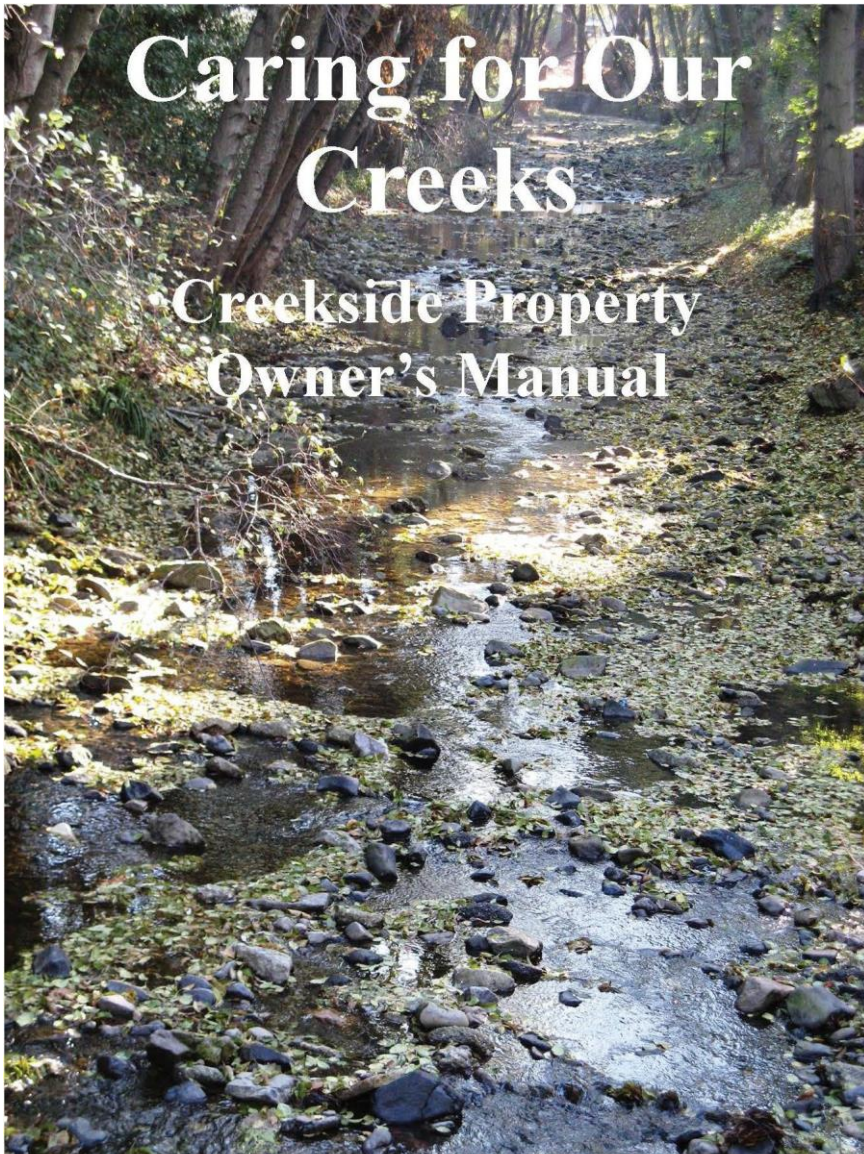


Caring for Our Creeks

Creekside Property Owner's Manual



Revised 2018

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Photo courtesy Cinda MacKinnon.

San Pablo Creek behind downtown

Where Are Our Creeks?

Most of Orinda is located within the San Pablo Creek Watershed and drains into San Pablo Reservoir just north of Orinda. The southeastern portion of Orinda is located in the Upper San Leandro Watershed and drains to the south into the Upper San Leandro Reservoir, south of Moraga.

