



HOMEOWNERS GUIDE FOR FLOOD, DEBRIS & EROSION CONTROL



Agoura Hills Public Works Department 2018

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SECTION 1

Before the Flood: Flood Prevention Strategies

Evaluating Your Property

Know your property: identify changes in slope and grade that influence where water and debris flow and collect. Know the over-land escape routes for water/debris, and plan diversions accordingly. Consider low spots and high flow areas when planning for structure and property protection. Also consider escape routes for water and be sure that your efforts to protect your own property do not result in diverting water to a neighbor's property where it could cause damage there. See *Figures 1 and 2* for drawings depicting protected and unprotected properties.

Property Flood Proofing: Drainage Improvements

There are two types of drainage to consider; surface and subsurface. Surface drainage refers to channels, ditches, culverts, walls and other conveyance or diversion methods that move surface water or debris off your property. Sub-surface drainage includes pipes, French drains and sumps which move water under the surface of land. Sub-surface drainage can be more difficult and expensive to construct but can also result in lower property damage due to surface flooding and soil erosion, or flooded structures. Myths and facts of floods are shown in *Figure 3*.

Carefully evaluate which type of drainage is needed for your property. When designing a drainage system, especially if you are located in a flood prone area, consider consulting a professional such as a civil or geotechnical engineer or a landscape architect.

Unprotected Homes

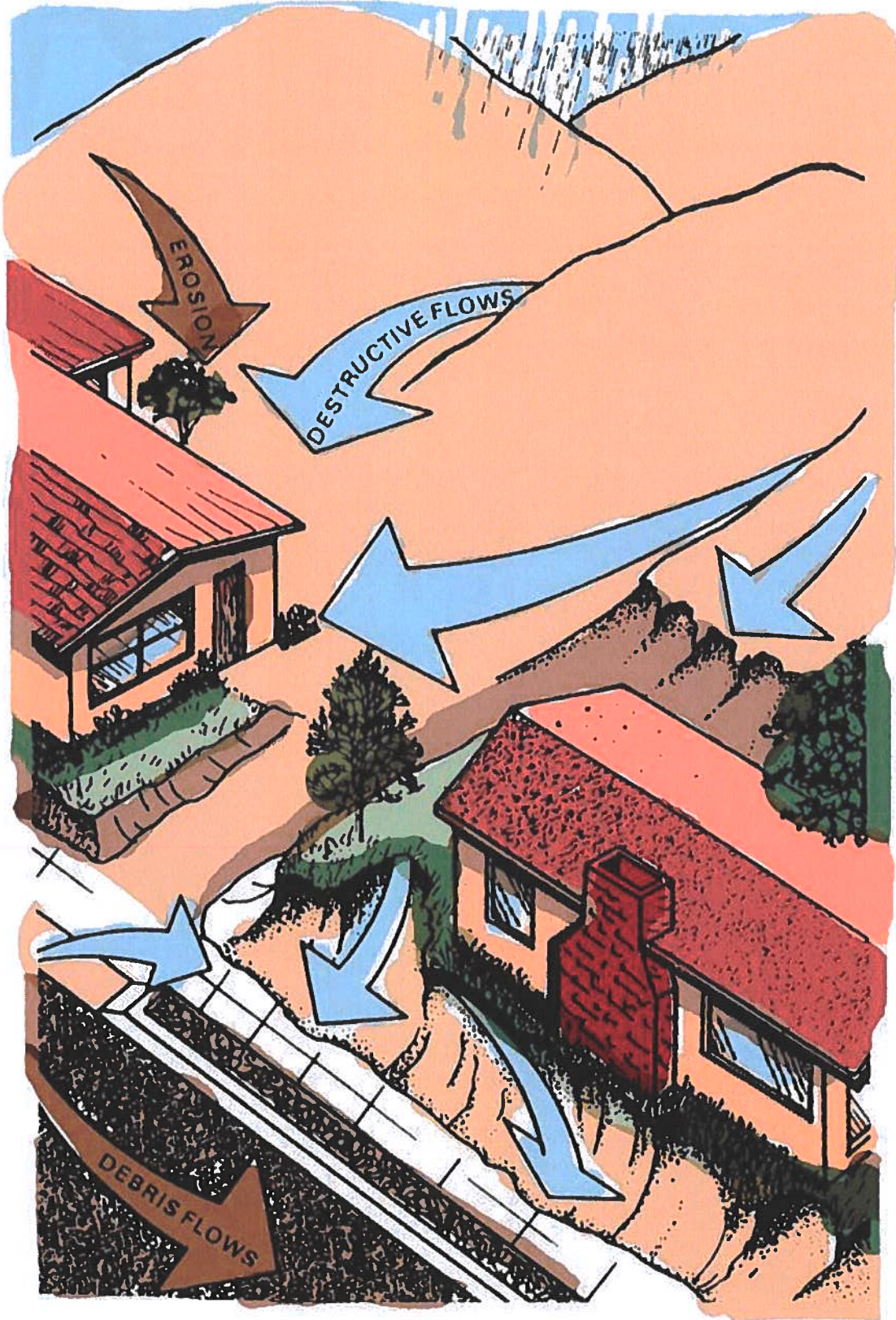


Figure 1: Unprotected Homes – A typical configuration of a home at risk.

Protected Homes

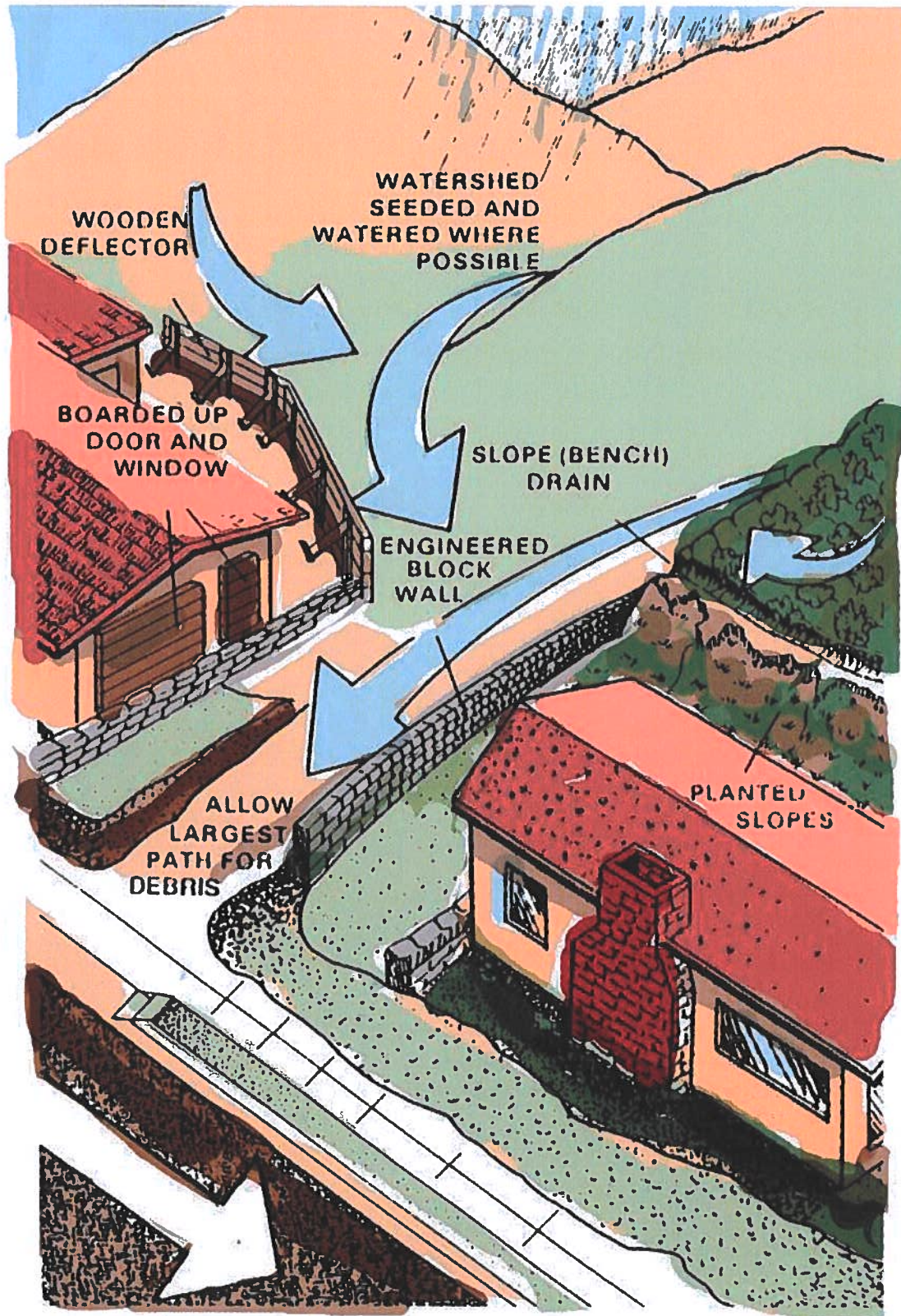


Figure 2: Protected Homes – A home with various protection features in place.

MYTHS & FACTS

MYTH

A 100-year flood occurs only once every 100 years.

FACT

The 100-year flood is a climactic average; there is a 1% chance that a 100-year flood will occur in any given year.

MYTH

Flash floods mainly occur in the eastern United States.

FACT

Flash floods occur in all 50 states, including Alaska and Hawaii.

MYTH

Flash floods occur only along flowing streams.

FACT

Flash floods can occur in dry arroyos and urban areas where no streams are present.

MYTH

Flash floods occur mainly in the late afternoon and evening.

FACT

Many flash floods occur at night.

MYTH

Homeowners insurance policies cover flooding.

FACT

Unfortunately, many homeowners do not find out until it is too late that their policies do not cover flooding. Contact your insurance company or agent to buy flood insurance.

MYTH

You can't buy flood insurance if your property has been flooded.

FACT

You are still eligible to purchase flood insurance after your home, apartment, or business has been flooded, provided your community is participating in the National Flood Insurance Program.

MYTH

Larger vehicles, such as SUVs and pickups, are safe to drive through flood waters.

FACT

Two feet of rushing water can carry away most vehicles including SUVs and pickups.

