5.2. Bicycle and Pedestrian System

Marin County's various unincorporated communities each have their own distinct qualities and unique attributes that contribute to the region's overall quality of life. This remains evident even though many of these unincorporated communities are landlocked or function as small, residential neighborhoods immediately adjacent to their more urban, incorporated neighbors. From a practical standpoint and for purposes of continuity, it makes sense for projects in these areas to be included in the adjacent incorporated jurisdiction's bicycle and pedestrian plan, where possible.

Examples of the recommended strategies for bicycle circulation consist of a comprehensive network of utilitarian bikeways connecting residential neighborhoods in Marin County with schools, parks, community centers, downtowns, and other destinations. It focuses around a primary system of north-south and east-west corridors, using a combination of paths, lanes, and routes. Bikeway improvements have been broken down between a primary and secondary system, and short-term, mid-term, and long-term projects.

Pedestrian improvements by nature are highly localized, and therefore prototype solutions have been developed that have widespread applicability in unincorporated Marin County. In addition, several pedestrian treatments for specific areas were developed. In some cases, projects listed under Bikeway improvements, such as multi-use paths, are also pedestrian facilities as well.

The proposed bikeways in Marin's unincorporated regions consist of approximately 131 miles of bikeways, including approximately 22 miles of Class I multi-use pathways, approximately 106 miles of Class II on-street bicycle lanes and Class IIr shoulders, and approximately 2 miles of signed bicycle routes and shoulder improvements (See **Table 5-6**).

Over 5,000 lineal feet of additional sidewalk are proposed in several locations countywide. As described in Chapter 3, all new facilities must meet standards provided in Chapter 1000 of Caltrans' *Highway Design Manual*. Note that some facilities listed below may be under other agencies' jurisdictional or maintenance responsibility.

The proposed bicycle and pedestrian projects in unincorporated Marin County are organized into a series of priority projects that fall into one of the following four categories:

1. North Marin (**Figure 5-1** and **Table 5-1**)
2. Central Marin (**Figure 5-2** and **Table 5-2**)
3. Southern Marin (**Figure 5-3** and **Table 5-3**)
4. West Marin (**Figure 5-4, Figure 5-5,** and **Table 5-4**)
5. Other projects (**Table 5-5**)

The top priority bikeway and pedestrian projects were selected based on input from Marin County staff, the public, and the consultant team based on their knowledge of the current direction of funding programs.

5.3. Cost Breakdown

An initial cost breakdown for bicycle and pedestrian infrastructure projects is presented in **Table 5-1** through **Table 5-5**. The total capital cost is estimated to be over $222 million. Assumptions for the high-level planning cost estimates include:

- All cost estimates are conceptual because no feasibility or preliminary design has been completed
- Funded costs only include capital projects which have not yet initiated
- Where several alternatives were considered, estimates for the most cost-effective option are used

NORTHERN MARIN COUNTY PROPOSED AND EXISTING BIKEWAY NETWORK FIGURE 5.1

Legend

Bicycle Facilites

Existing/Proposed

- Existing Class I Path
- Proposed Class I Path
- Existing Class II Bike Lane
- Proposed Class II Bike Lane
- Existing Class IIr Shoulder
- Proposed Class IIr Shoulder
- Existing Class III Route
- Proposed Class III Route
- Existing Class III Route with Sharrows
- Proposed Class III Route with Sharrows
- Existing One Way Class IV Bikeway
- Proposed One Way Class IV Bikeway
- Existing Two Way Class IV Bikeway
- Proposed Two Way Class IV Bikeway
- Existing Class III/Proposed Class II
- Existing Class III/Proposed Class IIr
- Class II/III Combination
- Class II/IIIs Combination
- Class IIr/III Combination
- Class IIr/IIIs Combination
- Freeway Legal Route
- Existing Other Facility
- Proposed Other Facility
- School

0 0.5 1 2

Miles

DATA SOURCE MARINMAP

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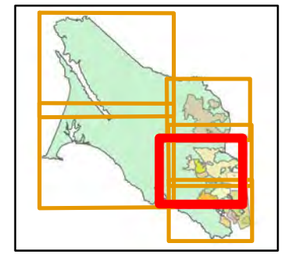
CENTRAL MARIN COUNTY PROPOSED AND EXISTING BIKEWAY NETWORK FIGURE 5.2



Legend

Bicycle Facilites

Existing/Proposed

- Existing Class I Path
- Proposed Class I Path
- Existing Class II Bike Lane
- Proposed Class II Bike Lane
- Existing Class IIr Shoulder
- Proposed Class IIr Shoulder
- Existing Class III Route
- Proposed Class III Route
- Existing Class III Route with Sharrows
- Proposed Class III Route with Sharrows
- Existing One Way Class IV Bikeway
- Proposed One Way Class IV Bikeway
- Existing Two Way Class IV Bikeway
- Proposed Two Way Class IV Bikeway
- Existing Class III/Proposed Class II
- Existing Class III/Proposed Class IIr
- Class II/III Combination
- Class II/IIIs Combination
- Class IIr/III Combination
- Class IIr/IIIs Combination
- Freeway Legal Route
- Existing Other Facility
- Proposed Other Facility
- School

0 0.5 1 2

Miles

DATA SOURCE MARINMAP

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SOUTHERN MARIN COUNTY PROPOSED AND EXISTING BIKEWAY NETWORK FIGURE 5.3

Legend

Bicycle Facilites

Existing/Proposed

- Existing Class I Path
- Proposed Class I Path
- Existing Class II Bike Lane
- Proposed Class II Bike Lane
- Existing Class IIr Shoulder
- Proposed Class IIr Shoulder
- Existing Class III Route
- Proposed Class III Route
- Existing Class III Route with Sharrows
- Proposed Class III Route with Sharrows
- Existing One Way Class IV Bikeway
- Proposed One Way Class IV Bikeway
- Existing Two Way Class IV Bikeway
- Proposed Two Way Class IV Bikeway
- Existing Class III/Proposed Class II
- Existing Class III/Proposed Class IIr
- Class II/III Combination
- Class II/IIIs Combination
- Class IIr/III Combination
- Class IIr/IIIs Combination
- Freeway Legal Route
- Existing Other Facility
- Proposed Other Facility
- School

0 0.5 1 2

Miles

DATA SOURCE MARINMAP

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WESTERN MARIN COUNTY
(northern portion)
PROPOSED AND EXISTING BIKEWAY NETWORK
FIGURE 5.4

Tomales Petaluma Rd
1
Hicks Valley Rd
Pt Reyes Petaluma Rd
Novato Blvd
Sir Francis Drake Blvd
Nicasio Valley Rd

Legend

Bicycle Facilites

Existing/Proposed

- Existing Class I Path
- Proposed Class I Path
- Existing Class II Bike Lane
- Proposed Class II Bike Lane
- Existing Class IIr Shoulder
- Proposed Class IIr Shoulder
- Existing Class III Route
- Proposed Class III Route
- Existing Class III Route with Sharrows
- Proposed Class III Route with Sharrows
- Existing One Way Class IV Bikeway
- Proposed One Way Class IV Bikeway
- Existing Two Way Class IV Bikeway
- Proposed Two Way Class IV Bikeway
- Existing Class III/Proposed Class II
- Existing Class III/Proposed Class IIr
- Class II/III Combination
- Class II/IIIs Combination
- Class IIr/III Combination
- Class IIr/IIIs Combination
- Freeway Legal Route
- Existing Other Facility
- Proposed Other Facility
- School

0 0.75 1.5 3

Miles

DATA SOURCE MARINMAP

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WESTERN MARIN COUNTY (southern portion) PROPOSED AND EXISTING BIKEWAY NETWORK FIGURE 5.5

Sir Francis Drake Blvd
Pt Reyes Petaluma Rd
Novato Blvd
Bear Valley Rd
Nicasio Valley Rd
Lucas Valley Rd
Sir Francis Drake Blvd
1

Legend

Bicycle Facilites

Existing/Proposed

- Existing Class I Path
- Proposed Class I Path
- Existing Class II Bike Lane
- Proposed Class II Bike Lane
- Existing Class IIr Shoulder
- Proposed Class IIr Shoulder
- Existing Class III Route
- Proposed Class III Route
- Existing Class III Route with Sharrows
- Proposed Class III Route with Sharrows
- Existing One Way Class IV Bikeway
- Proposed One Way Class IV Bikeway
- Existing Two Way Class IV Bikeway
- Proposed Two Way Class IV Bikeway
- Existing Class III/Proposed Class II
- Existing Class III/Proposed Class IIr
- Class II/III Combination
- Class II/IIIs Combination
- Class IIr/III Combination
- Class IIr/IIIs Combination
- Freeway Legal Route
- Existing Other Facility
- Proposed Other Facility
- School

0 0.75 1.5 3

Miles

DATA SOURCE MARINMAP

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*Table 5-1: Proposed Projects, North Marin**

ID	Segment	Begin	End	Length	Facility Type	Total Cost	Unfunded Cost	Funded Cost
1	**North Marin: Oakview Path**	Lucas Valley Road	Marinwood Avenue	0.9 mi	Class I	$1,049,000	$1,049,000	$0
2	**North Marin: Marinwood Ave**	South End	Grande Paseo (North)	0.2 mi	Class II	$10,000	$10,000	$0
3	**North/Central Marin: SMART Pathway (coordinate with SMART and cities of Novato and San Rafael)**	Smith Ranch Road	SMART Hamilton Station	2.7 mi	Class I	$2,970,000	$2,970,000	$0
4	**North Marin: Lucas Valley Path (Old Lucas Valley Road / Canyon Oak Drive)**	Bridgegate Drive	Miller Creek Road	2.2 mi	Class I	$1,760,000	$1,760,000	$0
5	**North Marin: San Antonio Road**	San Antonio Road at Korean Church	Sonoma County Boundary	0.6 mi	Class II	$260,000	$260,000	$0
6	**North Marin: State Route 37**	Petaluma River	Hanna Ranch Road	3.3 mi	Class I	$6,209,000	$6,209,000	$0
7	**North Marin: Vineyard Rd / Indian Valley Golf Club Service Road**	Novato Boulevard	Woodside Court	2.4 mi	Class III	$5,000	$5,000	$0
8	**North Marin: Stafford Lake Path**	Stafford Lake	Sutro Avenue	1.9 mi	Class I	$3,200,000	$3,200,000	$0
	TOTAL			14.2 mi		$15,463,000	$15,463,000	$0

*Planning-level cost estimates are based on latest available implementation unit costs in the Bay Area and includes design costs. Many projects are undefined at this level, and the final type and scope of the project is yet to be determined. The estimates do not include any major right-of-way, environmental, or engineering costs that may be discovered in the feasibility analysis process. Costs from available feasibility studies or inflation-adjusted costs from the previous Plan update were used, where available.

*Table 5-2: Proposed Projects, Central Marin**

ID	Segment	Begin	End	Length	Facility Type	Total Cost	Unfunded Cost	Funded Cost
9	**Central Marin: College of Marin Access Improvements - College Ave**	Corte Madera Creek Pathway	Sir Francis Drake Boulevard	0.1 mi	Class II	$2,000	$2,000	$0
10a	**Central Marin: Central Marin Ferry Connection Phase II****	East Sir Francis Drake Blvd.	Redwood Highway	0.4 mi	Class I	$11,100,000	$2,100,000	$9,000,000
10b		Redwood Highway	Wornum Drive	0.3 mi	Class I	$7,950,000	$7,950,000	$0
11	**Central Marin: E. Sir Francis Drake Boulevard (coordinate with City of San Rafael and Caltrans)**	Larkspur City Limits	Main St (San Quentin)	1.4 mi	Class I	$3,540,000	$3,540,000	$0
12	**Central Marin: North San Pedro Road**	Civic Center Drive/San Pablo Avenue Drive	Vendola Drive	1.7 mi	Class II	$34,000	$34,000	$0
13	**Central Marin: Sir Francis Drake Boulevard (Greenbrae)**	Wolfe Grade	Eliseo Drive	1.2 mi	Class I	$2,500,000	$2,500,000	$0
14	**Central Marin: Sir Francis Drake Boulevard (Kentfield)**	Ross Town Limits	Wolfe Grade	1.0 mi	Class II	$42,000	$42,000	$0
15	**Central Marin: Butterfield Road**	San Anselmo Town Limits	Van Winkle Drive	1.3 mi	Class II	$104,000	$104,000	$0
16	**Central Marin: Point San Pedro Road**	Mooring Road	Main Drive	0.8 mi	Class II	$20,000	$20,000	$0
	TOTAL			8.2 mi		$25,292,000	$16,292,000	$9,000,000

*Planning-level cost estimates are based on latest available implementation unit costs in the Bay Area and includes design costs. Many projects are undefined at this level, and the final type and scope of the project is yet to be determined. The estimates do not include any major right-of-way, environmental, or engineering costs that may be discovered in the feasibility analysis process. Costs from available feasibility studies or inflation-adjusted costs from the previous Plan update were used, where available.
**In design

*Table 5-3: Proposed Projects, Southern Marin**

ID	Segment	Begin	End	Length	Facility Type	Total Cost	Unfunded Costs	Funded Cost
17	**Southern Marin: Redwood Highway Frontage Road**	Tiburon Boulevard	Mill Valley City Limits	1.2 mi	Class II	$96,000	$96,000	$0
18	**Southern Marin: Tennessee Valley Road**	Tennessee Valley Trailhead	Enterprise Concourse	1.3 mi	Class II	$1,300,000	$1,300,000	$0
19	**Southern Marin: Tiburon Boulevard**	Highway 101	Tiburon Town Limits	1.2 mi	Class II	$60,000	$60,000	$0
20	**Southern Marin: Tiburon Boulevard**	East Strawberry Drive/Bay Vista Drive	Greenwood Cove Drive/Blackfield Drive	0.2 mi	Class I	$2,933,000	$2,933,000	$0
21	**Southern Marin: North-South Greenway/Alto Tunnel**	Vasco Court	Tamalpais Drive	1.2 mi	Class I	$52,600,000	$52,600,000	$0
22	**Southern Marin: Lomita Drive**	Shell Road	Horse Hill Path	0.2 mi	Class II	$210,000	$210,000	$0
23	**Southern Marin: Lomita Drive**	Edna Maguire School	Shell Road (E)	0.4 mi	Class II/III	$32,000	$32,000	$0
24	**Southern Marin: Lomita Drive Pedestrian Improvements (joint with Mill Valley)**	Ashford Avenue	Edna Maguire School	1,100 ft	Sidewalk	$321,000	$321,000	$0
25	**Southern Marin: Seminary Drive**	Redwood Highway Frontage Road	Gilbert Drive	0.6 mi	Class II	$248,000	$248,000	$0

ID	Segment	Begin	End	Length	Facility Type	Total Cost	Unfunded Costs	Funded Cost
26	**Southern Marin: Alexander Avenue (Fort Baker)**	Bunker Road	Sausalito City Limits	0.8 mi	Class II	$132,000	$65,000	$67,000
27	**Southern Marin: Vista Point Path Extension**	Vista Point (GG Bridge)	Conzelman Road	0.3 mi	Class I	$6,000,000	$6,000,000	$0
28	**Southern Marin: Bikeway Access Improvements - Shoreline Hwy (Coordinate with Caltrans)**	Maple Street	Almonte Blvd	0.8 mi	Class II	$301,000	$201,000	$101,000
29	**Southern Marin: Redwood Highway Frontage Pedestrian Improvements (Tamalpais Motel frontage)**	Seminary Drive	Strawberry Village	300 ft	Sidewalk	$33,000	$33,000	$0
30	**Southern Marin: Almonte Boulevard Pedestrian Improvements**	Shoreline Highway	Helen Avenue	250 ft	Sidewalk	$28,000	$28,000	$0
31	**Southern Marin: Belvedere Drive Sidewalk**	Bayview Terrace	Ricardo Road	750 ft	Sidewalk	$110,000	$110,000	$0
	TOTAL			8.2 mi (bikeways)/ 2,400 ft (sidewalks)		$64,404,000	$64,237,000	$168,000

*Planning-level cost estimates are based on latest available implementation unit costs in the Bay Area and includes design costs. Many projects are undefined at this level, and the final type and scope of the project is yet to be determined. The estimates do not include any major right-of-way, environmental, or engineering costs that may be discovered in the feasibility analysis process. Costs from available feasibility studies or inflation-adjusted costs from the previous Plan update were used, where available.

*Table 5-4: Proposed Projects, West Marin**

ID	Segment	Begin	End	Length	Facility Type	Total Cost	Unfunded Cost	Funded Cost
32	**West Marin: Railroad Avenue (Woodacre)**	Sir Francis Drake Boulevard	Elm Avenue	1.0 mi	Class IIr	$800,000	$800,000	$0
33	**West Marin: Point Reyes-Petaluma Road**	Shoreline Highway	Laurel Canyon Road	3.6 mi	Class IIr	$3,960,000	$3,960,000	$0
34	**West Marin: Point Reyes-Petaluma Road/Red Hill Road**	Nicasio Valley Road	Bottom of Red Hill Grade north side	6.5 mi	Class IIr	$7,150,000	$7,150,000	$0
35	**West Marin: Shoreline Highway (Point Reyes Station)**	Point Reyes-Petaluma Road	Main Street	1900 ft.	Sidewalk	$420,000	$420,000	$0
36	**West Marin: Lucas Valley Road**	Westgate Drive	Nicasio Valley Road	6.6 mi	Class IIr	$7,260,000	$7,260,000	$0
37	**West Marin: Shoreline Highway**	Maple Street (Tam Valley)	Sonoma County Boundary	53.9 mi	Class IIr	$59,290,000	$59,290,000	$0
38	**West Marin: Nicasio Valley Road**	Sir Francis Drake Boulevard	Nicasio School	4.8 mi	Class IIr	$5,280,000	$5,280,000	$0
39	**West Marin: Novato Boulevard**	Point Reyes-Petaluma Road	Novato City Limits	5.8 mi	Class IIr	$5,220,000	$5,220,000	$0
40	**West Marin: Panoramic Highway**	Shoreline Highway (S)	Gravity Car Grade	2.6 mi	Class IIr	$2,880,000	$2,880,000	$0

ID	Segment	Begin	End	Length	Facility Type	Total Cost	Unfunded Cost	Funded Cost
41	**West Marin: Cross Marin Trail/Taylor Park Road (East End Pathway Upgrade)**	Sir Francis Drake Boulevard/Inkwells Bridge	Park Road	1.4 mi	Class I	$1,120,000	$1,120,000	$0
42	**West Marin: Panoramic Highway**	Shoreline Highway (N)	Mt. Tamalpais State Park Boundary (MP 7.8)	1.4 mi	Class IIr	$2,280,000	$2,280,000	$0
43	**West Marin: Cross Marin Trail/ Tocaloma-Pt. Reyes Pathway**	Sir Francis Drake Boulevard	Shoreline Highway	4.5 mi	Class I	$4,950,000	$4,950,000	$0
44	**West Marin: Sir Francis Drake Boulevard**	Platform Bridge Road	Shoreline Highway	1.8 mi	Class IIr	$4,980,000	$4,980,000	$0
45	**West Marin: Tomales-Petaluma Road**	Shoreline Highway	Sonoma County Line	5.5 mi	Class IIr	$5,220,000	$5,220,000	$0
46	**West Marin: Shoreline Highway/ Stinson Beach Pedestrian Improvements**	Belvedere Avenue	West of Calle del Mar	980 ft	Sidewalk	$208,000	$208,000	$0
	TOTAL			99.4 mi (bikeways)/ 2,880 ft (sidewalks)		$111,018,000	$111,018,000	$0

*Planning-level cost estimates are based on latest available implementation unit costs in the Bay Area and includes design costs. Many projects are undefined at this level, and the final type and scope of the project is yet to be determined. The estimates do not include any major right-of-way, environmental, or engineering costs that may be discovered in the feasibility analysis process. Costs from available feasibility studies or inflation-adjusted costs from the previous Plan update were used, where available.