The creeks of the San Pablo Creek Watershed include

- San Pablo Creek
- Lauterwasser Creek
- Brookside Creek
- An unnamed creek, often referred to as El Toyonal Creek
- Overhill Creek

Those in the Upper San Leandro Watershed include

- Ivy Creek
- Ivy Creek tributary to Moraga Creek

Of the approximately 31 miles of creeks flowing through Orinda, 19 miles are bordered by more than nearly 800 home sites – roughly 11 percent of home sites in the City. Refer to the map on the back 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 carry direct runoff from creekside property and runoff from the rest of the City's land area through linkage with manmade storm drains. They also provide a habitat for wildlife and a host of aesthetic benefits. Our creeks are an irreplaceable natural resource – a vital part of the lives of all the people and animals who live within the community. 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 *decrease* its value.



Native plant *Trillium chloropetalum* that grows along creek banks in winter.

Photo courtesy C. MacKinnon.

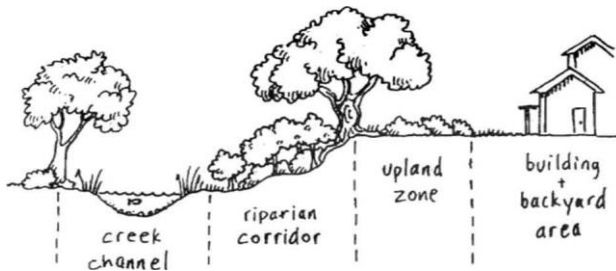
What Should I Expect From This Guide?

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 will:

- Inform you about the causes and effects of erosion.
- Offer advice for both preventing erosion and for stabilizing a bank experiencing erosion.
- Inform you about regulatory requirements which must be met before beginning a bank stabilization project or any other work in a creek setback.
- Take you through the process of securing proper permits.
- Provide you with agency contacts and resources that are available to you.

What Exactly is Erosion?

When flowing water meets unprotected soil, 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. However, urban development can accelerate the rate of change within a watershed beyond nature's healing capacities. Indeed, the development Orinda experienced since the 1950s has increased peak flows of our creeks enormously, causing severe property loss along many reaches of our creeks, particularly Lauterwasser and El Toyonal Creeks.



High flow rates from even a single intense rain can make significant changes in a creek bank. Increased volumes of runoff due to development and up-stream 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 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?

Because most of Orinda creeks are located on private property, much of the responsibility for the health of creeks and the survival of creek-dependent wildlife lies with you, the creekside residents. Creekside property in most cases utilizes the nominal creek centerline as the property line, despite the perception that a fence at the top of the creek bank defines a property. Ownership of creekside property carries special responsibilities and risks. 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.

How Do I Recognize Erosion?

Bank erosion generally occurs as a result of the action of stream flow 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 is often 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 to Prevent Erosion?

Check your creek bank regularly for signs of erosion so you can correct problems as they arise. Native riparian plants growing within the **riparian corridor** help stabilize banks, so revegetate barren slopes 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 restraining soil in place
- Filtering soil out of runoff
- Intercepting the impact of raindrops
- Retarding velocity of runoff
- Allowing water infiltration into the soil
- Protecting slopes against undercutting and slumping
- Absorbing and consuming water

How to Prevent Erosion? (continued)

Don't locate structures in the riparian corridor or upland zone. Structures 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 those in the **building/backyard area**) can compromise a bank's stability, so protect your creek from the effects of erosion by:

- Scheduling construction projects for late spring or summer months (May through September) when chances of rainfall and erosion 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 mixture or other native plants as temporary ground cover on larger exposed surfaces.

Never throw brush, grass clippings, and prunings into your creek or on 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 pickup of yard waste, or learn how to make a healthy compost pile for your garden.

