flowing water.

Engineer/Consultant – A licensed or registered engineer in a given state; offers experience and expertise in the design and inspection of dams.

Failure – An incident resulting in the uncontrolled release of water from a dam.

Foundation of Dam - The natural material on which the dam structure is placed.

Freeboard – The vertical distance between a stated water level and the top of a dam.

Gate or Valve – In general, a device in which a leaf or member is moved across the waterway to control or stop the flow.

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

Groin - That area along the contact (or intersection) of the face of a dam with the abutments.

Height of Dam - The vertical measurement expressed in feet as measured from the downstream toe of the dam at its lowest point to the elevation of the top of the dam.

Hydraulic Shadow Map - A map delineating the area that would be inundated in the event of a dam failure.

Impoundment – Water or wastewater held back by a dam.

Maintenance – The upkeep necessary for efficient operation of dams and their appurtenance works. It involves labor and materials, but is not to be confused with alterations or repairs.

Masonry Dam - Any dam constructed mainly of stone, brick, or concrete blocks that may or may not be joined with mortar. A dam having only a masonry facing should not be referred to as a masonry dam.

Ogee Spillway (Ogee Section) - An overflow weir in which in cross section the crest, downstream slope, and bucket have an "S" or ogee form of curve. The shape is intended to match the underside of the nappe at its upper extremities.

One percent/One Hundred Year (100-YEAR) Flood -The flood magnitude expected to be equaled or exceeded on the average of once in 100 years. It may also be expressed as an exceedance frequency with a 1% chance of being exceeded in any given year.

Operator – The owner, or an agent or employee of the owner.

Outlet – An opening through which water can freely discharge for a particular purpose from an impoundment.

Owner – Any person who owns, leases, controls, operates, maintains or manages a dam or impoundment.

Phreatic Surface – The upper surface of saturation in an embankment.

Piping – The progressive development of internal erosion by seepage, appearing downstream as a hole or seam discharging water that contains soil particles.

Plunge Pool – A natural or sometimes artificially created pool that dissipates the energy of free-falling water. The pool is located at a safe distance downstream of the structure from which water is being released.

Primary Spillway (Principal Spillway) - The principal or first used spillway during flood flows.

Repair – To essentially restore a dam to its approved design condition.

Riprap – A layer of large stones, broken rock or precast blocks placed in a random fashion on the upstream slope of an embankment dam, on a reservoir shore, or on the side of a channel as a protection against wave and ice action.

Scarp - The nearly vertical, exposed earth surface created at the upper edge of a slide or a breached area along the upstream slope of an earthen embankment.

Seepage - The movement of water that may take place through the dam, its foundations, or its abutments.

Slide - The movement of a mass of earth fill down a slope. In embankments and abutments, this involves the separation of a portion of the slope from the surrounding material.

Slump Area – A portion of earth embankment which moves downslope, sometimes suddenly, often with cracks developing.

Spillway - A structure over or through which flood flows are discharged. If the flow is controlled by gates, it is considered a controlled spillway; if the elevation of the spillway crest is the only control, it is considered an uncontrolled spillway.

Spillway Channel - A channel conveying water from the spillway crest to the river downstream.

Stilling Basin – A basin constructed to dissipate the energy of fast-flowing water, eg. from a spillway or bottom outlet, and to protect the river bed from erosion.

Stoplogs – Logs or timbers, steel or concrete beams placed on top of each other with their ends held in guides on each side of a channel or conduit.

Storage - The retention of water or delay in runoff either by planned operation, as in a reservoir, or by temporarily filling the overflow areas, as in the progression of a flood crest through a natural stream channel.

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

Toe of Dam - 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.

Toe of Embankment – The junction of the face of the dam with the ground surface.

Top of Dam - The elevation of the uppermost surface of a dam, usually a road or walkway, excluding parapet wall, railings, etc.

Trash Rack – A structure of metal or concrete bars located in the waterway at an intake to prevent the entry of floating or submerged debris.

Valve - In general, a device fitted to a pipeline or orifice in which the closure member is either rotated or moved transversely or longitudinally in the waterway so as to control or stop the flow.

Weir - A low dam or wall built across a stream to raise the upstream water level. Termed fixed-crest weir when uncontrolled. A structure built across a stream or channel for the purpose of measuring flow. Sometimes described as a measuring weir or gauging weir. Types of weirs include broadcrested weirs, sharpcrested weirs, ogee weirs, and V-notched weirs.