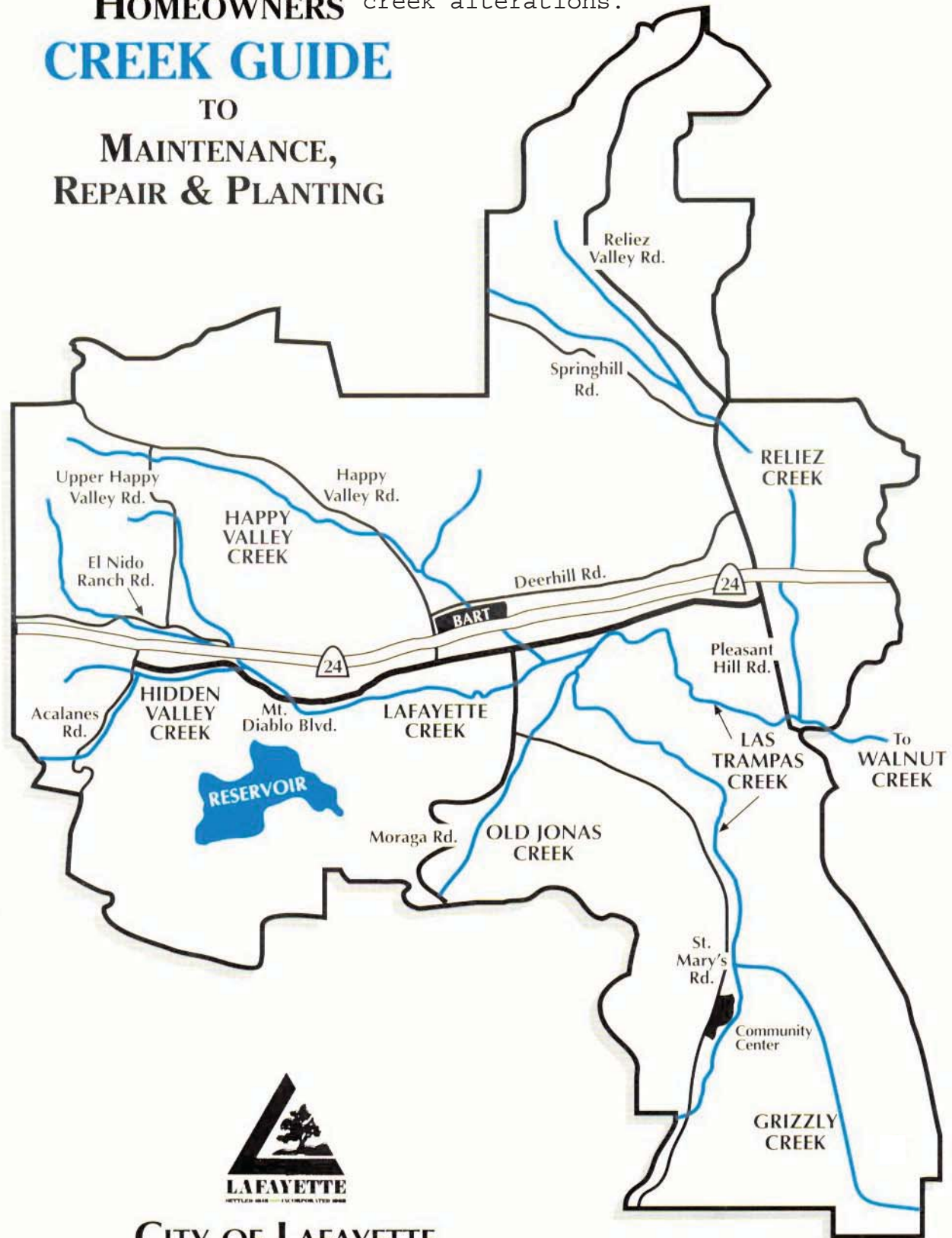


Always consult the State Department of Fish and Wildlife, the Regional Water Quality Control Board, the Army Corp of Engineers, and the City of Lafayette before beginning creek alterations.

# HOMEOWNERS CREEK GUIDE TO MAINTENANCE, REPAIR & PLANTING



CITY OF LAFAYETTE

## Where Are Our Creeks? . . .

Much of the Las Trampas Watershed lies within the City of Lafayette, as depicted on the cover of this Guide. Rainwater and runoff from our entire land area is carried by Las Trampas and six tributary creeks, two of which flow into Lafayette Creek:

- **Lafayette Creek**
  - **Hidden Valley Creek**
  - **Happy Valley Creek**
- **Old Jonas Creek**
- **Grizzly Creek**
- **Reliez Creek**

Some 13 miles of these creeks are bordered by more than 1000 homesites — roughly 12% of homesites in the City. Refer to the map on the cover of this Guide to see where your property is located in relation to these creeks.

## Why Are They Valuable? . . .

These fragile waterways are the *ultimate storm drains* of our City. They not only carry direct runoff from creekside property but, through linkage with man-made storm drains, they carry the runoff from the rest of the City's land area as well. They also provide a habitat for wildlife and a host of aesthetic benefits. Our creeks are, in short, an irreplaceable natural resource — a vital part of the lives of all the people and animals who live within this watershed. They can be especially valuable to a creekside property owner since a healthy creek traditionally *increases* the value of a creekside property; a degraded creek, on the other hand, can cause serious property damage and *decreases* its value.

