

## EMERGENCY CONTACT INFORMATION

### IN CASE OF AN EMERGENCY DIAL 911

**Insert your Local Emergency Contact numbers**

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Fire Department

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Police Department

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Ambulance

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Poison Control Center

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Family Physician

**For NON-Emergencies in the Albuquerque Area-  
DIAL 311**

**Insert your Local Non- Emergency Contact numbers**

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Local Emergency Authorities

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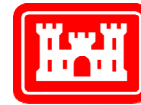
Local Red Cross

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Family Meeting Place

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Check-In Contact Telephone



**US Army Corps  
of Engineers®**

Albuquerque

District

### **FLOOD FIGHTING FIELD GUIDE**



## Introduction

We live in a land of contrasts – red rock cliffs, wide grassy bluffs, sandy flats, and urban areas, all under the bright New Mexico sun. Threading through it all are the rivers, channels, acequias, and ditches that carry the lifeblood of the land – WATER.

As beautiful and essential as it is, water can easily become a danger to homes, businesses, and lives when storms, erosion, animal burrowing, or simple age threaten the structures that contain it.

The US Army Corps of Engineers, and the US Bureau of Reclamation, in consultation with other Federal, State, and local entities and experts, have teamed together to bring you this guide. In it, you will find flood-fighting resources. If you are walking along a levee or a ditch bank and see something that just does not look quite right, this guide contains material to assist in identifying a potential problem. You can make the difference between safety, and water damage or flooding.

**Riprap** - A layer of large stones, broken rock, precast blocks, or other suitable material, placed on an embankment, on a reservoir shore, or along a watercourse as protection against wave action, erosion, or scour. Very large riprap is sometimes referred to as armor. Riprap may be dumped, wire-tied, or grouted.

**RISK** - A measure of the likelihood and severity of an adverse consequence.

**SAND 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.

**SCOUR** - Occurs when the current velocity against the levee is adequate to remove levee embankment materials.

**SEEPAGE** - The internal movement of water through the embankment, foundation, or abutments of the dam.

**SLIDE** - The disrupted movement of a mass of earth down a slope on the embankment or abutment of the dam or in the reservoir area.

**TOE** - The junction of the upstream or downstream slope (structural fill) of an embankment with the natural ground surface

**TOP (CREST)** - The elevation of the uppermost surface of an embankment (structural fill), which can safely impound water behind the levee/dam.

**For additional information contact the US Army Corps of Engineers (USACE):**

**USACE Emergency Operations Center - 505-342-3686**

**USACE EOC Conference Room - 505-342-3296**

**EMERGENCY ACTION PLAN (EAP)** – A formal document identifying potential emergency conditions that may occur at the dam and specifying preplanned actions to minimize potential failure of the dam and to minimize failure consequences including loss of life, property damage, and environmental damages. The EAP includes an Evacuation Map.

**EPA** - Environmental Protection Agency

**EVACUATION MAP**- a map showing the geographic area downstream of a dam to be evacuated. This map may also show planned evacuation routes.

**FEMA** - Federal Emergency Management Agency, U.S. Department of Homeland Security.

**HAZARD** - A situation that creates the potential for adverse consequences such as loss of life, property damage and environmental damages.

**HEIGHTH** - The vertical distance as measured from the lowest natural ground surface elevation at the downstream toe of the structural fill of the dam to the crest of the dam.

**EARTHFILL DAM** - An embankment dam constructed of similar earth material throughout.

**MRGCD** - Middle Rio Grande Conservancy District

**MRGFCA**- Middle Rio Grande Flood Control Association

**NMWDOC**- New Mexico Watershed and Dam Owners Coalition

**Reservoir**- The body of water impounded or potentially impounded by the dam.

## **‘Need to Knows’ of Floods**

### **What is a flood?**

Floods are an abnormally high water flow or water level that overtops the natural or artificial confining boundaries of a waterway; a general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of river and/or tidal waters and/or the unusual accumulations of waters from any sources.

### **What is Flood Fighting?**

Flood fighting are actions taken immediately before or during a flood to protect human life and to reduce flood damages, such as evacuation, emergency sandbagging, and providing assistance to flood victims.

