Council Agenda #7A
Meeting of November 12, 2008

# Staff Report

DISCUSSION AND DIRECTION REGARDING CREEK RESTORATION PROGRAM

Honorable Mayor and Council Members:

**Summary**

The City Council has identified development of a program to maintain creeks as a Priority Calendar Item. The Priority Project includes identifying current commitments for creek maintenance along Belmont Creek, Notre Dame, and East Laurel Creek and evaluating maintenance responsibilities. Information on creeks traveling through City owned property and opportunities for their improvement or restoration will be reviewed with the Council. Some recent creek projects on creeks crossing City property are described and cost information included for reference and to aid in providing direction on future projects. Other programs and regulations that affect creeks will also be described. In addition, information on some of the resources available to private property owners are described and portions of two informational documents for private property owners are attachments to this report.

**Background**

On March 23, 2004, information was provided to Council regarding City creeks maintenance commitments and ownership as a Priority Calendar item. The previous report is quite informative and is enclosed for reference, as Exhibit A. The report exhibits have been confirmed and the map, enclosed as Exhibit B, has been updated to show properties that contain City easements only where the easement (with a typical width of 20') is along an open creek or channel. Because of changes in the City National Pollutant Discharge Elimination System (NPDES) program that were anticipated to affect any City creek restoration program, the project to evaluate creek maintenance was put on hold after the presentation in 2004. There have been some changes from 2004, and this report provides an update on changes in regulation and other factors that would need to be considered in any creek restoration program.

**Ownership of Property Crossed by Creeks**

The primary location where the City of Belmont has open creeks crossing City owned property is within Twin Pines Park and in the park areas surrounding Water Dog Lake. Other miscellaneous easements are owned at locations shown on the map enclosed with the report as Exhibit A, Creek Easement Map. The City of Belmont has accepted a limited number of easements scattered along portions of Belmont Creek, or unnamed tributaries to Belmont Creek. The City has had some fairly recent projects and the cost for those projects, and an estimate to complete the design of a restoration of Belmont Creek through Twin Pines Park is described for reference. As noted in the report from 2004, the easements may have been accepted by the City in anticipation of the

future installation of culvert or concrete lining of the creek. Because that mode of improvement is no longer feasible the City might now wish to consider vacating the easements instead. The majority of natural creeks within both Belmont and in other communities are located on private property and educational or other efforts to support these residents may be considered.

**Regulation of Creeks**

Creeks crossing private property and City owned property are affected by various regulations and programs. Regulatory requirements are a key factor in the maintenance of a creek. The San Mateo Countywide Stormwater Pollution Prevention Program brochure entitled "Guide to Creek and Wetland Project Permitting" describes the potential regulatory approvals that need to be addressed prior to performing construction in creeks. The summary table indicating agencies that should be contacted before performing certain types of work in the creek is attached to the staff report as Exhibit C.

As indicated in the previous report to the Council: *The State of California issued Belmont a National Pollutant Discharge Elimination System (NPDES) permit to discharge stormwater into the creeks in 1992. This signaled a major change in the City's maintenance role and responsibilities. Creeks could no longer be considered part of the City's stormdrain system. Instead, creeks are "waters of the State of California."(California Porter-Cologne Water Quality Control Act of 1970) The State's NPDES permit defines the City's role as a regulated discharger and makes it responsible for managing discharges in a manner that preserves the creek water quality and channel. The permit assigns the City numerous detailed tasks to protect creeks. The State will not allow the City to directly maintain or improve the creek channels except through separate stream alteration and water quality certification permits. Regional Water Quality Control Board and Fish and Game staff have told City staff that their agencies oppose granting permits for any structure or construction that alters a natural creek.*

In addition, through the National Flood Insurance Program (NFIP) the City is required to maintain hydraulic capacity in creeks that have been evaluated by the Federal Emergency Management Agency and meet other requirements. In Belmont, Belmont Creek has been evaluated and the 100-year flow rate and the associated floodplain defined. Any construction within the lower portions of Belmont Creek up to Alameda de las Pulgas needs to comply with FEMA requirement, and not obstruct the creek. When making improvements, even natural ones, hydraulic analysis needs to be performed to make sure the proposed improvements will not restrict flows. The analysis also, in particular in Belmont Creek where portions of the creek have experienced erosion, needs to evaluate stability of any installed features especially during storm events. Water Dog Lake serves as a detention facility for the City, serving a function of reducing the 100-year FEMA peak flows to Belmont Creek downstream of Notre Dame De Namur Dam.

Currently the City regulates grading and retaining wall construction, by issuing City permits, and this would include regulation of work within the creek. The City may also conduct code enforcement activities to address failing structures that jeopardize neighboring properties. This is typically done on a complaint basis. Another approach the City may wish to consider is to

create an ordinance, possibly within the Zoning ordinance, to allow the City to establish building setbacks from the creek. This would allow the City to regulate construction within the riparian zone and/or the creek. Because the creek is already so heavily urbanized many existing structures would remain within the creek and the set back area. New construction and other activities within the creek or setback area that currently are not regulated under current ordinance could be projects approved under permits issued by the City. City review, approval, and inspection cost could be reimbursed if the City wished to pursue this option. Such ordinance has been adopted by a number of communities and many cities (though not the majority of jurisdictions) have them.

**Regulation of Creeks and the Watershed**
**(National Pollutant Discharge Elimination System)**

The Regional Water Quality Control Board (RWQCB) issued the National Pollutant Discharge Elimination System (NPDES) permit that we currently operate under to all cities in San Mateo County in 1999, and has issued several amendments. The City addressed permit requirements for the City of Belmont permit by its participation in countywide and municipality specific tasks required under the permit and reported on annually to the RWQCB. The City performs certain activities that meet specific requirements of the permit with the goal of the prevention and the control of stormwater pollution. Regional activities and larger program activities are typically addressed by what is referred to as the General Program or the San Mateo Countywide Stormwater Pollution Prevention Program (SMCWPPP), a program of the City/County Association of Government (C/CAG). The General program, addresses General Permit requirements regionally for San Mateo County and its member cities and agencies. The City also has municipal specific tasks, including for example review and inspection of development projects, inlet cleaning, mandatory committee participation, certain enforcement activities, and public outreach activities that are conducted by the City.

The City permit will soon be amended by the Regional Water Quality Control Board, and a new Municipal Regional Permit (MRP) will be issued. This is important to creeks because programs funded by city stormwater fees to support creek activities to address requirements of the current permit. When those permit requirements change, the program will in all likelihood change as well. The City and many others made comment on the draft permit in March of 2008 and an amended permit is expected to be issued in the near future. One area where change is anticipated is in trash monitoring and removal. The General Program has been conducting creek walks and studies to identify a baseline condition for each watershed. The data will be used by the General Program to evaluate the effectiveness of any measures implemented within the watershed in the future. It also will be used to identify areas that generate trash so the permit may then identify measures that may be taken to most effectively reduce trash in urban creeks, and critical locations.