## What Should I Expect From This Guide? . . .

This Guide provides you, the creekside homeowner, with practical information regarding the proper care, preventive maintenance and, if necessary, restoration of your creek bank. It offers advice both for preventing erosion of an existing bank and for stabilizing a bank already experiencing severe erosion. It will also:

- inform you about regulatory requirements which must be met before beginning a bank stabilization project;
- take you through the process of securing proper permits;
- help you to engage qualified consultants, engineers and contractors to assist you.

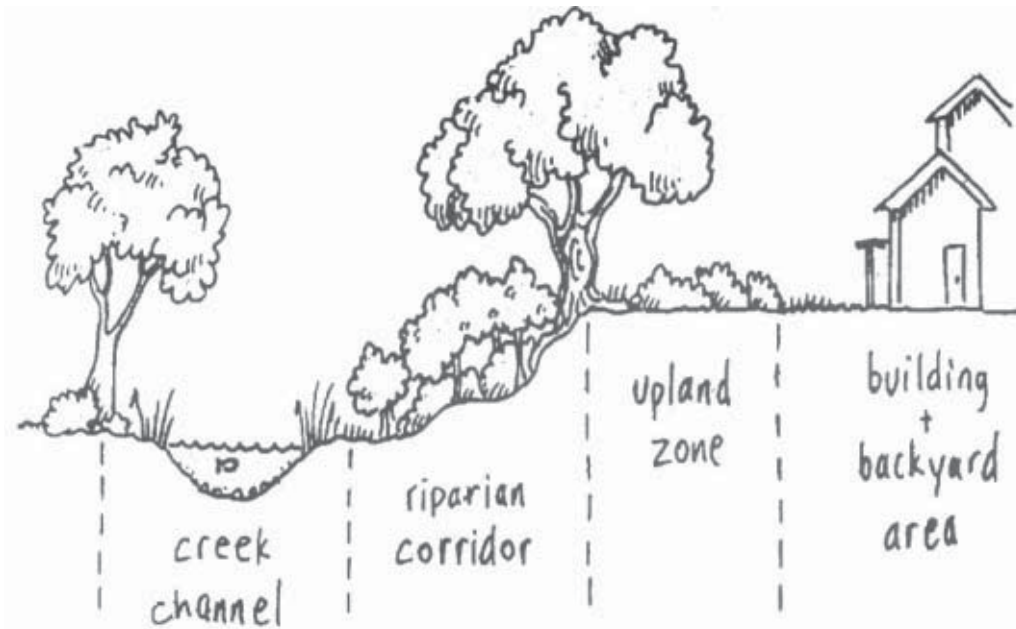
## What Exactly Is Erosion? . . .

Erosion is a natural process. When flowing water meets unprotected soil, some of that soil is carried away by the water and erosion results. In stable watersheds, the rate of erosion is slow and natural healing processes can usually keep up with it. Urban development, however, can accelerate the rate of change within a watershed beyond nature's healing capabilities. Indeed, the explosive development Lafayette has experienced since the 1950's has increased peak flows of our creeks enormously, causing severe property loss along the greater length of Las Trampas Creek and two of its tributaries, Happy Valley Creek and Reliez Creek. High flow rates from even a single intense rain can make significant changes in a creek bank.

Increased volumes of runoff and upstream changes of the *creek channel* may lead to serious erosion even on banks that previously had been stable for years.

Barren slopes and improper construction of decks and structures in the *riparian corridor* and the *upland zone* can contribute to bank instability. Instability, in

turn, can lead to bank failure and introduce large volumes of sediment (soil, sand, and fine gravel) into the creek. This sediment fills in the creek bed and reduces its ability to carry high flows, leading to flooding as well as a further loss of creekside vegetation — a vicious cycle. It's up to you, the creekside homeowner, to break this cycle and keep your creek clean and its bank stable.



## Why Me? . . .

Creekside property in most cases utilizes the nominal creek centerline as the property line, despite the misperception that a fence at the top of the creek bank defines a property. Ownership of creekside property therefore carries special responsibilities. By City Ordinance, you and your neighbors on both sides of the creek share responsibility for maintaining your banks and riparian corridor vegetation. By properly exercising this responsibility, you not only enhance your own property, but can: prevent erosion; avoid flood losses and property damage; preserve water quality; and contribute to the survival of fish and wildlife to benefit everybody in our community. It's hard to find a better deal than that.

## How Do I Recognize Erosion? . . .

Bank erosion generally occurs as a result of the action of streamflow against the toe (base) of an unprotected slope. Look for barren areas at the bottom of the slope as well as signs of soil slippage at the top. As the bank slope readjusts after its toe is washed away, a fissure or crack often is evident at the top of the bank as the soil peels away. Severe erosion is accompanied by bank instability and, ultimately, collapse. Very steep banks are so vulnerable to active erosion that large sections of the bank may break away and fall into the creek.