Obstructed Creek



Unobstructed Creek



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 the creek's capacity to effectively carry storm water. This not only can cause elevated flood stages, it can increase erosion by deflecting stream flow 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 is 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 (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 by first trimming the portion of a fallen tree above the water and trying to leave the trunk and root wad intact. If it still presents a flood hazard, removal may be required under Orinda Municipal Code 18.03 (see page 13 for pertinent City ordinances). If you suspect that fish are unable to swim around a particular barrier, contact the California Department of Fish and Wildlife. Removal of a barrier requires a Section 1603 Streambed Alteration Permit with the California Department of Fish and Wildlife 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 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 away from the creek in a protected way. Drain pipes projecting directly into 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 with native plants. When ground and banks are left bare, soil washes off into the creek. Using native vegetation to stabilize banks is low-cost and highly effective. Native vegetation requires less water, is deep-rooted, and helps bind the soil in the bank. 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. When re-vegetating an eroding bank:

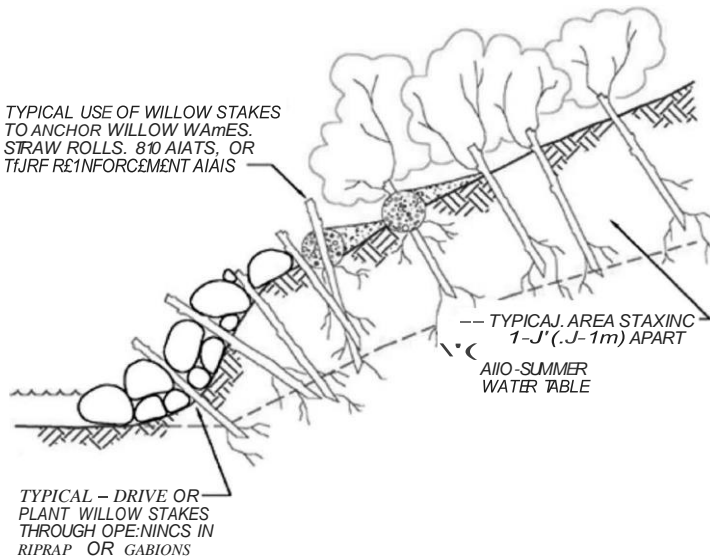
- Temporarily stabilize the area with geotextile fabric until the vegetation becomes fully established. These fabrics are woven netting made of synthetic or natural fibers and can be stapled into the soil to protect it from erosion. Synthetic fiber blankets have the disadvantage of being non-biodegradable. While a variety of natural fiber fabrics are available, coir fabrics are best for use in waterways because they are strong, resistant to rot, and withstand high stream flow and velocities.
- Preserve a "buffer" strip of at least 10 feet of dense natural vegetation to grow along the water's edge; and
- Plant vegetation native to our area.

How to Prevent Erosion? (continued)

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. See adjacent page for list of native riparian corridor and non-native invasive plants.

Seek expert technical advice before attempting the revegetation of a creek bank. Consult the Urban Creeks Council, the California Native Plant Society, or the California Invasive Plant Council if you have questions regarding which plants are acceptable along your creek. Some examples of native plants best for our creeks can be found in the adjacent table, along with some non-native plants which should be avoided because they are considered invasive and encroach into native species.

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". They are fast-growing and have deep roots. Several methods for revegetating with willows exist and the most appropriate one depends on the creek bank. Methods include pole plantings, brush layering, brush mattresses, wattles, and post plantings. Additional information on how to revegetate with willows can be found from the Urban Creeks Council (see Resources section below).



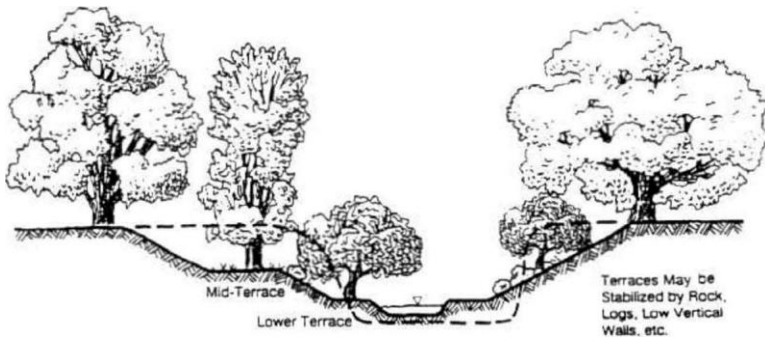
Graphic courtesy Urban Creeks Council.