The General Program has recently completed a trash survey and begun conducting creek surveys in San Mateo County. Belmont Creek was one of the creeks surveyed. Belmont Creek was found to be less impaired in the natural areas within the Water Dog Lake area of the park. This is because the watershed above is smaller and less developed than the watershed draining to

lower portions of the creek. The Biological Assessment of Belmont Creek and Comparison with Existing San Mateo County Data by Bio-Assessment Services dated August 2007, characterized the lower portion of the creek as deeply incised creek channel with varying levels of channel modification and bank stability and a narrow riparian corridor surrounded by residential and commercial land use. The upstream sites were characterized as relatively natural channels with highly eroded banks and drainage areas primarily containing open space, residential and public land uses.

One very visible area where the City participates in creek protection is through public information. Some residents may not be aware that storm drain inlets in the street drain to a downstream creek, and ultimately to the Bay. They assume instead that inlets drain to the sanitary sewer and is treated at the wastewater treatment plant. Dumping of oil and other pollution into inlets is less likely if residents are aware that inlets drain to the creek. Activities sponsored to enhance public education include marking of inlets with "Drains to the Bay" and creek clean ups. The last Coastal Clean-Up Day on September 20, 2008 had 3,573 volunteers, and 36,384 lbs. of trash and 6,137 lbs. of recyclables were picked up along 83 miles of shoreline and other locations that drain to the Bay, including Belmont Creek. Sixty-nine residents and college students from Belmont participated at the Belmont Creek site, collecting 820 lbs. of trash from areas in the vicinity of the creek. Such events may also include tree planting or other activities.

## Discussion

### City Maintenance of Creeks

The City has had several recent projects that included creek improvements.

The City routinely does desilting of the portion of Belmont Creek between Old County Road and El Camino Real because of the build up on silt in this area that may contribute to potential flooding. In order to complete the work, approvals were required from the Department of Fish and Game, the Regional Water Quality Control Board, and Army Corp of Engineers. This project was just completed at a cost of approximately $15,000 for the removal of 300 cubic yards of material from the 265 linear feet of open channel and culvert.

In addition, in 2006 the City completed a project on a tributary to Belmont Creek to stabilize the creek banks. The project originally included the rehabilitation of 88 linear feet of the creek. The project was originally designed in 2003 as a bio-engineering project, including bank stabilization designs that were compatible with existing biotic habitats and wildlife uses. When the project was advertised the bids received were in the $400,000 plus range and the project had to be amended and re-advertised with a modified Phase I scope. The project location on the tributary to Belmont Creek was constrained, and included installation of a shear pin wall to protect an adjoining apartment building. The project as constructed was reduced in scope to include a shear pin wall at a cost of $125,000 to provide necessary stabilization of the northern bank.

The City also has future or planned projects in creeks.

Just downstream of Old County Road in the unincorporated area, improvements have been identified in the Harbor Industrial Area that would be completed as a part of any annexation of the area into the City of Belmont. Currently the flow capacity of this portion of the creek is constrained by overgrowth and silt deposition.

The Public Works Department investigated the cost to complete a project within the limits of Twin Pines Park. It is estimated that the cost to evaluate the creek for potential Bank Stabilization and Erosion Control improvements to the 1,500 linear feet of the creek traveling through the park would be approximately $60,000. Work that would be included in the evaluation would include detailed survey of current condition, geomorphology and geological evaluation, hydraulic evaluation, environmental review and permitting, and engineering design. If the City were to pursue such a project an updated scope would need to be prepared and evaluated, and new proposals would need to be secured. Funding would also need to be identified. In a recent inspection of the creek area, it was noticed that gabion baskets of retaining walls within the creek have rusted through, and portions of the basket require repair. In other areas sacked concrete walls have been undermined and should be supported. Some locations are on City property. These areas will need to be looked at for remedial repairs.

The City maintains Water Dog Lake which serves as a detention facility for the City and drains to Belmont Creek and eventually through Twin Pines Park. The operation of the lake and the dam are regulated by the Division of Dam Safety. The lake has collected sediment throughout the years, affecting the lake detention capabilities. The extent of the affect has not been fully evaluated. The Department of Public Works has a multi-year Capital Improvement Program project to remove the accumulated sediments. A consultant would need to be retained to provide professional services to complete the studies, improvement plans, and environmental approvals associated with such a project. Funding options would also need to be explored further as current funding for this use is limited.

Finally, the City of Belmont completed a Storm Drain Master Plan that was presented to the City Council in June of 2007, which defines other storm drain improvements primarily to the City collection system of inlets and culverts. Projects identified and evaluated are primarily those eligible for construction using Sewer Funds.

**Funding of City Owned Creeks Projects**

An issue with completion of creek improvement projects and programs is limited funding. Currently storm drainage improvements are funded through the City NPDES fees and through sewer fees. Activities related to the City NPDES permit are funded through two fees, one that supports the general program and the other that supports the City municipal program. Increase in the NPDES fee would need to go through a Proposition 218 approval process that would include a vote (as opposed to a protest vote as is required for certain sanitary sewer fees). Sewer fees are used for storm drain projects that reduce infiltration into the City Sanitary Sewer System. Creek improvements are unlikely to be able to be constructed using sanitary sewer

funds.

In June of 2008, HF&H Consultants, LLC completed a report for the SMCWPPP entitled Stormwater Program Funding Options. The report was prepared by the General Program in anticipation of there being increased cost associated with the proposed Municipal Regional Permit that should be issued in the near future. It is expected that additional funding will be needed to support the program once the new permit requirements go into effect. The Figure 4, Stormwater Funding Options table, summarizing the options described in the report is enclosed for reference as Exhibit D. The City of Belmont currently utilizes Sewer and Refuse funds to appropriately support stormwater activities and has existing stormwater fees to support NPDES program activities. The report makes a number of recommendations regarding funding options that the City may wish to consider when the new permit is issued, the new requirements are known, and increased cost can be estimated.

Proposition 84 identified funds for storm water quality improvement related activity, but the program favors regional programs and projects that have multi-agency and community stakeholder's support. The San Mateo Countywide program is contemplating applying for grant funding under this program. Information available to City staff indicates that individual cities would be unlikely to successfully compete for these funds. The General Program conducts many programs to address Creek and Watershed assessment, and City would benefits from the General Program activities.

**Private Property Owner Maintenance of Creeks**

There are a number of resources available to residents who have a natural creek crossing their property. This information would be more pertinent to the privately owned portions of Belmont Creek and the upper reached of Belmont Creek, privately owned tributaries such as Notre Dame Creek, and to Laurel Creek. The General Program also provides literature such as the Streamside Planting Guide for San Mateo and Santa Clara County Streams attached to the staff report as Exhibit E (pages 1-4 only). This information would be helpful to residents who wished to make improvements to the riparian areas adjoining or to obtain the necessary regulatory approvals to make limited improvements within the creek itself.