*Table 5-5: Other Projects, Unincorporated Marin County**

ID	Segment	Begin	End	Length	Facility Type	Total Cost	Unfunded Cost	Funded Cost
47	**Rural Road Improvement Project - Shoulders/Turnouts**	N/A	N/A	25% of total Class III mileage	Paving	$1,323,000	$1,150,000	$0
48	**101/ Tiburon Blvd Interchange Improvements**	Tower Drive	Redwood Highway Frontage Road	0.4 mi	Class II	$978,000	$850,000	$0
49	**Interchange and Intersection Project - New Overcrossing**	N/A	N/A	1.0 mi	Bridge	$2,300,000	$2,000,000	$0
50	**Safe Routes to Schools - Safe Pathways Projects**	N/A	N/A	Varies	Varies	$1,700,000	$0	$1,700,000[1]
	TOTAL			1.4 mi +		$6,301,000	$4,000,000	$1,700,000

*Planning-level cost estimates are based on latest available implementation unit costs in the Bay Area and includes design costs. Many projects are undefined at this level, and the final type and scope of the project is yet to be determined. The estimates do not include any major right-of-way, environmental, or engineering costs that may be discovered in the feasibility analysis process. Costs from available feasibility studies or inflation-adjusted costs from the previous Plan update were used, where available.

[1] Measure A

*Table 5-6: Total Projects, Unincorporated Marin County**

Facility Type	Length	Total Cost	Unfunded Cost	Funded Cost
Class I	21.9 mi	$107,881,000	$98,881,000	$9,000,000
Class II/IIr	106.1 mi	$108,149,000	$107,854,000	$168,000
Class III	2.4 mi	$5,000	$5,000	$0
Class IV	0.0 mi	$0	$0	$0
Sidewalks	5,280 ft	$1,120,000	$1,120,000	$0
Other	N/A	$5,323,000	$3,150,000	$1,700,000
TOTAL	131.4 mi (bikeways)/ 5,280 ft (sidewalks)	$222,478,000	$211,010,000	$10,868,000

*Planning-level cost estimates are based on latest available implementation unit costs in the Bay Area and includes design costs. Many projects are undefined at this level, and the final type and scope of the project is yet to be determined. The estimates do not include any major right-of-way, environmental, or engineering costs that may be discovered in the feasibility analysis process. Costs from available feasibility studies or inflation-adjusted costs from the previous Plan update were used, where available.

In addition, some of the following criteria were also considered in selecting and prioritizing projects:

- Existing bicycling patterns based on counts and observation
- Traffic volumes and travel speeds on streets
- Amount of side friction (i.e., driveways, side streets, etc.)
- Pavement or roadway width
- Number of destinations served (i.e., schools, parks, employment centers, etc.)
- Topography and gradients
- Connectivity with the regional system
- Presence of reasonable alternatives for bicyclists
- Directness and connectivity to destinations
- Collision data and safety concerns

The unincorporated Marin County bicycle and pedestrian systems were developed with a focus on connecting existing segments of bikeways and walkways, addressing routes used by bicyclists and pedestrians, and focusing on specific opportunities and constraints. The street pattern and topography of Marin County is such that the bicycle and pedestrian system naturally follows primary north-south and east-west routes.

Finally, it is important to remember that the bicycle and pedestrian systems and the top projects serve as guidelines for agencies responsible for implementation. The system and segments themselves may change over time as a result of changing bicycling and walking patterns and implementation constraints and opportunities.

5.4. Long Term Vision

Marin County and its unincorporated communities are already recognized as some of the most livable communities in the country. One of the aspects that make a community livable is that people feel comfortable bicycling or walking there, whether they be children, families, or senior citizens. The long-term vision of this Plan is to make unincorporated Marin County a model for livable communities, a place where there is a balance between the various transportation modes and where the fragments of existing bikeways are connected to provide a consistent experience from community to community. In addition to the policies recommended in Chapter 2, this Plan provides the following physical and program improvements to help reach this goal. Because this Plan is limited in scope to the unincorporated areas of Marin County, coordination between the Marin County Department of Public Works, local cities and towns, the Transportation Authority of Marin, Caltrans, and local transit agencies will be critical to the realization of this countywide vision which goes beyond the North-South Bikeway and extends into every community in the county.

5.4.1 Bikeway Network

The Countywide Bikeway Network is composed of a primary and secondary bikeway system. The primary system provides critical inter-community and regional connections and serves all of the primary activity centers in unincorporated Marin County. The secondary system provides important connections to local neighborhoods and other destinations, acting as feeder routes to the primary system. It is important to note that the portions of the primary and secondary bikeway system described here are located in unincorporated Marin County. Where the bikeway system is located in one of the numerous small pockets of unincorporated Marin County adjacent to incorporated towns and cities, this Plan attempts to coordinate improvements with the plans of those incorporated areas.

5.4.2 SMART/Northwestern Pacific Railroad Right of Way

The proposed primary bikeway system described in this section and the SMART and Northwestern Pacific Railroad (NWP) are so intertwined that it is useful to discuss the history of these railroads in the context of the proposed bikeway improvements. The NWP and its predecessors actually helped form the transportation system as it is known today in Marin County, predating the development of a roadway system. Starting from the 1860s, a railroad system developed that eventually connected virtually all Marin County communities to ferry service to San Francisco. By the early 1900s, an efficient double-track electric commuter rail operation brought commuters from the growing towns of Marin County to schools and jobs on a daily basis. Decreasing revenue and increased operating costs resulted in the abandonment of the rail right of way west of Manor (just north of Fairfax) in 1933. By the 1940s increased competition from the automobile and completion of the Golden Gate Bridge led to the abandonment of the electric commuter service and eventually to the abandonment of the entire passenger system south of Ignacio, though freight service continued into the late 1970s. North and east of Ignacio, freight service is still provided by Northwestern Pacific Railroad Authority (NWPRA).

At the time of cessation of service south of Ignacio, the Northwestern Pacific Railroad was a subsidiary of the Southern Pacific Railroad Company. Subsequently, the Southern Pacific was purchased by the Union Pacific Railroad (UPRR). The railroad sold off nearly all its interests south of the Ignacio Wye to various agencies and private owners, including the section between Ignacio and eastern Corte Madera to the Golden Gate Bridge, Highway, and Transportation District (GGBHTD) for future use as a transitway. Sections of railbed through western San Rafael, Kentfield, and in the upper Ross Valley were abandoned and sold off or reused as roadways. Remaining segments south to Sausalito and Tiburon were sold to the County and various cities. Several of these segments were reconstructed as multi-use paths in the early 1980s, representing some of the first rail-to-trail conversions in the country.

Sonoma-Marin Area Rail Transit (SMART) was formed on January 1, 2003 as a new regional transportation district to oversee the development and implementation of a "rail with trail" passenger rail service and multi-use pathway extending from Cloverdale in Sonoma County to Larkspur in Marin County, including portions acquired from GGBHTD. In 2006 SMART released the Final Environmental Impact report for this proposal, which described in Chapter 2 of this Plan. A sales tax measure in Marin County and Sonoma County to fund SMART passed in 2008. The initial operating segment, between Santa Rosa and San Rafael was completely reconstructed for rail service commencing in 2017, and subsequent funding was obtained to construct the planned system extension southward to Larkspur for operation by 2019.

Construction of the multi-use path portion of the project, much of which is also part of the North-South Greenway, is being constructed in segments as additional funding becomes available. The path segment between Andersen Drive in San Rafael and the Larkspur station was constructed as part of the Cal Park Tunnel rehabilitation project, which as the only two-track tunnel in the county was reconstructed to provide one track for SMART and the other track for a multi-use path. Other pathway segments in Marin County constructed through the Initial Operating Segment include the section between Ranchitos Road and the Civic Center Station in north San Rafael and several segments in Novato. Other sections of the ultimate path alignment have been constructed as part of other roadway and development projects.

5.4.3 Tunnels

There is a total of eight historic railroad tunnels in Marin County. Most of the tunnels are within various city limits, but the tunnels themselves, as well as portals and the approaching rights of way for several of the tunnels, are under control of the County, SMART, private owners, or still retained by Union Pacific. **Table 5-7** lists the tunnels in Marin County.

Table 5-7: Marin County Tunnels

Tunnel	Length (ft)	Year Built	Status
White's Hill Tunnel	3,190	1904	Closed; substantial collapse
Tiburon-Reed Tunnel	566	1884	Closed; unknown
Reed-Meadowsweet Tunnel	1,849	1884	Closed; unknown
Alto Tunnel	2,183	1884	Closed with partial collapse
Cal Park Hill Tunnel	1,105	1884	Reconstructed and reopened in 2010 for multiuse pathway and SMART use.
Puerto Suello Tunnel	1,351	1879	Reconstructed and reopened in 2016 for SMART use
North Tomales Tunnel	1,706	1875	Rock; on private property
South Tomales Tunnel	98	1874	Rock; on private property

All of the tunnels accommodated single tracks and were approximately 15-20 feet wide by almost 30 feet high except for the Cal Park Hill tunnel which was a double-tracked tunnel with an approximate width of 30 feet.

With the exception of the Puerto Suello Tunnel (which was rehabilitated for use by SMART), the Cal Park Hill Tunnel (which was reconstructed in 2010 as a combined pedestrian, bicycle and SMART facility), and the Alto Tunnel (which was analyzed using tunnel borings and remote sensors in 2017), the condition of the tunnels is not known.

The two tunnels in Tomales are still somewhat intact but are on private property and isolated from the remainder of the former rail right of way. All of the other tunnels are sealed off and inspection is not possible without significant resources to evaluate their condition. Similar to the Cal Park Tunnel's original construction, the Alto, White's Hill, and Tiburon-Reed tunnels are predominately timber lined and over time with moisture inside the bore and no fresh air, it is likely that the supports have been compromised and would likely require complete replacement of the tunnel support structure to reopen them for bicycle and pedestrian use.

The cost of reconstructing the tunnels is difficult to estimate and can change over time. Reconstruction of the Cal Park Tunnel and pathway cost $27.7 million in 2010.

Alto Tunnel

The Alto Tunnel has been the subject of multiple studies over the last twenty years. The tunnel has long been identified as a key component of the North-South Greenway, envisioned as a continuous, separated pathway between the Golden Gate Bridge and Sonoma County line. It would also be the only level route available between Corte Madera and Mill Valley and has been identified as a crucial link to encourage bicycling and walking by all ages and abilities. As other segments of the North-South Greenway are completed, this segment stands out as a major gap. At the same time, significant deterioration of the tunnel structure over the years has resulted in collapses and remedial actions to preclude further collapse.

Corridor and tunnel studies have projected costs to reconstruct the Alto tunnel over the years. The 2017 Jacobs study conducted borings into the tunnel to better ascertain its condition. This information, combined with inflation-adjusted data from previous studies, resulted in a focused cost estimate of $52,600,000 which includes reconstruction of the tunnel structure and providing a Class I multi-use path between the current path termini at either end. No funding is allocated at this time to proceed with any action in this corridor, though it remains shown as a proposed project should conditions change in the future.

The various studies related to the Alto tunnel can be viewed at: http://walkbikemarin.org/projects.php

5.4.4 Access to Public Park and Open Space Lands

With the Golden Gate National Recreation Area, Pt. Reyes National Seashore, Muir Woods National Monument, and numerous State and County Parks, watersheds, and open space areas, Marin County is a major destination for visitors. While a great natural resource, these parklands also attract tremendous seasonal traffic flows to unincorporated Marin County, resulting in congestion for residents and visitors alike. Bicycling and walking are already very popular means of touring and sometimes accessing visitor destinations, as witnessed by the number of hotels in San Francisco that promote or offer bicycle rentals for visitor use to Marin County and the large number of bicyclist tourists that ride across the Golden Gate Bridge to Marin County on rented bicycles. The National Park Service has undertaken several roadway improvements in the Fort Baker and Fort Cronkite areas that have provided wider shoulders for bicyclists, particularly on uphill grades. Shuttle services from locations in southern Marin County, including the Manzanita Park and Ride Lot to Muir Woods and other West Marin destinations, was implemented in 2005 as a means to address the significant visitor traffic impacts.

Many of the short- to mid-term recommendations in this Plan directly address access to the numerous parkland destinations in Marin County, including the Alexander Avenue Project, Rural Road Improvement Project, and the Samuel P. Taylor Pathway project. Pathway improvements within the parks should be considered within the limitations on use and environmental impacts set by each park agency.

5.4.5 Environmental Protection

Bicycling and walking are two of the most environmentally sound forms of travel and directly help reduce problems associated with motor vehicle use, such as air, noise, and water pollution, over development, and loss of pervious surfaces due to paving. At the same time, some of the more ambitious pathway proposals in this Plan may have environmental impacts of their own. Some of these may be direct, such as impacts to wetlands, and others may be indirect, such as impacts of unleashed dogs in habitat areas. All of the projects in this Plan will require additional feasibility and environmental analyses. Additional California Environmental Quality Act (CEQA) review will be completed as needed once the project is deemed feasible and a preliminary design developed. Once approved and constructed, the bicycle and pedestrian improvements and programs in this Plan will continue to make unincorporated Marin County one of the most environmentally sound communities in the country.

5.5. Short- and Mid-Term Priority Projects

Much of the Plan is also built on projects developed by individual communities. Based on the criteria described previously, the highest priority short- to mid-term bikeway and walkway projects for unincorporated Marin County are described on the following pages.

5.5.1 Countywide Projects

Marin Pathway Maintenance Program

Jurisdiction(s): Transportation Authority of Marin, County of Marin, local cities and towns, Caltrans

Project Location(s): Countywide

Many residents and visitors have commented on the need to maintain and improve Marin County's existing multi-use pathways. Maintenance of some of these pathways is performed by the Marin County Parks and Open Space Department, whereas bicycle lanes are maintained through the Department of Public Works' road maintenance programs. The County currently maintains sections of the Mill Valley-Sausalito Bike Path, Mission Pass Path (Fawn Drive), Corte Madera Creek Path, and Novato Bike Path (from San Marin High School to Stafford Lake) that run through the unincorporated county area. Some of the existing pathways are maintained in partnership with Caltrans such as the Pacheco Hill Pathway between Novato and Marinwood and the Alto Hill Pathway, also called Horse Hill Pathway, between Mill Valley and Corte Madera. The Samuel P. Taylor Park Pathway is maintained by California State Parks and the National Park Service.

The maintenance needs for these pathways typically fall into two categories – routine maintenance and major maintenance. The former consists of regular activities such as sweeping, debris removal, trimming vegetation and minor spot repairs to the pathway surface. The latter calls for extensive repaving overlays or full reconstruction of the path and associated structures. The Transportation Authority of Marin has implemented a program under Measure A to provide routine and capital maintenance funds for multi-use pathways, though only for those constructed since 2008. This program consists of a variety of improvements listed below, with each pathway and section requiring different improvements for paths constructed prior to 2008. As appropriate for the individual pathway, one goal of this effort would be to bring pathways up to Caltrans minimum standards regarding width and safety of entrances and exits, to invite a wider range of users to the facility.

Details of the expanded program are to be determined based on whether a consistent local source of funds can be used for pathway maintenance.

Routine Maintenance

A common concern expressed by agency staff responsible for building and maintaining infrastructure is the lack of consistent and adequate funds for maintenance. Capital funding for the projects identified in this Plan may be available through Federal and State sources, but maintenance funds are not included. This implementation project would seek to establish a regular source of maintenance funds for multi-use pathways, similar to the streetlight agreement already in place in the county. Recommended minimum maintenance activities and practices to be funded under this project are presented below.

Many of Marin County's paths need maintenance attention, such as fixing broken asphalt and clearing plant overgrowth. Bicycle lanes need regular sweeping to clear debris. Class I multi-use path maintenance costs include labor, supplies, and amortized equipment costs for weekly trash removal, monthly sweeping, bi-annual resurfacing and repair patrols, cleaning, spot repairs to the asphalt path, repairs to crossings, cleaning drainage systems, trash removal, and landscaping. Underbrush and weed abatement should be performed once in the late spring and again in mid-summer. Maintenance access on Class I multi-use paths is typically achieved using standard County pick-up trucks. Sections with narrow widths or other clearance restrictions should be clearly marked.

Other bicycle- and pedestrian-related maintenance costs include centerline and crosswalk restriping, sweeping debris, and tuning/equipping signals for bicycle and pedestrian sensitivity at pathway/roadway intersections. In addition, maintenance and operation costs of maintaining the pathways through tunnels should also be considered.

Recommendation #1: Support efforts to expand funding for routine bicycle and pedestrian pathway maintenance

This would expand the TAM funding program to include all multi-use pathways in the county and would oversee a mechanism for funding pathway maintenance.

Recommendation #2: Consider bicycles and pedestrians in performing maintenance and repair work:

- Provide suitable construction warning signs where appropriate.
- Where necessary, provide detour routes around areas undergoing construction.

Recommendation #3: Evaluate the feasibility of implementing a web-based application to report maintenance needs:

- Such a program should be countywide, across jurisdictions and be inclusive of all roadway users.

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Major Maintenance

As detailed below, major maintenance is a less frequent but more costly maintenance activity. It consists of structural repairs to facilities to ensure the following standards are met and to maintain compliance with Caltrans' requirements.

1. Resurfacing as needed to provide a consistent, smooth surface including centerline striping where pathway volumes are high.
2. Widening the paved section to 10 feet with unpaved shoulders on each side is mandatory unless deemed infeasible based on environmental, visual, and community review.
3. Providing a more compacted and consistent unpaved surface on one or both sides of the pathway for runners and walkers.

Improvements, such as the following, should be included to improve user safety, especially for the most vulnerable users such as children and the elderly, and to encourage people to bicycle and walk.

1. Evaluation of roadway crossings and improvements as needed including additional advisory and warning signs, longer signal times, etc.
2. Providing consistent pathway management signing advising users about maximum speed limits, overtaking protocol, slower traffic staying to the right, leash requirements and dog etiquette, and any applicable enforcement codes.
3. Pathway enhancements such as benches, historic markers, gateways, and/or landscaping as appropriate to make the pathway a more functional and enjoyable transportation facility.
4. Exploration of innovative techniques such as colored pavement demarking user groups if approved for use in California, or possibly through a California Traffic Control Devices Committee-approved demonstration project. Colored bikeways have proven effective in other communities in California especially where the paths cross busy roadways.
5. Raising the pathway elevation to reduce or eliminate the impacts of flooding or tidal action.
6. Improving existing bridges as needed.
7. Guide signs and informational kiosks

Recommendation #3: Apply adopted uniform standards for path width, bridge structure width, and pathway/roadway intersections as goals for long-term major maintenance safety improvements.

When undertaking new construction or major rehabilitation projects, review for conformance with applicable standards, guidelines, and best practices.

Emerging Technologies

Jurisdiction(s): All agencies

Project Location(s): All unincorporated areas

The last several years have seen rapid shifts in mobility and how emerging technologies have shifted the focus on how our public rights-of-way will be used in the future. Ride hailing applications, autonomous passenger and freight vehicles, car sharing services, bicycle sharing services, and changing demographics will continue to evolve. The County, in conjunction with partner transportation agencies, stay abreast of these trends and what the future may hold.

Recommendation #4: Monitor and evaluate shifting trends in mobility and work with related agencies to account for those shifts, including revised parking standards, shared-use streets, provision of autonomous vehicle loading and dwell zones, reallocation of lane assignment, increased use of bicycle sharing, and improved connectivity and schedule coordination with transit operators..