Figure 3: Myths & Facts of floods

Slope (Bench) Drain

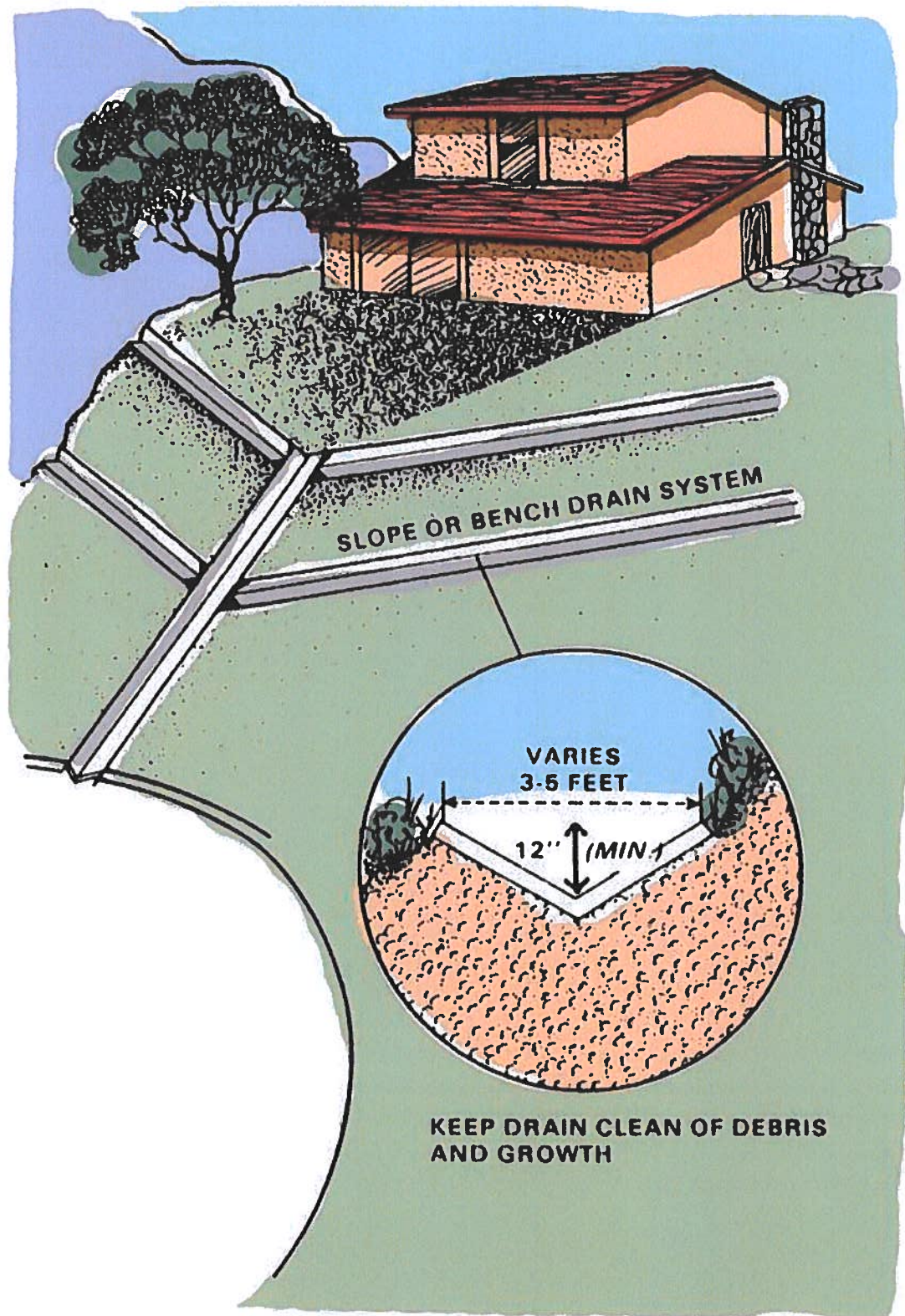


Figure 4: Slope (Bench) Drain – A typical bench drain system in hillside applications.

Property Drainage

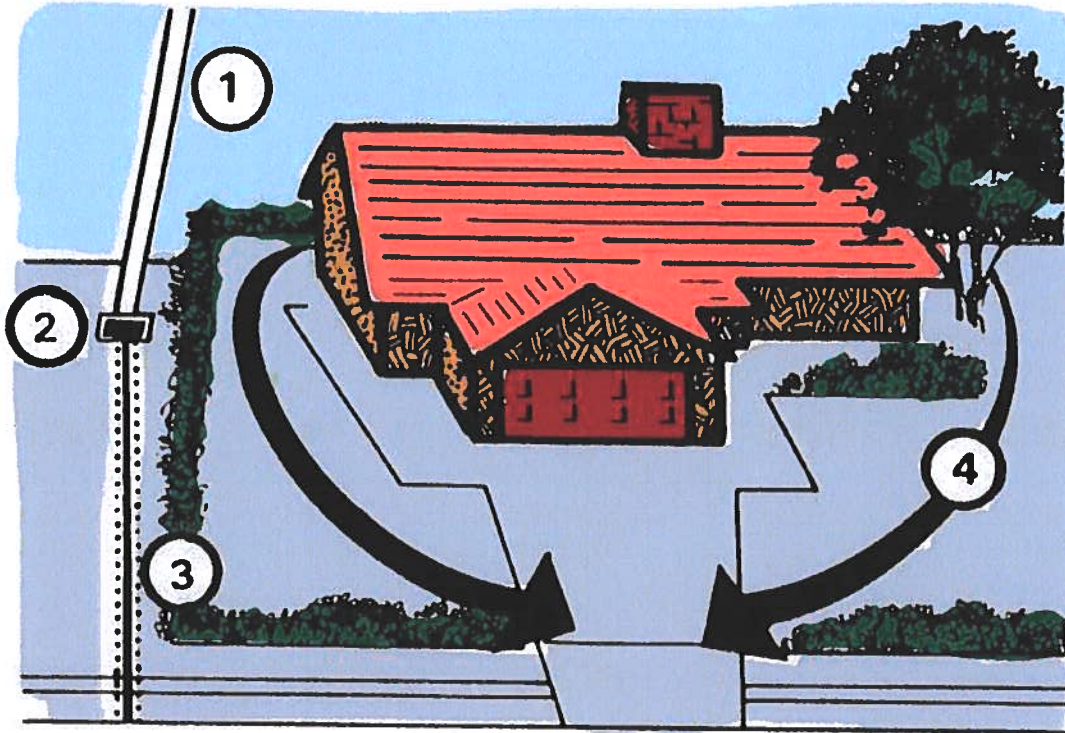


Figure 5: Property Drainage – A home with typical single lot drainage features.

PROPERTY DRAINAGE

- ① Paved terrace drains may extend over several lots, but it is each owner's responsibility to maintain that portion which is on their property. Keep drainage clean.
- ② Grates and basins should be kept free of silt and debris. Make periodic checks to be sure the grate and outlet pipes are not clogged.
- ③&④ Earth berms prevent water from flowing over slopes. It is important that these berms be maintained. Side swales direct water around the house. Keep flow line at least 24 inches from the building wall.

In hillside areas, poorly maintained drainage devices (including slope or bench drains) are the source of many flooding problems. Maintenance of these drains is the responsibility of the homeowner

with few exceptions. **Keep these drains clear of debris and overgrowth.** Blocking may cause undermining and structural failure of the drains or erosion of the hillside. *See Figure 4.*

A primary design consideration is the location of overland escape routes for water on your property leading to streets or gutters. It is important that your drainage system not overload those escape routes.

Once you have designed and installed a drainage system, be sure that you maintain it and check it periodically during the rainy season to identify and correct problem areas such as leaves clogging a drain or sump.

See *Figures 4 and 5* for drawings illustrating drainage improvements.

Preparing Your Property for Debris Flows

During a flood, your property can be damaged by water, debris (mud, rocks, branches, etc.) or both. You need to be prepared for the possibility that both could occur. Many of the prevention strategies are the same. The following section emphasizes preparing for debris flows. The section on flood-proofing structures focuses on keeping water out of homes and other structures.

DEBRIS

Don't underestimate the potential power of debris flows. Begin planning and installation of debris control facilities before the storm season. Start as soon as possible. Protection facilities are not always pleasing to the eye but appearance should not dictate location or type of installations.

Be prepared to personally observe and maintain your installations during storm periods, for in many cases a minor correction will prevent major failure. However, do not take any unnecessary risks.

Directing Debris Flows Between Buildings

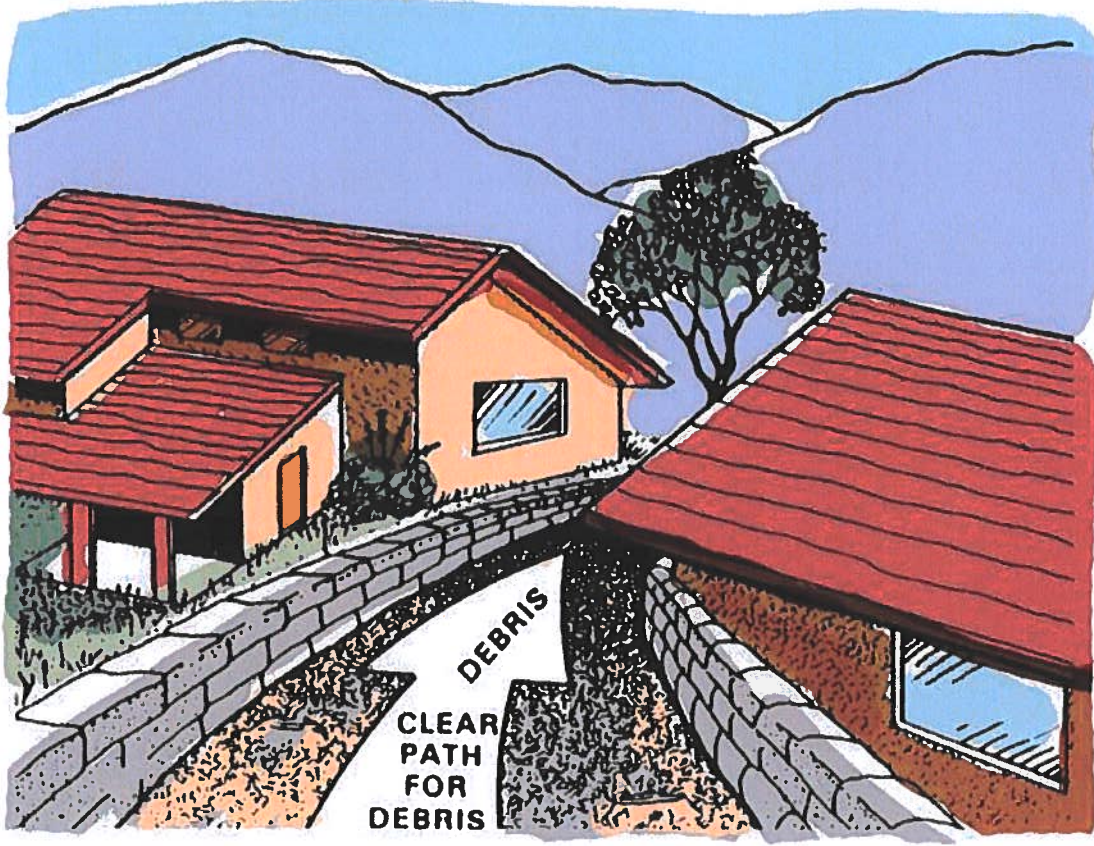


Figure 6: Directing Debris Flows Between Buildings – How to channel debris through and away from buildings.