## How Do I Prevent Erosion? ...

**Check your creek bank regularly** for signs of erosion so you can correct problems promptly as they arise. Native plants growing within the *riparian corridor* help stabilize the bank, so revegetate barren areas with native plants as quickly as possible. In times of flooding, a well vegetated creek bank may be your property's best protection against erosion by:

- binding and retaining soil in place
- intercepting the impact of raindrops
- retarding velocity of runoff
- filtering soil out of runoff
- permitting water infiltration into the soil
- protecting the slope from undercutting and slumping
- absorbing and consuming water

**Don't locate structures in the riparian corridor or upland zone.** Any structure built within reach of flood waters is not only subject to damage or loss, it also decreases the creek's ability to handle high flows safely. Structures such as storage sheds, patios, and decks threaten a bank's natural protective vegetation and decrease the stability of its slope. Construction and landscaping projects, even in the *building/backyard area*, can compromise a bank's stability, so protect your creek from their erosive effects by:

- scheduling projects for late spring or summer months (May through September) when chances of rainfall are minimal;
- covering exposed soil with straw, wood fiber, woven straw blankets, landscape fabric or other non-toxic permeable materials;
- planting fast-growing native grass seed mixtures or other native plants as temporary ground cover on larger exposed surfaces.

**Never throw brush, grass clippings, and prunings** into your creek or onto its banks. They may be carried by wind or rain and block a culvert or create a blockage downstream, causing flooding as well as erosion. Collect them in the green containers provided for weekly curbside pick-up of yard waste, or learn to make a healthy compost pile for your garden.

**Manage debris.** Accumulation of some natural debris in your creek or on its bank, such as trees, branches, logs and root wads, is often desirable since it creates food and shelter for fish and wildlife. Excessive debris, however, can cause blockages and compromise your creek's capacity to effectively carry stormwater. This not only can cause elevated flood stages, it can increase erosion by deflecting streamflow into its banks. Therefore you should:

- remove trash, litter and "urban artifacts" such as tires and old appliances from the *creek channel* and *riparian corridor*; and
- routinely check the *creek channel* for fallen trees, branches, limbs and brush.

Simply removing all woody debris can degrade the fish and wildlife habitat so it's important to carefully observe the situation before taking action. If it appears that a barrier obstructs creek flow and poses a threat to life or property





**Obstructed Creek**



**Unobstructed Creek**

(a house, utility pole, or other structure), it may need to be repositioned, partially removed or removed altogether. It's often best to take small incremental steps in addressing removal. First trim the portion of a fallen tree above the water and try to leave the trunk and root wad intact. If it still presents a flood hazard, removal may be required under City Ordinance 472 — consult the City of Lafayette Department

of Engineering Services. Most fish can swim through or around debris barriers but if you suspect that fish are unable to swim around a particular barrier and you are unsure about what action to take, contact the California Department of Fish and Game. Removal of a barrier requires a 1603 Streambed Alteration Permit and the Regional Water Quality Control Board may also require water certification.

**Control runoff.** Water running off your property can carry soil directly into the creek. Therefore you should:

- **minimize paved areas.** Impervious concrete driveways, walkways, and patios increase the amount and velocity of water that flows into the creek. Use wooden decks, brick or stone patios, gravel, paving stones, or concrete blocks so that water can permeate into the soil;
- **manage roof drainage.** Guide downspout discharge to the creek in a protected way. Drain pipes projecting directly into the creek bank or flexible pipes allowed to drape down a bank cause erosion. Reduce the force of water against bare soil by directing its discharge to rocks placed on filter fabric and route it to the creek through rock-lined channels.

**Keep your bank vegetated.** When ground and banks are left bare, soil washes off into the creek. Resist the temptation to put tires or slabs of concrete over exposed areas. This will just create more erosion. The use of vegetation to stabilize banks is low-cost and highly effective. Native vegetation usually requires less water, is naturally deep-rooted and helps bind the soil in the bank. It is uniquely adapted to survive flood conditions -providing erosion protection during high flows and generally recovering quickly when flood waters subside. Its top growth serves to dissipate the energy, decrease the velocity and deflect the flow away from the bank, thereby reducing the potential for transferring erosion problems to new locations. Since it's difficult to support vegetation on an eroding bank:

- temporarily stabilize the area with geotextile fabric until the vegetation becomes fully established. These fabrics are woven netting made of either synthetic or natural fibers and they can be stapled into the soil to help protect it from erosion. Synthetic fiber blankets have the disadvantage of being non-biodegradable. The oldest and most well-known fabric is jute netting; however its use near the *creek channel* is limited because it does not function well in heavy water flows. While a variety of other natural fiber fabrics made from cotton, sisal and coir are available at garden supply centers, coir fabrics are best for use in waterways because they are strong, resistant to rot, and withstand high stream flows and velocities;

- preserve a “buffer strip” of at least 10 feet of dense natural vegetation to grow along the water’s edge; and, most importantly,
- plant vegetation native to our area.