Designing for All Ages and Abilities

Jurisdiction(s): County

Project Location(s): All unincorporated areas

Having public rights-of-way usable to everyone, within the appropriate context, is the philosophy of All Ages and Abilities. Its premise is that whether anyone from an eight-year old child trying to get to school to a young adult going to work, to a senior trying to get to the library should not be excluded from using the public realm to get to their destination, even if they do not have access to an automobile. Because many of Marin County's roadways are constrained and overtaxed, providing additional roadways, bicycle lanes, or sidewalks is not easily achievable. There are several resources available to aid communities in evaluating their options when it comes to providing more inclusive streets. The National Association of City Transportation Officials (NACTO) is one of several organizations that have developed guidance and criteria for evaluating transportation improvements and its recommendations have been adopted by many transportation agencies to improve access for all users. For more information, visit: *https://nacto.org/*

Rural Roads Improvements

Jurisdiction(s): County, Caltrans

Project Location(s): All unincorporated areas

Bicycle use on the roads outside of the developed portions of Marin County is high and consists of both recreational and commuting use. Rural roads typically are located outside developed areas and have no (or limited) curbs, gutters, or sidewalks. Many people cited a variety of problems on rural roads throughout the county, which are packaged into one countywide project here. This project would provide a mechanism to address specific problems at locations along Marin County's rural roads, which could be addressed through a combination of any of the following methods:

1. Advisory and warning signs and pavement stencils, including, where appropriate, "Share the Road" signs, "Give 3 Feet" signs, or "Bicycles Allowed Full Use of Lane" signs.
2. Continued implementation of the County's "widen where feasible" program that adds or widens shoulders on designated roadways as part of resurfacing projects where additional improvements such as retaining walls or drainage modifications are not necessary as an interim measure until more comprehensive shoulder improvements can be undertaken.
3. Shoulder widening or new shoulders on designated roadways, particularly on higher-speed segments and on uphill grades (see **Figure 5-6** and **Figure 5-7**)
4. Travel lane re-striping where excess width is available
5. New or improved turnouts, especially in areas where shoulder widening is difficult to accomplish.
6. Enhanced roadway surface maintenance, such as increased sweeping and through a pavement management program.
7. Completion of the County's Bicycle Route Guide Signage Project

Designated on select roadways in West Marin are Class IIr bikeways. Class IIr bikeways are those where the pavement section meets Caltrans standards for Class II bikeways, including width and line striping, but do not include signs or pavement stencils. Class IIr bikeways are in recognition of the need for de facto bicycle lanes while acknowledging concerns about excessive signage and stenciling negatively affecting the rural character of the area.

Some Rural Roads Program example sections most frequently mentioned for improvements include:

1. Highway 1/Shoreline Highway north of Northern Avenue in Tam Valley to the Sonoma County line.
2. Nicasio Valley Road between Sir Francis Drake Boulevard and Nicasio School
3. Sir Francis Drake Boulevard west of Lagunitas
4. Paradise Drive
5. Novato Boulevard west of Stafford Lake
6. Pt. Reyes-Petaluma Road north of Nicasio Reservoir and between Platform Bridge Road and Highway 1
7. Lucas Valley Road west of Westgate Drive
8. North San Pedro Road east of Buck's Landing

Recommendation #4: Continue implementation of the Rural Roads Improvement Program and seek funding to design and construct more robust improvements such as Class IIr bikeways.

Figure 5-6: Sample Rural Class IIr Lane/Shoulder in Steeper Sections

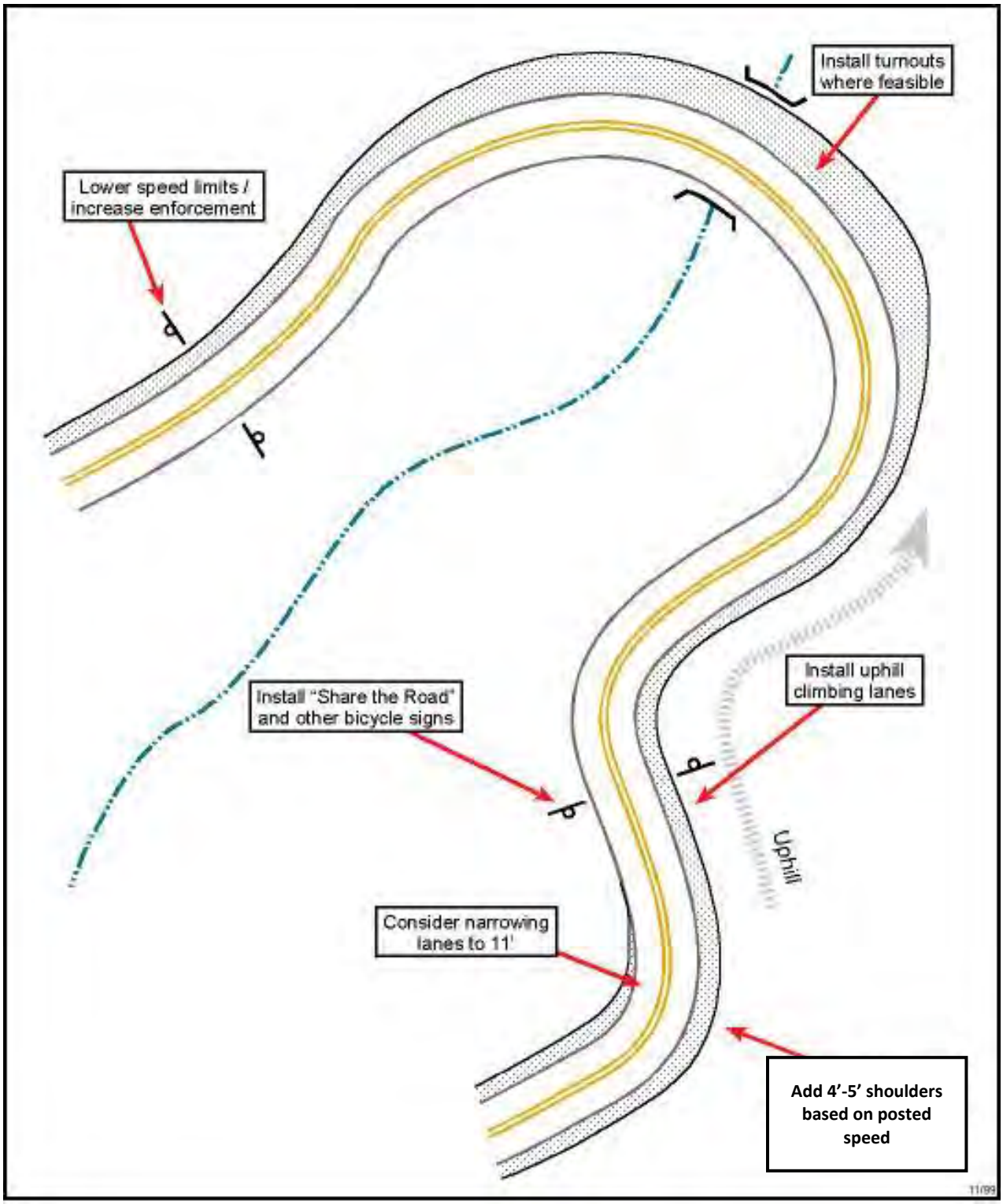
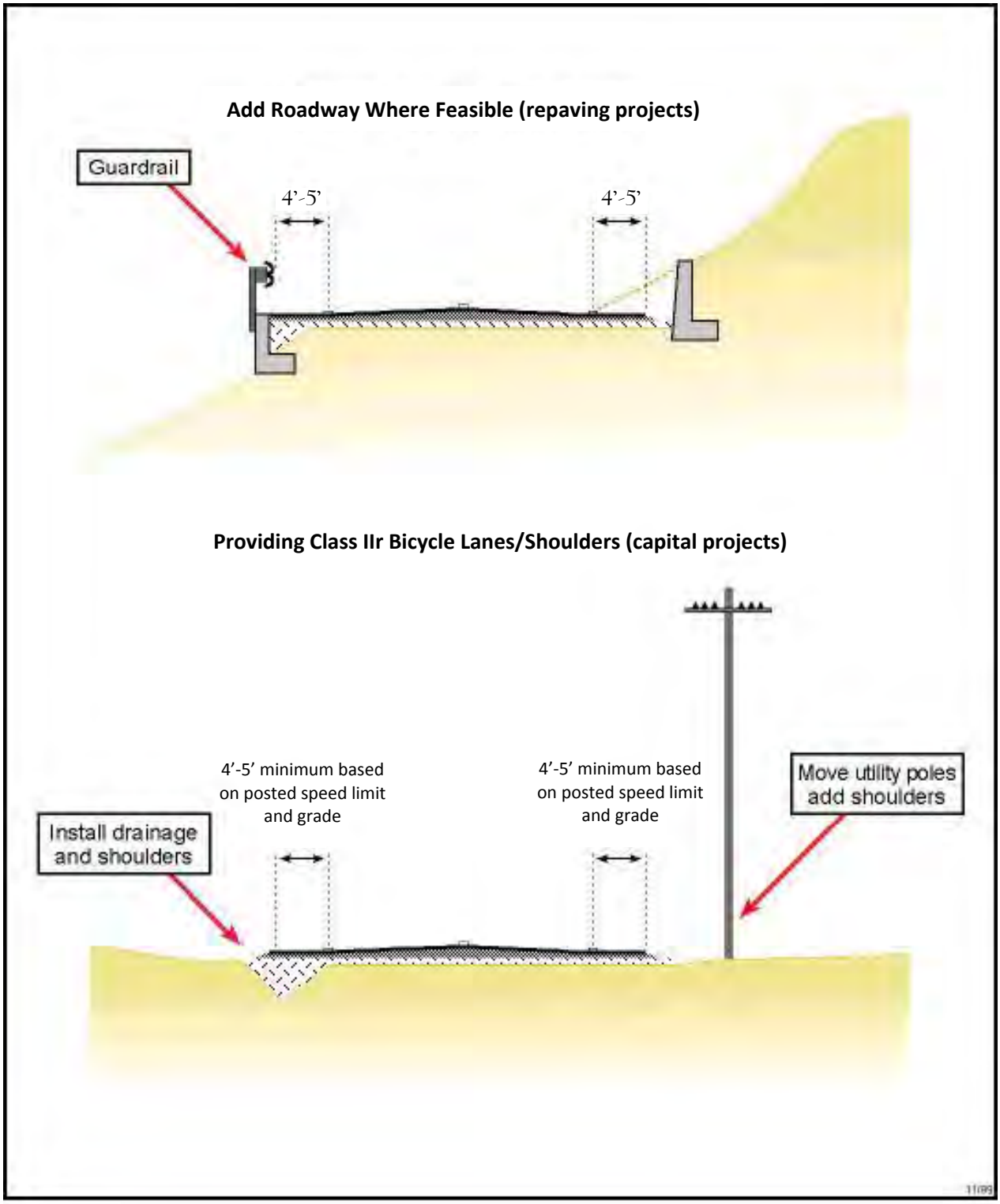


Figure 5-7: Sample Rural Roadway Improvement Cross-sections



Bicycle Parking Project

Jurisdiction(s): County, local cities and towns, school districts, Marin Transit, Golden Gate Transit, Caltrans

Project Location(s): Countywide

Recommended design standards for bicycle parking facilities are summarized below. In addition, *Essentials of Bike Parking: Selecting and Installing Bicycle Parking that Works* (APBP, 2015) provides state of the art national best practices for bicycle parking layout and design and can be downloaded at the following website:

http://c.ymcdn.com/sites/www.apbp.org/resource/resmgr/Bicycle_Parking/EssentialsofBikeParking_FINA.pdf

These standards are a resource available for the County and local agencies to use as they see fit.

In general, all bicycle parking should be in a safe, secure, covered area (if possible), be anchored to the ground, and allow bicycles to lock both frame and wheels. Bicycle parking on sidewalks in commercial areas would be provided according to specific design criteria, reviewed by merchants and the public, and installed as demand warrants. As a general rule, 'U' type racks bolted into the sidewalk are preferred on downtown sidewalks, to be located intermittently and/or at specific bicycle destinations (such as bicycle shops).

Bicycle parking can be provided on public property, required through development entitlements on private property, or provided to private entities on an at-cost basis.

The following bicycle parking improvements are recommended for adoption:

Recommendation #6: Countywide Bicycle Rack Program

In order to provide bicycle parking on the public right of way at all public buildings, shopping centers, employment centers, community facilities, libraries, parks, schools, and transit stops, the County should continue to support bicycle rack funding programs, such as the program funded by the Bay Area Air Quality Management District (BAAQMD) for installation at approved locations.

Recommendation #7: Require bicycle parking for non-residential public and private land uses.

Develop bicycle parking standards for each land use category triggered at appropriate thresholds and utilizing floor area ratios, residential units, activity types, or other criteria to determine the number of spaces. In addition, bicycle parking for existing uses could be implemented by promoting bicycle parking per the adopted standards.

Recommendation #8: A special program to construct sheltered bicycle parking at Marin County Schools should be continued and enhanced, where needed.

Sheltered bicycle parking provides a designated area for enclosed, long-term bicycle parking, that is secured either through lock or by an attendant where bicycles can be securely parked. These simple enclosed facilities are locked from the beginning to the end of school, and address the theft and vandalism concerns of students.

Recommendation #9: Continue and expand existing secure attended bicycle parking at all major special events, to encourage residents and visitors to bicycle rather than drive.

Since adoption of the previous version of this Plan, attended bicycle parking has been provided by the Marin County Bicycle Coalition at some special events in partnership with private sponsors and public agencies. Partnerships like this should be continued and expanded, with event sponsors seeking additional funding to defray the operating expenses.

Recommendation #10: Encourage people to "bike to transit" by expanding bicycle parking, building bicycle stations or other support facilities at key transit facilities, and creating marketing and information materials to increase the public's awareness of the location of bicycle-accessible transit facilities in Marin County.

Bicycle-related improvements such as increased bicycle parking (covered and/or uncovered parking or attended bicycle stations), wayfinding signage, and bike and transit information kiosks can be provided as a part of larger transit facility improvement projects.

Recommendation #11: Improve bicycle access to transit by providing for increased bicycle capacity on transit vehicles.

Currently, bicycle storage is available on all public transit vehicles in Marin County. In 2006 Golden Gate Transit purchased and installed underfloor style racks that hold two bicycles in the luggage compartment of 45-foot long buses which previously had no bicycle carrying capacity due to state law limits on bus length. The remainder of Golden Gate's fleet has the capacity to carry at least three bicycles per vehicle. Front-mounted bicycle racks with capacity for three bicycles are installed on all of Marin Transit's local services, including the West Marin Stagecoach and its three community shuttles.

Innovative Bikeways Program

Jurisdiction(s): County of Marin, local agencies

Project Location(s): Countywide

Caltrans' California Traffic Control Devices Committee (CTCDC) has established a program for testing experimental treatments. This process was used to test and approve the Shared Roadway Bicycle Marking adopted by Caltrans in 2006. More information on the CTCDC process is found at http://www.dot.ca.gov/trafficops/ctcdc/docs/example-experimentprocess.pdf

The Federal Highway Administration (FHWA) has a federal program for testing experimental facilities for possible future inclusion in the Manual of Uniform Traffic Control Devices (MUTCD). More information about the FHWA process can be found at http://mutcd.fhwa.dot.gov/condexper.htm

Recommendation #12: Pursue innovative solutions where appropriate through the established Caltrans or FHWA process.

5.5.2 Freeway Interchange Improvements

Two areas have been identified as major safety concerns, especially for bicyclists traveling between communities or across the county: freeway interchanges and locations where bicycle facilities cross signalized intersections.

Highway 101 in Marin County acts as a major barrier for bicyclists and pedestrians of all ages and abilities. Limited separated overcrossings mean everyone, including young children, is forced to negotiate ramps and intersections – sometimes unprotected – with high traffic volumes simply to reach school, work, or shopping destinations. Even transit users must negotiate these interchanges simply to reach the bus pads. Public comments mentioned these locations from Novato to Sausalito as major barriers in the county.

This proposed project recognizes both the complexity and the similar nature of the issue from interchange to interchange. Many interchanges share the same characteristics, meaning that prototype solutions may have wide applicability. Caltrans has modified interchanges in Marin County, notably the southbound East Blithedale Avenue off-ramp, partially to improve bicycle and pedestrian safety. The Transportation Authority of Marin conducted an extensive study of the Highway 101/Tiburon Boulevard/E. Blithedale Avenue interchange for bicyclist, pedestrian, and transit access improvements, and they developed many short- and long-range project concepts.

Rather than attempt to solve each interchange individually, which is beyond the scope of this Plan, this proposed project encourages a multi-jurisdictional approach. A traffic engineering analysis needs to be done for each site, possibly by Caltrans or by the applicable jurisdiction, which would work with Caltrans to achieve the desired goals. The unincorporated area interchanges mentioned by the public and staff have been: (1) E. Blithedale Avenue/Tiburon Boulevard, (2) E. Sir Francis Drake Boulevard/I-580/Main Street, (3) North San Pedro Road., and (4) Lucas Valley Road. In this manner, similar problems at interchanges, such as high-speed loop ramps, can be addressed at one time rather than on a recurring basis. Recommended modifications to these critical interchanges should be included in Caltrans' District 4 Bicycle/Pedestrian Plan, being drafted as of February 2018.

Types of improvements that might be considered at interchanges include:

- Reducing the ramp entry/merge radius so that vehicles have to slow down rather than be able to accelerate
- Replacing speed ramps with signal-controlled intersections
- Improving crosswalks and warning signs
- New or improved sidewalks or bicycle lanes/shoulders
- Separated facilities
- Constructing new pedestrian crossings near interchanges to serve local needs, especially access to schools and parks for children. A new pedestrian/bicycle overcrossing of U.S 101 is included in the cost estimate, located in Corte Madera.

Recommendation #13: Encourage TAM to establish a multi-jurisdictional project to identify and implement safety improvements for cyclists and pedestrians at freeway interchanges. Work with Caltrans to implement projects in conformance with Caltrans Deputy Directive 64-1 and relevant Complete Streets policies.

5.5.3 Signalized Intersection Improvements

Bicyclists, especially those traveling along major roads at night, are frequently faced with a dangerous double-bind when they arrive at signalized intersections. In the absence of suitable detection or push-buttons, they must frequently choose between running a red light in order to cross or waiting until a car approaches to trip the light in their favor. This creates a situation where bicyclists are forced to behave illegally and thus endanger themselves and others. Most signalized intersections in the unincorporated area have been upgraded since the last Plan update. However, some intersections continue to experience challenges in effectively detecting bicycles, particularly those primarily featuring carbon fiber and/or non-ferrous metals.

Recommendation #14: Install and mark traffic detection loops or employ other detection technology which are responsive to bicycles at all signalized intersections except timed signal locations.

New signal detectors that can detect bicycles and yet not be influenced by motor vehicles on the roadway should be installed where appropriate. Signal detectors and stencils identifying where bicyclists should place their bicycles to trigger signals should be reviewed and approved by the County Department of Public Works staff prior to implementation. Specific implementation criteria may include: sensitivity, impact of overlay projects, cost, and need. One possible alternative to signal detectors is the use of push buttons that are convenient for bicyclists to use, although loops or video detection are preferable to ensure that bicyclists remain safely visible to drivers in the roadway.

Safe Routes to Schools

Jurisdiction(s): Transportation Authority of Marin, County and local agencies, school districts, community groups

Project Location(s): All unincorporated areas

Since adoption of the 2001 and 2008 Plan updates, school commute improvements continue to be a major focus of public and staff comments, partially out of concerns about current safety and impacts of school-related traffic, and partially because of dedicated State and Federal funding opportunities, such as Measure A which provides local funding for Safe Routes educational and safety activities and capital improvements.

As noted in Chapter 3, the Marin Safe Routes to Schools program, administered by TAM, has been successful both from the point of view of mode shift and traffic reduction. The program is also popular with students, parents, advocates, and elected officials. Given the growing size and scope of the program, it is anticipated that the program will continue to produce numerous new, detailed infrastructure and education and safety recommendations.

Unincorporated Areas School Participation

Most school districts serving the unincorporated areas of the county currently participate in the Safe Routes (SR2S) program. SR2S projects and programs may be developed for other communities. Virtually all schools in Marin, especially those not currently participating in the program, could use additional funds for bicycle racks, long-term bicycle parking, and crossing guards, the latter of which are funded by Measure A (Strategy 4.2).

Recommendation #15: Continue to seek funding for school access improvements identified through Safe Routes Improvement Plans

The Safe Routes to Schools program identifies targeted improvements for school access through Improvement Plans developed in consultation with the school and traffic engineers in recommending safety and access improvements that meet engineering standards. As these plans are developed, the County should include appropriate improvements in capital planning and seek funding to construct those improvements.