Should your debris control problems appear to warrant facilities in excess of the type described in this pamphlet; it is recommended that you consult a competent expert such as a civil or geotechnical engineer or landscape architect for additional advice.

DO-IT-YOURSELF DEBRIS CONTROL AIDS

There are a variety of inexpensive ways to control debris flow on your property during a storm. See *Figures 6, 7 and 8* for drawings depicting debris flow and control. When compared to the protection received, they are well worth the time and money to install them. Most of the following items can be installed with normal household tools and consist of materials readily available at your local lumber yard. They include lumber, sandbags, sand, and plywood.

Directing Debris Flows Between Buildings

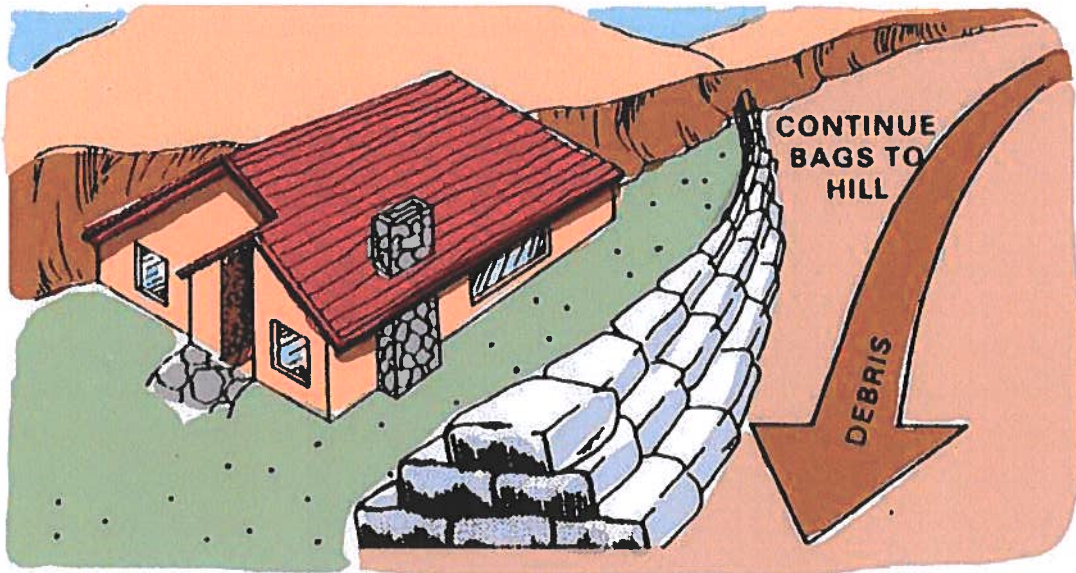


Figure 7: Directing Debris Flows – The use of a sandbag wall to deflect debris away from structures.

Protected Homes

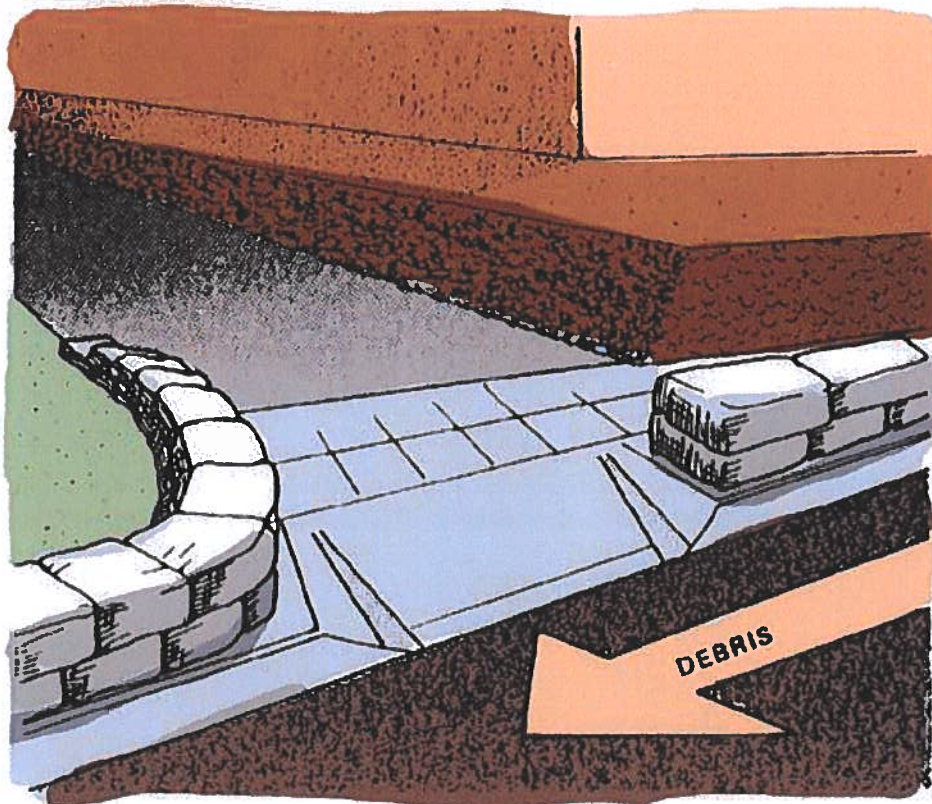


Figure 8: Controlling Debris – Directing debris flows away from homes and allowing entry of debris from other sources.

Sandbag Filling and Placement

SANDBAGS

When properly placed, sandbags will redirect water and debris flows away from property improvements. See *Figures 9, 10, 11, and 12* for details.

FILLING SANDBAGS

1. Fill sandbags half full. Sand is suggested if readily available; however, it is not mandatory, as any local soil may be used.
2. Fold top of sandbag down and rest bag on its folded top.

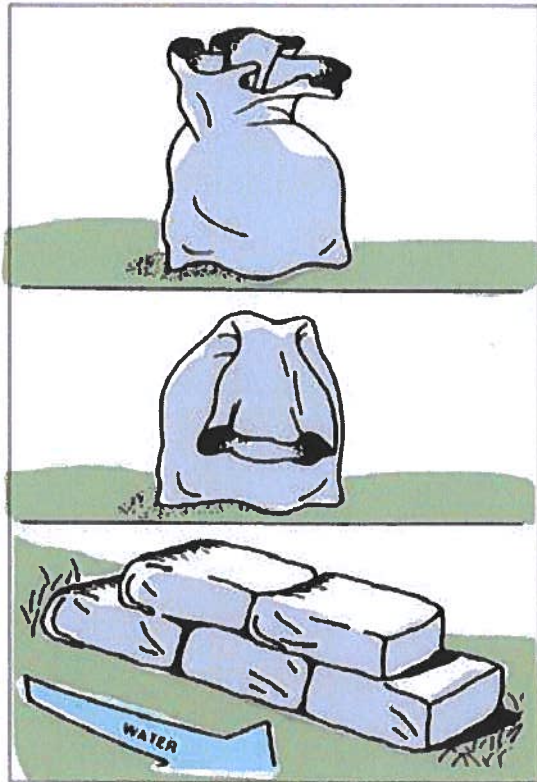


Figure 9: Sandbag Filling and Placement – Proper filling and placement of sandbags is important.

PLACING SANDBAGS

Care should be taken to stack sandbags in accordance with the photos and illustrations. Place each sandbag as shown, completing each layer prior to starting the next layer. Limit placement to three layers unless a bracing is used as a backing or sandbags are stacked in a pyramidal style as shown in *Figure 9*.



Sandbag Stacking

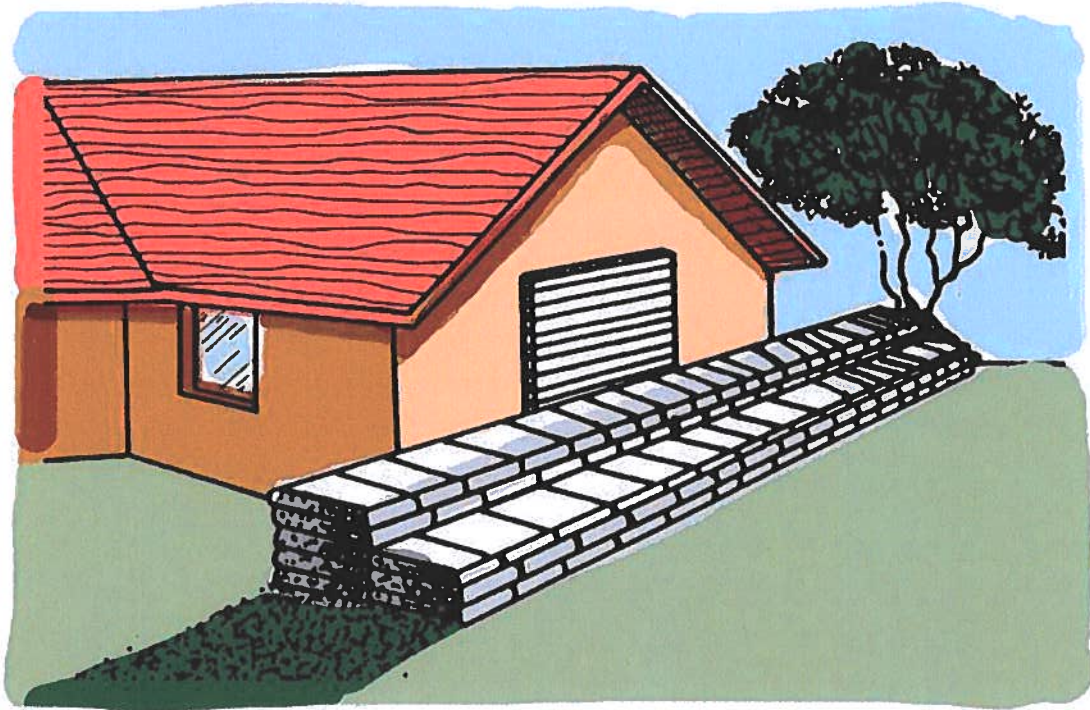


Figure 10: Sandbag Stacking – Allow for a wider sand bag wall when stacking sand bags higher.