Be aware that many “natural appearing” banks are vulnerable to erosion because shallow rooted invasive plants which don’t provide effective bank stabilization have forced out native plants. When possible, these invaders should be carefully removed and replaced by native vegetation; however, remove an eucalyptus tree only if it is less than twelve inches in diameter or poses a safety hazard.

## Native Riparian Corridor Plants

Black walnut (*Juglans californica* var. *hindsii*)  
 California bay (*Umbellularia californica*)  
 Pacific Madrone (*Arbutus menziesii*)  
 Arroyo willow (*Salix lasiolepis*)  
 Red Willow (*Salix laevigata*)  
 Coast live oak (*Quercus agrifolia*)  
 Valley oak (*Quercus lobata*)  
 California buckeye (*Aesculus californica*)  
 Big leaf maple (*Acer macrophyllum*)  
 Box elder (*Acer negundo* var. *californicum*)  
 White alder (*Alnus rhombifolia*)  
 Fremont Cottonwood (*Populus fremontii*)  
 Blue elderberry (*Sambucus mexicana*)  
 Coyote brush (*Baccharis pilularis*)  
 Toyon (*Heteromeles arbutifolia*)  
 Coffeeberry (*Rhamnus californica*)  
 California rose (*Rosa californica*)  
 Snowberry (*Symphoricarpos albus*)  
 Red columbine (*Aquilegia formosa*)  
 Seep-spring Monkey Flower (*Mimulus guttatus*)  
 Pink-flowering currant (*Ribes sanguineum*)  
 Evergreen currant (*Ribes riburnifolium*)  
 California strawberry (*Frageria vesca*)  
 California blackberry (*Rubus ursinus*)  
 Pipevine (*Aristolochia californica*)  
 Douglas Iris (*Iris douglasiana*)  
 Virgins bower (*Clematis ligusticifolia*)  
 California Poppy (*Ecshscholzia californica*)  
 Meadow barley  
 Molate fescue  
 Creeping wild rye  
 California brome

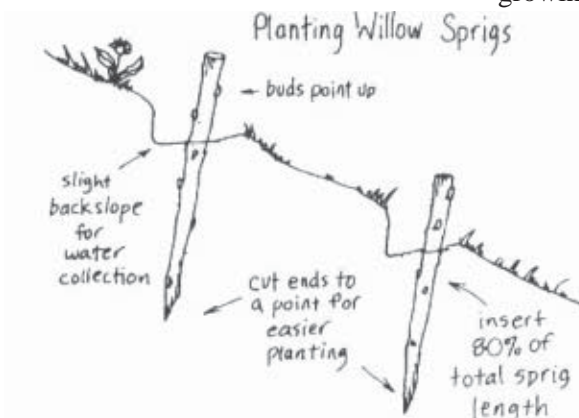
## Non-Native Invasive Plants

Eucalyptus  
 Gums  
 Kangaroo thorn  
 Bailey acacia  
 Black acacia  
 Green wattle  
 Silver wattle  
 Golden wattle  
 Tree of heaven  
 Pines  
 White poplar  
 Plums  
 Himalaya blackberry  
 Tobacco  
 Giant reed  
 French broom  
 Wild radish  
 Wild lettuce  
 Periwinkel  
 Algerian ivy  
 Fennel  
 Perennial pepperweed  
 Ox tongue  
 Wild oat  
 Rippgut grass  
 Wild barley  
 Pampas grass  
 Bamboo

Seek expert technical advice before attempting the revegetation of a creek bank. If you have questions regarding which plants are acceptable, consult a local nursery, the California Native Plant Society or the California Department of Fish and Game. Some examples of native plants best for our creeks can be found in the above table, together with some non-native plants which should be avoided. It's a common misconception that native plants need sunny, open environments. All the native plants listed above do well in the filtered shade of creek banks and most can tolerate full shade with no irrigation. Plant in the fall and irrigate during the first winter if there is a long dry spell, but be careful not to plant too close to the creek where the young plants may be washed away by high creek flows.

Revegetating with willows is the easiest way to establish woody vegetation on a denuded creek bank. Historically, willows grew along most of the creeks in coastal California and still do. They can be planted from dormant cuttings or "sprigs" following these steps:

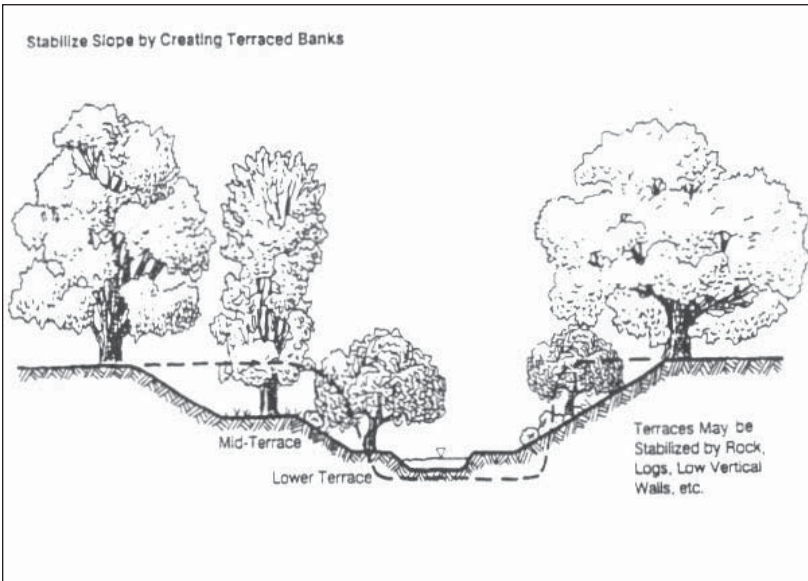
- Make cuttings in the late fall when the leaves have dropped and the ground is soft and wet. It's critical to plant as early as possible so they can develop good root systems before they sprout leaves in the spring. Planting too late is the most common cause of failure.
- Cuttings should be at least 3/4 inch in diameter — the bigger the better. Large diameter branches can be used. They should be at least 14 inches long but can be longer.
- Plant 2-4 cuttings/sq. yd. by pushing at least two-thirds of the length of the cut end directly into soft soil. They may need to be pounded in with a hammer. Alternatively, you can first make a hole with a sharp stick or pick but be sure to compress soil tightly around the cuttings. Angle sprigs slightly downstream to prevent them from being undermined by storm flows.
- Adequate water and sun are key to their establishment and survival. Plant them low enough on the bank to ensure adequate soil moisture during the summer. Willows that are planted too high are likely to dry out and die.
- Prune and shape willows to keep them from invading the creek channel and causing flood and erosion problems. Allowing trees to grow tall will develop a canopy to help shade the creek and vegetation growing below.



If your bank is steep and there is sufficient space between its top and the **building/backyard** area, you should consider reducing your bank to a slope of one vertical foot for every two horizontal feet, using terraces reinforced with rock or log retaining walls. Terracing, done with professional help, will improve the prospects of establishing new vegetation and contribute to bank stability.

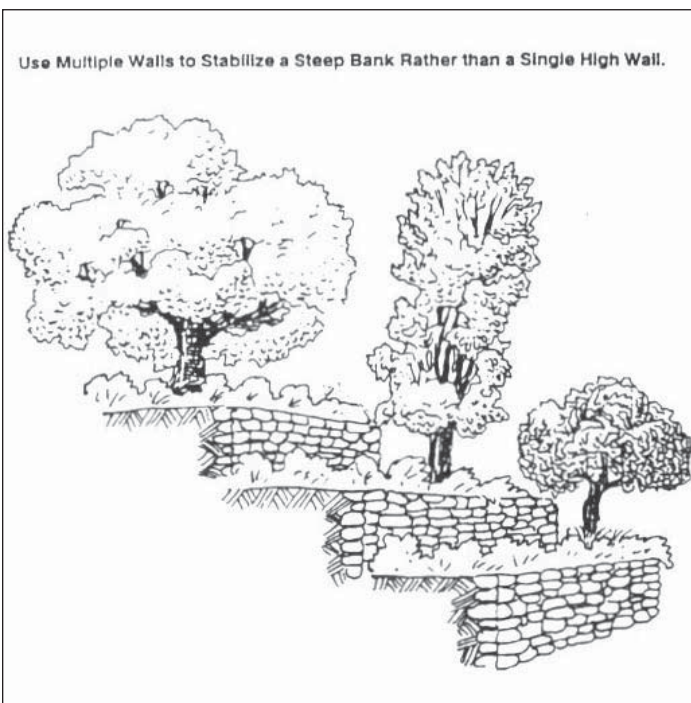
## My Bank Is Still Eroding— What Should I Do? . . .

If your bank is unstable and continues to erode despite the preventive and vegetative measures discussed above, you will need to make structural repairs. While your first instinct may be to dump rock (rip-rap) on the severely eroded areas, don't do it. This won't properly stabilize the toe of the bank and will only encourage further failure. Furthermore, rip-rap won't dissipate any of the excess stream energy that caused the erosion in the first place. Instead, it will transfer



and sometimes amplify this energy to the next section of unprotected bank, causing more erosion. Unless the entire creek is treated in this manner — a costly and unsightly option — the erosion problem is not solved, but merely transferred to a new location. Indeed any hard objects placed on the banks can perpetuate erosion. Stream flow deflected off rocks, concrete and railroad ties creates eddying that erodes the creek's banks up and down-stream. They can also deflect currents to the opposite bank, causing that bank to be undercut. For these reasons, the best restoration strategies employ vegetation in combination with structural methods.