### **Flood Facts:**

- Overland flooding occurs outside a defined river or stream, such as when a levee is breached, but still can be destructive.
- Flooding can also occur when a dam breaks, producing effects similar to flash floods.
- Hurricanes, winter storms and melting snow are common causes of flooding.

### **Actions to consider BEFORE a flood:**

Avoid building in a floodplain unless you elevate and reinforce your home. Elevate the furnace, water heater, and electric panel if susceptible to flooding.

### **Actions to consider DURING a flood:**

If there is any possibility of a flash flood, move immediately to higher ground. Do not wait for instructions to move.

### **If You Are Directed to Evacuate:**

- Secure your home. If you have time, bring in outdoor furniture. Move essential items to an upper floor.
- Turn off utilities if instructed to do so.
- Disconnect electrical appliances. Do not touch electrical equipment if you are wet or standing in water.
- Do not walk through moving water. Six inches of moving water can make you fall. If you must, walk where it is not moving and use a stick to check the firmness of the ground in front of you.
- Do not drive into flooded areas. If floodwaters rise around your car, abandon the car and move to higher ground if you can do so safely.
- Pre-stage important documents and papers in a portable container so that you can easily transport it with you when you evacuate.

## **GLOSSARY OF TERMS/ACRONYMS FOR FLOOD CONTROL FACILITIES:**

**ABCWUA** – Albuquerque/Bernalillo County Water Utility Authority

**ABUTMENT** - That part of the natural ground against which the dam is constructed. The left and right abutments of dams are defined with the observer looking downstream.

**AMAFCA** – Albuquerque Metropolitan Arroyo Flood Control Authority

**BERM** - A nearly horizontal step (bench) in the sloping face of the dam.

**BREACH** - An opening through the dam that allows draining of the reservoir. A controlled breach is an intentionally constructed opening. An uncontrolled breach is an unintended failure of the dam.

**DAM** - A man-made barrier built across a watercourse or off-channel for the purpose of storage, control or diversion of water.

**DAM FAILURE** - The uncontrolled release of a dam's impounded water.

**DRAINAGE AREA (WATERSHED)**- Geographic area on which all runoff flows into the dam. This may vary depending upon storm frequency.

**EMBANKMENT** – A slope constructed of fill material, usually earth or rock that is longer than it is high or the sloping side of a dam.

**EMERGENCY** - A condition that develops unexpectedly, endangers the structural integrity of the dam and/or downstream human life and property, and requires immediate action.



# CAUSES OF LEVEE FAILURE Observations Checklist

☐ Overtopping

☐ Downed trees on levee slope

☐ Gopher holes

☐ Seepage through pervious levee material

☐ Saturated levee embankments

☐ Seepage following tree root paths

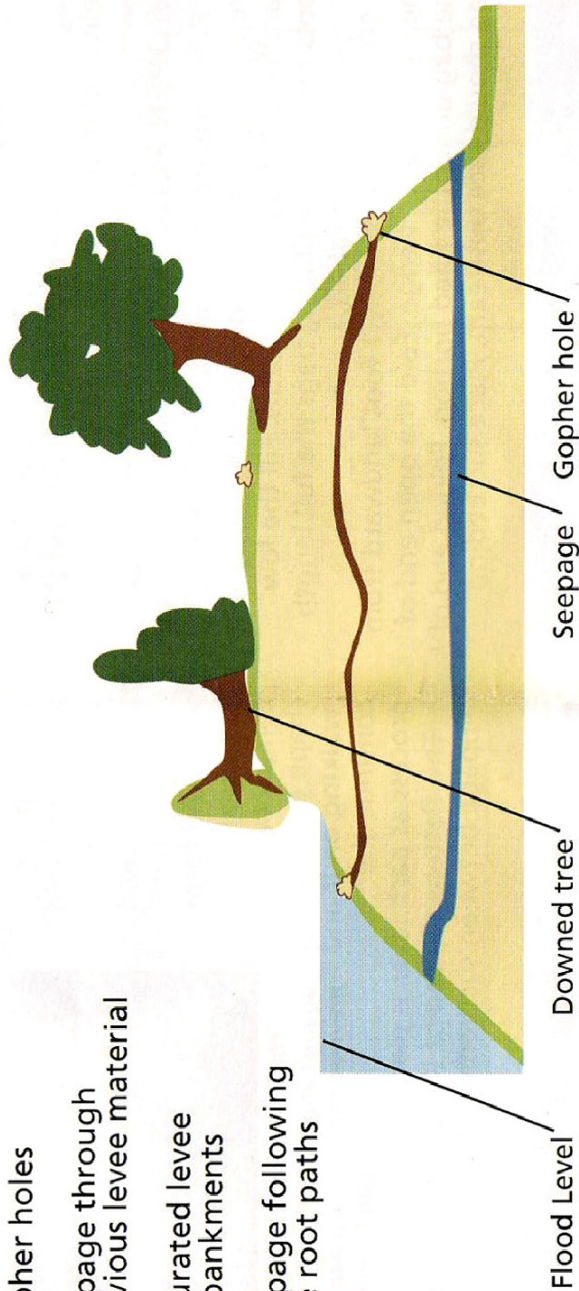
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## Actions to consider AFTER a flood:

- Listen to news reports for current information on:
  1. Evacuation routes
  2. Designated shelters
  3. If the community's water supply is safe to drink.
  4. Where assistance may be available
  5. When it is safe to return
- Avoid floodwaters; water may be contaminated by oil, gasoline, or raw sewage. Water may also be electrically charged from underground or downed power lines.
- Be aware of areas where floodwaters have receded. Roads may have weakened and could collapse.
- Return home only when authorities indicate it is safe.
- Use extreme caution when entering buildings; there may be hidden damage, particularly in foundations.
- Damaged sewage systems are serious health hazards. Service damaged septic tanks, etc. as soon as possible.
- Clean and disinfect everything that got wet. Mud left from floodwater can contain sewage and chemicals.

# FLOOD LEVELS

**FLASH FLOOD:** A rapid rise in water that occurs with little or no advanced warning, usually as the result of intense rainfall over a relatively small area in a short amount of time. Flash Floods can also be caused by dam or levee failures, ice jams, and topography.

**FLASH FLOOD WATCH:** Issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area. When a watch is issued, be aware of any potential flood hazards. Those in the affected area are urged to be ready to take quick action if a Flash Flood Warning is issued or flooding is observed.

**FLASH FLOOD WARNING:** Issued when flash flooding is in progress, imminent, or highly likely. Those in the affected area should evacuate immediately or move to higher ground if possible. Information in this warning will include the locations of the flood and any areas which may be impacted. Flash Flood Warnings can be issued without a Flash Flood Watch in effect.

**For additional severe weather terminology visit:**  
<http://www.weather.gov/om/severeweather/>

**Erosion:** The most common type of cause of failure to a slope-protected embankment.

Look for wave wash or scouring of the riverside levee slope.



**Scour:** Occurs when the current velocity against the levee is adequate to remove levee embankment materials. Scouring will most likely develop at road crossing ramps and locations where pipes, sewers, and or other structures penetrate the levee.





**Slides & Sloughs:** When seepage exits at a pressure that allows the soil to move like a fluid, the foundation becomes susceptible to sliding and/or sloughing which can lead to an embankment failure.

**Sliding:**



**Sloughing:**



## Potential Areas of Concern

**PERCHED:** When the bed of the river is at a higher elevation than the surrounding flood plain.

**BENDS:** Also known as meanders, creates erosion to the outer edge and deposition of sediment on inner edge they can create a cut bank.



**CONFLUENCES:** The meeting of two or more bodies of water, occurs in river and canal systems.





**NARROWS:** River or canal contraction can cause flooding problems upstream as water backs up or downstream if the water bursts the formations causing the contraction .



**DEBRIS CLOGS:** Bridges, check structures, turn outs, narrows, etc. can be clogged by debris during flash floods and can cause greater flooding to occur by backing up water.



**Sand boils:** 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.



The common method for handling sand boils is to construct a ring of sandbags around the boil(s) until the water within the ring has attained sufficient head to counteract the effective head causing the boil.





**Bladders:** Structurally supported membranes, and lightweight shells that are filled with sand from a bucket loader.



**Seepage:** A clear indication that seepage water is passing through or under the levee and has sufficient pressure to reach the ground surface:

- Look for sand boils or unusual wet areas landward of the landside toe.
- Look for slides or sloughs in levee side slopes.