Sandbag Stacking



Figure 11: Sandbag Stacking – Allow for a wider sand bag wall when stacking sand bags higher.

Building Protection

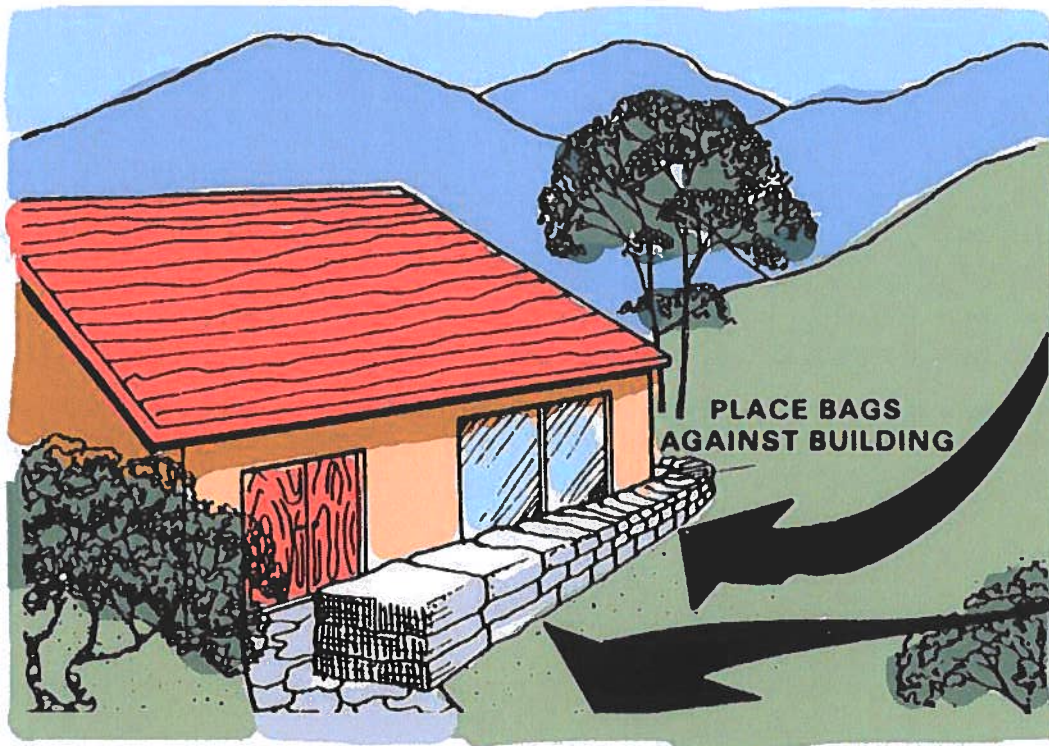


Figure 12: Building Protection – When backstopped against a building, the structure can help provide for sandbag stability and allows a taller wall.

GENERAL RULES FOR DEBRIS FLOW CONTROL

Each situation differs; however, basic rules can be followed in all cases involving debris movement.

- Never underestimate the power of any debris flow.
- Try to direct debris flows away from improvements.
- Clear a path for the debris.
- Always place protection to deflect debris, not to dam it.
- Use your house or building as a deflector if necessary.
- Avoid trying to confine the flows more than is absolutely required.
- Debris can enter a building through windows – consider boarding up windows that might be in the path of debris, such as a side of a structure next to a steep slope.
- Remember to protect your home first. Then consider what time and money are available to protect other less valuable objects, such as swimming pools or landscaping.
- Be prepared to sacrifice portions of your property to achieve good protection.
- Try to work with adjacent affected property owners.



Flood-Proofing Structures

Preventing water from entering a home or structure means assuring that the primary access points (roof, windows, doors, walls and floor/ foundation) are all protected as much as possible. The following information addresses each of these areas.

ROOF AND GUTTERS

Be sure your roof does not leak. A simple inspection by a roofing expert, or observation during a storm of wet areas on the ceiling, should be adequate. A problem point can be near the chimney, where cinder blocks or bricks can leak, leading to infiltration down into the fireplace. Water proof sealing materials are available at most hardware and building supply outlets.

Gutters should be checked every year before the rains to be sure they are clear of leaves and debris, and free of holes, rust or other structural defects. Gutters are the primary means to move excess water from the roof to safe overland escape points; non-functioning gutters can lead to problems. Downspouts should be designed to direct runoff to overland escape points.

WINDOW AND DOOR PROTECTION

It is important to provide protection against water intrusion at possible entry points of a structure, such as doors and windows. Prevent debris from entering doorways and windows with baffle boards. See *Figures 13 and 14*.

A hazard may require complete closure of a door and necessitate the use of another entrance. To prevent water from seeping through a door, a rubber seal (similar to weather stripping) should be affixed to the door frame. When the door is closed, a watertight seal should result. See *Figure 15*. To prevent water from seeping through a sliding glass door, a plastic sheet (2 to 3 mils thick) should be placed between the door and the sandbags or between the door and the plywood barrier. See *Figure 16*. This is not recommended for water levels above two feet.

Window and Door Protection

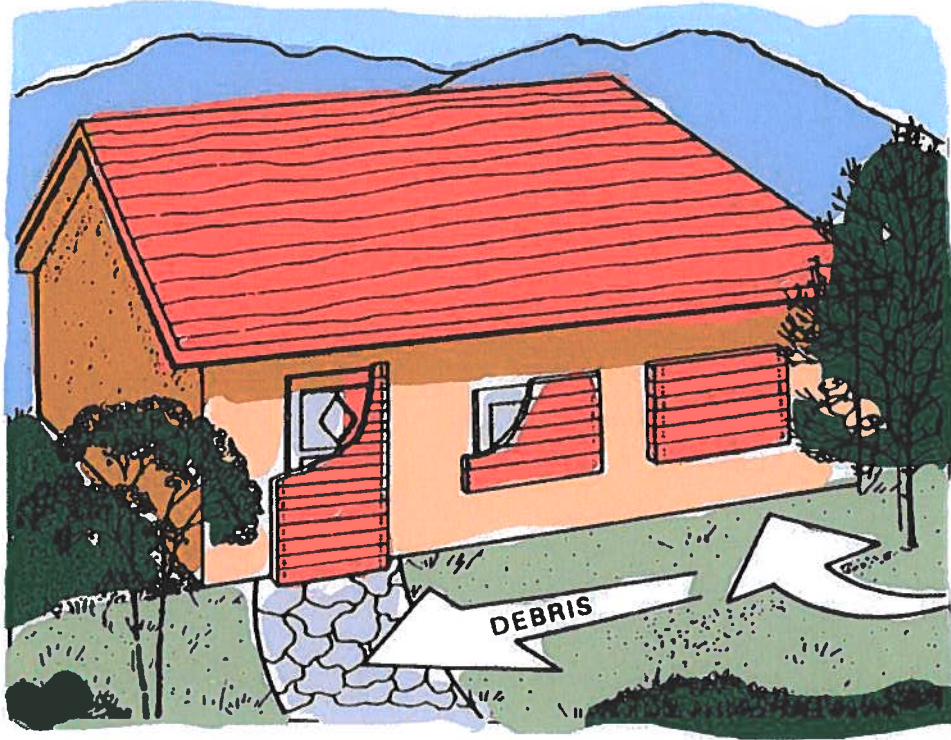


Figure 13: Window and Door Protection – Use of plywood or timbers can help protect windows and doors from damage.

Typical Window/Door Protection

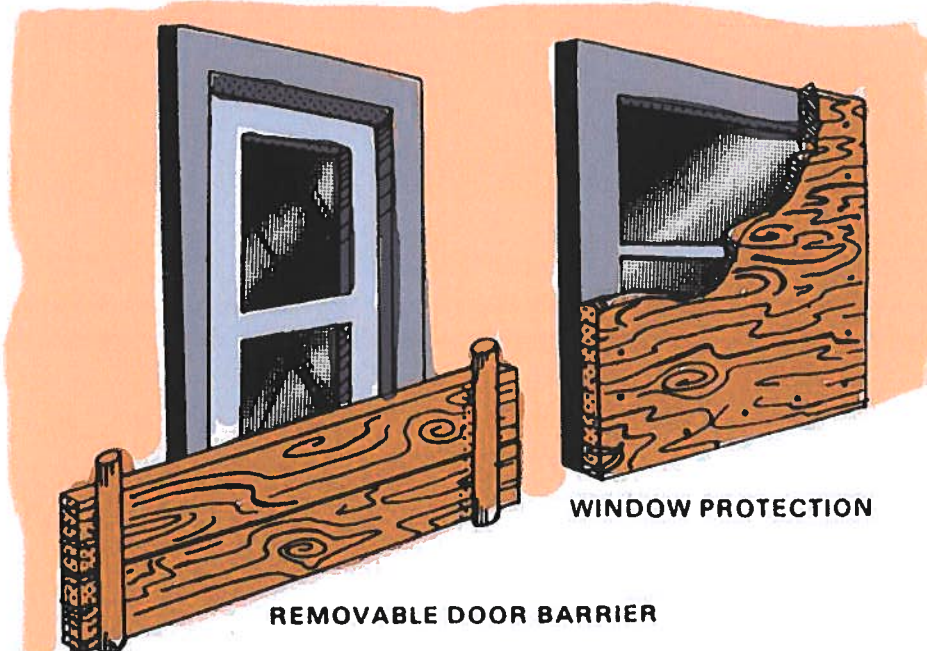


Figure 14: Typical Window/Door Protection – Use of plywood or timbers can help protect windows and doors from damage.