Native Riparian Corridor Plants	Non-native Invasive Plants
<p>Black Walnut (<i>Juglans californica</i> var. <i>hindsii</i>) California bay (<i>Umbrellularia californica</i>) Pacific madrone (<i>Arbutus menziesii</i>) Arroyo willow (<i>Salix lasiolepis</i>) Red willow (<i>Salix laevigata</i>) Coast live oak (<i>Quercus agrifolia</i>) Valley oak (<i>Quercus lobata</i>) California buckeye (<i>Aesculus californica</i>) Big leaf maple (<i>Acer macrophyllum</i>) Box elder (<i>Acer negundo</i> var. <i>californicum</i>) White alder (<i>Alnus rhombifolia</i>) Fremont Cottonwood (<i>Populus fremontii</i>) Blue elderberry (<i>Sambucus mexicana</i>) Coyote brush (<i>Baccharis pilularis</i>) Toyon (<i>Heteromeles arbutifolia</i>) Coffeeberry (<i>Rhamnus californica</i>) California rose (<i>Rosa californica</i>) Snowberry (<i>Symphoricarpos albus</i>) Red columbine (<i>Aquilegia formosa</i>) Seep spring Monkey Flower (<i>Mimulus guttatus</i>) Pink-flowering currant (<i>Ribes sanguineum</i>) Evergreen currant (<i>Ribes riburnifolium</i>) California strawberry (<i>Fragaria vesca</i>) California blackberry (<i>Rubus ursinus</i>) Pipevine (<i>Aristolochia californica</i>) Douglas iris (<i>Iris douglasiana</i>) Virgins bower (<i>Clematis ligusticifolia</i>) California poppy (<i>Ecshscholzia californica</i>) Meadow barley Molate fescue Creeping wild rye California brome</p>	<p>Eucalyptus Gums Kangaroo thorn Bailey acacia Black acacia Green wattle Silver wattle Golden wattle Tree of heaven Pines White poplar Plums Himalayan blackberry Tobacco Giant reed French broom Wild radish Wild lettuce Periwinkle Algerian ivy Fennel Perennial pepperweed Ox tongue Wild oat Ripgut grass Wild barley Pampas grass Bamboo</p>

My Bank is Still Eroding-What Should I Do?

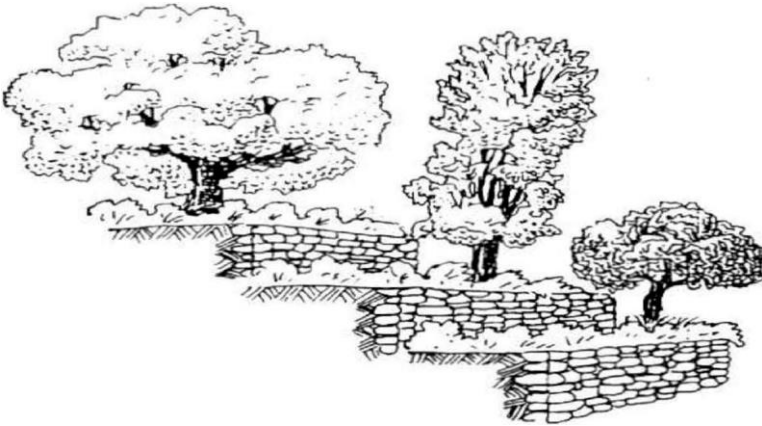
If the bank is unstable and continues to erode despite preventative and vegetative measures, you should consult with a qualified professional to evaluate if structural repairs are needed. If the bank is steep and there is sufficient space between the top of bank and the **building/backyard** area, you 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 such as rock-filled gabions or log crib walls. Terracing done with professional help will improve the prospects of establishing new vegetation and contribute to bank stability.

Stabilize Slopes by Creating Terraced Banks



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 erosion. 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 bank up and downstream. 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.