Other communities have formed "Friends of the Creek" Groups to protect and enhance their watershed, such as "Friends of Cordilleras Creek." There are also various watershed-based programs such as USEPA's Adopt Your Watershed program (http://www.epa.gov/adopt/), but it is not clear how helpful these programs might be to private property owners, if at all.

Grants are also available for community groups and other agencies wishing to sponsor outreach programs. SMCWPPP is offering $15,000 in Community Action Grants for volunteer groups, teachers, environmental organizations, and other local, not-for-profit associations interested in developing and/or implementing projects that improve the quality of local creeks, the Bay or the Pacific Ocean within San Mateo County. Up to $3,000 will be awarded to groups proposing projects to restore, protect, enhance, or prevent pollution of local waterways or which benefit the ecology of the San Mateo County watershed. Notre Dame High School was approved for a grant

for a Creek Restoration Project in the amount of $3,000 in 2008 for a project to restore the Notre Dame Creek native riparian ecosystem located on school campus. This project includes native plant restoration, litter cleanup, water quality monitoring, public access nature trail, and pollution prevention outreach.

There has been discussion by the NPDES program of providing follow up to the creek surveys that have been completed on various creeks in San Mateo County, including Belmont Creek. The main follow-up that has been discussed is developing an outreach and support program similar to the Urban Creeks Council's (www.urbancreeks.org) Stream Management Program for Landowners (SMPL). In Contra Costa County this program is funded by the Costa Clean Water Program and provides free advice about creek care to Contra Costa County property owners. Services include free site visits and consultations on creek restoration techniques and associated permitting, including addressing issues such as bank failure, erosion, and flooding.

The data from the Program's Unified Stream Assessment (USA) surveys could assist San Mateo County property owners to target and optimize creek management and restoration efforts initiated through this type of creek management program. However, a funding source to implement a program similar to SMPL in San Mateo County has not been identified. If there was interest by property owners in obtaining this service, they would currently have to pay for it themselves. Other options would be for grants to be secured to fund the service, if a suitable grant source could be identified. Friends of the Creek or other community groups may secure some grants for these types of purposes. If there was interest, the City or other interested parties might sponsor a workshop for City residents to learn more about opportunities for restoration of the creek and how to protect the creek. The type of information that might be presented could include techniques similar to those shown in the Streamside Planting Guide for San Mateo and Santa Clara County Streams and regulatory information in brochures such as the Guide to Creek and Wetland Project Permitting.

**General Plan/Vision Statement**

Belmont Vision, Natural Beauty: Our actions today preserve and enhance Belmont's beauty to make it even lovelier for our grandchildren.

**Fiscal Impact**

There is no fiscal impact from this report. Implementation of a Creek Restoration Program would require new funding sources be identified.

**Public Contact**

The Council agenda was posted.

**Recommendation**

To provide Discussion and Direction on what activities or programs the Council would like more information on or would like staff to pursue implementation of. The report identified:

1. The vacation of existing drainage easements along Belmont Creek at various locations upstream of Twin Pines Park.
2. Evaluation of a potential bioengineering bank stabilization and erosion control project on the portion of Belmont Creek through Twin Pines Park, and preparation of design drawings.
3. Creation of a new ordinance providing for city regulation of construction or other activities within creeks located on private property, and the riparian zone adjoining the creek.
4. Investigate potential funding sources for Creek Restoration Projects for creeks crossing City owned property.
5. Investigate and support an educational event to provide private property owners with information regarding maintenance of creeks crossing their property.
6. Identify potential Friends of Belmont Creek sponsors to further develop private programs to support property owners with maintenance of creeks crossing their property.

**Alternatives**

1. Take no action.
2. Refer back to staff for further information.

**Attachments**

A. Exhibit A – Staff Report entitled Creek Maintenance and Easements Study Session (without attachments)
B. Exhibit B – Creek Easement Map
C. Exhibit C – Guide to San Mateo County Creek and Wetland Permitting (summary table)
D. Exhibit D – Stormwater Program Funding Options, Figure 4 (summary table)
E. Exhibit E – Streamside Planting Guide for San Mateo and Santa Clara County Streams (Pages 1-4)

Respectfully submitted,

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EXHIBIT A

COUNCIL
Agenda # A
MEETING OF March 23, 2004

CITY OF BELMONT

# STAFF REPORT

**Creek Maintenance and Easements Study Session**

March 23, 2004

Honorable Mayor and City Council:

## Summary

City Council requested an assessment of the City's creek maintenance commitments and a description of the creek easements held by the City under Priority Calendar project PW05. This report describes the Belmont Creek drainage, the historical and current goals for its maintenance and improvement, and the types and locations of public easements along its channel. The report also discusses the work staff will conduct over the next several years to address flood control and creek channel protection. Creek restoration is not discussed in this report because it is a separate priority calendar item to be assigned to staff.

## Background and Discussion

### 1. Belmont Creek Watershed and Channel

Approximately five square miles of watershed drain through the City of Belmont. Belmont Creek is the largest drainage, carrying about 62 percent of the flow through the developed central city. Its headwaters are in the hills above Hallmark Drive and it runs roughly parallel to Ralston Avenue through Water Dog Lake and Twin Pines Park. The creek exits the City just above Old County Road at Harbor Boulevard and then forms the boundary between the Harbor Industrial Area and the City of San Carlos. It reenters Belmont in the Island Park neighborhood as Belmont and O'Neill Sloughs before discharging to San Francisco Bay. The various segments of Belmont Creek have widely different properties. The creek passes through public and private lands, through undeveloped open channels and enclosed culverts, and through accessible parks/open spaces and inaccessible residential neighborhoods.

There are several good-sized tributaries to Belmont Creek from side canyons at Carlmont Drive, Alameda de las Pulgas and University of Notre Dame de Namur. East Laurel Creek carries

another 20 percent of stormwater flow from the San Juan Canyon to Laurel Creek in the City of San Mateo. The remaining 18 percent of Belmont's stormwater flows to San Mateo's Marina Lagoon from various stormdrains in the Sterling Downs neighborhood. This study focuses on Belmont Creek because it has the most potential to impact and be impacted by the City's residential and commercial development.

Development has both restricted the Belmont Creek channel and increased the magnitude of peak flow. Soil surfaces in the watershed have been covered with impermeable roofs and pavement. Rainwater that historically reached the creek by relatively slow overland flow or groundwater infiltration now is piped directly to creek outfalls from street gutters. The San Mateo Countywide Stormwater Pollution Prevention Program mapped the impervious surface area of the Belmont Creek watershed as ranging from 20 percent in the Western Hills to over 40 percent at City Hall.[1] Imperviousness increases the peak volume of runoff and the hydraulic force in creeks, resulting in more frequent flooding, increased channel erosion (scouring and widening), and increased sediment transport with downstream deposition of silt, sand and gravel. Some problems arise from conditions outside of the City limits. Staff has observed large depositions of gravel and cobbles in the downtown culvert under the train tracks. One reason is the bridge foundation at Old County Road backs up floodwaters into the culvert, allowing them to drop their gravel load. This bridge is in the unincorporated Harbor Industrial Area.