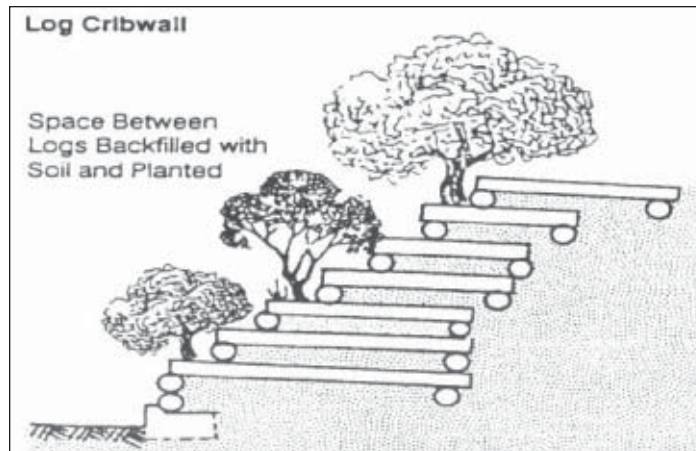
Before undertaking a structural project, it's very important to consider how your actions will affect your neighbors on both sides of the creek, upstream and downstream. Indeed, you might want to consider enlisting your neighbors in a group effort. Benefits include sharing the costs of planning, permits and repairs that will likely complement and even enhance all of your properties. Cooperative projects, done in conjunction with a local group such as Friends of Lafayette Creeks, may even be eligible for private or government grant programs.



You should then:

- seek professional assistance to determine the exact cause of the erosion;
- identify the best option for restoring the bank;
- contact City of Lafayette Engineering and Planning Services Departments for specific requirements;
- consult with a qualified registered Professional Engineer experienced in the area of the proposed design to prepare detailed restoration plans;
- submit duplicate copies of the plans to the City of Lafayette, State Department of Fish and Game, California State Water Board, and the Army Corps of Engineers for review;
- resubmit plans, if revisions are necessary for approval by these agencies;
- secure Grading Permit from the Contra Costa County Building Inspection Department.



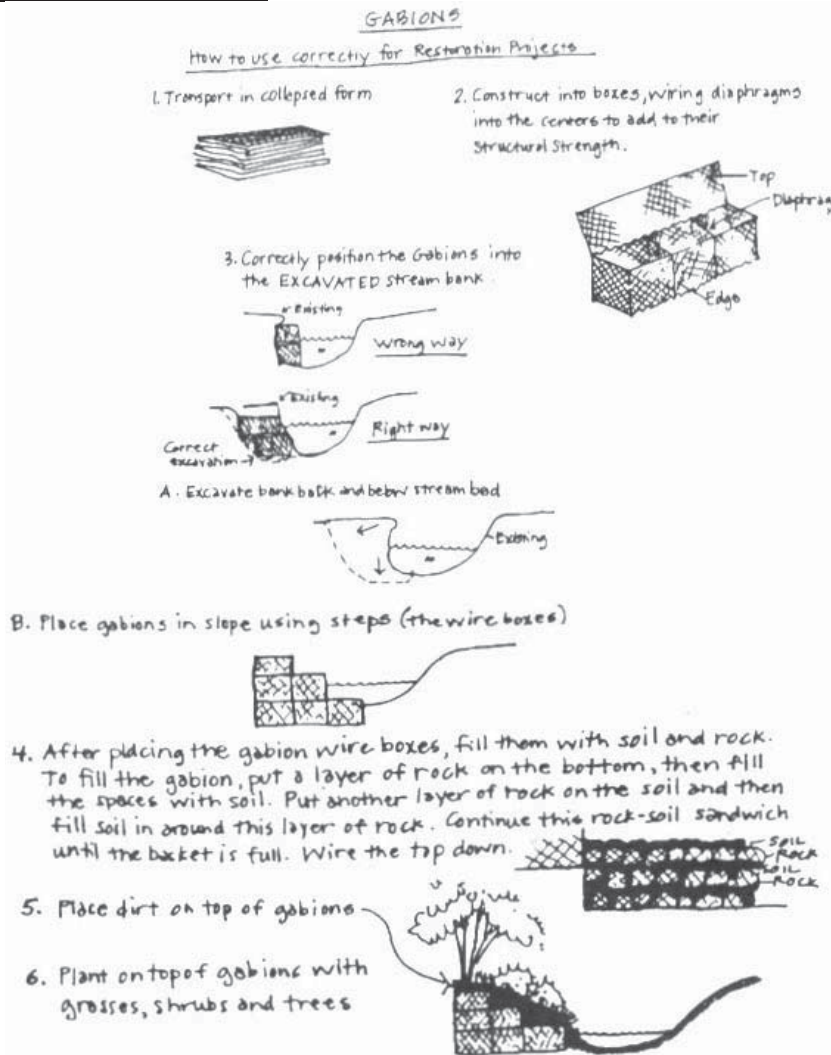


Another method of bank stabilization.