Use Multiple Walls to Stabilize a Steep Bank Rather than a Single High Wall



Before undertaking a creek bank stabilization project, it is 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 enhance all of the properties. Cooperative projects, done in conjunction with a local group, may even be eligible for private or government grant programs.

You should:

- Contact the Urban Creeks Council. Their Streamside Management Program for Landowners (SMPL) provides FREE advice about creek care, restoration, and maintenance;
- Seek professional assistance to determine the exact cause of erosion;
- Identify the best option for restoring the bank;
- Contact the City of Orinda Engineering and Planning 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 copies of the plans to the City of Orinda and other pertinent agencies (State Department of Fish and Wildlife, California Regional Water Quality Control Board, and Army Corps of Engineers), for review;
- Resubmit plans, if revisions are necessary for approval by these agencies;
- Secure a Grading/Drainage Permit from the Contra Costa Building Inspection Department.

Building Something?

Protect your creek by not locating structures and storage containers near the creek bank. Any structure built within reach of flood waters is subject to damage or loss and may decrease the creek's ability to handle flood flows safely. Structures such as storage sheds, patios, and decks-when too close to a creek-typically remove the creek's natural protective vegetation and often decrease the stability of vulnerable slopes. The construction process also disturbs the soil and vegetation, adding to sediment buildups in the creek.

The best way to accommodate flood waters is to avoid constructing improvements in the flood zone and to maintain the area in its natural state. If you need to construct near the creek or need to undertake repairs to a creek bank, certain procedures and/or setback ordinances must be followed. Consult the Planning Department and Municipal Code 18.03 for further details. Here are some typical steps to building by the creek:

New Structures

1. **Contact** the Orinda Planning Department for permit requirements.
2. **Consult** with a qualified registered Professional Engineer with expertise in creek, erosion, and drainage issues to prepare plans for review by the City of Orinda Engineering and Public Works Departments and Contra Costa County Building Inspection Department. Other local, regional, State and Federal permits may also be required which may be obtained using the Joint Aquatic Resource Permit Application (JARPA). Refer to the Resource section at the end of the guide for contact information.
3. **Revise** plans if needed, and resubmit.
4. **Obtain** permit.
5. **Cooperate** with City and County inspectors during construction.
6. **Implement** all conditions of approval.
7. **Obtain** final inspection and approval.

Creek Bank Stabilization

- **Seek** professional assistance to determine the exact cause of erosion and to identify the best option for bank restoration.
- **Discuss** plans with City of Orinda Planning, Public Works, and Engineering Departments for permit requirements.
- **Follow** steps 2 through 7 above (New Structures).

Plans should indicate significant natural features and indicate proposed tree species. Contact the City's Planning Department for specific plan requirements, including setbacks from top of creek bank.

What are the Regulations Pertaining to Creeks?

City of Orinda Regulations

Municipal Code 18.03.030 specifies that watercourses shall be maintained so that water will flow adequately and unimpeded through the watercourse. A natural watercourse shall be left unaltered unless improvement is necessary to protect life, health and property; or riparian restoration is required under this title.

Municipal Code 18.03.040 specifies maintenance responsibilities for watercourses. In all cases other than watercourses routinely maintained by the city, the responsibility for maintenance and repair of watercourses, or portions of them, shall belong to the property owner on whose property the watercourse, or portion of a watercourse, is located.

Municipal Code 18.03.050 requires watercourse alteration permits for projects that affect the existing flow of stormwaters; construct, alter or repair a watercourse; excavate, grade or otherwise alter the surface of land so as to affect the capacity of a watercourse; destroy or significantly alter vegetation at or near a watercourse; or install or construct a new structure or improve or expand an existing structure within or across a watercourse.

Municipal Code 16.64.220(c) discusses structure setback requirements for creeks, streams and other unimproved watercourses. **Municipal Code 17.4.6** specifies that no structure may be built in the setback required by Section 16.64.220(C) unless City Engineer and Design Review approval has been obtained.