Recommendation #16: Utilize the Safe Pathways Program

One of the most exciting things SR2S has to offer parents is the opportunity to work on actual capital improvements that will make their children's route to school, and ultimately the whole community, safer. This requires on-going capital funding for SR2S projects, which the Safe Pathways to School program was designed to provide and facilitate. Where SR2S identifies needed circulation and safety improvements, the Safe Pathways program is meant to provide the engineering, environmental clearance, and construction funding for pathway, sidewalk, and street-crossing improvements. The success of this program in leveraging state and federal dollars has benefited the entire community, as a safe network of pedestrian and bicycle facilities becomes a reality and local congestion is reduced. As the lack of safe pathways is the main reason why parents are unwilling to allow their children to walk or bike to school, it is in the best interest of the program to engage parents and clearly identify barriers for the implementation of traffic safety improvements

Recommendation #17: Sustain and Increase Participation, Enthusiasm, and Continuity

The SR2S program success is due largely to its volunteers. The program needs to be creative and tireless at making team leader positions engaging and attractive. An email network, social media outreach, and informal interactive events need to be established that build enthusiasm and promote participation among volunteers. Materials should also be evaluated for "user friendliness" so that team leaders are comfortable using them.

Volunteers should be encouraged to recruit and train their replacements, with positions of responsibility passing on from one year to the next. Volunteers who spend considerable time in one year should be encouraged to serve in an advisory capacity in the next year to mentor their replacements.

Recommendation #18: Continue to Remove Barriers to Alternative Modes

Parent surveys have revealed a high-level of interest in alternative modes if the children were supervised and if the process to become involved did not require much effort. Parents would allow their children to walk or bicycle if accompanied by other parents or children. Carpooling would be an option if the matches were already established. Several schools have established walking or bicycling "school buses" which gather larger numbers of students who walk or ride together with some parental assistance to create a visible and critical mass to enhance safety. These responses show that in order for alternative modes to be attractive, "walking school buses", "bicycling school buses" and carpools should be organized for the parents, preferably by the team leader, to remove any barriers to participation.

Recommendation #19: Increase Transit Access

The survey also showed low public and school bus ridership among students for reasons including safety concerns at bus stops and inconvenient schedules. Between the reinstatement of yellow school buses in some communities and the use of supplemental bus services from Marin Transit, additional opportunities have been provided to allow children to walk and take the bus to school instead of being driven by a parent. Incentives and funding programs to subsidize fares for disadvantaged youth have aided in supporting transit options. Encourage Marin Transit and related school districts to better coordinate school bell times with transit schedules to further encourage transit use to schools.

Marin Transit and Golden Gate Transit staff regularly monitor and evaluate ridership on the supplemental school routes and work to communicate any possible service changes with school and district administrators.

Marin Transit hopes that the Youth Pass program will accomplish similar objectives to the previous demonstration project by providing a convenient medium to local transit. SR2S should work to evaluate these changes as it continues to encourage bus ridership by Marin County students.

Regional Connection Projects

Jurisdiction(s): Marin County, Caltrans, Novato, GGNRA, San Rafael, ABAG (Bay Trail), MTC

Project Location(s): Black Point, San Quentin, Fort Baker, North Novato

Most current intra-regional bicycle or pedestrian travel in Marin County is across the Golden Gate Bridge, which carries the heaviest bicycle flows in the county. The National Park Service, in partnership with other agencies, has made improvements to portions of Alexander Avenue, East Road, and adjacent motor vehicle parking to improve access for bicyclists through Class II on-street bicycle lanes, widened shoulders, and improved directional signage. An additional project will construct a multi-use path from Vista Point down to Fort Baker to provide a direct connection to East Road to provide a less-trafficked route to Sausalito than Alexander Avenue.

A demonstration project to allow bicycles on the Richmond-San Rafael Bridge is under way, provided by placing a movable barrier on the upper deck to separate vehicle lanes from the former shoulder to create a bicycle path. North of Novato, the Highway 101 widening project is providing a combination of Class II on-street bicycle lanes on frontage roads and Class I multi-use path segments, such as the one through Olompali State Park, to provide dedicated bicycle facilities between Novato and Petaluma where previously bicyclists were required to ride on the narrow shoulders of the former expressway.

S.R. 37 to Black Point and Sonoma County involves the legal use of shoulders on a high-speed and heavily-trafficked highway which includes two narrow bridges without shoulders and has safety concerns for bicyclists and pedestrians. Currently, it is rare to see people bicycling or walking on this route. The Bay Trail shows the S.R. 37 corridor as a proposed segment of the Bay Trail, though no specific alignment is identified at this time. The greatest challenge of this corridor is the Petaluma River bridge which has no shoulders and is a substantial structure. The feasibility of adding bicycle facilities on this bridge has not been considered.

This project grouping consists of distinct components, which can be addressed jointly or separately by the appropriate agency:

1. Complete the gap closure between Marin and Sonoma counties by constructing the planned parallel, off-freeway route as part of the Marin-Sonoma Narrows freeway project.
2. Fill the gap between Marin and Sonoma counties by constructing a safe, continuous route along the Highway 37 through completion of this section of the Bay Trail.
3. Improve connections from Sausalito to the Golden Gate Bridge by completing the Class II on-street bicycle lanes on Alexander Avenue and the Class I multi-use path from Vista Point to Fort Baker.
4. Provide shoulders, as appropriate, along Shoreline Highway, Pt. Reyes Petaluma Road, and Tomales-Petaluma Road to connect Marin County with rural Sonoma County (see Rural Roads Improvement Project)

Recommendation #20: Partner with the appropriate agencies to support regional connections to the East Bay, Sonoma County, and San Francisco as described above.

5.5.4 Corte Madera-Mill Valley Connections and Gap Closure–

Mill Valley-Corte Madera Bikeway Project

Jurisdiction(s): Mill Valley, Corte Madera, County of Marin

Project Location(s): Mill Valley, Corte Madera, Unincorporated Mill Valley (Alto area)

A suitable bicycle and pedestrian connection between Mill Valley and Corte Madera has been long-desired, going back to the original countywide bicycle and pedestrian master plan in the 1970s. The greatest challenge is Blithedale Ridge, which separates the two communities. There are three identified routes in this corridor: Camino Alto/Corte Madera Avenue, Horse Hill (Lomita-Meadowsweet), and the closed Alto railroad tunnel.

Corte Madera Avenue/Camino Alto: This two-lane roadway connects the two communities through a gap in Blithedale Ridge and predates current Highway 101 as the original north-south highway. It is relatively steep, winding, and narrow and, except at the bottom of the grade on both sides, lacks sidewalks. Corte Madera Avenue is under the jurisdiction of the Town of Corte Madera while Camino Alto is under the jurisdiction of the City of Mill Valley. Both sections of the roadway were repaved in the mid-2010s; on the Camino Alto portion, the City widened the roadway to provide an uphill Class II on-street bicycle lane. Further improvements to the corridor would necessitate substantial grading and retaining wall structures to provide the necessary space for bicycle lanes or sidewalks.

Horse Hill (Highway 101) Path: This path connects eastern Mill Valley and Corte Madera via a Class I multi-use pathway parallel to Highway 101 and neighborhood streets. Connections to the path are from Lomita Drive on the south side and Meadowsweet Drive or Casa Buena Drive on the north. The gap in the ridge that this route traverses is lower in elevation than the Corte Madera Avenue/Camino Alto route but does have substantial grades, particularly on the path itself and on Lomita Drive. The County installed sidewalks and provided uphill Class II on-street bicycle lanes on a portion of Lomita Drive as part of a school access improvement project, but the remainder of the roadway, as well as much of Meadowsweet and Casa Buena Drives in Corte Madera, do not have bicycle facilities or sidewalks. Further improvements to this corridor would also require substantial grading and retaining walls to provide additional pavement width or sidewalk space.

Alto Tunnel: The Alto Tunnel is a former Northwestern Pacific Railroad tunnel that has been closed since the railroad ceased operations in the late 1970s. The tunnel corridor would provide a flat connection under Blithedale Ridge between the two communities without any roadway crossings and which would provide an accessible path of travel for all ages and abilities. Both the Larkspur-Corte Madera Path and the Mill Valley-Sausalito Path are constructed on the former railroad right of way to the north and south, respectively, of the tunnel, leaving the tunnel corridor segment a gap in the North-South Greenway. Similar in construction technique to the Cal Park Tunnel, it is assumed that a reconstruction of the tunnel structure will be necessary. Several known collapses and subsequent efforts to stabilize the tunnel with gravel and slurry plugs further highlight the complexity of reconstructing the tunnel. The Alto Tunnel is discussed in more detail in **Section 5.2.3**.

5.5.5 Local Pedestrian and Bikeway Projects – Southern Marin

Gate 6 Road Intersection Improvements

Jurisdiction(s): Caltrans, City of Sausalito, County of Marin

Pedestrians and bicyclists at this intersection experience challenges in nearly every direction of travel. Southbound bicyclists on the Mill Valley Sausalito Pathway have no clear route to traverse the intersection and get to the southbound Bridgeway bicycle lanes. Northbound bicyclists are in conflict with southbound bicyclists riding the wrong way to avoid crossing the intersection. Both bicyclists and pedestrians encounter conflicts from a free double right turn from Donahue Street onto southbound Bridgeway. The City of Sausalito has taken the lead to coordinate with the County and Caltrans on modifications to this busy intersection. Planned improvements include:

- Establishment of a clear southbound route for bicyclists traveling from the pathway to the bicycle lanes by installing a designated lane through the intersection arcing from the northwest corner to the southeast corner.
- Provision of a bicyclist queuing area at the northwest corner of the intersection to allow bicyclists waiting to cross the roadway to do so without obstructing other users of the pathway or standing in the roadway.
- Retiming of signals and re-signing the intersection to remove turning movement conflicts and provide dedicated phases for selected movements.
- Retiming of signals to ensure appropriate pedestrian phase length.
- Provision of pedestrian push-buttons and countdown pedestrian signal heads.

Tam Valley Improvements

Jurisdiction(s): Caltrans, County of Marin

Several improvements have been made in the Tam Valley area since the last Plan update, such as construction of the McGlashan/Tennessee Valley Pathway, the Manzanita Pathway, a new bridge over Coyote Creek, installation of sidewalks on Marin Avenue, and traffic signals on Shoreline Highway at Flamingo Road and Tennessee Valley Road to provide a safer crossing for pedestrians. Other desired improvements remaining to be implemented include:

- Provision of Class II on-street bicycle lanes on Shoreline Highway between Coyote Creek and Northern Avenue. The section between Coyote Creek and Flamingo Road is currently funded and scheduled for construction.
- Construction of sidewalk improvements along Shoreline Highway west of Coyote Creek. This project is currently funded as a Caltrans project..
- Safety improvements on Almonte Boulevard and Shoreline Highway at Tam Junction.
- Study of long-term improvements to this area, including extending the McGlashan pathway or installing Class II on-street bicycle lanes to the south towards the Tennessee Valley trailhead.

Tiburon Boulevard Improvements (Strawberry/Tiburon)

Jurisdiction(s): Caltrans, County of Marin, Town of Tiburon

Tiburon Boulevard (S.R. 131) is the primary access route to Tiburon, Belvedere, and Strawberry. It is designed to expressway standards with two travel lanes in each direction, wide shoulders, and a large median, and it has a posted speed of 35 mph to 45 mph. Access to adjacent parcels is generally limited and all intersections but one are signalized. Two different studies have been conducted related to the corridor: one for the area surrounding the corridor and including the interchange with Highway 101 and the other looking at Bay Trail connections between Strawberry and Tiburon. This project features several components, each of which could generally be undertaken separately:

1. Stripe and sign Class II on-street bicycle lanes between Redwood Highway Frontage Road and Trestle Glen Boulevard in conjunction with the Town of Tiburon. This could be done using the existing shoulders which are sufficiently wide that a painted separation zone could be provided to move the bicycle lanes further away from vehicle traffic. Transition/weave zone markings, such as green paint, will be necessary at most intersections due to the geometric features of those intersections, including slip lanes.
2. Construct Highway 101 interchange improvements between Tower Drive/Kipling Drive in Mill Valley to Redwood Highway Frontage Road. The TAM study for this interchange recommended several modifications to improve bicyclist and pedestrian circulation through the interchange, including adding bicycle lanes, widening sidewalks, closing sidewalk gaps, and improving access to the transit stops and freeway bus pads. Proposed improvements were divided into short-, medium-, and long-term aspects. The County should coordinate with Caltrans, TAM, and the City of Mill Valley in seeking to have these improvements implemented.

3. Construct a Class I multi-use path connection on the south side of Tiburon Boulevard between East Strawberry Drive and Greenwood Cove Road, connecting Strawberry to Tiburon. The path was analyzed as part of the Bay Trail study to provide an off-roadway connection between the two streets. Currently there is no sidewalk on Tiburon Boulevard and this one-block section is the only connection for a major bicycling corridor. Pedestrians must walk on the roadway shoulder and westbound bicyclists commonly ride contraflow on the shoulder to avoid crossing Tiburon Boulevard twice to get to E. Strawberry Drive and Belvedere Drive. The project would construct a Class I multi-use path between the two intersections and modify their geometries.
4. Consider installation of Class IV protected bikeways through the corridor instead of Class II on-street bicycle lanes. In conjunction with Caltrans and the Town of Tiburon, the County should study the feasibility of Class IV protected bikeways on each side of Tiburon Boulevard. The study would address right of way availability, roadway and shoulder design factors, any needed grading or retaining walls, and any intersection modifications necessary to provide a proper interface.

Lomita Drive Improvements (Alto/Mill Valley)

Jurisdiction(s): County of Marin, City of Mill Valley

Lomita Drive is a primary access route for the Alto neighborhood. It also provides access to two schools, a shopping center, and is a designated bicycle route between Mill Valley and Corte Madera. It is primarily maintained by the County, but there are also some sections maintained by the City of Mill Valley. Lomita Drive is primarily residential in character with two lanes; some sections have sidewalks but others do not.

The County, through a Safe Pathways grant, constructed sidewalks and added uphill Class II on-street bicycle lanes on a portion of Lomita Drive in 2014. However, several sections remain without sidewalks and the roadway can experience significant traffic volumes during school drop-off and pick-up times. Providing continuous pedestrian and bicycle facilities will improve access for the neighborhood and enables a safe path of travel to nearby schools. This project consists of four components:

1. Close the sidewalk gap between Ring Mountain School and Greenfield Court, including a short section of missing sidewalk between the school and the subdivision, to create a continuous sidewalk between the Mill Valley-Sausalito Path and Shell Road (east).
2. Install Class II on-street bicycle lanes in front of Ring Mountain and Edna Maguire schools. The bicycle lanes were anticipated as part of the Safe Pathways sidewalk project and the reconstruction of Edna Maguire School; however, completion of some remaining drainage improvements will need to occur when this section of Lomita Drive is resurfaced. During roadway resurfacing, there will be an opportunity to add bicycle lanes.

3. Sidewalk installation and replacement on the north-south segment of Lomita Drive between Edna Maguire School and Ashford Avenue. This segment is also an important school access route with some sections under the City of Mill Valley's jurisdiction and others under the jurisdiction of the County. The project would replace damaged or substandard sidewalks that currently exist and construct a new, raised concrete sidewalk where there is currently only a modified shoulder of the roadway.

Belvedere Drive Sidewalk (Strawberry)
Jurisdiction: County of Marin

Belvedere Drive is an important link between Strawberry Village, Strawberry Elementary School, and the surrounding residential neighborhoods. There is a major gap in the existing sidewalk on Belvedere Drive between Bayview Terrace (west) and Ricardo Road, so pedestrians must walk in the roadway of a high-volume collector street. Providing a sidewalk would provide a safe path of travel for pedestrians in the neighborhood to get to the shopping center and transit services as well as for children attending the school.

Redwood Highway Frontage Road Bike Lanes (Strawberry)
Jurisdiction(s): Caltrans, County of Marin

Redwood Highway Frontage Road is the main north-south spine on the east side of Strawberry and is a critical link for pedestrians and bicyclists looking to travel between Mill Valley, Strawberry, and Tiburon. The route includes a pedestrian overcrossing and a roadway undercrossing of Highway 101 that provide a more desirable route than navigating the Tiburon Boulevard interchange. This project would install Class II on-street bicycle lanes between Tiburon Boulevard and the Mill Valley city limits near the Richardson Bay Bridge. The vast majority of the roadway can accommodate bicycle lanes as it is currently constructed, although widening the pavement by two feet would allow for a more favorable roadway cross section, particularly in relation to the on-street parking in front of the shopping center.

The segment between Seminary Drive and the Highway 101 ramps/DeSilva Island Drive is extremely constrained and in the interim, could only be designated as a Class III bicycle route with sharrows for added emphasis. At such a time as any of the fronting properties are redeveloped, dedication or acquisition of additional right of way should occur to enable the provision of Class II bicycle lanes in this segment.

Mill Valley-Sausalito Path Rehabilitation

Jurisdiction(s): Caltrans, County of Marin

The Mill Valley-Sausalito Path is a Class I multi-use path extending from Vasco Court in Mill Valley in the north to Gate 6 Road in Sausalito to the south. It was originally constructed in 1982 on the railbed of the former Northwestern Pacific Railroad and is by far the most highly-used pathway in Marin County, seeing an average of over 2,500 users per day and over 5,000 users on some of its busiest days. As a major segment of the North-South Greenway, it serves as the primary spine route through southern Marin County while also providing local access to several parks, schools, neighborhoods, commercial areas, and the Mill Valley Community Center. With the exception of a bicycle roundabout near Mill Valley Middle School, nearly all of the pavement on the path is original. In 2017, two segments of the path were repaved, from Vasco Court to East Blithedale Avenue and from East Blithedale Avenue to Almonte Boulevard. The remaining segment to the south will be repaved once funding is secured.

The path faces several challenges, including four wooden bridges that are at or beyond their useful life and tidal flooding that periodically inundates sections of the path. The high number of path users has also resulted in conflicts between pedestrians, bicyclists, people walking dogs, and others. Widening the path to accommodate the increased usage is desirable but faces several challenges related to environmental concerns. Further, with the assumed increase in sea levels in the coming decades, the base elevation of the path means it will be subjected to increased tidal flooding.

Recommendation #21: As part of a comprehensive evaluation of the area in regards to sea level rise, incorporate a resilient, wider pathway as part of the project through the corridor, including the possibility of a modified alignment. In the interim, continue to maintain the existing path and seek ways to address the periodic tidal flooding that currently occurs.

5.5.6 Local Pedestrian and Bikeway Projects – Central Marin

Central Marin Ferry Connection Project – Phase 2

Jurisdiction(s): Corte Madera, Larkspur, Marin County, GGBHTD, Caltrans, SMART

Project Location(s): Unincorporated, Larkspur, and Corte Madera

With the completion of the first phase of the Central Marin Ferry Connection project in 2016 that included the truss bridge over East Sir Francis Drake Boulevard, there is now a continuous, grade-separated pathway between Andersen Drive in San Rafael to the Corte Madera Creek Path via the Cal Park Tunnel. The next phase of this project is to address the current condition of a narrow sidewalk along the Highway 101 northbound off ramp over Corte Madera Creek. The funded project will widen the current walkway on the freeway structure over the creek to a full multi-use facility and connect to Redwood Highway Frontage Road near the pedestrian overcrossing. Additional analysis is under way on extending the path southward to the Wornum Drive undercrossing and Sandra Marker Path, either continuing south along the frontage road or connecting to the former Northwestern Pacific right of way east of the commercial and industrial area.

The designated North-South Greenway alignment from previous studies and analyses remains the railroad right of way south from the existing bridge over East Sir Francis Drake to a new bridge over Corte Madera Creek and continuing on the railroad right of way to Wornum Drive. This alignment is the most direct and traffic-separated route for this segment of the North-South Greenway.

Recommendation #22: Continue to pursue completion of Central Marin Ferry Connection Project and the North-South Greenway in this corridor.

East Sir Francis Drake Boulevard Bikeway

Jurisdiction(s): Larkspur, San Rafael, Marin County, Caltrans

The East Sir Francis Drake Bikeway is a gap closure project on one of the county's major east-west spines and provides access to a regional connection at the Richmond Bridge; it is also designated as part of the Bay Trail. The corridor was analyzed in 2011 in the San Quentin Area Bicycle and Pedestrian Access Study, analyzing several alternatives to connect the current terminus of the Corte Madera Creek pathway at Remillard Park in Larkspur with eastern San Rafael, San Quentin Village, and a planned connection to a bikeway on the Richmond Bridge. With the construction of the Richmond Bridge bikeway in 2017, this remaining gap becomes more critical due to the lack of current connections to the San Quentin peninsula. Currently, at the end of the Corte Madera Creek path, E. Sir Francis Drake Boulevard is one lane in each direction with wide shoulders up to its intersection with Andersen Drive and the I-580 ramps. The ramps and the shoulders of eastbound I-580 to the Main Street/San Quentin exit are one of the few locations in Marin in which it is legal for bicyclists to ride on the freeway shoulder, though sections are extremely narrow. The project contains two components:

1. Extending the Corte Madera Creek Class I multi-use path from its current terminus at Remillard Park along the south/east side of E. Sir Francis Drake Boulevard to Andersen Drive. Plans to make congestion-related improvements to the roadway will extend the path slightly eastward from its current terminus. Once northeast of the west gate to San Quentin State Prison, the roadway ascends a grade towards the gap in the ridge at Andersen Drive. In this section it is likely that retaining walls will be necessary to support the pathway.