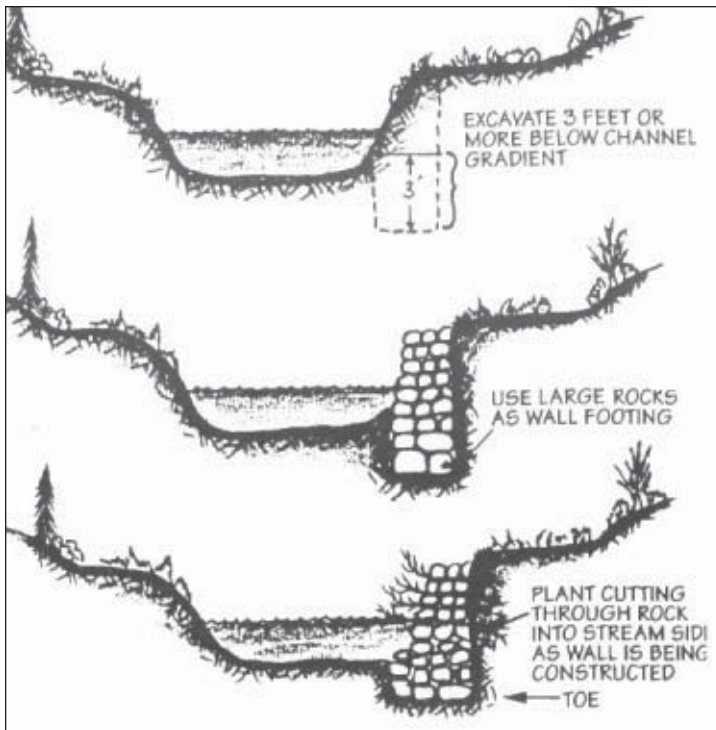
## What Kind Of Structural Repairs Are Best? . . .

**Rock-filled gabions** are probably the most popular and commonly used of the structural methods. They require inexpensive building materials that are easy to purchase, transport, and handle. While they have a tendency to be unsightly, they are certainly preferred to concrete retaining walls because they are flexible, porous and can be planted. They should be installed professionally. If installed incorrectly, they frequently blow out of the bank and scatter rocks and cages downstream.

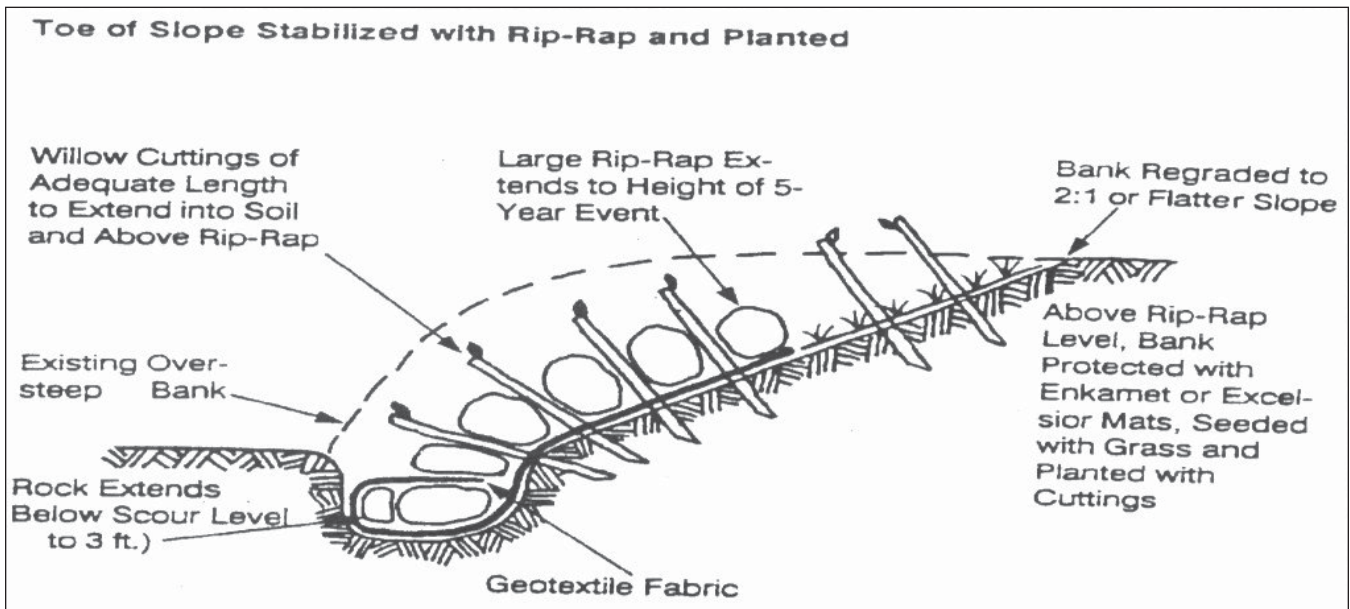
Their correct use as a restoration tool involves the proper excavation of the creek bank, the filling of the cages with both rock and soil, and the covering of the gabions with soil and plants. A good gabion is an invisible gabion. Follow these steps for installation:



- Determine the correct width and depth dimensions for the bankfull channel. Then excavate the stream bank so that the gabions fit into the bank without protruding into the bankfull channel.
- To fill the gabion, start with a layer of approximately fist-sized rock in the bottom of the cage. Fill the spaces between the rock with soil (not excavated from the creek). Continue these rock-and-soil layers until the gabion basket is filled.



- When adding soil to the gabion, lay plant cuttings in the soil so that the growing tips stick out the holes of the basket. You can line the inside of the basket with filter fabric if loss of soil from the outside face is an issue.
- After constructing the gabion in this manner, backfill soil over the top of it so that you can no longer see the basket.
- Plant the top of the new slope with enough cuttings and/or container or tube stock to cover and hold soil before the winter rains.
- Water sufficiently to establish the plantings.
- Be careful not to wash excess soil into the creek.