**HIGH BANKS:** In locations where the banks are much higher than the channel bed, erosion can occur below the surface of the banks and cause the banks to collapse.



**RECENT EROSION:** Weathering and transport of solids, such as soil, from their source that has occurred not long ago.



**CHANGE IN SLOPE:** When steeper grades change into shallower grades, they can be subject to vulnerability during times of flood. The change in slope causes a change in velocity and can cause erosion of the soil.

## MIGRATING CHANNEL AREA:

Areas subject to stream bank destabilization, rapid stream incision, stream bank erosion, and shifts in location of stream channels.



**STEEP GRADE:** In steep graded channels, the floodwaters will increase the velocity and the ability to pick



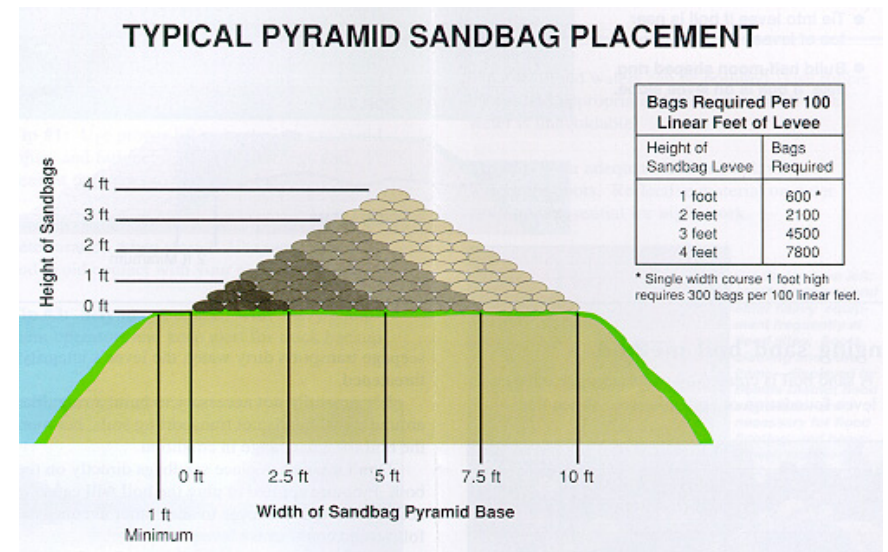
up and transport sediment, this causes higher erosion and will cause problems downstream when the grade is less and the sediment will be dropped out with potential to cause backwater and flooding.

## Plastic sheeting and sandbagging:



### Sandbagging Dimensions:

- 1 bag in length equals about 1 foot
- 3 bags in width equals about 2 ½ feet
- 3 bags in height equal about 1 foot





## **Raising a Levee:**

\* Please Note: No heavy equipment should be used on a levee when water is near the top, as the vibration may cause a failure.

**Sandbags:** Sandbags can be used to raise the height of an existing levee or can be used over open ground to protect an area with no levee at all.



### **Basic rules:**

- Approximately 3 times as wide as they are high
- Staggered within each layer, just as they are staggered from one layer to the next
- The directions of the bags may be alternated, as long as no loose ends are left exposed.
- Place tightly and overlapping with adjacent bags and compact by walking on the sandbag after it is in place to seal gaps between sandbags.

**ALLUVIAL FANS:** A fan-shaped deposit of soils where a stream flattens out and slows down. In desert areas, they are subject to flash flooding, typically found at the exit of an arroyo or canyon.



**EARTH MEETS CONCRETE:** Any location where a concrete structure meets the earth has a greater potential for soil erosion during flooding. The soil could erode enough to make the concrete structure unstable or fail.



**UNMAINTAINED:** Canals and channels that have not been maintained are subject to higher vulnerability during



flooding. Banks can have animal borrows allowing water to erode deeper and quicker; dense vegetation can cause the channels to incise and deepen, among various other potential flooding problems.

**STRAIGHTENED CHANNELS:** River channels that have been straightened are a risk during flooding because typically, the grade of the bed has steepened and the natural bends will try to reform.



## What to look for & How to fix the problem

**Overtopping:** When water flows over the crown. If the stream is predicted to approach or exceed the height of the existing levee, immediate attention should be given to raising the levee crown.