2. From Andersen Drive to Main Street, there were several alternative routings considered. One alternative was extending the Class I multi-use path beyond Andersen Drive along the south side of I-580 to Main Street. A second alternative considered was using a combination of path connections and on-street bicycle lanes on the freeway structure to access E. Francisco Boulevard. A hybrid of these two options was also considered. This segment will require additional analysis to determine the best alternative as each solution has considerable cost-intensive aspects, such as cutting the hillside on the east side of the roadway back, constructing a path tunnel under the E. Sir Francis Drake Boulevard/Andersen Drive intersection, and/or widening the freeway overpass. Whether the E. Sir Francis Drake Boulevard/Andersen Drive intersection is signalized may further direct the level of improvements.

Sir Francis Drake Boulevard Improvements (Greenbrae/Kentfield)

Jurisdiction(s): Larkspur, Marin County, Caltrans

Sir Francis Drake Boulevard through Greenbrae and Kentfield is one of the county's most congested corridors. Previous Plan updates have identified the roadway for potential Class II on-street bicycle lanes. Significant constraints in pavement width and usage of the roadway for vehicle lanes east of Wolfe Grade make provision of bicycle lanes difficult, though a proximate parallel route exists to the south on the Corte Madera Creek Path and South Eliseo Drive. A corridor rehabilitation project currently in planning for the corridor is recommending improvements focused on traffic congestion relief, pedestrian safety improvements, and facilitating paths of travel for area children to get to schools. In addition to substantial pedestrian crossing improvements at multiple intersections, the rehabilitation project is also analyzing the concept of widening the current 4- to 5-foot-wide sidewalk on the north side of the roadway between Eliseo Drive and Bon Air Road to a 10+ foot-wide sidewalk/pathway to provide a safer path of travel for bicyclists and pedestrians, particularly those who reside on the Greenbrae hills. A similar widened path would be constructed on the southside of the roadway from Bon Air Road to Laurel Grove Avenue.

In addition to the widened sidewalk component of the corridor rehabilitation project, this Plan retains the proposed Class II on-street bicycle lane designation for the corridor, with the following assumptions:

- *West of Wolfe Grade to the Ross Town Limits*: The roadway has sufficient width to stripe Class II on-street bicycle lanes without affecting current functionality of the roadway, including retention of existing on-street parking needed by area businesses.
- *East of Wolfe Grade to Eliseo Drive*: It is currently not feasible to provide Class II on-street bicycle lanes in this segment because anticipated right-of-way constraints. Should conditions change in the future, this segment should be considered for Class II on-street bicycle lanes to improve connections in the east-west corridor.

Sir Francis Drake Boulevard Bike Lanes Gap Closure (Fairfax)

Jurisdiction(s): Marin County

Between the Fairfax Town Limits and the recently-constructed Class II bicycle lane on Sir Francis Drake Boulevard ascending White's Hill, there is a short gap with no bicycle facilities. Closing this gap entails mostly striping and signage improvements with minor pavement widening. A pavement rehabilitation project scheduled for this area should incorporate these improvements as part of the work program.

Butterfield Road Bike Lanes (Sleepy Hollow)

Jurisdiction(s): Marin County

The unincorporated segment of Butterfield Road in Sleepy Hollow has wide shoulders and sufficient right of way to implement a bicycle facility. Currently, vehicles are permitted to park in the shoulder area which forces bicyclists out into the vehicle lanes. Butterfield Road is the sole access to Sleepy Hollow and is a major school access route which sees significant congestion. Providing a safe path of travel for bicyclists on this busy roadway may encourage students to bicycle to school and help reduce some of the existing school traffic congestion. The project would prohibit parking on the paved shoulder of the roadway while permitting it off of the pavement or on paved pads outside of the bicycle facilities.

North San Pedro Road Bike Lanes (Santa Venetia)

Jurisdiction(s): Marin County, San Rafael

Other than the new SMART pathway to the north, North San Pedro Road is effectively the only access to the Santa Venetia community, including providing access to China Camp State Park, and, as a result, it sees a significant number of bicyclists. This Plan designates North San Pedro Road from Civic Center Drive to Buck's Landing for proposed Class II on-street bicycle lanes. On-street parking is permitted for the vast majority of this segment; east of Vendola Drive the road is rural in nature. Providing the needed space for bicycle lanes can be accomplished on the portion between Oxford Drive and Vendola Drive with minor striping and signing modifications. Between Oxford Drive and Civic Center Drive, the roadway is more constrained. In particular, the high volume of on-street parking from surrounding land uses that have insufficient on-site parking for their operations presents a difficult tradeoff for roadway space. Absent prohibiting parking in this section, a redesign of the roadway is necessary which may affect current medians and other aspects of the current layout.

College of Marin Pedestrian and Bicycle Access Improvements (Kentfield, Ross, Larkspur)

Jurisdiction(s): Larkspur, Ross, Marin County

This project calls for improvements in the unincorporated areas surrounding the College of Marin Kentfield campus. Specific improvements would include:

- Extending the existing Class II bicycle lanes on College Avenue from the Corte Madera Creek Path to Sir Francis Drake Boulevard.
- Adding Sharrows to Kent Avenue to designate safer riding areas outside the "door zone" alongside parallel parking.
- Upgrading the pedestrian beacon at the Corte Madera Creek path crossing of College Avenue to a more visible and user-responsive treatment.
- Improve bicycle and pedestrian access and facilities at bus stops serving the College of Marin.
- Improve pedestrian crossings on Sir Francis Drake Boulevard at Ash Avenue, College Avenue, and Toussin Avenue as designated for the Sir Francis Drake Boulevard Rehabilitation Project.

5.5.7 Local Pedestrian and Bikeway Projects – Northern Marin

Oakview Connector Project (Marinwood)

Jurisdiction(s): San Rafael, Marin County, Caltrans

This project is a potential public-private partnership in which local development and construction of a new roadway would be used as an opportunity to create an important linkage through an area of unincorporated Marin County.

The Oakview Connector is proposed to be a combination of Class II on-street bicycle lanes and Class I multi-use paths between the end of Los Gamos Road at Lucas Valley Road and the end of Marinwood Avenue to the north. New street construction at the south end of Marinwood Avenue as a part of planned development would allow for on-street bicycle lanes to be extended south through the new development. At the point the new street ends, approximately 0.5 miles south of Miller Creek Road, a new Class I multi-use path would connect the neighborhood to the north end of Los Gamos Road. Alignment of the path would be affected by the future reconstruction of the Lucas Valley interchange and the likely need for a new signal at Los Gamos Drive.

This project has been established as a priority for four reasons. First, it serves as an important connector for the populous neighborhoods of North San Rafael which currently have limited bikeway access opportunities. Second, the project has the potential for minimal fiscal impact if it can be funded entirely through development mitigation requirements. Third, the project will connect directly to the existing Pacheco Hill Pathway that leads to Novato and to Los Gamos Drive, which provides a relatively flat connection for bicyclists and pedestrians to Terra Linda.

Recommendation #23: Pursue the Oakview connector through public-private partnership as a condition of development, where possible; pursue funding to design and build segments that must be completed by public agencies.

Lucas Valley Path

Jurisdiction(s): City of San Rafael, Marin County

In the 2008 Plan, a Class I multi-use path was proposed on the former alignment of Lucas Valley Road. This segment is now a County Parks facility with an unpaved path between Canyon Oak Drive and Mt. Lassen Drive. The 2008 Plan update included an extension of the alignment southeast along a new bridge over Miller Creek to the intersection of Lucas Valley Road and Miller Creek Road. This extension remains unconstructed. This Plan extends the proposed Class I pathway on the remaining old Lucas Valley Road alignment westward to Bridgegate Drive.

San Antonio Road Bike Lanes

Jurisdiction(s): Marin County, Caltrans

As part of the Highway 101 "Narrows" freeway project, San Antonio Road was extended southward on a new frontage road to connect with the new interchange. The new frontage road was constructed with Class II on-street bicycle lanes. However, the remnant segment of the roadway, continuing northward to the Sonoma County Line, has not been improved as part of that project while the entire road sees relatively high-speed motor vehicle traffic. Upon completion of the freeway project this northernmost section of the North-South Bikeway will be the regional connection to Petaluma and the rest of Sonoma County through the Highway 101 corridor. This project widens the remaining section of San Antonio Road to construct 5 foot-wide Class II on-street bicycle lanes, completing the link to Sonoma County.

Stafford Lake Path

Jurisdiction(s): City of Novato, Marin County

The Stafford Lake Path would consist of a Class I multi-use path originating in the City of Novato at Novato Boulevard and Sutro Avenue then continuing west to Stafford Lake. The existing asphalt sidepath runs adjacent to Novato Boulevard and is within the road right of way. However, it is narrow and has experienced deterioration, making it not suitable for combined bi-directional bicycle and pedestrian travel. Because Novato Boulevard has narrow shoulders in this area, even in its decrepit state the existing sidepath is preferred by many users going to the popular park at the lake.

The path has been proposed for improvement over the years with the greatest challenge being that widening the path adjacent to the roadway is not feasible due to insufficient right-of-way width and separation requirements for Class I multi-use paths. Additional challenges occur between the golf course entrance and the top of the lake's dam as the narrow path is sandwiched between the roadway and the dam's spillway. Marin County Parks has been evaluating options for constructing the path on alternative alignments away from the roadway and closer to Novato Creek. Construction of this new path will require coordination with the City of Novato and adjacent landowners and may necessitate acquisition of certain lands.

5.5.8 Local Pedestrian and Bikeway Projects – West Marin

White's Hill Gap Closure Project

Jurisdiction(s): Marin County, Fairfax

Project Location(s): Trestle Glen/Baywood Canyon, Woodacre, West Marin

As with other gap closure projects defined by connecting two communities separated by hills, this project involves several alternatives which must be evaluated first to determine the most cost-effective solution. Any alternative that utilizes private property will require negotiation with the owner first.

Option #1: Evaluate the White's Hill Tunnel as a potential connection to Woodacre. While this would provide a level, direct connection between Fairfax and San Geronimo Valley, it has significant obstacles. First, the tunnel is known to be at least partially collapsed. Second, both approaches have constraints including fill material on the west side, and private property issues on the east side. Finally, the east approach would require a new undercrossing of Sir Francis Drake Boulevard so that bicyclists and pedestrians would not have to cross this road on a blind curve.

Option #2: Evaluate the use of the original NWP narrow gauge (North Pacific Coast Railroad) grade that was used between 1875 and 1904. This route is visible from the White's Hill summit looking down Ross Valley and San Geronimo Valley. This route could provide a gentle, steady grade for people climbing White's Hill, especially from Fairfax. However, there are several major obstacles to this proposal. First, the right of way is partially owned by the Open Space District which may not permit paving and bridge improvements in this area, while a couple of locations are privately owned. Access on the Fairfax side would require traversing a private development. There are several major gaps where trestles once existed and where current users are required to make steep descents and ascents. Creating a grade-separated pathway connection through the summit cut would be expensive and would be necessary to avoid having people crossing the roadway on a blind curve.

Samuel P. Taylor Bike Path/East-West Bikeway Project

Jurisdiction(s): Marin County, State Parks, GGNRA

Location(s): Lagunitas, West Marin, Tocaloma, Jewell, Pt. Reyes Station

The segment of the former NWP narrow gauge line between Woodacre and Pt. Reyes Station followed the course of Lagunitas and Papermill Creeks, creating an ideal location for a Class I multi-use path when it was abandoned. Part of this right of way is already in use as a paved trail between Tocaloma and Samuel P. Taylor State Park, offering an important safety amenity to bicyclists and pedestrians moving through this corridor. It also offers a direct safety benefit to motor vehicles by removing a large number of people bicycling that would have otherwise needed to share the narrow, twisting roadway.

In 2005, the Inkwells Bridge was completed, fulfilling the first of the recommendations for this project identified in the 2001 Plan update.

This project is composed of several remaining components, described below.

1. It is recommended that a 10-foot-wide hard surface pathway be installed over the current soft-surface path from the Inkwells Bridge to the existing paved segment through Samuel P. Taylor Park. A substantial area alongside the proposed hard surface area should be left unpaved for pedestrian and equestrian use. Where feasible, this soft surface area should be of equal width to the paved area, to ensure equity among users.
2. Alternative paving methods should be explored to provide a hard surface for the above pathway that can be efficiently maintained and provide ADA compliance while preserving the natural character of the existing facility. Much of this segment has sufficient width that a paved surface and unpaved surface could be provided.
3. Improve the existing paved section through Samuel P. Taylor Park to Tocaloma, especially maintenance in the winter and fall.
4. Complete the current feasibility study analyzing extending the trail 5.2 miles from Tocaloma to Pt. Reyes Station, through private ranchland and GGNRA property. This link would provide a total of 10.6 miles of separated pathway between the Inkwells Bridge and Pt. Reyes Station, offering a uniquely level scenic route and important safety benefits to the area residents and numerous visitors, including removing the need to ride on either Sir Francis Drake Boulevard or Point Reyes-Petaluma Road to Olema and Point Reyes Station as both roads are winding and without shoulders. Potential constraints to this linkage, other than gaining access to private property with active cattle operations or designing a bypass which circumnavigates the private lands, would be environmental impacts, open space impacts, and the need to reconstruct a bridge of significant length across Lagunitas Creek near Pt. Reyes Station.
5. Support the development of a pathway or bikeway (or a combination of the two, as appropriate) to connect Point Reyes Station to Inverness Park. Other segments, particularly those between Inverness and Inverness Park, may need to be addressed by improvements along Sir Francis Drake Boulevard in the County's jurisdiction. This segment of the project was consistently identified by West Marin residents as a top priority.

Recommendation #24: Pursue the above five recommendations with the goal of implementing, where possible, a continuous east-west route between Lagunitas and Inverness Park separated from automobile traffic.

Stinson Beach Sidewalk/Path
Jurisdiction(s): Caltrans, Marin County, State Parks, GGNRA

Location: Stinson Beach

The segment of Shoreline Highway between Calle del Arroyo and Willow Street serves as Stinson Beach's Main Street. On its eastern half it is lined with local businesses and beach access while the western half connects to the beach neighborhoods to the west. Parking is somewhat haphazard and there is no dedicated pedestrian path of travel along the roadway which, especially during busy weekends, means pedestrians are walking in the vehicle lanes of the roadway. The sidewalk/path is a desire expressed by local residents to create a safe, separated path of travel through the village which would also include addressing the parking arrangements along the roadway

Point Reyes Station Safe Routes to Schools Improvements
Jurisdiction(s): Caltrans, Marin County,

Location: Pt. Reyes Station

Safe Routes to Schools has recommended several improvements to the section of Shoreline Highway between Point Reyes Petaluma Road and A Street in its West Marin School Improvement Plan, including high-visibility crosswalks and signage, path improvements, and improved delineation of the pedestrian right of way.

5.6. Additional Local Community Bikeway and Pedestrian Project Ideas

Residents of Marin County's unincorporated communities, organizations, and committees contributed a information and ideas during the development of this Plan and previous updates. The following project ideas have been suggested by these individuals, local advisory committees, and/or staff. All of the ideas identified in the following descriptions are strictly concepts at this point. The need, feasibility, impact, location, cost, or other basic information is not known. The purpose of listing ideas or concepts here is to initiate discussion and, if appropriate, additional feasibility analysis, ultimately leading to adoption by the Board of Supervisors.

Recommendation #25: Local planning groups, organizations, and others, in conjunction with the County, should initiate local discussions and planning for bikeway and pedestrian projects, some of which are listed below. Where needed, conduct additional analysis to determine overall project feasibility cost, impacts, and other information. Prior to implementation, additional public and CEQA input and review should be completed, along with needed funding, design, and construction.

5.6.1 West Marin

West Marin is a unique land setting of agricultural, urban, recreational, and tourism uses. West Marin comprises the area south to Stinson Beach and north to Tomales along with the San Geronimo Valley and the Point Reyes Peninsula.

The West Marin area gets 2.6 million plus visitors per year to the Point Reyes National Seashore and has roads not conducive to safe bicycle and pedestrian travel. Features of this area include former railway rights of ways, levee roads, existing road rights-of-way, and the possibility for roadway reconfiguration to allow for safer use by pedestrians and bicyclists.

West Marin is in need of improved routes linking its communities for safer pedestrian and bicycle travel. Specific routes to be considered in linking communities in West Marin for pedestrians and bicyclists are:

1. Tocaloma to Point Reyes Station
2. Tocaloma to Olema
3. Point Reyes Station to the Bear Valley Visitors Center
4. Point Reyes Station to Inverness
5. Olema south paralleling Highway 1 to Bolinas (Rift Zone Trail)
6. Olema to the Bear Valley Visitors Center
7. Point Reyes to Marshall
8. Highway 1 corridor south from Bolinas to Stinson and Muir Beach Communities

Pt. Reyes and Inverness Area

The document *West Marin Pathways Study* (1988) prepared by Brian Wittenkeller & Associates for the County and West Marin Paths, a local community group, provided detailed information for a route from Point Reyes Station to Inverness and then to the Visitor Center. Concerns with potential costs and ecological effects put the plan on hold. A portion of the path was constructed in the vicinity of White House Pool west of Point Reyes Station and is currently maintained by the Marin County Parks Department.

Consideration of the following should be made for a network of paths in this area of West Marin:

1. This Plan should be coordinated with National Park Service General Management Plan for Point Reyes National Seashore.
2. The Rift Zone Trail should be identified as a possible bicycle and pedestrian corridor for safer travel between Olema and Bolinas.
3. Sir Francis Drake Boulevard and Highway 1 in Olema are unsuitable for pedestrian foot traffic. Design considerations should be suggested to improve the safety on this stretch of road.
4. Explore the possibility of a path from Tocaloma to Olema.

Bolinas

Construct the second phase of the Class I multi-use path that connects to downtown Bolinas by extending it to Mesa Road.

Muir Beach

1. Improve shoulders on Panoramic Highway and Muir Woods Road, where feasible.
2. New crosswalks in heavily crossed trailhead locations, such as the Dipsea Trail and the Panoramic-Bayview intersection.

Stinson Beach

1. Intersection of Highway 1 and Calle del Mar in the center of town (under Caltrans jurisdiction): need improvements for pedestrians and bicyclists to more safely cross this busy intersection.
2. Install better signage and flashing warning light at the Stinson Campus of the Bolinas-Stinson School on Highway 1 (under Caltrans jurisdiction).
3. Create a designated pick up or drop off area for students. A safe walkway from this area to the school gate is needed (under Caltrans jurisdiction).
4. Install bicycle racks or lockers at all major points of interest, together with informational placards to direct usage. This will encourage greater bicycle usage for local recreation and commercial business, as well as provide bicycling visitors with an opportunity to patronize local businesses and recreational facilities on foot.
5. Advisory and warning signs should be installed where appropriate at all areas of use and congestion (under Caltrans jurisdiction).
6. Shoulders should be improved where feasible.

San Geronimo Valley

1. Consider bikeway facilities on Castro Street and Meadow Way.
2. Construct a tunnel under Sir Francis Drake Boulevard between the school and Meadow Way.
3. If the San Geronimo Golf Course is publicly acquired and modified, consider providing a multi-use path connecting Woodacre and the Lagunitas School through the property as an alternative to Sir Francis Drake Boulevard.

5.6.2 Central Marin

Kentfield/Greenbrae Area

Construct a Class I multi-use path in and around the college campus connecting both sides of College Avenue with the Magnolia commercial area.