**Rock work** properly performed also can have a positive role in restoration of an unstable bank, especially difficult sites with vertical banks and minimum setbacks. While merely dumping rock along a stream channel should be avoided, rock or concrete rubble (rip-rap) can be carefully handcrafted into aesthetic walls that provide reinforcement and support vegetation. The spaces between the rocks or rubble pieces can be planted with cuttings as the wall is constructed.

Follow these steps in constructing a rock wall:

- Determine the bankfull width and depth dimensions of the channel. Excavate the stream banks back 2 feet greater than the bankfull width. Excavate the channel bed at the toe of the bankfull channel below grade about 2.5 to 3 feet.
- Starting at the trench at the toe of the slope, lay rock or concrete rubble to start your wall below the grade of the bed of the stream. This will toe-in the project and help stabilize the wall.
- When the wall height reaches above the base flow of the creek, add cuttings. Push the butt ends of the cuttings into the bank as far as you can. The cuttings need at least 2 feet of soil to root in. Carefully place the rock or rubble on and next to the cuttings so you don't damage them. The cuttings should stick out of the rock wall by 6 inches.
- To facilitate anchoring the cuttings deep into the bank as you construct the wall, hammer rebar into the bank to create planting holes, then tamp the cuttings gently into the holes. Trim any split cuttings with lopping shears to remove the damaged
- Water the structure when the project is completed.

## PROFESSIONAL ASSISTANCE

The following firms and individuals are known by the City of Lafayette Engineering Services Department and/or members of the Creeks Committee to have provided helpful advice and assistance regarding the maintenance and restoration of eroding creek banks. This is not intended to be a complete list of qualified professionals nor does it imply certification by the City or its representatives.

### Engineers/Consultants:

William Gibson; ENGINEERED SOIL REPAIRS	Tel: (925) 210-2150
Phil Gregory; CAL ENGINEERING & GEOLOGY	Tel: (925) 935-9771
Mary Lee Guinon; SYCAMORE ASSOCIATES	Tel: (925) 279-0580
Jeff Haltiner; PHILLIP WILLIAMS & ASSOCIATES	Tel: (415) 262-2300

### Contractors:

Barry Clyde; NED CLYDE CONSTRUCTION	Tel: (925) 689-5411
PACIFIC GENERAL ENGINEERING	Tel: (925) 932-2533
SITWORKS CONSTRUCTION	Tel: (925) 284-1437

## Acknowledgements

This guide was prepared by the Creeks Committee of the City of Lafayette using information gathered from the following sources: "Creek Care Guide" (National Park Service); "Caring for Our Creeks" (Contra Costa County); "A Citizen's Guide to Riparian Area Management" (Lake County, IL); "Restoring Our Creeks, Chapter 9" by Ann Riley; "Riparian Plants for Local Creeks" (Jeanne Ateljevich); "Alhambra Creek Enhancement Plan" (City of Martinez); "Implementation Manual" (San Leandro); and "Creek Care," "Controlling Erosion" and "Repairing Streambank Erosion" (Marin County).

Design and layout of this guide was done by Phuong Nguyen, graphic design student, Acalanes High School.

**PERMITTING AGENCIES**

**City:**

City of Lafayette Engineering Services Dept.      Tel: (925) 284-1951  
 Fax: (925) 284-3169

City of Lafayette Planning Services Div.      Tel: (925) 284-1976  
 P. O. Box 1968      Fax: (925) 284-1122  
 3675 Mt. Diablo Boulevard, Suite 210  
 Lafayette, CA 94549  
website: [www.ci.lafayette.ca.us](http://www.ci.lafayette.ca.us)

**County:**

Contra Costa County Building Inspection Dept.      Tel: (925) 299-0141  
 Mr. Ron Hart, Grading Inspector      Fax: (925) 299-0134  
 Lamorinda Building Inspection Office      Info: (925) 299-0263  
 3685 Mt. Diablo Boulevard  
 Lafayette, CA 94549

**State:**

California State Department of Fish and Game      Tel: (707) 944-5520  
 Mr. Greg Martinelli      Tel: (707) 944-5570  
 P. O. Box 47      Fax: (707) 944-5563  
 7329 Silverado Trail  
 Yountville, CA 94599  
website: [www.dfg.ca.gov/1600/notification\\_pkg.shtml](http://www.dfg.ca.gov/1600/notification_pkg.shtml)

Calif. Regional Water Quality Control Board      Tel: (510) 622-2300  
 Ms. Tina Low      Tel: (510) 622-5682  
 1515 Clay Street, Suite 1400      Fax: (510) 622-2460  
 Oakland, CA 94612  
website: [www.swrcb.ca.gov/rwqcb2/certs.htm](http://www.swrcb.ca.gov/rwqcb2/certs.htm)

**Federal:**

U.S. Army Corps of Engineers      Tel: (415) 977-8464  
 San Francisco District      Fax: (415) 977-8343  
 Attn: Regulatory Branch - Mr. Ed Wiley  
 333 Market Street, 8th Floor  
 San Francisco, CA 94105-2197  
website: [www.spn.usace.army.mil/regulatory](http://www.spn.usace.army.mil/regulatory)

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