Door Seal

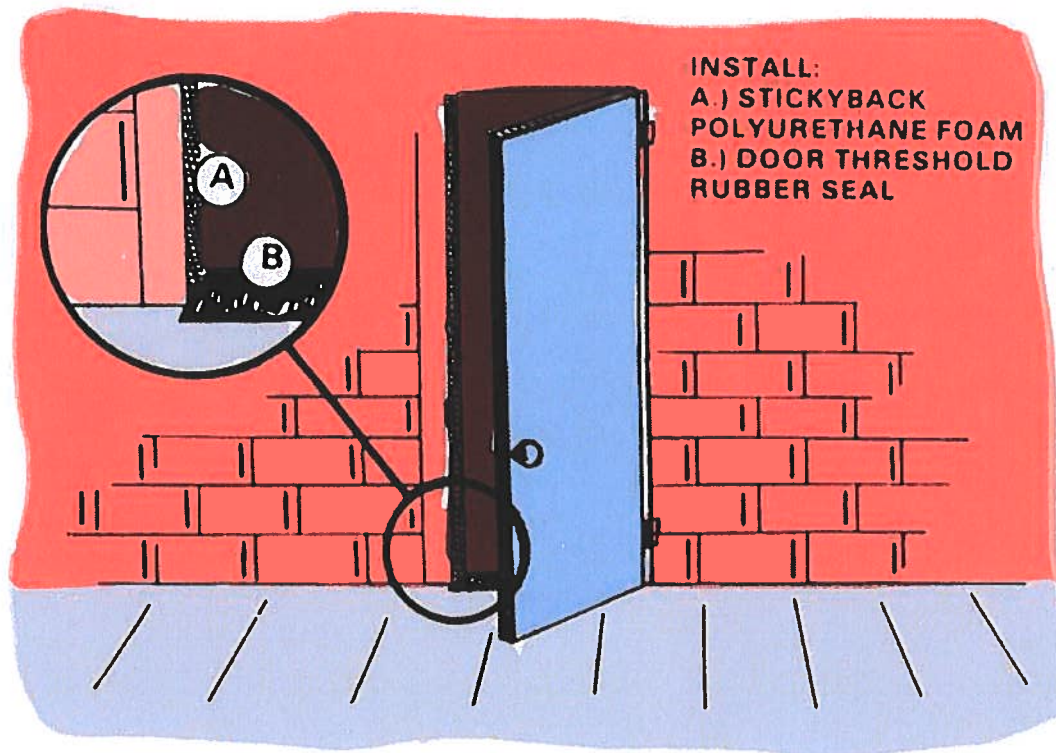


Figure 15: Door Seal – water can still seep through doors and other openings, the use of a seal can reduce infiltration.

Materials can be dismantled after the storm season and stored from year to year. Use low grade plywood, and overlap windows, vents or doors three to four inches on all sides. Secure the plywood with four or more nails, screws or bolts; a stake and board may also be used to wedge boards in place.

Sliding Glass Door Sealing

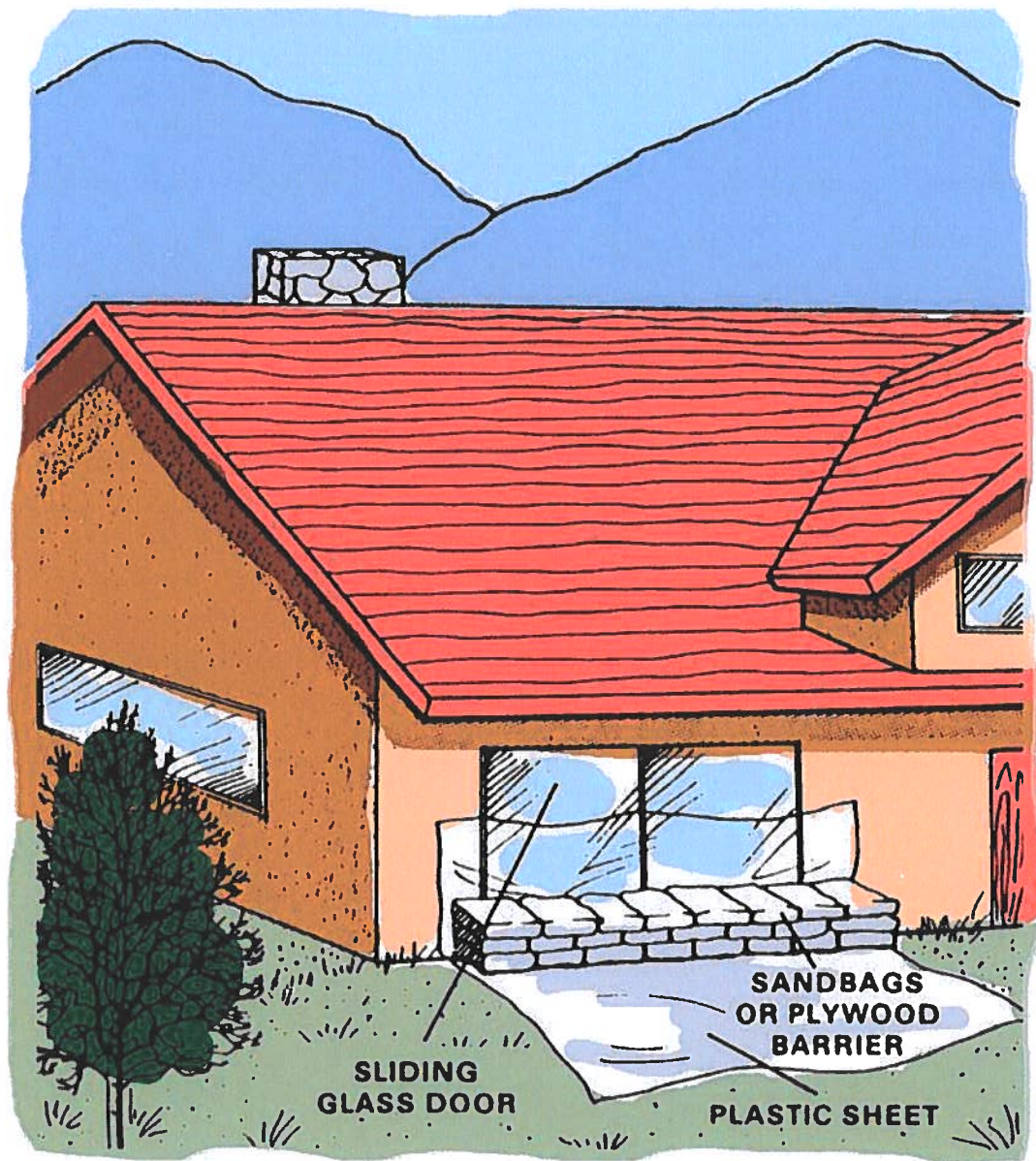


Figure 16: Sliding Glass Door Sealing – The use of plastic sheeting can help provide a waterproof seal on doors and openings.

Timber Deflectors

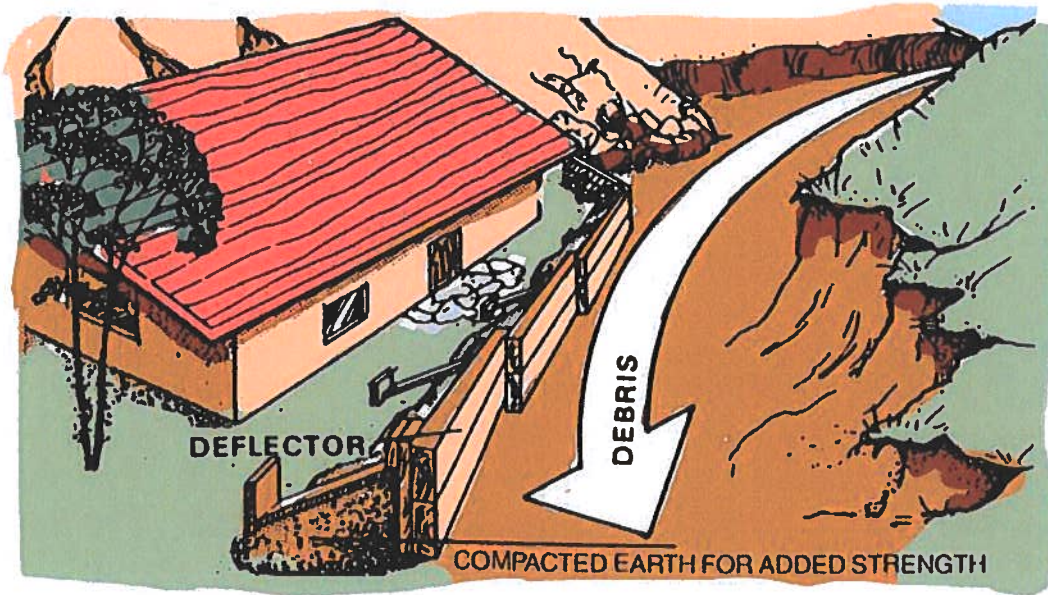


Figure 17: Timber Deflector – For use in particularly dangerous installations, timbers can be used to form a stronger deflector wall.

WOODEN DEFLECTORS

A wooden deflector is used outside a structure to deflect debris or water to the best overland escape. See *Figures 17 and 18* for detail. Use low grade lumber and overlap sections with protruding face downstream. Drive stakes to at least one half their length to ensure proper anchorage. Place deflectors on solid level soil to reduce the hazard of undercutting. Don't attempt to use the lumber as a dam.

Earth packed behind the deflector will provide needed additional strength. If the deflector required is more than three feet in height, the house or structure will have to be protected with sandbags and used as a deflector.