Development also encroaches on the creek's historic flood plain. FEMA mapped the 100- and 500-year flood plains along Belmont Creek in 1982.[2] This map shows that a 100-year flood will overtop the channel along Carlmont Drive, Escondido Way, O'Neill Avenue, Shoreway Drive, and Island Parkway. A 100-year storm produces flows of approximately 1200 cubic feet per second in the lower reaches of the creek, or about twice the capacity of the 8- by 12-foot box culvert beneath El Camino Real. A 500-year flood would inundate the downtown to up to Ralston and Sixth Avenue, the Harbor Industrial Area, and Island Park.

## 2. Changes in the City's Creek Management Role and Responsibilities

Although the Belmont hills were largely subdivided in the 1920s, development did not make significant inroads into the watershed until after World War II. With development came the need to protect property from erosion and flood damage. Property owners looked to the City to manage the municipal drainage system for this purpose. The City viewed the creeks as a component of the municipal drainage system to be improved and maintained. The City

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[1] San Mateo Countywide Stormwater Pollution Prevention Program, "Characterization of Imperviousness and Creek Channel Modification for Seventeen Watersheds in San Mateo County," January 1, 2002.

[2] FEMA National Flood Insurance Program, Flood Insurance Rate Map, City of Belmont, California, San Mateo County, Community Panel Number 065016 0005 B, March 9, 1982.

completed the first 10-year storm drain master plan in 1963[3] and updated this with a 20-year master plan in 1980.[4] These plans modeled the drainage system as network of catchments consisting of roofs, driveways, and streets draining to gutters; gutters draining to catch basins and drainpipes; and pipes outfalling to open creeks. Flow calculations identified deficiencies in pipes and in the creek that required improvement.

The master plans recommended that the City acquire easements across private property for all channels more than two feet wide. This would both prohibit property owners from filling or constructing within the creek channel and would give the City the right to maintain flood capacity by clearing, widening, reshaping, and adding engineered structures to the channel. The City's 1982 subdivision ordinance also requires dedication of drainage right-of-way or easement in final maps for subdivisions containing creeks and open channels.

Belmont joined the Federal Emergency Management Agency (FEMA) National Flood Insurance Program in 1982. This program enables property owners in the 100-year flood plain to purchase flood insurance as required by federally-regulated loans. The program defines the City's role as the flood plain administrator and requires the City to adopt, administer, and enforce floodplain management regulations. Implicit in these regulations is the acceptance that floods are recurring events that cannot be wholly prevented. The City's responsibility is to require new construction to be designed and built in a manner that will withstand flooding.

The State of California issued Belmont a National Pollutant Discharge Elimination System (NPDES) permit to discharge stormwater into the creeks in 1992. This signaled a major change in the City's maintenance role and responsibilities. Creeks could no longer be considered part of the City's stormdrain system. Instead, creeks are "waters of the State of California."[5] The State's NPDES permit defines the City's role as a regulated discharger and makes it responsible for managing discharges in a manner that preserves the creek water quality and channel. The permit assigns the City numerous detailed tasks to protect creeks. The State will not allow the City to directly maintain or improve the creek channels except through separate stream alteration and water quality certification permits. Regional Water Quality Control Board and Fish and Game staff have told City staff that their agencies oppose granting permits for any structure or construction that alters a natural creek.

### 3. Current and Planned Creek Maintenance and Management Activities

The City's responsibilities for the NPDES permit and FEMA flood insurance program compliance largely define its current creek management activities. In addition, staff is planning projects to desilt Water Dog Lake and complete a new storm drainage master plan.

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[3] Wilsey, Ham & Blair, "Storm Drain Master Plan," 1963.
[4] Wilsey &Ham, "Sanitary Sewer and Storm Drain Master Plan," 1980.
[5] California Porter-Cologne Water Quality Control Act of 1970.

### 3.1 NPDES Permit Requirements for Creek Protection

The City is a member of the San Mateo Countywide Stormwater Pollution Prevention Program (STOPPP), a C/CAG program formed in 1992 to support the municipalities' administration of the NPDES stormwater discharge permit. STOPPP recently submitted a new five-year work plan as part of a permit renewal application.[6] This plan is available on the STOPPP web page (see link in footnote below) or from the Public Works Department. It draws from over a decade of work of RWQCB scientists, environmental consultants, and staff and represents the current consensus in this rapidly developing field for the best methods of creek maintenance. The work plan tasks are too numerous to list here, but the broad categories are summarized as follows:

- New Development and Construction Controls: The State views the tasks assigned to the City under this component as the most important for the long-term preservation and maintenance of creeks. The strategy of this component is for the City to use its development review and approval authority to halt and over time reverse the impact development has had on runoff from the watershed. The City is tasked to identify and review project-specific Best Management Practices (BMPs) to retain stormwater on new and reconstructed developments. Typical development BMPs are permeable pavement, grassy swales, and retention basins. The City has been tasked to review its ordinances and policies for provisions restricting use of BMPs. In addition, STOPPP is tasked to research and prepare a "Hydrograph Modification Plan" for San Mateo County watersheds including Belmont Creek to serve as a creek management tool. A hydrograph is the measure of flow volume over time. It indicates the intensity and duration of flow in response to a storm. This plan will allow staff to quantify the impact of new development and redevelopment on Belmont Creek and determine acceptable modifications, i.e., increases in peak flow.

- Municipal Maintenance: The City will continue street sweeping, catch basin cleaning, maintenance of parks and corporation yards, and other maintenance activities to protect water quality. Parks staff will implement an integrated pest management (IPM) program for city operations.

- Commercial and Illicit Discharge Controls: The City will continue its program of inspecting commercial properties for stormwater compliance and will investigate and enforce cleanup of illicit discharges. The City and STOPPP will provide educational outreach material and training to commercial operators to discourage the practice of dumping materials such as soap, oil, and paint into the City's drainage system.

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[6] San Mateo Countywide Stormwater Pollution Protection Program, "Stormwater Management Plan: April 2004 – June 2010," November 4, 2003, http://www.flowstobay.org/articles_links/index.html

- Public Information and Participation: The City will continue outreach programs to businesses and residents explaining the impact on creek water quality from streamside activities and discharges to driveways, streets, gutters, and catch basins. Attachment 1 is a list of informational brochures developed and distributed under this component. These brochures are available from the Department of Public Works or from STOPPP's website http://www.flowstobay.org/p2business/bestmanagementpractices.html.

- Watershed Assessment and Monitoring: Through STOPPP, the City will participate in the watershed monitoring program to collect data quantifying the impact of watershed discharges on the creeks. Representative samples of water and creek sediments will be tested for chemicals including polychlorinated biphenyl compounds (PCBs) and mercury, pathogens, and trash. This work supports RWQCB's establishment of Total Maximum Daily Loads (TMDLs) for these priority pollutants.