5.6.3 Southern Marin

North Strawberry & Alto

Explore an east-west connection across Highway 101 between the Alto Ridge and Tiburon Open Space areas.

5.6.4 Northern Marin

Marinwood/Lucas Valley

1. Construct Class IV protected bikeways, roundabouts, speed tables, and high-visibility safety treatments on Las Gallinas Avenue and Miller Creek Road.
2. Connect to the future SMART pathway through St. Vincent's/Silveira.

5.7. Pedestrian Projects

Preliminary pedestrian projects developed by Design, Community, & Environment are presented on the following pages. These consist of both prototype and site-specific recommendations. In addition to this information, the County's *General Plan* provides policies regarding the implementation and integration of pedestrian needs into the transportation system.

5.7.1 New Sidewalks In Residential Neighborhoods

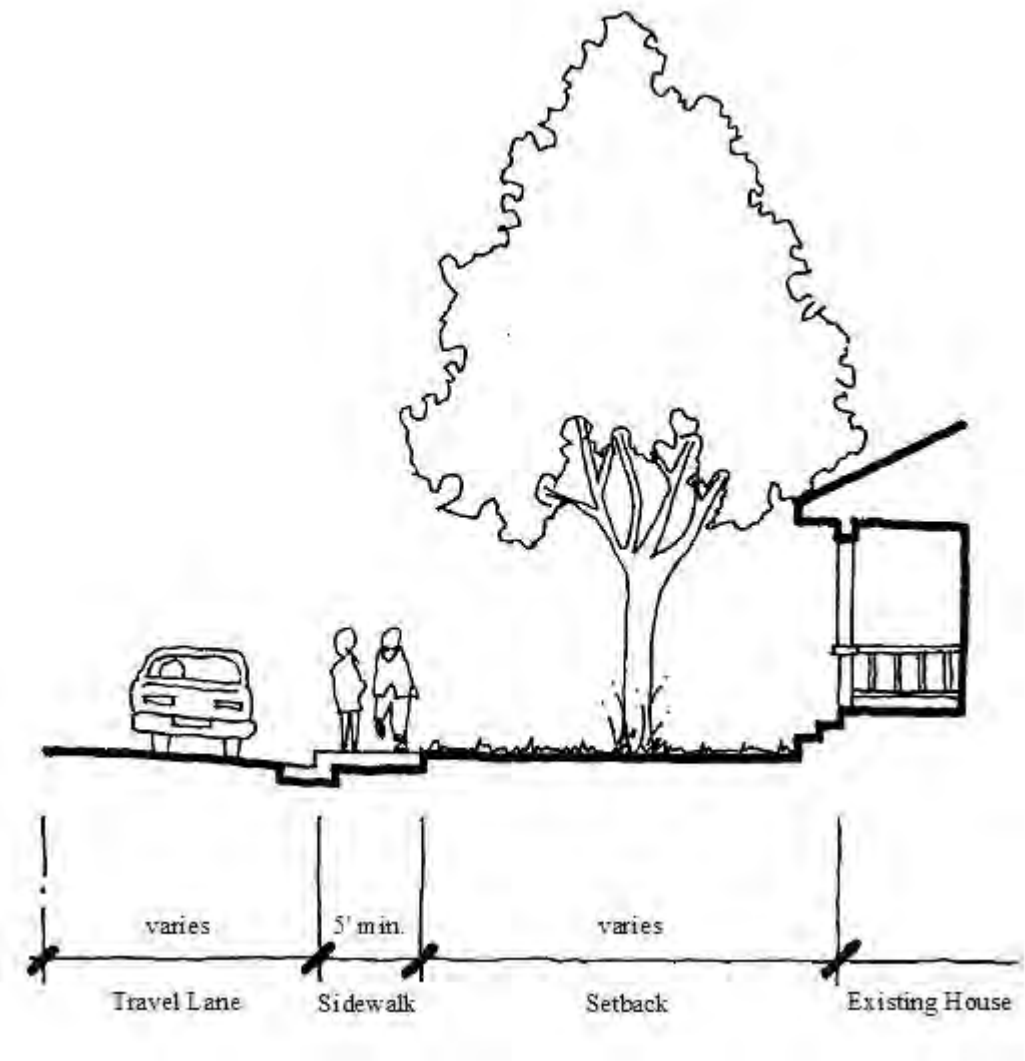
Many of Marin County's unincorporated communities and villages lack sidewalks. Although not every neighborhood may desire sidewalks, there will be places that could benefit from their installation. Safer trips by schoolchildren, shopping trips, and recreation trips are just some of the reasons that a community may wish to see sidewalks built in one of their existing neighborhoods.

It is preferable that sidewalks be at least 5 feet wide to allow two pedestrians to pass each other or walk abreast. However, in constrained situations, the sidewalks may be limited to a width of 4 feet. Below are some basic guidelines that should be followed when installing new sidewalks.

Sidewalks on Narrow Streets

The illustration on this page shows the minimal solution for new sidewalks in existing neighborhoods. It shows a site constrained by a small setback to the existing house or significant landscaping and a narrow street condition that does not allow for a parking lane between the pedestrians on the sidewalk and the motor vehicle travel lane.

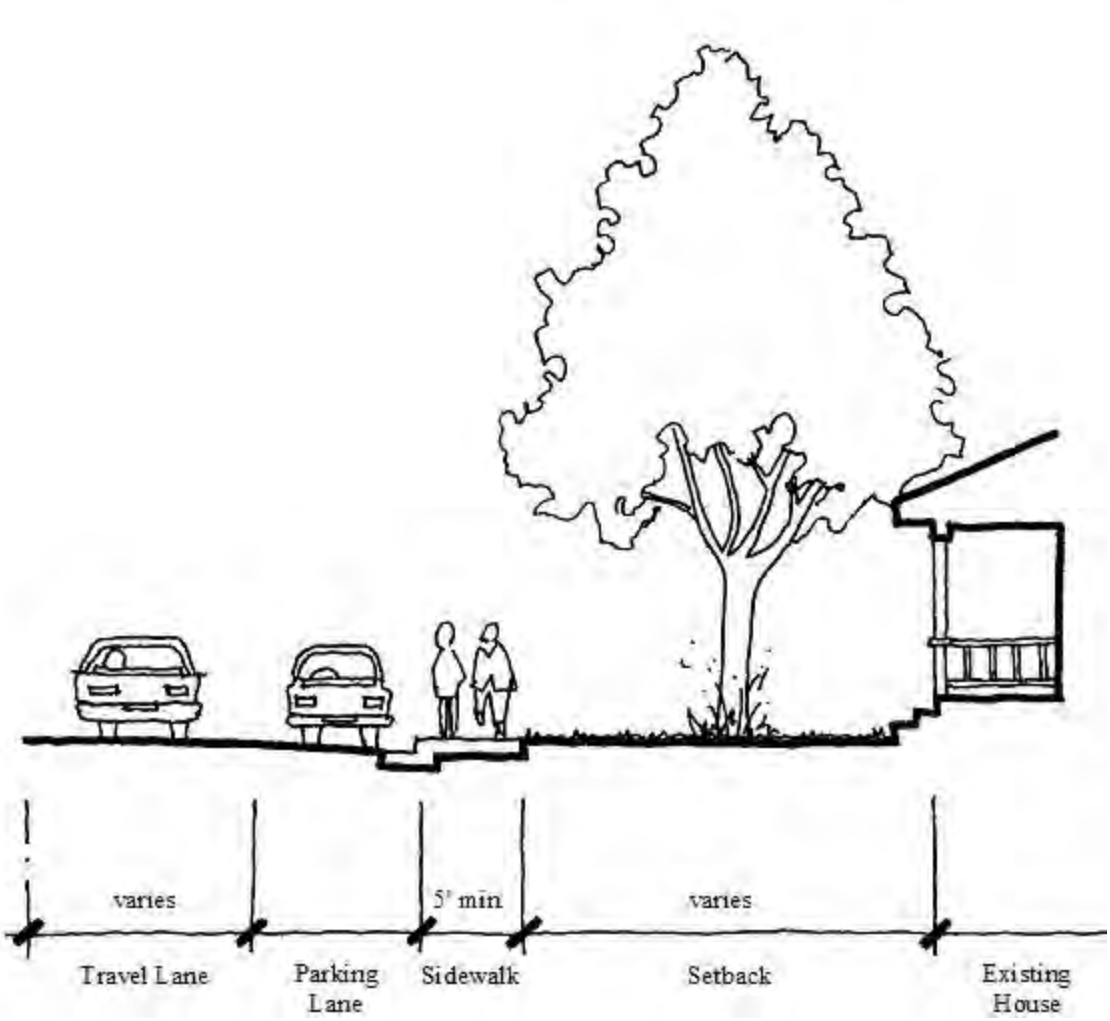
Figure 5-8: Sidewalks on Narrow Streets



Sidewalks on Wider Streets

The illustration below demonstrates the preferred design where a parking aisle exists between the walkaway and the motor vehicle travel lane. A parking aisle is generally preferred for pedestrian safety since it separates pedestrians from moving cars. If the street is not wide enough to install this improvement, and the existing house or landscaping is set back far enough, the possibility of acquiring land to widen the right of way should be investigated.

Figure 5-9: Sidewalks on Wider Streets

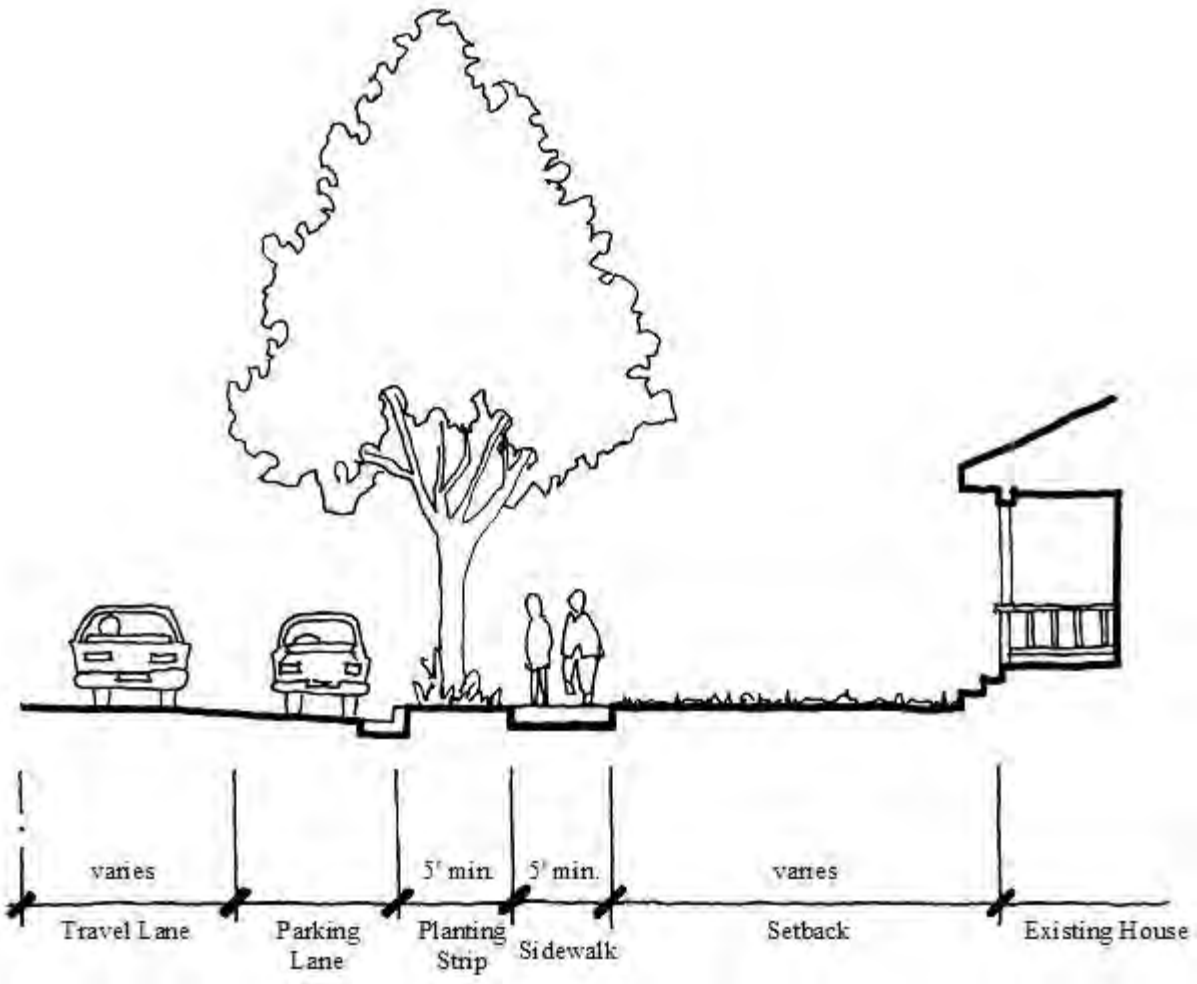


Sidewalk with Planting Strip

The most desirable condition, as illustrated here, is for the pedestrian to be buffered from motor vehicle traffic by both a parking lane and a planting strip. This is particularly important on streets with higher traffic volumes and speeds. Ideally, the planting strip should contain street trees at an interval of 20 to 50 feet on center. The trees help to create a more amenable pedestrian corridor and give better spatial definition to the street. This can make the street appear narrower, which helps to slow vehicular traffic.

If the street is not wide enough to install this improvement, and the existing house or landscaping is set back far enough, the possibility of acquiring land to widen the right of way should be investigated.

Figure 5-10: Sidewalks with a Planting Strip



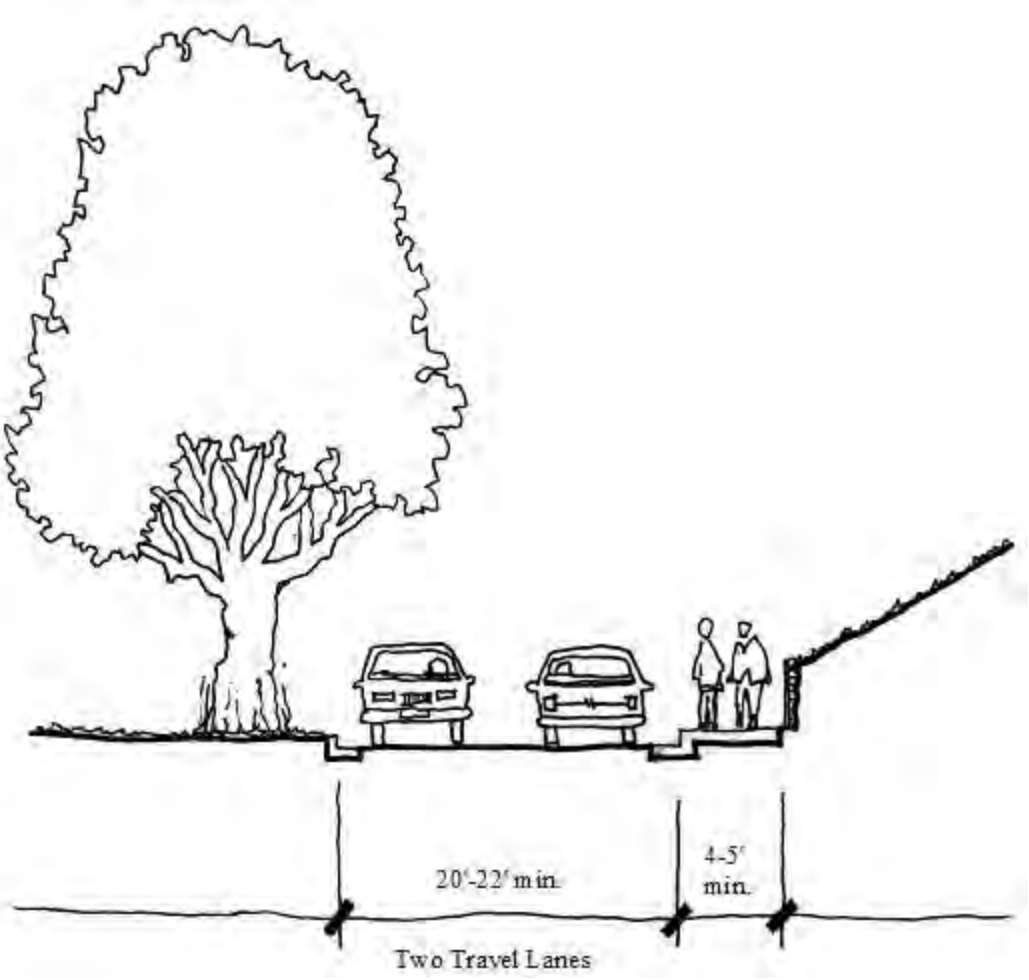
5.7.2 Pedestrian Facilities On Constrained Residential Streets

Some neighborhoods in Marin County have severe constraints that prevent the installation of sidewalks. Such constraints would include the topography immediately adjacent to one or both sides of the street, significant trees or landscape features, small front yard setbacks and/or right-of-way limitations. This section shows various options for addressing pedestrian safety on these streets.

Sidewalk in Cut Slope Area

One option, as shown below, is to install a retaining wall along a hillside in order to provide the preferred width of 5 feet or the minimum width of 4 feet for sidewalk access. Other topographical barriers could be overcome using similar soil retaining methods.

Figure 5-11: Sidewalks in Cut Slope Areas



5.8. Access Ramps

In many locations in Marin County, corners do not have access ramps conforming to ADA standards. Upgrades to conform to ADA are required when streets are repaved. However, for other locations improvements should be made as funding becomes available for projects at non-conforming intersections in accordance with applicable standards.

5.9. Enforcement, Education, and Support Programs

This Plan provides both physical recommendations (such as bicycle lanes) and program recommendations. Some of the program recommendations, such as possible changes in zoning requirements for bicycle parking, have already been covered. This section covers future efforts to educate bicyclists and motorists, and efforts to increase bicycling and walking. Some of these efforts will be provided by local agencies and non-profit groups, TAM's Safe Routes to Schools Program, and in collaboration with public agencies and private sponsors.

5.9.1 Education

The school districts, police departments, and public works departments for the County and various cities and towns have a long history of trying to improve safety conditions for bicyclists and pedestrians. However, with the exception of the Share the Road program, motorist education on the rights of bicyclists and pedestrians is virtually non-existent. Many people mistakenly believe, for example, that bicyclists do not have a right to ride in travel lanes and that they should be riding on sidewalks. Many motorists do not understand the concept of 'sharing the road' with bicyclists, or why a bicyclist may need to ride in a travel lane if there is no shoulder or it is full of gravel or potholes.

Recommendation #1: Encourage Continuation of Current School Education Programs

Per the recommendations in the previous section, existing school educational and encouragement programs should continue to be supported in a cooperative effort between the County, TAM, and the Marin County School Districts.

Recommendation #2: Continue support of bicycle outreach programming.

Marin County Bicycle Coalition (MCBC) offers several courses designed to educate new riders on safer and proper riding techniques, assist parents with riding and demonstrating good practices while riding with their children, and provide more experienced riders with guidance on riding in traffic. MCBC also produces a countywide bicycling map to assist cyclists with navigating the county's paths and roadways. TAM and/or the County should continue to support these efforts through:

- *Mapping*: Coordinate with MCBC in production of updates to the Marin County Bicycle Map .
- *Course Offerings*: Continue to support the offering of various classes such as Basic Street Skills, Family Biking, and other courses emphasizing safer bicycling behaviors and habits, such as how to avoid collisions and citations, how to ride safely, how to improve visibility, and knowing the legal rights and responsibilities of bicyclists. Continue to support the Court Diversion Program that enables cyclists who have received a bicycle violation to attend a class to reduce their fine. TAM should seek annual funding for the provision of classes, as well as courses for pedestrians.

5.9.2 Bikeshare

Bikesharing programs have been implemented in multiple communities worldwide and usually focus on short trips within a defined area. Typical bikeshare programs feature a standardized bicycle suited for the local conditions with multiple locations at which a bicycle may be picked up or parked. Fee collection methods vary from kiosks that accept credit cards to online accounts accessed via smartphone apps. Funding for the programs is a combination of fare recovery and outside financing, such as a corporate sponsorship.