Typical Timber Installation

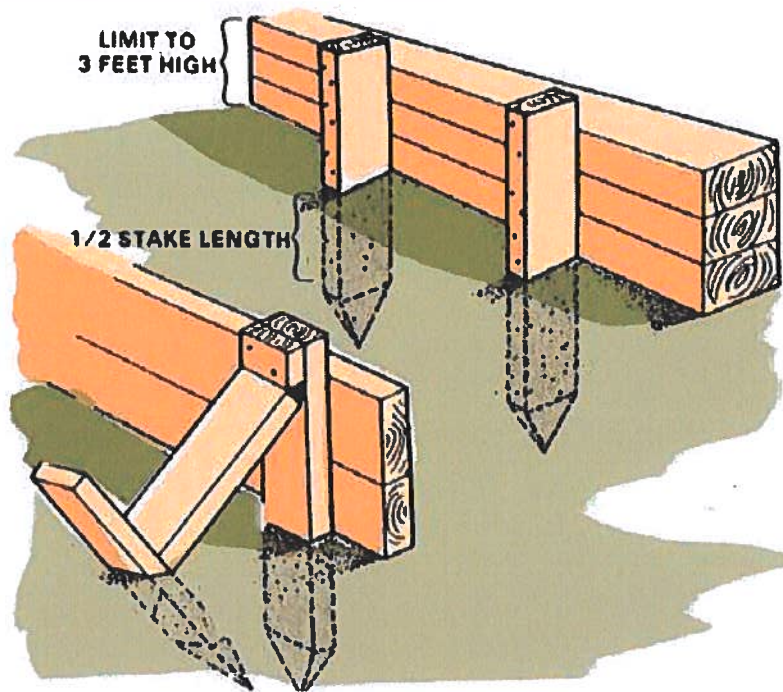


Figure 18: Typical Timber Installation – Timbers need solid anchoring to provide stability.

Telephone Pole or Railroad Tie Barrier

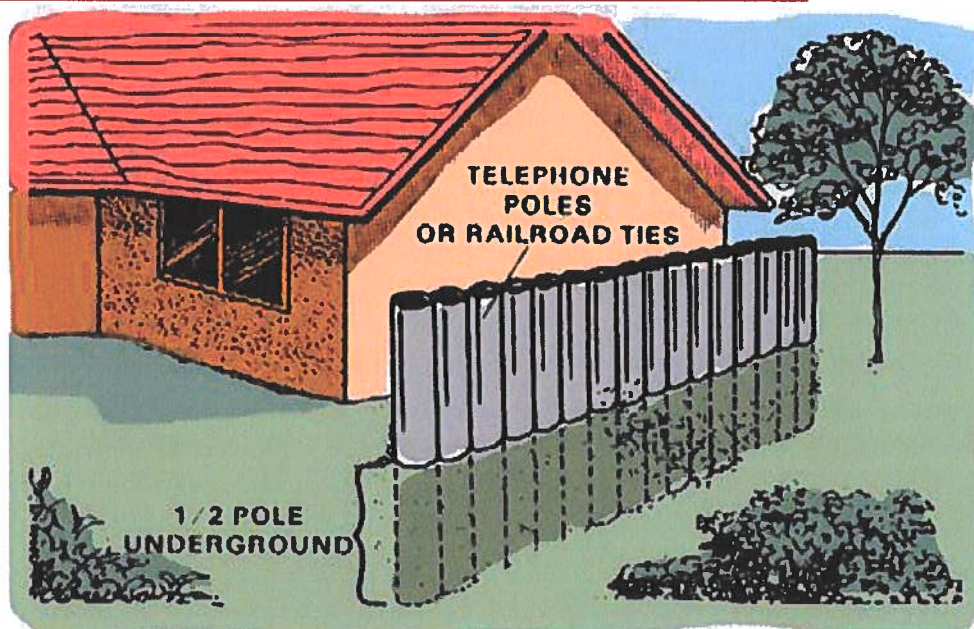


Figure 19: Telephone Pole or Railroad Tie Barrier – Use stronger materials for tall installations that may endure extreme conditions.

Removable Driveway Barrier

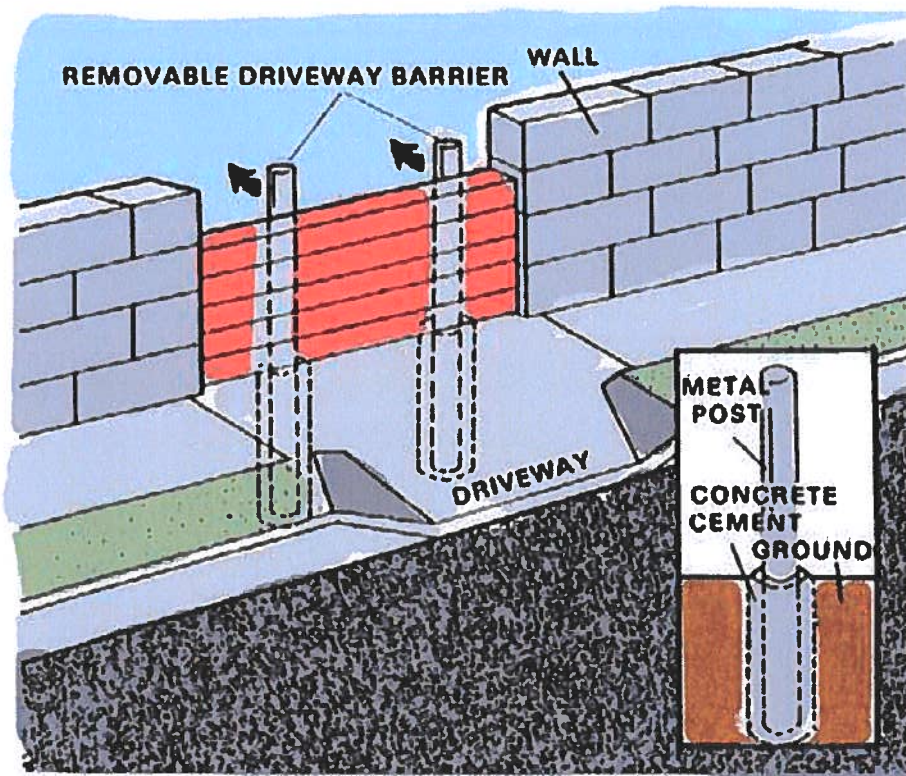


Figure 20: Removable Driveway Barrier – Permanent barriers may need access points that are open until needed.

ENGINEERED WALLS

Concrete block and heavy-duty wood walls that are designed and built to withstand loads caused by water and debris are excellent for protection and durability. In many cases, such walls can be adapted to become part of the landscaping. Generally, these walls are expensive and should be considered permanent installations. See *Figures 19 and 20*.

Caution: Do not rely on walls which have not been specifically engineered for protection.

GENERAL PREVENTION STRATEGIES

- Seal wood with water seal products such as Jasco.
- Install weather stripping.
- Be sure chimney and vent flashing is adequate.
- Clean out culverts and drains near structures to assure clear water path.

Flood Protection and Erosion Control in Newly Developed Areas

Most newly developed areas lack good coverage from landscaping and ground covers and are therefore more susceptible to erosion. The following tips will help prepare these areas for flooding/erosion.

1. KEEP WATER AWAY FROM THE AREA TO BE PROTECTED

- a. **For water flowing onto the property:** Dig a small ditch with a hoe or shovel fairly close to the upper edge of the property. The pitch of the ditch should be nearly level to insure slow water movement. Provide for the ditch to drain into a natural watercourse or onto street pavement or to a well vegetated area.
- b. **For water falling on the property (rain):** Dig the same type of small ditch at the top of each steep slope. Do not allow large amounts of water to concentrate along one route. On soils, especially susceptible to erosion, an additional degree of protection can be gained by using inexpensive plastic sheeting. These sheets should be overlapped like shingles and securely tied or staked down so that the majority of water does not reach the soil at all. Shrubs may be planted through the plastic by cutting a hole just large enough for planting. Where ditches are used in unstable soil, the ditch should be planted with a non-invasive groundcover or sowed with perennial grasses. Check with a local nursery knowledgeable about native plants for suggestions.

2. STRENGTHEN THE SOIL TO RESIST EROSION

- a. Straw or wood chips are effective in holding the soil in place. They have the further value of increasing the organic content of the soil. Either material should be worked into the top few inches of the soil. Use a one-inch covering of chips, or less as slope and soil conditions indicate. Nitrogen fertilizer should be added.

- b. Woven burlap or jute netting can be laid on the slope and tied down properly with stakes to prevent lifting by wind or water. Regular planting procedures can be followed before laying the burlap, since it will in no way interfere with establishing growth on the slope. The burlap decomposes eventually, but will remain long enough for grasses or plantings to become well established.

Erosion Control in Burned Area

It is especially important to provide adequate protection against flooding and erosion for structures in recently burned areas. Planting in burned areas is similar to planting in newly developed areas. Consult a landscape professional for appropriate ground covers and erosion control techniques. Plant throughout the burned area. It may be necessary to irrigate in order to assure early growth.

Since rains can normally be expected to start in October, plant in the early fall to take advantage of this extra watering.

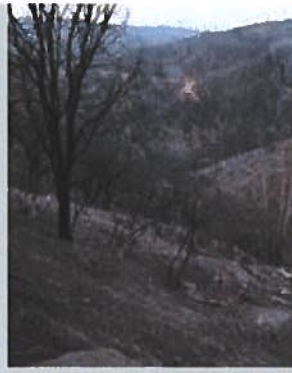
For more information about soil erosion and prevention, contact the Natural Resources Conservation Service (formally the Soil Conservation Service) at (805) 984-2358 ext. 101, or call a landscape architect or contractor with erosion control experience.

See *Figure 21* for a drawing demonstrating techniques to protect areas damaged by fires or other erosion problems.

ADDITIONAL INFORMATION

- Know the location of interceptor ditches on slopes near your home.
- Clean silt and debris from these ditches to prevent overflow of storm waters.
- Remove debris which might obstruct the flow of water.
- Watch storm drain inlets and culvert entrances in your vicinity.





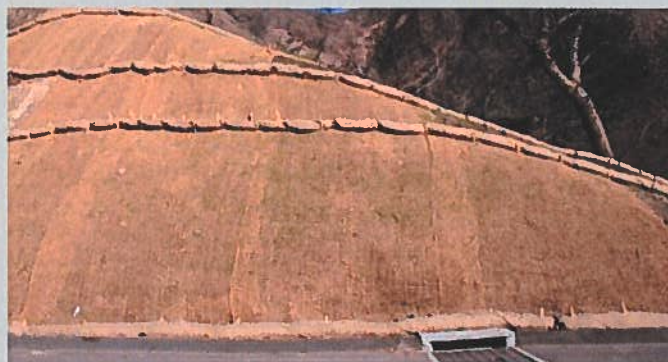
FIRE AND EROSION

Following a fire, watershed conditions change dramatically. Impacts associated with Fires include:

- A dramatic increase in rainfall runoff velocity and volume,
- Extremely high yields of silt and sediments off hillsides and adjacent properties,
- Potential for debris flows including large rocks and trees,
- Heightened potential for creek overflow and flooding.