### 3.2 National Flood Insurance Program Development Standards

The City is required to adopt and enforce a floodplain management ordinance as a condition of membership in the National Flood Insurance Program. Belmont last adopted amendments to its ordinance in 2001 to bring it into agreement with current program requirements. The purpose of the ordinance is to protect human health, minimize the need for costly flood control projects, and minimize property damage. The ordinance includes methods and provisions to restrict construction in the flood plain, require construction to incorporate flood protection measures, and control alteration of the flood plain and stream channels. It designates the Director of Public Works as the City's Flood Plain Administrator and assigns him responsibility for building permit review to determine that construction in the flood plain will not adversely affect the flood plain and that standards of flood plain construction are met. These standards include anchoring buildings to prevent flotation, using flood resistant materials, using construction practices such as foundation openings to minimize flood damage, and raising base floor elevations above the 100-year flood level.

### 3.3 Water Dog Lake Operation, Maintenance and Planned Desiltation

The City leases Water Dog Lake from the University of Notre Dame de Namur and operates it as a flood control facility under a California Department of Water Resources (DWR), Division of Dam Safety permit. This reservoir serves to moderate peak flow in Belmont Creek by capturing and metering its release through two discharge valves in the standpipe near the spillway. Permit conditions require the City to open and monitor the discharge valves during the wet season, monitor water levels within the earthen dam on a monthly basis, and prepare an annual report. DWR inspects the dam semiannually and requires the City to maintain all structures and control vegetation on the dam face. A couple of years ago, DWR required the City to repair a landslide below the dam that damaged the 60-inch spillway pipe and to replace the damaged pipe. At this

time, they are requiring the City to rehabilitate the 40-year-old piezometers used to monitor water levels in the dam and establish survey monuments on the dam and dam buttresses. After the monuments are installed, the City will be required to make periodic surveys to assess the stability of the dam.

The lake also captures sediments suspended in stormwater where its quiescent waters allow them to settle. The resulting siltation has greatly reduced the lake's capacity. The Department of Public Works has a multi-year Capital Improvement Program project to remove the accumulated sediments. Staff plans to select a qualified consultant to manage this work this fiscal year. The consultant will complete the necessary studies and planning, obtain environmental permits and approvals and complete a process design in the following year. Staff anticipates that this will be a difficult, time-consuming process. If approved, Public Works will contract for the actual desiltation in FY06.

### 3.4 Storm Drain Master Plan

The Department of Public Works has a Capital Improvement Program project to prepare a new storm drain master plan. The 1980 master plan is out of date, both in concept and content. Staff plan to select a qualified consultant to prepare the new plan this fiscal year. As with previous plans, the consultant will be expected to collect and analyze data about the capacity and performance of the City's storm drain system and recommend improvements. Staff will also task this consultant to incorporate the modern management tools offered by the City's Information Technology Division such as the GIS and the NPDES program hydrograph modification research. For example, recommended drainage improvements could be construction of retention basins within the system to slow rather than speed the flow of runoff to the creeks.

### 3.5 Twin Pines Park

Staff has observed excessive bank erosion and bed scouring in Twin Pines Park above and below the pedestrian bridge to the group picnic area. This was especially damaging during the 1998 El Niño storms when several trees collapsed into the creek. A consultant is under contract to evaluate this problem and propose a remedy.

## 4. Inventory of Existing Creek Easements

As described in Section 2, the City sought easements from creekside property owners to protect the flood capacity of the creek. An easement is a right to use some part of another person's land. The easement does not necessarily place financial obligations on the holder for maintenance, improvements, or taxes on the land. Easement rights and obligations are governed by the language of the easement document. In some instances, the easement holder's will, by the express terms of the easement, be given a right to use the property but assume no maintenance

obligations. In other instances, the terms of the easement may require the holder to maintain the land. Cities seek and accept public easements for various purposes including street right-of-way, access, public utilities, preservation of views, and recreation. Staff reviewed the original subdivision maps and other City records and found eleven easements aligned on creek channels; all but one on Belmont Creek below Alameda de las Pulgas (Attachment 2 and Figure 1). These easements were difficult to locate. A formal property title search would likely identify others. The identified easements are all aligned on the creek centerline and are variously titled drainage, storm drain, public services, and water course and recreation:

1. Drainage: Staff located three drainage easements along Belmont Creek. The drainage easement is the most common for natural streams. This easement restricts the property owner from interfering with the natural channel and was intended to gives the City the right to access and maintain the channel and banks. In the 1960s through the 1980s, staff also obtained drainage easements to allow future construction of storm drain utilities such as culverts and concrete channels. These easements no longer provide the City much benefit because the State of California asserts jurisdiction over creeks and regulates all activities from debris removal to construction for both property owners and the City.

2. Storm Drain: The storm drainage easement is typically used for engineered conveyance structures such as pipes, culverts, and concrete channels. Its purpose is to grant the right for the structure to cross the land and grant the City access to maintain the structure. The City holds three storm drain easements of 20-, 30- and 50-foot widths aligned along open channels that do not contain drainpipes. These were likely intended to function as drainage easements. These easements are also of limited benefit because the State does not intend to grant the City permits to build pipes or culvert in existing creeks.

3. Public Services: A public services easement is the most restrictive of the easements held by the City. This type of easement includes the restrictions of many other easements such as utility, recreation, air and light. Staff located one 20-foot wide public service easement on Belmont Creek at Misty Lane. The City could vacate its rights under this easement but that would not vacate right held by other entities such as utility companies and the public.
4. Public Access to Public Resources: A public access easement grants the public the right to cross private property to a public stream. In 1986, the State Legislature amended the California Subdivision Map Act to require local agencies to provide reasonable public access to public rivers and streams when it approves subdivision maps. Belmont has four "Water Course and Recreation Easements" below Twin Pines Park that were likely obtained in response to this requirement.

**Recommendations**

The City should not plan or design major creek maintenance projects at this time but should instead wait for the State to complete research into best practices for urban creek protection. The creeks are waters of the state, regulated by the California Department of Fish and Game and the California Regional Water Quality Control Board. These agencies have a mandate to protect and preserve the creeks and water quality, but have not yet fully agreed on acceptable methods to protect urban creeks. Creeks are highly complex hydraulic and environmental systems that can respond in unforeseen ways to changes in flow or the channel. The State has observed that past actions to improve creek channels have resulted in upstream and downstream deterioration.

The City should take the following actions:

1. The State has required staff to review City ordinances, plans, and policies to identify conflicts or insufficient authority for the current NPDES permit best management practices. We recommend revising or modifying these ordinances, plans, and policies to align them with the permit. Specific revisions to consider include the following:

    i. Revising the municipal code road development standards requiring curb and gutter and the grading drainage standards requiring runoff to be piped to the municipal drainage system;
    ii. Incorporating current NPDES best management practices into the General Plan;
    iii. Adding creek setback restrictions to the Zoning Code.

2. Staff will pursue the Capital Improvement Program project to removed sediments from Water Dog Lake to restore its flood capacity. The consequences of not completing this work would be loss of flood control capacity and potential damage or failure of the dam.