Most bikeshare programs have been undertaken in places with greater density than Marin County due to the typical bikeshare model and operational concerns necessary to make them functional. However, subsequent generations of bikeshare program approaches have been successful in less urban environments. With the evolving variety of bikeshare programs, select areas of Marin County as noted in the *Marin County Bicycle Share Feasibility Study* (2013)[2] may be suitable for a such a program. TAM has been evaluating the possibility of establishing bikeshare in Marin and should be encouraged to pursue bikesharing where it will be effective and utilized.

5.9.3 Other Support Programs

Without community support, a bicycle/pedestrian plan lacks the key resources that are needed to ensure implementation over time. While the County's Public Works Department may be responsible for designing and constructing physical improvements, strategies for community involvement will be important to ensure broad-based support. This support translates into political support, which can help secure financial resources. Involvement by the private sector in raising awareness of the benefits of bicycling and walking range from small, incremental activities by non-profit groups, to efforts by the largest employers in the County. Specific programs are described below.

[2] https://www.tam.ca.gov/wp-content/uploads/2017/02/Bike-Share-Feasibility-Study_Final-November-2013.pdf

Bicycle Donation Program

A fleet of loaner bicycles available to employees to use as a commute alternative has proved successful in Portland and other U.S. cities. The bicycle may be purchased new or obtained from police auctions, repaired, painted, and engraved with ID numbers, and made available free of charge to employees. Depending on demand, bicycles may be made available through reservations or on a rotating basis. The bicycles themselves should be lower-end, heavy-duty bicycles that have minimal re-sale value. Employers' responsibilities would be limited to an annual maintenance inspection and repairs as necessary. The objective of the program is to encourage employees to try bicycling to work as an alternative, without making a major investment. Employers may wish to allow bicycle commuters to leave 15 minutes early from work, or some other type of incentive to encourage use of the bicycles. The County may consider such a program and may wish to encourage private employers to follow suit by offering travel demand management (TDM) credits or subsidized purchases of bicycles.

Bicycle Clunker and Parts Program, Bicycle Repair Program

San Rafael's 'Trips for Kids' Re-Cyclery program ties directly into the bicycle donation program by obtaining broken, stolen, abandoned, or donated bicycles and restoring them to working condition. The program's dual mission is to provide people in need with bicycles and to train young people (ages 12 to 18) how to repair bicycles as part of a summer jobs training effort. Bicycles are an excellent medium to teach young people on the fundamentals of mechanics, safety, and operation. Young people can use these skills to maintain their own bicycles or to build on related interests. The program is often staffed by volunteers from local bicycling organizations and bicycle shops, who can help build an interest in bicycling as an alternative to driving. The seed money to begin this program often comes from a local private funding source. The bicycles themselves could be obtained from unclaimed stolen bicycles from the police department or from donated bicycles. A program will need to qualify as a Section 501c(3) non-profit organization to offer tax deductions.

Community Adoption

Programs to have local businesses and organizations 'adopt' a Class I multi-use path similar to the adoption of segments of state highways. Small signs located along the pathway would identify supporters, acknowledging their contribution. Support would be in the form of an annual commitment to pay for the routine maintenance of the pathway, which in general costs about $10,578 per mile. Parks & Recreation or other groups may administer this program.

Bike and Walking Fairs and Races

To encourage increased bicycling and walking, interest groups are well-positioned to capitalize on the growing interest in on-road and off-road bicycle races, criterions, marathons, and other fairs and races. Events would need to be sponsored by local businesses and involve some promotion, insurance, and development of adequate circuits for all levels of riders. It is not unusual for these events to draw up to 1,000 bicyclists and walkers, which could bring spur additional spending in and around the event area.

The County can assist in developing these events by acting as a co-sponsor, and expediting and possibly underwriting some of the expenses of, for example, police time. The County should also encourage these events to have races and tours that appeal to the less experienced bicyclist. For example, in exchange for local governments underwriting part of the costs of a race, the event promoters could hold a bicycle repair and maintenance workshop for kids, short fun races for kids, and/or a tour of the route lead by experienced bicyclists who could show less experienced riders how to safely negotiate County streets.

Employer Incentives

Beyond programs previously mentioned such as the Bicycle Donation Program, countywide employer incentives to encourage employees to try bicycling or walking to work include sponsoring bike fairs and races, providing bicycle lockers and shower facilities, providing convenient and safe bicycle parking for employees and customers, and offering incentives to employees who commute by bicycle or walking by allowing for more flexible arrival and departure times. The County may offer incentives to employers to institute these improvements through air quality credits, lowered parking requirements, reduced traffic mitigation fees, or other means. For example, the County of Marin has an award-winning Employee Commute Alternative Program designed to encourage alternative modes of transportation for their work commute through provision of cash stipends. This program includes incentives for bicyclists and actively participates in Bike-to-Work and Bike-to-School Days.

In addition to the existing 511.org annual bike-to-work days, the County and TAM should continue to help promote local bike or walk-to-work/school days, such as "Walk and Roll to School". Bike-to-school days could be jointly sponsored with the School District, possibly in conjunction with bicycle education programs and through the Safe Routes to Schools Program.

5.9.4 Bikeway and Walkway Security

Unless covered by prior agreement, the Marin County Sheriff's Department, using both bicycles and vehicles will perform enforcement of applicable laws on bicycle paths within the unincorporated County jurisdiction, depending on available resources and priorities. Note that additional funding for this effort will be needed. Enforcement of vehicle statutes relating to bicycle operation will be enforced on Class II and Class III bikeways as part of the department's normal operations. No additional staff or equipment is anticipated for Class II or III segments. The County should consider the installation of lighting on pathways in urbanized areas.

5.9.5 Marketing the Bicycle and Pedestrian Plan

The success of this Plan depends largely on the community's acceptance and promotion of its contents. The following are steps that will help ensure it becomes a living document that shapes Marin County's future.

- Recognize that most of these education and encouragement programs and activities will likely be cooperative efforts between Transportation Authority of Marin (TAM), the County of Marin, local governments, private sponsors, and community groups and work to foster those relationships.
- Provide bicycle and pedestrian planning and design training for all transportation engineers and planners at county and local levels, as needed.
- Encourage local businesses to participate in the Bicycle-Friendly Business Program sponsored by the League of American Bicyclists.
- Work with towing companies and emergency clean up crews so they better understand the needs of bicyclists.
- Work with contractors and subcontractors and County and City maintenance and utility crews to help them better understand the needs of bicyclists and pedestrians.
- Develop, promote, and publicize bicycle commuter services, such as bicycle shops selling commute gear and regular escorted commute rides.
- Create events such as "bicycle to the grocery store" days, when bicyclists get vouchers for or coupons off items in the store or "walk to the movies" days when bicyclists and pedestrians receive free popcorn or a discount on a movie or refreshments.
- Work with the Department of Parks and Open Space to deliver a "benefits of bicycling and walking message" to youth that are working on water, air, and general pollution activities.
- Hold an annual community event to encourage residents to replace one car trip a week with a bicycle trip.
- Promote and publicize new and existing education and encouragement efforts by community groups and businesses.
- Support planning and implementation of an annual mass bicycling ride in Marin County to attract new riders, showcase Marin County, and demonstrate the benefits of bicycling.
- Develop and implement a public education campaign to encourage bicycling and walking, such as ads on movie screens, city bench, bicycle locker and billboard advertising, and videos on cable access television.
- Develop measures to reduce bicycle theft such as a registration program, subsidized locks, and training for proper locking techniques.

6 Implementation Strategy

This section discusses funding and financing the proposed projects in Chapter 5.

6.1. Implementation of Countywide Projects

Some of the primary goals of this Plan are to continue countywide efforts such as bicycle parking or Safe Routes to Schools programs that serve all unincorporated areas, construct specific projects such as local bikeway gap closures, and complete multi-jurisdictional improvements on the Primary Regional Bikeway system. The ultimate objective is to build out the identified countywide bicycle network and complete pedestrian improvements to provide connectivity through and between neighborhoods, commercial districts, employment areas, recreation facilities, transit hubs, and other activity nodes.

Local funding programs, such as TDA or Measure A Transportation Sales Tax, should be allocated whenever possible to projects that meet the funding criteria of those programs. The actual schedule for implementation on a year-to-year basis should be determined by (a) the readiness of each project in terms of local support, (b) CEQA approvals, (c) right-of-way control, (d) timing with other related improvements, and/or (e) success in obtaining competitive funding. Projects on the Primary County System may also be deemed higher priority projects.

6.2. Implementation of Local Projects

The steps between the concepts identified in this Plan and final completion vary from project to project, but typically include:

1. Adoption of the Unincorporated Area Plan by the Marin County Board of Supervisors,
2. If not already completed, preparation of a Feasibility Study involving a conceptual design (with consideration of possible alternatives and environmental issues) and a cost estimate.
3. Secure, as necessary, outside funding and any applicable environmental approvals.
4. Inclusion of the project in the appropriate department's or agency's work program, including commitment to provide any unfunded portion of the cost.
5. Completion of final Plans, Specifications, and Estimates (PS&E), advertising for bids, receipt of bids and award of contract(s).
6. Construction of the Project.

6.3. Maintenance

The total annual maintenance cost of all existing and proposed county unincorporated area bikeways identified in this plan is estimated to be approximately $964,000 (2017 dollars) when fully implemented. About one-quarter of the maintenance costs are associated with the proposed Class I multi-use paths. Class I path annual maintenance costs are based on an estimate of $12,000 (2017 dollars) per mile,[1] which covers labor, supplies, and amortized equipment costs for weekly trash removal, monthly sweeping, and bi-annual resurfacing and repair patrols includes cleaning, resurfacing and re-striping the asphalt path, repairs to crossings, cleaning drainage systems, trash removal, landscaping, underbrush and weed abatement (performed once in the late spring and again in mid-summer). Maintenance access on Class I paths will be achieved using standard pick-up trucks on the pathway itself. Sections with narrow widths or other clearance restrictions should be clearly marked. Class II on-street bicycle lanes annual maintenance costs are based on an estimate of $4,000 per mile which includes materials and labor for restriping and re-stenciling once every five years and sign replacement as necessary. Routine maintenance activities such as street sweeping of bicycle lanes are included by most jurisdictions in their regular street maintenance costs and so incur no additional expenses. Class III bicycle routes annual maintenance costs are based on an estimate of $400 per mile which includes materials and labor for sign replacement as necessary.

Two Class I paths, the Pacheco Hill Path between Novato and Marinwood, and the Horse Hill Path between Corte Madera and Mill Valley are under a joint maintenance agreement with Caltrans in which the County (Parks) is responsible for routine maintenance such as sweeping and litter removal while Caltrans is responsible for capital maintenance including pavement and associated infrastructure. Some Class I multi-use paths receive maintenance funds from a program administered by the Transportation Authority of Marin which is disbursed to the responsible agency to offset maintenance costs.

Actions: Ensure continued funding support by TAM for Class I pathways and encourage expansion of the program to provide maintenance funding for all Class I pathways. Seek sufficient and stable maintenance funding in the County Roads budget to enable regular maintenance of Class II and III bikeway facilities. All proposed designs should be closely examined to minimize future maintenance costs.

[1] Inflation-adjusted value. Transportation Authority of Marin. *Marin County Bike Path Maintenance Report*, 2007

6.4. Security

Security may be perceived as an issue along portions of the proposed Class I multi-use paths, bridges, and tunnels. High-speed bicyclists are incompatible with other users of Class I multi-use paths, particularly in congested areas while loitering and other inappropriate behaviors on the path can result in discomfort for other users of the facility. The advent of motorized-assist bicycles has resulted in the potential for increased user conflict because of the higher speeds to which these bicycles are capable. Illegal parking or other obstructions on bicycle lanes force bicyclists into motor vehicle travel lanes which can discourage bicycling by novice bicyclists. The following action is recommended to address these concerns.

Action: Enforcement of applicable laws on paths will be performed using both bicycles and motor vehicles. In Marin County's unincorporated areas, the California Highway Patrol is responsible for all vehicle code enforcement actions on all county roads, while the Marin County Sheriff's Department is responsible for all civil and criminal matters. Enforcement of vehicle statues relating to bicycle operation will be enforced on Class II and Class III bikeways as part of the department's normal operations. No additional staff or equipment is anticipated for Class II or III segments. Class I multi-use paths may require additional patrol and enforcement services, whether by local police agencies or park rangers. Marin County Parks has adopted specific regulations for users on paths it maintains, including the use of motorized bicycles. Those regulations are found in section 10.05 of the Marin County Code and are enforced by Parks staff and local law enforcement.

6.5. Financing

Proposed improvements and programs to be developed over the next 20 years in Marin County have been analyzed to determine the annual financing requirements, and to allow the County to budget its resources and target funding applications. Funding programs administered by the Transportation Authority of Marin provide a local funding source with fewer constraints than other funding programs are shared amongst all of Marin County's agencies. While these funds work towards the overall goal of building out the countywide network, the County competes for these same funding pools with other local communities to fund its projects in the unincorporated area. Funding for many bicycle and pedestrian projects, particularly more complex projects, is typically derived from regional, State and Federal sources. These funding sources are extremely competitive, and require a combination of sound applications, local support, and lobbying on the regional, state and national level. Depending on the funding program, the local match requirement can also require a considerable contribution from the local community.

6.6. Funding Opportunities

This section provides information on potential funding sources for bicycle and pedestrian improvements. Federal, state and local government agencies invest billions of dollars every year in the nation's transportation system. Only a fraction of that funding is used in development projects, policy development, and planning to improve conditions for pedestrians and bicyclists. Even though appropriate funds are limited, they are available. To support agency efforts to find outside funding sources to implement bicycle and pedestrian improvements, a summary by source type is provided below.

6.6.1 Federal Sources

The Fixing America's Surface Transportation Act (FAST Act)

The FAST Act, which replaced Moving Ahead for Progress in the 21st Century Act (MAP-21) in 2015, provides long-term funding certainty for surface transportation projects, meaning States and local governments can move forward with critical transportation projects with the confidence that they will have a Federal partner over the long term (at least five years).

The law makes changes and reforms to many Federal transportation programs, including streamlining the approval processes for new transportation projects and providing new safety tools. It also allows local entities that are direct recipients of Federal dollars to use a design publication that is different than one used by their State DOT, such as the *Urban Bikeway Design Guide by the* National Association of City Transportation Officials. *More information:* https://www.transportation.gov/fastact

Surface Transportation Block Grant Program (STBGP)

The Surface Transportation Block Grant Program (STBGP) provides states with flexible funds which may be used for a variety of highway, road, bridge, and transit projects. A wide variety of bicycle and pedestrian improvements are eligible, including trails, sidewalks, bike lanes, crosswalks, pedestrian signals, and other ancillary facilities. Modification of sidewalks to comply with the requirements of the Americans with Disabilities Act (ADA) is also an eligible activity. Unlike most highway projects, STBGP-funded pedestrian facilities may be located on local and collector roads which are not part of the Federal-aid Highway System.

Fifty percent of each state's STBGP funds are sub-allocated geographically by population. These funds are funneled through Caltrans to the metropolitan planning organizations in the state. The remaining 50 percent may be spent in any area of the state.

STBGP Set-Aside: Transportation Alternatives Program

Transportation Alternatives Program (TAP) has been folded into the Surface Transportation Block Grant program (STBG) as a set-aside funded at $835 million for 2016 and 2017, and $850 million for 2018, 2019, and 2020. Up to 50 percent of the set-aside is able to be transferred for broader STBGP eligibility.

Improvements eligible for this set-aside fall under three categories: Transportation Enhancements (TE), Safe Routes to Schools (SR2S), and the Recreational Trails Program (RTP). These funds may be used for a variety of pedestrian and streetscape projects including sidewalks, multi-use paths, and rail-trails. TAP funds may also be used for selected education and encouragement programming such as Safe Routes to Schools.

Non-profit organizations (NGOs) are now eligible to apply for funding for transportation safety projects and programs, including SR2S programs and bike share.

Complete eligibilities for TAP include:

1. **Transportation Alternatives**. This category includes the construction, planning, and design of a range of pedestrian infrastructure including "on–road and off–road trail facilities for pedestrians, bicyclists, and other active forms of transportation, including sidewalks, bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting and other safety–related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act of 1990." Infrastructure projects and systems that provide "Safe Routes for Non-Drivers" is still an eligible activity.
2. **Recreational Trails.** TAP funds may be used to develop and maintain recreational trails and trail-related facilities for both active and motorized recreational trail uses. Examples of trail uses include hiking, in-line skating, equestrian use, and other active and motorized uses. These funds are available for both paved and unpaved trails, but may not be used to improve roads for general passenger vehicle use or to provide shoulders or sidewalks along roads. Recreational Trails Program funds may be used for:
    - Maintenance and restoration of existing trails
    - Purchase and lease of trail construction and maintenance equipment
    - Construction of new trails, including unpaved trails
    - Acquisition or easements of property for trails
    - State administrative costs related to this program (limited to seven percent of a state's funds)
    - Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a state's funds)

3. **Safe Routes to Schools.** There are two separate Safe Routes to Schools Programs administered by Caltrans. There is the Federal program referred to as SRTS, and the state-legislated program referred to as SR2S. Both programs are intended to achieve the same basic goal of increasing the number of children walking and bicycling to school by making it safer for them to do so. All projects must be within two miles of primary or middle schools (K-8).

   The Safe Routes to Schools Program funds non-motorized facilities in conjunction with improving access to schools through the Caltrans Safe Routes to Schools Coordinator.

   Eligible projects may include:
   - Engineering improvements. These physical improvements are designed to reduce potential bicycle and pedestrian conflicts with motor vehicles. Physical improvements may also reduce motor vehicle traffic volumes around schools, establish safer and more accessible crossings, or construct walkways or trails. Eligible improvements include sidewalk improvements, traffic calming/speed reduction, and pedestrian crossing improvements.
   - Education and Encouragement Efforts. These programs are designed to teach children safe walking skills while educating them about the health benefits and environmental impacts. Projects and programs may include creation, distribution and implementation of educational materials; safety based field trips; interactive pedestrian safety video games; and promotional events and activities (e.g., assemblies, walking school buses).
   - Enforcement Efforts. These programs aim to ensure that traffic laws near schools are obeyed. Law enforcement activities apply to cyclists, pedestrians and motor vehicles alike. Projects may include development of a crossing guard program, enforcement equipment, photo enforcement, and pedestrian sting operations.
   - Planning, designing, or constructing roadways within the right-of-way of former Interstate routes or divided highways. At the time of writing, detailed guidance from the Federal Highway Administration on this new eligible activity was not available.

405 National Priority Safety Program

Approximately $14 million annually (5 percent of the $280 million allocated to the program overall) will be awarded to States to decrease bike and pedestrian crashes with motor vehicles. States where bike and pedestrian fatalities exceed 15 percent of their overall traffic fatalities will be eligible for grants that can be used for:

- Training law enforcement officials on bike/pedestrian related traffic laws
- Enforcement campaigns related to bike/pedestrian safety
- Education and awareness programs related to relevant bike/pedestrian traffic laws

Highway Safety Improvement Program (HSIP)

The Highway Safety Improvement Program (HSIP) provides $2.4 billion nationally for projects that help communities achieve significant reductions in traffic fatalities and serious injuries on all public roads, bikeways, and walkways. Non-infrastructure projects are no longer eligible. Eligible projects are no longer required to collect data on all public roads. Pedestrian safety improvements, enforcement activities, traffic calming projects, and crossing treatments for active transportation users in school zones are examples of eligible projects. All HSIP projects must be consistent with the state's Strategic Highway Safety Plan. *The 2015 California SHSP is located here:* http://www.dot.ca.gov/hq/traffops/shsp/docs/SHSP15_Update.pdf

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

The Congestion Mitigation and Air Quality Improvement Program (CMAQ) provides funding for projects and programs in air quality nonattainment and maintenance areas for ozone, carbon monoxide, and particulate matter which reduce transportation related emissions. These federal dollars can be used to build pedestrian and bicycle facilities that reduce travel by automobile. Purely recreational facilities generally are not eligible.

To be funded under this program, projects and programs must come from a transportation plan (or State (STIP) or Regional (RTIP) Transportation Improvement Program) that conforms to the SIP and must be consistent with the conformity provisions of Section 176 of the Clean Air Act. States are now given flexibility on whether to undertake CMAQ or STBGP-eligible projects with CMAQ funds to help prevent areas within the state from going into nonattainment.