This hillside is susceptible to erosion problems caused by flooding after a fire.



Erosion mitigation measures have been implemented on this hillside after a fire in order to prevent erosion problems and encourage plant growth.

Fire and Erosion

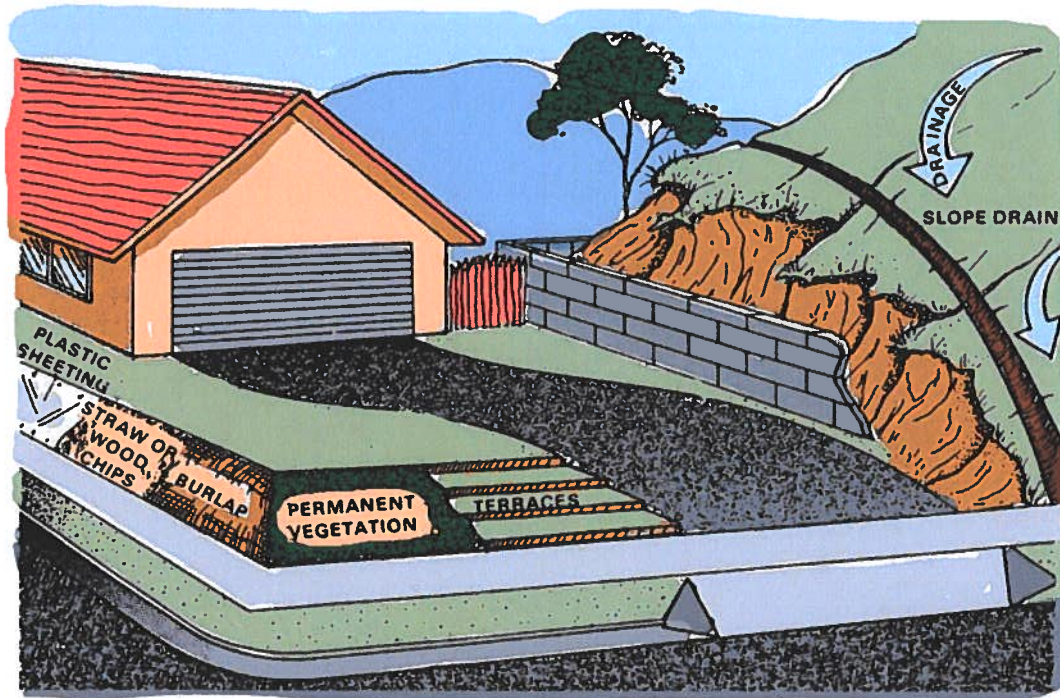
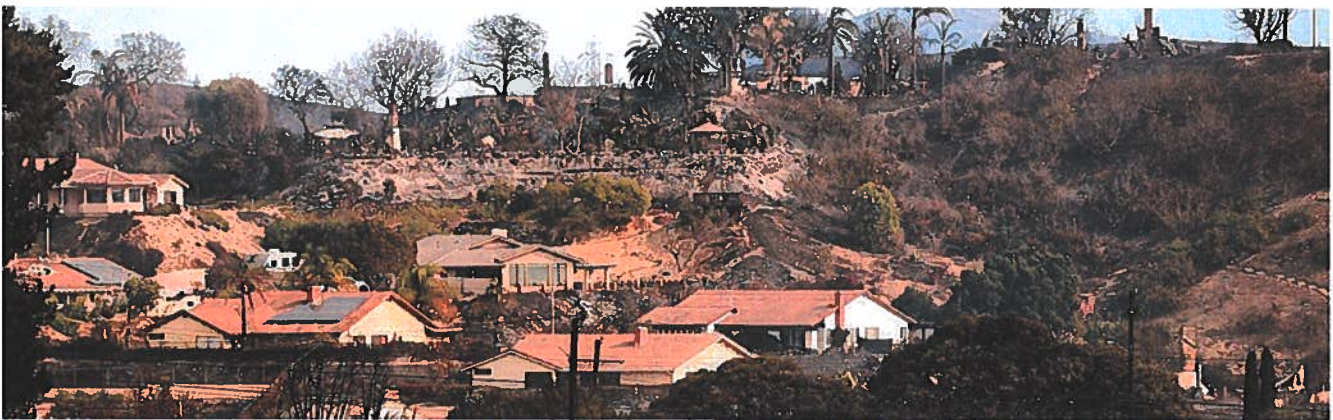


Figure 21: Fire & Erosion – This property features typical alternatives to erosion control.

INDIVIDUAL PROPERTY OWNER

Individual property owners have the responsibility to provide protection to their private property. Property owners should carefully survey their property and identify hazards and the steps to protect their property.

The assistance of technical professionals may be advantageous. Hazards could take the form of hillside erosion from your property, or from your neighbor's, flooding and debris from denuded properties, and creek overflows.



General Preparation

Learn the safest route from your home or place of business to high, safe ground if you should have to evacuate in a hurry.

Keep a portable radio, emergency cooking equipment, and flashlights in working order.



Persons who live in frequently flooded areas should keep on hand materials such as sandbags, plywood, plastic sheeting, and lumber which can be used to protect property. Remember, sandbags should not be stacked directly against the outer walls of a building, since, when wet, the bags may create added pressure on the foundation.



Flood Insurance

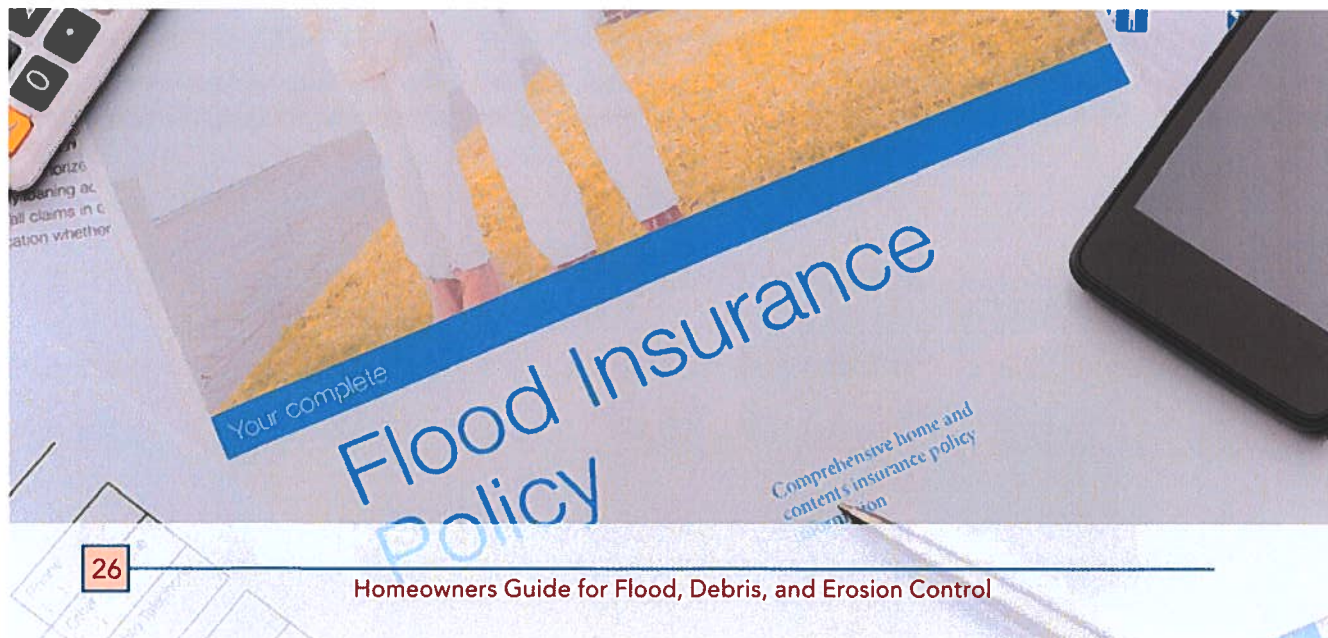
Standard homeowner's policies do not cover flood loss. You should evaluate the need for flood insurance in your situation, depending on where your property is located. Contact your property/casualty agent or broker about flood insurance, which is offered through the National Flood Insurance Program. Generally, there is a 30-day waiting period for this policy to become effective, so don't wait until the last minute to apply.

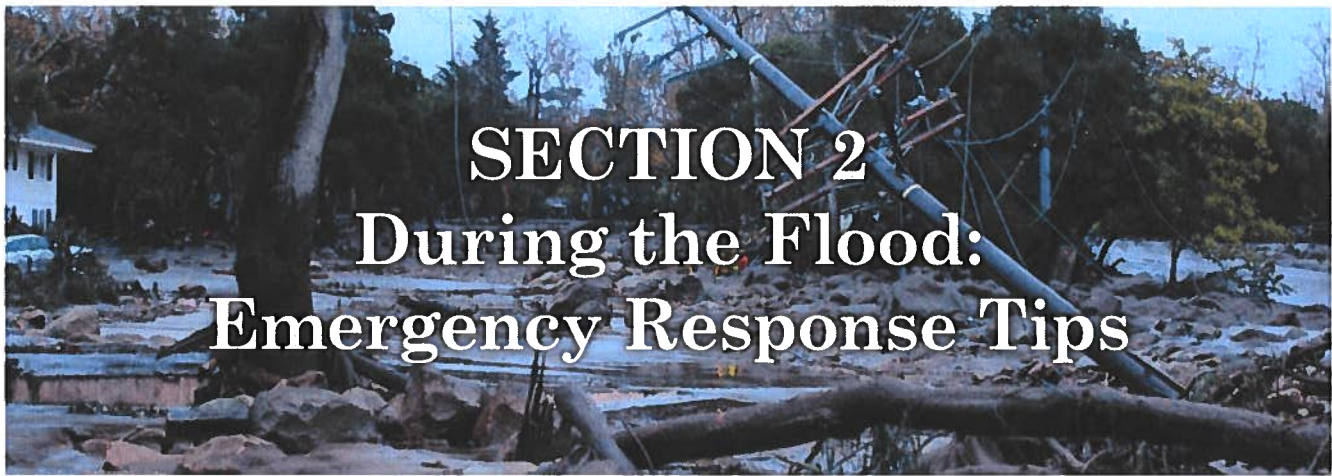
Until the late 1960's, flood insurance was practically unavailable to home and business owners. Since private insurance firms were unwilling to assume the financial risk alone, Congress voted in 1968 to create the National Flood Insurance Program (NFIP). This federal program provided flood insurance at reasonable cost in exchange for management of flood prone areas by local communities.