3. Staff recommends revising the subdivision ordinance requirement for drainage right-of-way easements. We believe that the City not expend resources obtaining additional drainage or storm drain easements in the creeks at this time. These easements provide limited benefit to the City because the State now regulates activities in and around creeks. Adding a creek setback requirement to the zoning ordinance would provide the City a more efficient method to control construction near the creek banks. The City may consider vacating drainage and storm drain easements if the property owners so request and pay fees to compensate staff time.

## Conclusions

Belmont's creeks are asset to the community. They are part of the natural environment, providing habitat for riparian plants and animals. They are a prominent recreational feature of the Water Dog Lake open space, Twin Pines Park, and the Island Park walking trails. They also

activities in and around creeks. Adding a creek setback requirement to the zoning ordinance would provide the City a more efficient method to control construction near the creek banks. The City may consider vacating drainage and storm drain easements if the property owners so request and pay fees to compensate staff time.

## Conclusions

Belmont's creeks are asset to the community. They are part of the natural environment, providing habitat for riparian plants and animals. They are a prominent recreational feature of the Water Dog Lake open space, Twin Pines Park, and the Island Park walking trails. They also have an indispensable role in conveying municipal storm water from the City's streets, gutters and stormdrains to San Francisco Bay.

The creeks are not part of the City's municipal drainage system and are not under the City's direct control. They are waters of the state, regulated by the California Department of Fish and Game and the California Regional Water Quality Control Board. These environmental agencies understand that urban creeks need to receive and convey municipal stormwater. The State is currently researching the best methods for cities to manage stormwater discharges to minimize impact to the creeks and will provide direction through municipal stormwater NPDES permits and other environmental regulations.

## Attachments

1. List of creek protection informational brochures.
2. Inventory of identified creek easements
3. Figure showing location of creeks and easements

Respectfully submitted,

| | | |
|---|---|---|
| Kathleen E. Phalen, PE | Raymond E. Davis III, PE, PTOE | Jere A. Kersnar |
| City Engineer | Public Works Director | City Manager |

# CREEK EASEMENT MAP

CITY OF BELMONT
CALIFORNIA

CITY OF SAN MATEO

REDWOOD SHORES

CITY OF SAN CARLOS

**EXHIBIT B**

**Legend**

- Water Dog Lake
- Creeks, Streams, and Sloughs
- Owned in Fee
- Watercourse & Recreation Easement
- Drainage Easement
- Public Service Easement
- Storm Drain Easement
- City Limits

**1 INCH = 1,250 FEET**

**NOV 2008**

# Guide to San Mateo County Creek and Wetland Permitting

EXHIBIT C

(Note: A checked box indicates the agency that should be contacted. It does not indicate that a permit will definitely be required.)

| Does Your Project: | City/Co. Planning & Building/ CEQA Reviews | SMCO Environ. Health Services Divisions | SMCO Flood Control Districts | SWRCB Division of Water Rights | Regional Water Quality Control Board | California Dept. of Fish and Game | Calif. Coastal Comm. | S.F. Bay Conserv. and Develop. Comm. | U.S. Army Corps of Engineers | U.S. Fish & Wildlife Service | U.S. National Marine Fisheries Service | U.S. Natural Resources / SMCO Resource Conserv. District |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Involve creek bank stabilization or erosion control? | ✓ | | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Require the removal of riparian or other wetland vegetation? | ✓ | | | | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ |
| Involve planting riparian or wetland vegetation? | ✓ | | | | ✓ | ✓ | | ✓ | | ✓ | | ✓ |
| Affect native plants, wildlife or fisheries? | ✓ | | | | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ |
| Result in stormwater discharge into a creek or wetland? | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Divert or obstruct the natural flow; or change the natural bed or bank of a creek or wetland? | ✓ | | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Involve repair, rehabilitation or replacement of any structure or fill adjacent to a creek or wetland? | ✓ | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Involve building any structure adjacent to a creek or wetland? | ✓ | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Involve fish and wildlife enhancement, attraction or harvesting devices and activities? | ✓ | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Use materials from a streambed (including but not limited to boulders, rocks, gravel, sand and wood debris)? | ✓ | | | | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| Require the disposal or deposition of debris, waste, or any material containing crumbled, flaked, or ground pavement with a possibility that such material could pass into a creek or wetland? | ✓ | | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Involve the removal of any materials from, or add fill to, a creek or wetland? | ✓ | | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Involve grading or fill near a creek or wetland? | ✓ | | | | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ |
| Involve a bridge or culvert? | ✓ | | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Involve utility pipe lines? | ✓ | | ✓ | | ✓ | ✓ | | ✓ | ✓ | | | |
| Involve a septic leach field near a creek or wetland? | ✓ | ✓ | | | ✓ | ✓ | | ✓ | | | | |
| Require a water well near a creek or wetland? | ✓ | ✓ | | | | ✓ | | ✓ | | | | |
| Involve work within historic or existing coastal wetlands? | ✓ | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Remove water from creek for storage or direct use on non-riparian land. | ✓ | | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Require that hazardous materials be generated and/or stored on site? | ✓ | ✓ | | | ✓ | ✓ | | ✓ | | | | |