Municipal Code 17.30.3(9) applies to Design Review requirements for construction within creek setbacks. If a proposed structure is located in the setback, **Municipal Code 17.30.5(8)** requires the Planning Commission to make findings of fact that the site and landscape plan retains, enhances, and restores appropriate riparian vegetation, which shall be verified in a creek setback protection report by a qualified biologist retained by the city at the expense of the property owner.

Municipal Code 17.17.1 requires riparian habitat restoration for many projects if the subject property includes or is bordered by a watercourse (as defined in **Municipal Code 18.06.010**). **Municipal Code 18.04.010** discusses riparian habitat restoration requirements, with regard to grading, drainage, and landscaping.

Municipal Code 18.06.010 defines a watercourse as any natural or machine-made channel or other facility or structure for directing or transporting water, whether continuously flowing or intermittent, improved or unimproved.

What are the Regulations Pertaining to Creeks?

(continued)

State and Federal Agencies

In addition to City regulations, coordination with state and/or federal agencies may be required. The California Department of Fish and Wildlife requires a Stream Alteration Agreement (SAA) for projects that will divert or obstruct the natural flow of water, change the bed, channel or bank of any stream, or use any material from a streambed. A Federal Clean Water Act (CWA) Section 401 Water Quality Certification is required for any activity which may result in a discharge into any waters of the United States. Activities include flood control channelization, channel clearing, and placement of fill. The California Regional Water Quality Control Board generally requires Section 401 Certification for most creek projects. The US Army Corps of Engineers also may require a permit for work done in waters under their jurisdiction.

The Joint Aquatic Resources Permit Application (JARPA) is an effort to simplify the permitting process for projects impacting water bodies. JARPA provides a way for applicants to give the same information at the same time of all the involved permitting agencies. Refer to the resource information on the adjacent page.

Acknowledgments

Creekside's Owner Manual was a Contra Costa County Clean Water Program project completed jointly by the city of San Pablo and the City of Orinda with input from the Friends of Orinda Creeks. Information in this guide was obtained from sources within Contra Costa County as well as from publications, including those by the National Park Service, the American Red Cross, FEMA, US Department of Agriculture, and Marin County Resource Conservation District. In addition, the 2018 revised version was prepared using information from the "Homeowner's Creek Guide" (Creeks Committee of the City of Lafayette).

The map of Orinda Watersheds on the back cover is courtesy of the Contra Costa Watershed Forum, which created the map from its Watershed Atlas. For more information on your watershed or on the Watershed Forum, go to www.cocowaterweb.org.

Permitting Agencies and Other Useful Resources

City of Orinda

Engineering/Public Works Department
Planning Department
Building Inspections Department
22 Orinda Way, Orinda, CA 9454
Website: www.ccc.cityoforinda.org

Telephone

925-253-4231
925-253-4210
925-253-4265

State

California Department of Fish and Wildlife
Regional Manager, Gregg Erickson
2825 Cordelia Route, Suite 100
Fairfield, CA 94534
Website: www.dfg.ca.gov/habcon/1600

707-428-2002 (main)
925-376-1274 (local)

Regional Water Quality Control Board
San Francisco Bay Region, Ms. Katie Hart
1515 Clay Street, Suite 1400
Oakland, CA 94612
Website:

510-622-2356

www.waterboards.ca.gov/sanfranciscobay/water_issues/programs.shtml#water

Federal

U.S. Army Corps of Engineers
San Francisco District, 1455 Market St., 16th Floor
San Francisco, CA 94103-1398
Dr. Katerina Galacatos, X6778
Website: www.spk.usace.army.mil/Missions/regulatory

Telephone

415-503-6773

Other Contacts

Friends of Orinda Creeks, PO Box 883, Orinda, CA 94563
Email: info@orindacreeks.org;
Website: www.orindacreeks.org
Urban Creeks Council
Website: www.urbancreeks.org
California Native Plant Society
California Invasive Plant Council
Joint Aquatic Resources Permit Application
Website: <http://sfep.abag.ca.gov/projects/JARPA/JARPA.html>

Telephone

510-549-0211
510-843-3902

Orinda Watersheds