Today, you can insure almost any enclosed building and its contents against flood loss, as long as your community is participating in the NFIP. All areas within the county participate in NFIP.

To facilitate submitting claims after a flood, make an itemized list of personal property, including furnishings, clothing, and valuables. Photographs of your home - inside and out - are helpful. This will assist an adjuster in settling claims and will help prove uninsured losses, which are tax deductible.

Remember to keep your insurance policies and a list of personal property in a safe place, such as a safety-deposit box. Know the name and location of the agent(s) who issued these policies.





SECTION 2

During the Flood: Emergency Response Tips

When a Flood Comes

Personal safety is the most important consideration during a flood. Since floodwaters can rise very rapidly, you should be prepared to evacuate before the water level reaches your property.

BEFORE A FLOOD

Find out if you live in a flood-prone area from your local floodplain manager. Ask if your property is within a special flood-hazard area.

Learn flood warning signs and your community alerts signals.

If you live in a frequently flooded area, stockpile emergency building materials such as plywood, plastic sheeting, lumber, nails, hammer and saw, shovels and sandbags.

Have check valves installed in sewer traps in your home and/or business to prevent floodwaters from backing up in sewer drains. As a last resort, have large corks or stoppers to use to plug showers, tubs and basins.

Plan and practice an evacuation route. Contact the Ventura County Office of Emergency Services for a copy of the community flood evacuation plan. If you live in a flash flood area, have several alternative evacuation routes.

Have a disaster supply kit on hand:

- Flashlights and extra batteries
- Portable, battery-operated (or hand-crank) radio and extra batteries
- First aid kit and manual
- Emergency food and water

- Non-electric can opener
- Essential medicines
- Cash and credit cards
- Sturdy shoes

Develop an emergency communication plan in case family members are separated from one another during floods. Ask an out-of-town relative or friend to serve as the family contact. After a disaster it's often easier to call long distance than locally. Make sure everyone in the family knows the name, address and phone number of the contact person.

Teach all family members how to turn off gas, electricity and water. Teach children how to call for emergency help and which radio station to turn to for emergency information.

Keep your insurance policies in a safe place. Ask your insurance agent about flood insurance or call 1-800-720-1090 for information. Remember that there is a 30-day waiting period before a policy is in effect.

DURING A FLOOD WATCH

Listen to a battery-operated radio for the latest storm information.

Fill bathtubs, sink and jugs with clean water, in case the local water supply becomes contaminated. You can sanitize these storage containers by first rinsing with bleach.

Bring outdoor belongings, such as lawn furniture, indoors or tie them down securely.

Move valuable papers and household possessions to upper floors or to safe ground, if time permits.

If you are instructed to do so by local authorities, turn off all utilities at the main switch and close the main gas valve.

Be prepared to evacuate.

DURING A FLOOD

If Indoors

Turn on battery-operated radio or television to get the latest information.

Get your disaster supply kit.

If you're caught in the house by suddenly rising waters, move to the second floor and, if necessary, to the roof. Take warm clothing, a flashlight, and portable radio with you. Then wait for help...don't try to swim to safety. Rescue teams will be looking for you in/at the house.

Turn off all utilities at the main power switch and close the main gas valve if evacuation appears necessary. Do not touch any electrical equipment unless it is in a dry area and you are standing on a piece of dry wood while wearing rubber gloves and rubber-soled boots or shoes.

If advised to evacuate, do so immediately. Evacuation is easier and safer before floodwaters become too deep. Take your pet and their food and medicines.

Follow recommended evacuation routes. Shortcuts may be blocked.

If Outdoors

Climb to high ground and stay there.

Avoid walking through any floodwaters. Even six inches of swiftly moving water can sweep you off your feet.

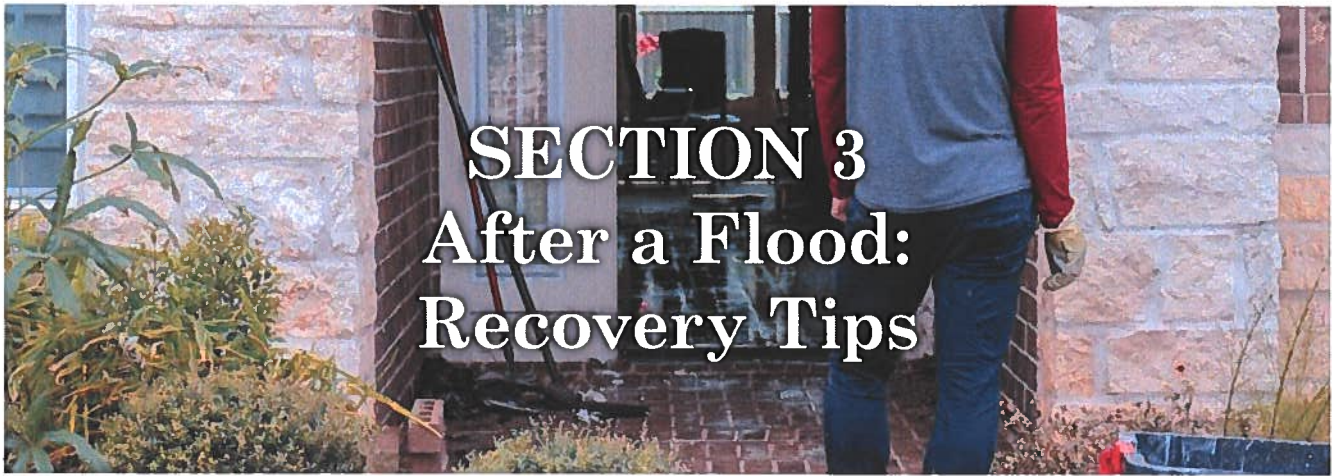
If Evacuated

If it is safe to evacuate by car, you should consider the following:

Stock your car with nonperishable foods (like canned goods), a plastic container of water, blankets, first aid kit, flashlights, dry clothing and any special medication needed by your family.

Do not drive where water is over the road— turn around and go another way.

If your car stalls in a flooded area, abandon it immediately and climb to higher ground. Floodwaters can rise rapidly and sweep a car and its occupants away. Many deaths have resulted from attempts to move stalled vehicles.



SECTION 3

After a Flood: Recovery Tips

Flood dangers do not end when the water begins to recede. Listen to radio or television and do not return home until authorities indicate it is safe to do so.

Entering a Building After a Flood

Before entering the building, inspect the foundation for cracks or other damage. When entering the building, use extreme caution.

Wear sturdy shoes and take battery-powered lanterns or flashlights to examine the damage. Do not use matches or other open flames because gas may be trapped inside.

Examine walls, floors, doors and windows to make sure the building is not in danger of collapsing. Watch for loose plaster and ceilings that could fall.

Take pictures of the damage – both to the house and its contents – for insurance claims. If possible, take photos that show the high-water marks left on walls and other damage.

Watch out for animals, especially poisonous snakes that may have come into your home with the floodwaters. Use a stick to poke through debris.

Look for fire hazards, such as broken or leaking gas lines, flooded electrical circuits, submerged furnaces or electrical appliances and flammable or explosive materials that may have come from upstream.

Cover broken windows and holes in the roof or walls to prevent further weather damage. The expense of these temporary repairs is usually covered under your flood insurance policy, so save your receipts.

Throw away food, including canned goods, that has come in contact with floodwaters.

Water for drinking and food preparation should be boiled vigorously for ten minutes, until such time as the public water system has been declared safe. Another method of disinfection is to mix 1/2 teaspoon of liquid commercial laundry bleach with 2-1/2 gallons of water; let stand for five minutes before using. The flat taste can be removed by pouring the water from one container to another or adding a pinch of salt. In an emergency, water may be obtained by draining a hot water tank or melting ice cubes.

Service damaged septic tanks, cesspools, pits and leaching systems as soon as possible. Damaged sewage systems are health hazards.

Inspecting Utilities in a Damaged Home

Check for gas leaks. If you smell gas or hear a blowing or hissing noise, quickly leave the building. Turn off the gas at the outside main valve if you can, and call the gas company from a neighbor's home. If you turn off the gas for any reason, it must be turned on by a professional.

Keep power off until the electrical system is inspected. If you see sparks or broken and rayed wires, or if you smell hot insulation, call an electrician for advice before doing anything.

Check for sewage and water-line damage. If you suspect sewage lines are damaged, avoid using the toilets and call a plumber. If water pipes are damaged, contact the water company and avoid using water from the tap.

Information Sources

During a major storm or flood event, you can turn to these resources for information and assistance:

Agoura Hills Emergency Information

www.ci.agoura-hills.ca.us (I want to...Get Emergency Information)

Los Angeles County

www.lacounty.gov/emergency

Ready L.A.

www.readyla.org/

Los Angeles Watershed

www.dpw.lacounty.gov/wmd/whatis.cfm

SigAlert

www.sigalert.com

National Weather Service

www.weather.gov

California Highway Patrol

www.chp.ca.gov/traffic

A very special thank you to Ventura and Los Angeles County Department of Public Works, San Diego and Santa Barbara County Flood Control and Water Conservation District for use of color figures and text assistance.

Important Contacts

EMERGENCIES.....911

LOCAL

Los Angeles County Sheriff

Lost Hills/Malibu Station

.....(818) 878-1808

Twitter - @LASDHQ

Los Angeles County Watershed Protection District.....(800) 773-2489

Twitter - @LACitySAN

Los Angeles County Fire Department

Non-emergency.....(818) 597-2272

Twitter - @LACoFD and @LACoFDPIO

STATE

Governor's Office of Emergency Services

Warning Center (24 hours).....(916) 845-8911

Twitter - @Cal_OES

CA State Highway Patrol Office (M-F/8-5).....(818) 888-0980

Twitter - @CHPWESTValley

FEDERAL

Federal Emergency Management Agency

Region IX.....(510) 627-7100

National Flood Insurance

Program.....(800) 427-4661

www.floodsmart.gov/

Flood Map Information.....(877) FEMA-MAP

(877) 336-2627

www.msc.fema.gov/portal/home