## Figure 4. Stormwater Funding Options

| | Funding Strategy | Action Required | Proposition 218 Considerations | Stormwater Funding Benefits | Minimum Timeframe to Establish Funding | Potential Amount of Available Funding | Probability of Success |
|---|---|---|---|---|---|---|---|
| **1.** | **Fund stormwater O&M and capital projects from related services** | | | | | | |
| a. | Sewer funds I&I reduction portions of stormwater program (e.g., drainage, flood control) | Sewer rates are increased and revenue is transferred to stormwater fund | Subject to majority protest, but not voter approval | O&M and capital projects | 12 to 24 months - allowing time for rate study | Large | Good if sewer rate increases are acceptable |
| b. | Refuse funds waste reduction portion of stormwater program (e.g., street sweeping, trash removal) | Refuse rates are increased and revenue is transferred to stormwater fund | Subject to majority protest, but not voter approval | O&M and capital projects | 12 to 24 months - allowing time for rate study | Large | Good if refuse rate increases are acceptable |
| c. | Water funds water quality and supply portions of stormwater program (monitoring, basins) | Water rates are increased and revenue is transferred to stormwater fund | Subject to majority protest, but not voter approval | O&M and capital projects | 12 to 24 months - allowing time for rate study | Large | Good if water rate increases are acceptable |
| **2.** | **Realign funding for general fund/public works** | | | | | | |
| a. | All enterprises pay full share of governmental overhead | Rates are increased and revenues transferred from enterprises to general fund to cover overhead | Subject to majority protest, but not voter approval | Frees up funding for use by stormwater, if needed | 24 to 36 months - allowing time for studies and integration with timeframe for sewer, refuse, and water rates | Medium | Good if rate increases are acceptable |
| b. | Sewer, refuse, and water rates cover appropriate right-of-way maintenance costs (e.g., pavement repair, mapping) | Rates are increased and revenues transferred from enterprises to general fund/public works for ROW maintenance | Subject to majority protest, but not voter approval | Frees up funding for use by stormwater, if needed | 24 to 36 months - allowing time for studies and integration with timeframe for sewer, refuse, and water rates | Medium | Good if rate increases are acceptable |
| c. | Redirect gas tax revenues to fund stormwater program related to streets | Local budget appropriation for gas taxes; legislation for vehicle registration fees | Exempt from Prop 218 | Street related O&M and capital projects | 18 months for gas taxes; 2 to 3 years for vehicle registration fees - allowing time for legislation | Medium | Good for gas taxes; low for vehicle registration fees because of legislative process |
| **3.** | **Recover full cost of services and facilities** | | | | | | |
| a. | Permitting, inspection, and enforcement fees fully recover cost | Fees are updated to reflect current costs | Exempt from Prop 218 | Reimbursement for specific services rendered | 12 months - allowing time for cost study | Small | Good, although full cost recovery may not occur |
| b. | Litter abatement costs recovered from sources | Business licenses cover costs of litter abatement | Exempt from Prop 218 | Reimbursement for specific services rendered | 2 to 3 years - allowing time for cost study | Small | Good |
| c. | Development impact fees fully recover growth's fair share of capital improvements | Fees are updated under Gov't Code Section 66000 et seq.. | Exempt from Prop 218 | Reimbursement for stormwater capital improvements | 18 to 24 months - allowing time for study and adoption | Large | Good, although full cost recovery may not occur |
| **4.** | **Apply for grant funding** | | | | | | |
| | Apply for Prop 84 or 1E state and federal programs | Undergo application process | Exempt from Prop 218 | Matching funding for eligible capital projects | 2 to 3 years based on similar grant programs | Large | Low given likelihood of eligibility for limited funding |
| **5.** | **Implement stormwater fees** | | | | | | |
| | Create or increase existing stormwater fees | Conduct analysis and hold election | Subject to voter approval | O&M and capital projects | 2 to 3 years - allowing time for public outreach | Large | Very low given voter approval requirement |
| **6.** | **Implement taxes/assessments** | | | | | | |
| | Pledge revenues toward debt service and ongoing O&M | Conduct analysis and hold election | Subject to voter approval | O&M and capital projects | 2 to 3 years - allowing time for public outreach | Large | Very low given voter approval requirement |

# WHY IS STREAM CARE IMPORTANT?

A stream is more than just a channel for rainwater to pass through on its way to the sea. It is a complex, living system where many plants and animals make their home. The stream corridor, including the vegetation along the bank, is known as *riparian* habitat. This high-moisture environment supports a great diversity of wildlife. The corridor is an invaluable natural resource that serves as a conduit for floodwater, replenishes surface and ground water, and contributes a host of aesthetic and recreational benefits.

Since the great majority of streamside property is privately owned, much of the responsibility for the life and health of our streams lies with you, the streamside resident.

Proper management of your stream and its vegetation can prevent or minimize erosion, preserve water quality, contribute to the survival of fish and wildlife, and help avoid flood damage. By protecting and preserving both property and the environment, streamside stewardship represents an excellent opportunity to create a "win-win" situation.

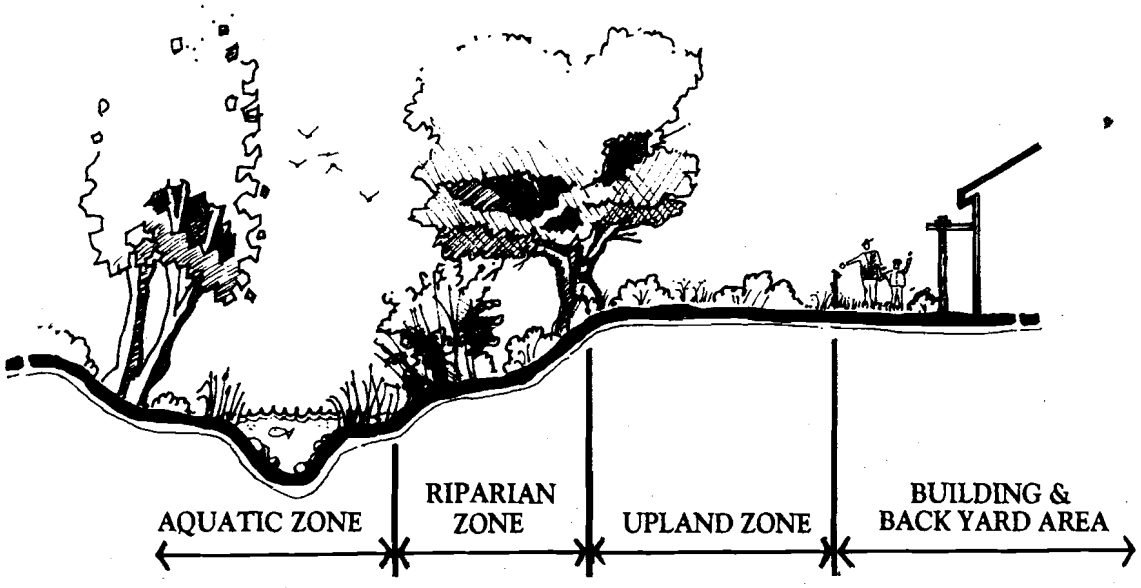
This brochure is a guide to protecting one of the most valuable elements of a living stream — the riparian vegetation. On the next few pages you will find ways you can protect the plants within a riparian habitat, tips on taking care of your stream, a listing of suggested plantings, and advice on how to join others who care about riparian habitat protection. Using this brochure, you can help restore and enhance one of California's most vital and endangered resources, the living creek environment.

# Caring for a Living Stream and Protecting the Riparian Zone

To be a good stream steward, you need to protect your riparian habitat and make it an inviting place for fish and wildlife. Prime goals of stream care include:

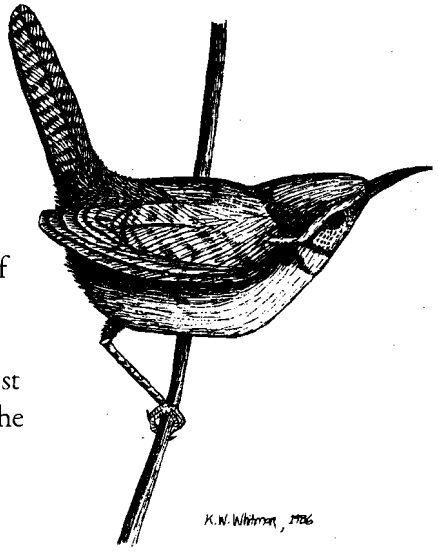
- Minimizing erosion or contamination from property adjacent to streams;
- Preserving the stream and the riparian zone in as natural a state as possible; and
- Repairing disturbed sites by restoring streamside vegetation.

Of course, it is always easier to prevent erosion and damage to a riparian habitat than it is to repair it once damaged. Learn to be aware of damage to a creek ecosystem and be prepared to try some of the stream-saving ideas presented in this brochure.




A stream corridor is made up of essentially three zones: the aquatic zone, the riparian or streamside zone, and the upland or buffer zone.

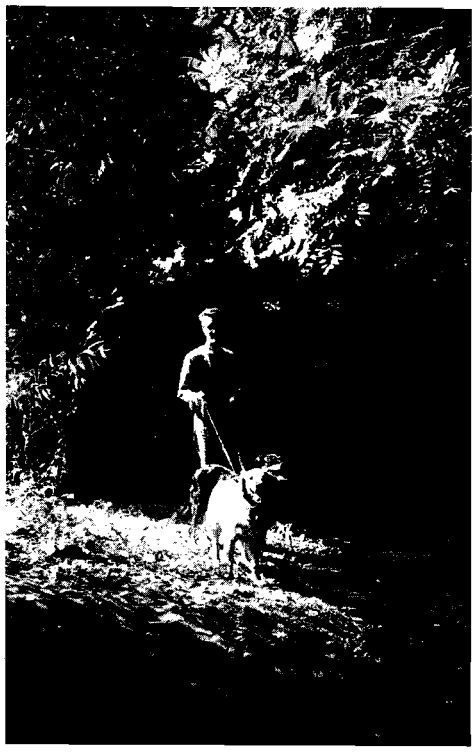
The aquatic zone is the surface water environment: the water, the creekbed and its flora and fauna. The riparian zone is the border of moist soils and water-loving plants next to the aquatic zone. It may be only a few feet wide or extend for hundreds of feet, but it is a very important part of the stream ecosystem. The upland zone is the area immediately adjacent to the riparian zone and can extend for hundreds of feet in width. This upland area is where you can best protect and enhance the creek habitat. The upland zone is the region that allows you to enjoy the creek while providing an important buffer that minimizes disturbance to wildlife.



# Guidelines for Stream Planting and Enhancement

The following guidelines will help you to enhance the stream corridor and, as a result, protect the creek habitat.

- It is very important to plant locally collected plant material. Local plant material is more likely to be adapted to local site conditions, more likely to be part of the existing "gene pool," and therefore more likely to survive.



- Observe adjacent or nearby creek habitats and determine which native plants grow in your immediate vicinity, and where they grow in relation to the stream. This is one of the best sources of knowledge for determining appropriate selection and location of plantings.

- Never use fertilizers or pesticides in the riparian or aquatic zones; the runoff into creeks can kill insects, fish and birds.

- Keep domestic animals away from the riparian zone; dogs and cats prey on riparian wildlife, while livestock trample or eat riparian plants leading to erosion and disturbance of fish and other wildlife.

- Minimize soil compaction by controlling use of trails and other recreational activities.

- Control erosion by protecting areas where flowing water meets bare soil, such as on dirt roads, trails, driveways, earthen drainage ditches, or patches of bare or sparsely vegetated earth. In these areas, reduce the force of runoff against the soil by reducing its speed, redirecting it to vegetated areas, shielding the soil with protective materials such as mulch and erosion control fabric, or replanting with native trees, shrubs, or groundcover.

- Protect existing vegetation. Construction, compaction, modifying the soil grade or drainage patterns, or tilling should never occur beneath the drip-line (from the trunk to the edge of vegetation canopy). If utility line installation or other construction is needed in this area, work the area by hand not machinery.

- Do not rake up leaf litter and fallen branches of native plants. This material provides food and shelter for beneficial insects which are an important part of the food chain.

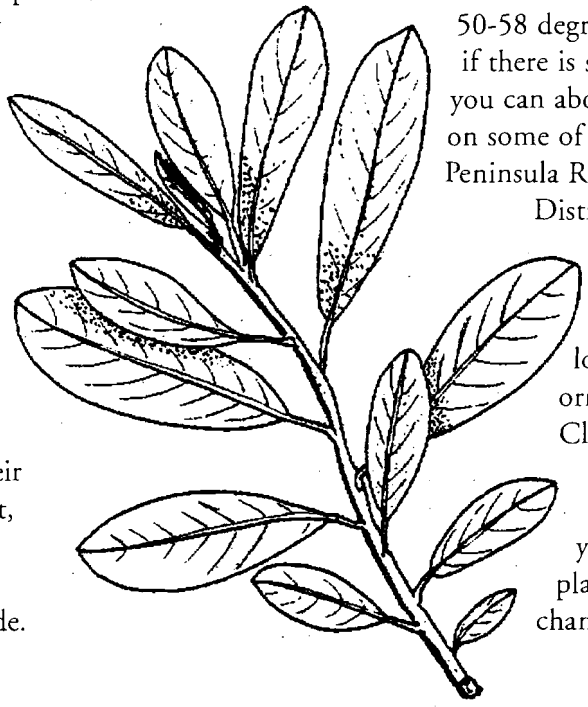
- Do not dump yard wastes into the creek corridor as they spread invasive non-native plants, can cause erosion by smothering existing plants, and can contribute to flooding by adding to blockages at bridges if mobilized during high flows. In addition, do not dump organic debris, such as grass clippings, into the creek. As it decomposes it robs the water of oxygen, affecting fish and other aquatic organisms.

❧ Remove non-native, invasive plants gradually and replace with natives. Work in small sections when removing plants; replant immediately to reduce erosion, maintain shade and minimize disturbance to wildlife. Take out unwanted non-natives before they are large enough to set seed. Learn to recognize native seedlings and encourage them. Some undesirable non-native, invasive plants are listed below:

| | |
|---|---|
| Broom | English and Algerian Ivy |
| Tamarisk | Acacia |
| Black Locust | Tree-of-Heaven |
| Periwinkle | Giant Reed or Bamboo |
| Pampas Grass | Poison Hemlock |
| Cape Ivy | Eucalyptus |

## Watering

Most homes along the creek sit high above average water table levels. As a result, most trees and shrubs that you plant will eventually reach the water table, but it may take several years of supplementary watering to get them established. Do not water during the hottest part of the day, no matter how tempting. Harmful soil fungi and microorganisms multiply in hot, wet conditions. Native plants not accustomed to these organisms are often damaged. Instead, water only occasionally and deeply. Extend both ends of the rainy period by watering in spring and autumn. During the dry summer period, water slowly and deeply in early morning to ensure deep percolation.



## Know Your Habitat

View this project as an opportunity to learn. Keep lists of birds, butterflies, etc. Watch how they use their habitat — what they eat, what provides shelter. Keep temperature readings in the sun and shade.

There is a big difference! Native trout and salmon will survive if the water is at 50-58 degrees. This can only happen if there is shade. Learn as much as you can about native plants. Walk on some of the trails on our Mid-Peninsula Regional Open Space District lands. Make reservations for a Jasper Ridge Biological Preserve tour. Go on field trips with the local chapter of the California Native Plant Society. Closely observe plants that grow in native habitats similar to your own back yard. Get to know your plants through-out the changing seasons.