In the Bay Area, CMAQ funding is administered through the Metropolitan Transportation Commission (MTC) on the local level. These funds are eligible for transportation projects that contribute to the attainment or maintenance of National Ambient Air Quality Standards in non-attainment or air-quality maintenance areas. Examples of eligible projects include enhancements to existing transit services, rideshare and vanpool programs, projects that encourage pedestrian transportation options, traffic light synchronization projects that improve air quality, grade separation projects, and construction of high-occupancy vehicle (HOV) lanes. Projects that are proven to reduce direct PM2.5 emissions are to be given priority.

Partnership for Sustainable Communities

Founded in 2009, the Partnership for Sustainable Communities is a joint project of the Environmental Protection Agency (EPA), the U.S. Department of Housing and Urban Development (HUD), and the U.S. Department of Transportation (USDOT). The partnership aims to "improve access to affordable housing, more transportation options, and lower transportation costs while protecting the environment in communities nationwide." The Partnership is based on five Livability Principles, one of which explicitly addresses the need for pedestrian infrastructure ("Provide more transportation choices: Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health").

The Partnership is not a formal agency with a regular annual grant program. Nevertheless, it is an important effort that has already led to some new grant opportunities (including the TIGER grants). Mill Valley should track Partnership communications and be prepared to respond proactively to announcements of new grant programs.

For more information, visit: https://www.sustainablecommunities.gov/

6.6.2 State Sources

Active Transportation Program (ATP)

In 2013, Governor Brown signed legislation creating the Active Transportation Program (ATP). This program is a consolidation of the Federal Transportation Alternatives Program (TAP), California's Bicycle Transportation Account (BTA), and Federal and California Safe Routes to Schools (SRTS) programs.

The ATP program is administered by Caltrans Division of Local Assistance, Office of Active Transportation and Special Programs.

The ATP program goals include:

- Increase the proportion of trips accomplished by biking and walking,
- Increase safety and mobility for non-motorized users,
- Advance the active transportation efforts of regional agencies to achieve greenhouse gas reduction goals,
- Enhance public health,
- Ensure that disadvantaged communities fully share in the benefits of the program, and
- Provide a broad spectrum of projects to benefit many types of active transportation users.

The California Transportation Commission ATP Guidelines are available here:
http://www.catc.ca.gov/meetings/agenda/2014Agenda/2014_03/03_4.12.pdf

Eligible bicycle and Safe Routes to Schools projects include:

- Infrastructure Projects: Capital improvements that will further program goals. This category typically includes planning, design, and construction.
- Non-Infrastructure Projects: Education, encouragement, enforcement, and planning activities that further program goals. The focus of this category is on pilot and start-up projects that can demonstrate funding for ongoing efforts.
- Infrastructure projects with non-infrastructure components

The minimum request for non-SRTS projects is $250,000. There is no minimum for SRTS projects. *More information is available here:* http://www.dot.ca.gov/hq/LocalPrograms/atp/

Senate Bill 1 (SB1)

Senate Bill 1, signed into law in 2017, increases the vehicle fuel tax to fund various transporation maintenance and construction projects statewide. Some of these funds are directed to the regional and local level to implement projects of importance to the local community. Active transportation projects are eligible for some of the funding streams of this significant dedication of funding to improving transportation statewide.

Office of Traffic Safety (OTS) Grants

The Office of Traffic Safety Program is a partnership effort between the National Highway Traffic Safety Administration (NHTSA), Federal Highway Administration, and the states. In California, the grants are administered by the California Office of Traffic Safety (OTS).

Grants are used to establish new traffic safety programs, expand ongoing programs or address deficiencies in current programs. Eligible grantees are governmental agencies, state colleges, state universities, local City and County government agencies, school districts, fire departments, and public emergency services providers. Grant funding cannot replace existing program expenditures, nor can traffic safety funds be used for program maintenance, research, rehabilitation, or construction. Grants are awarded on a competitive basis, and priority is given to agencies with the greatest need. Evaluation criteria to assess need include potential traffic safety impact, collision statistics and rankings, seriousness of problems, and performance on previous OTS grants.

The California application deadline is January of each year. There is no maximum cap to the amount requested, but all items in the proposal must be justified to meet the objectives of the proposal.

More information: http://www.ots.ca.gov/

6.6.3 Regional & Local Sources

Metropolitan Transportation Commission OneBayArea Grant (OBAG)

The Bay Area Metropolitan Transportation Commission (MTC) OBAG program is a funding approach that aligns the Commission's investments with support for focused growth. Established in 2012, OBAG taps federal funds to maintain MTC's commitments to regional transportation priorities while also advancing the Bay Area's land-use and housing goals.

OBAG includes both a regional program and a county program that targets project investments in Priority Development Areas and rewards cities and counties that approve new housing construction and accept allocations through the Regional Housing Need Allocation (RHNA) process. Cities and counties can use these OBAG funds to invest in:

- Local street and road maintenance
- Streetscape enhancements
- Bicycle and pedestrian improvements
- Transportation planning
- Safe Routes to School projects
- Priority Conservation Areas

In late 2015, MTC adopted a funding and policy framework for the second round of OBAG grants. Known as OBAG 2 for short, the second round of OBAG funding is projected to total about $800 million to fund projects from 2017-18 through 2021-22.

More information: http://www.mtc.ca.gov/our-work/fund-invest/federal-funding/obag-2

San Francisco Bay Trail (ABAG)

The San Francisco Bay Trail organization provides funding to study and construct Bay Trail segments. Since 2002, over $3 million in study and construction funds have been dedicated to Bay Trail segments in Marin County.

Measure A (TAM Sales Tax)

The Transportation Authority of Marin's Measure A sales tax measure was passed by voters in 2004. It has allocated funds to various projects and programs within several funding categories, each with its own objective. Active transporation projects have received funding either directly, such as through specific project allocations, or indirectly, resulting from bicycle and pedestrian improvements being constructed as part of a larger roadway project.

Measure A (County Parks Sales Tax)

Marin County voters passed Measure A in 2012 to provide a revenue source to improve and enhance Marin County's parks and open spaces. Class I multi-use pathways, such as the Mill Valley-Sausalito path, have benefitted from funding allocations to improve pathway experience and functionality.

Developer Impact Fees

As a condition for development approval, municipalities can require developers to provide certain infrastructure improvements, which can include bikeway projects. These projects have commonly provided Class II facilities for portions of on-street, previously-planned routes. They can also be used to provide bicycle parking or shower and locker facilities. The type of facility that should be required to be built by developers should reflect the greatest need for the particular project and its local area. Legal challenges to these types of fees have resulted in the requirement to illustrate a clear nexus between the particular project and the mandated improvement and cost.

Roadway Construction, Repair and Upgrade

Future road widening and construction projects are one means of providing improved pedestrian and bicycle facilities. To ensure that roadway construction projects provide these facilities where needed, it is important that the review process includes input pertaining to consistency with the proposed system. In addition, California's 2008 Complete Streets Act and Caltrans's Deputy Directive 64 require that the needs of all roadway users be considered during "all phases of state highway projects, from planning to construction to maintenance and repair."

More information: *http://www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets.html*

Utility Projects

By monitoring the capital improvement plans of local utility companies, it may be possible to coordinate upcoming utility projects with the installation of bicycle and pedestrian infrastructure within the same area or corridor. Often times, the utility companies will mobilize the same type of forces required to construct bikeways and sidewalks, resulting in the potential for a significant cost savings. These types of joint projects require a great deal of coordination, a careful delineation of scope items and some type of agreement or memorandum of understanding, which may need to be approved by multiple governing bodies.

Cable Installation Projects

Cable television and telephone companies sometimes need new cable routes within public right-of-way. Recently, this has most commonly occurred during expansion of fiber optic networks. Since these projects require a significant amount of advance planning and disruption of curb lanes, it may be possible to request reimbursement for affected bicycle facilities to mitigate construction impacts. In cases where cable routes cross undeveloped areas, it may be possible to provide for new bikeway facilities following completion of the cable trenching, such as sharing the use of maintenance roads.

6.6.4 Other Sources

Local sales taxes, fees and permits may be implemented as new funding sources for pedestrian and bicycle projects. However, any of these potential sources would require a local election. Volunteer programs may be developed to substantially reduce the cost of implementing some routes, particularly multi use paths. For example, a local college design class may use such a multi-use route as a student project, working with a local landscape architectural or engineering firm. Work parties could be formed to help clear the right of way for the route. A local construction company may donate or discount services beyond what the volunteers can do. A challenge grant program with local businesses may be a good source of local funding, in which the businesses can "adopt" a route or segment of one to help construct and maintain it.

Appendix A: Relevant Legislation and Policies

Marin Countywide Plan (2007)

Bicycle- and Pedestrian-Related Policies

Policy TR-1.1 Manage Travel Demand. Improve the operating efficiency of the transportation system by reducing vehicle travel demand and provide opportunities for other modes of travel. Before funding transportation improvements consider alternatives – such as Transportation Demand Management (TDM) – and prioritize projects that will reduce fossil fuel use and reduce single-occupancy vehicle trips.

Policy TR-1.5 Require Necessary Transportation Improvements. Require necessary transportation improvements to be in place, or otherwise guaranteed to result in their timely installation, before or concurrent with new developments. In evaluating whether a transportation improvement is necessary, the County shall consider alternatives to the improvement consistent with Policy TR-1.1, Manage Travel Demand, and the extent to which the improvement will offset the traffic impacts generated by proposed and expected development and restore acceptable traffic levels of service.

Policy TR-1.6 Keep Rural Character in West Marin. Maintain roads in West Marin as two-lane routes, with the possible additions of bicycles lanes, turn lanes at intersections, and turnouts for slow-moving traffic.

Policy TR-1.8 Reduce Vehicle Miles Traveled (VMT). Reduce the rate of increase for total vehicle miles traveled by single-occupant automobile to not exceed the population growth rate.

Policy TR-2.1 Improve the Bicycle and Pedestrian Network. Promote adequate bicycle and pedestrian links, to the extent feasible throughout the county, including streetscape improvements and standards that are safe and pedestrian and bicycle friendly.

Policy TR-2.2 Provide New Bicycle and Pedestrian Facilities. Where appropriate, require new development to provide trails or roadways and paths for use by bicycles and/or on-street bicycle and pedestrian facilities. In-lieu feeds may be accepted if warranted in certain cases.

Policy TR-2.3 Connect to State and Federal Parklands. Explore the possibility of creating bicycle and pedestrian trails that would connect urban areas to federal and State parklands in Marin County.

Policy TR-2.4 Seek Funding Opportunities for Bicycle and Pedestrian Infrastructure. Seek grants and other funding opportunities available to construct new bicycle and pedestrian infrastructure and to connect existing segments.

Policy TR-3.3 Develop Mixed-Use Intermodal Hubs. Support and participate in the development of intermodal transit hubs that expand alternative transportation use.

Policy TR-3.5 Support Bicycle Access to All Transit Systems. Ensure that all new and existing transit systems provide for the storage of bicycles on transit as well as transit centers.

Policy TR-3.3 Reduce Congestion Due to Visitor Traffic in West Marin. Coordinate with Caltrans; local, State, and federal parkland agencies; and local communities to provide alternatives to recreational automobile travel to recreational areas in West Marin.

Bicycle- and Pedestrian-related Implementing Programs

Implementing Program TR-1.c Promote Transportation Alternatives. Work with local, State, and federal governments, businesses, schools, seniors, and environmental groups to encourage use of transit, vanpools, carpools, car sharing, bicycles, and walking, including providing incentives to employers, commuters, and recreational users to support these transportation alternatives.

Implementing Program TR-1.f Analyze Multimodal Performance. Develop methods and adopt standards to assess the performance of pedestrian, bicycle, and transit facilities, and measure the success of those components against the goals of the County *Transportation Vision*.

Implementing Program TR-1.o Keep West Marin Rural. Limit West Marin roads to two lanes, and work with State and federal agencies and local communities to enhance road safety, improve pedestrian, bicycle, and transit access, and maintain or reduce congestion through means such as limiting local parking, creating a multipurpose path from West Marin to the City-Centered Corridor, and providing shuttle service to popular destinations. Shoulder widening for bicycles, turn lanes at intersections, turnouts for slow-moving traffic, traffic calming measures, and similar improvements would be permitted. However, projects will not be undertaken to increase the motorized vehicular capacity of West Marin roads.

Implementing Program TR1.s VMT Reduction Monitoring and Implementation and Transportation Demand Management Program. Develop and implement a countywide program for monitoring and reducing VMT consistent with State and regional efforts and based on information from State and regional planning agencies. Identify and require in new developments specific transportation demand management (TDM) strategies for reducing the VMT below levels that would otherwise occur. Consider the following types of strategies for inclusion in the VMT Reduction Monitoring and Implementation and Transportation Demand Management Program:

- Increased transit.
- All new residential projects consisting of 25 units or more should be located within ½ mile of a transit node, shuttle service, or bus route with regularly scheduled daily service. New multi-family projects consisting of 25 units or more should include TDM measures, such as reduced parking for affordable or senior projects, subsidized public transportation passes, or ride-marching programs, based on site-specific review. For market-rate projects, consider TDM programs such as charging parking fees separate from rent.
- Safe, convenient connections should be provided to existing pedestrian and bicycle facilities, and secure bicycle parking should be provided in new nonresidential developments.
- TDM should be required for new or expanded projects with 50 employees or more, including programs such as parking cash out, subsidized transit passes, ridesharing incentives, and bicycle storage facilities.

Implementing Program TR-1.t Reduce Single Occupancy Trips. Adopt fees and other programs that encourage alternatives to the single occupant vehicle. Consider imposing tolls, congestion pricing, parking fees, gas taxes, and residential parking permit limits. Encourage and assist local cities and towns to adopt similar programs.

Implementing Program TR-2a Encourage Bicycling and Walking. Work with local community groups to encourage bicycling and walking for local trips by students, commuters, visitors, and shoppers through marketing and incentive programs, as well as improved facilities.

Implementing Program TR-2.b Adopt Standards for Pedestrian and Bicycle Access. Amend the County Code and Development Code to include standards for provision of safe pedestrian and bicycle accommodations. Include standards in the design of roadways. As appropriate, require new development

and redevelopment project s to address the following: bicycle and pedestrian access internally and to other areas through easements; safe access to public transportation and construction of paths that connect with other nonmotorized routes; safe road crossing at major intersections for school children and seniors; and secure, weatherproof bicycle storage facilities and shower/changing room facilities for bicycle commuters. Ensure that such facilities will have ongoing maintenance.

Implementing Program TR-2.c Support Bicycle Stations and Consider Attended Parking. Encourage the development of bicycle stations, attended parking, and other bicycle parking support facilities at intermodal hubs, such as the San Rafael Transit Center, the future Southern Marin transportation hub, the Larkspur Landing Ferry Terminal; at future SMART rail stations; and for large public events to encourage people to "bike to transit." Bike stations are full-service bicycle facilities providing secure and guarded "valet bicycle parking in addition to other possible amenities, such as showers or bicycle rentals and repairs.

Implementing Program TR-2.d Fund Projects. Work with the Transportation Authority of Marin and the Bicycle Advisory Group to implement the *Marin County Unincorporated Bicycle and Pedestrian Master Plan*; include pedestrian and bicycle projects in the County Capital Improvement Program; and apply, where feasible, a portion of traffic mitigation feeds toward improvements that will increase bicycle transportation and mitigate congestion. On-site improvements and those located near approved development are a priority.

Implementing Program TR-2.e Prioritize Completion of the North-South and East-West Bikeways. Work with applicable governmental agencies to identify gaps in the North-South and East-West Bikeways, and to place a high priority on obtaining funding for projects that complete these gaps.

Implementing Program TR-2.f Develop "Rails with Trails." Continue to work with SMART to incorporate and fund a multi-use pathway that generally follows the proposed SMART railroad corridor.

Implementing Program TR-2.g Add Bicycle Lanes. Identify roads with shoulders wide enough to be designated as bicycle lanes, and, where feasible, stripe and sign appropriate roadway segments as bike lanes and bike routes.

Implementing Program TR-2.h Encourage Innovative Bicycle Lane Design. Encourage the incorporation of innovative design concepts in the development of bicycle lane projects. Where feasible, consider using techniques and ideas employed in other communities throughout Europe and the United States, such as colored bike lanes, signage, lighting, and other safety features.

Implementing Program TR-2.i Renovate Tunnels Along the Planned North-South Bikeway into Multi-Use Pathways. Support reopening the California Park Hill Tunnel and, if feasible, reopening the Alto Tunnel as key connections in the bicycle and pedestrian network system. The California Park Hill Tunnel provides a key multimodal connection between the San Rafael Transit Center and the Larkspur Landing Ferry terminal, both major transit hubs. The Alto Tunnel provides a direct, nearly level link between Mill Valley and Corte Madera.

Implementing Program TR-2j Ensure Safe Routes to Schools. As funding permits, continue to work with TAM and local school districts to ensure that children have safe walking and bicycling routes to school. Support TAM's program to produce Safe Routes to school Plans for the county's schools providing a required planning bias for the Measure A-financed Safe Routes to Pathways County Capital Improvement Program. Continue the TAM-managed Safe Routes to Schools encouragement and education program, which provides bicycle and pedestrian safety training, events, contests, law enforcement, and the identification of potential bicycle and pedestrian transportation improvements.

Implementing Program TR-2.k Consider Pedestrian Needs. Work with local cities and towns to ensure that traffic signals are timed to allow safe and comfortable pedestrian crossing. Work with Caltrans to improve pedestrian access to freeway bus pads along Highway 101. Work with local communities and school districts to maintain and expand the Measure A-funded school crossing guard program.

Implementing Program TR-2.l Complete Streets. Include safe and convenient bicycle and pedestrian access, where feasible, in all transportation improvement projects. Request that Caltrans and the Federal Highway Administration provide separated, safe, and secure bicycle and pedestrian access as part of any roadway or interchange improvement work, and that access for pedestrians and bicyclists be available during construction. Continue to implement the Department of Public Works' policy on routine accommodation. While the county does not have authority to plan bicycle facilities located in other jurisdictions, it may be appropriate for the Transportation Authority of Marin (TAM) or similar entity or collaboration to assume this responsibility for planning.

Implementing Program TR-2.m Explore Funding Options. Continue to apply for regional, State, and federal grants for bicycle and pedestrian infrastructure projects. Consider using general fund monies, state gas tax subventions, sales tax funds, and development exactions/impact fees to provide bicycle and pedestrian facilities, as well, as Safe Routes to School programs.

Implementing Program TR-2.n Implement Nonmotorized Pilot Transportation Program. Carry out the Nonmotorized Transportation Pilot Program through construction of adopted Pilot projects and initiation of adopted Pilot education and outreach programs. Continue participation in national Pilot efforts, including outreach and mode shift measurement. Encourage continued funding of Pilot activities in future federal transportation bills and other State and local funding sources, including regional funding streams.

Implementing Program TR-3.b Provide Schedules and Shelters. Encourage bus service providers to post current schedules and maps at all transit stops and other key locations, to make real-time arrival information available to riders, and to provide shelters that adequately protect riders from inclement weather.

Bicycle- and Pedestrian-related Goals

Goal TR-1 Safe and Efficient Movement of People and Goods. Provide a range of transportation options that meet the needs of residents, businesses, and travelers.

Goal TR-2 Increased Bicycle and Pedestrian Access. Expand bicycle and pedestrian facilities and access in and between neighborhoods, employment centers, shopping areas, schools, and recreational sites.

Bicycle- and Pedestrian-related Indicator Monitoring

Indicator 2: Combined daily pedestrian/bicycle share of modal split countywide. Target: Increase the percentage of combined pedestrian and bicycle trips from 10.9 percent in 2000 to 20.0 percent by 2020.

Indicator 9: Miles of Class I bicycle pathways in unincorporated areas. Target: Increase from 3.5 miles of Class I in 2000 to 5-10 miles by 2010 and 10-25 miles by 2015.

Indicator 10: Miles of Class II bike lanes in unincorporated areas. Target: Increase from 2.25 miles of Class II in 2000 to 4.5-10 miles by 2010 and 9-25 miles by 2015.

Appendix B: Existing and Proposed Bay Trail

MARIN COUNTY

Bay Trail
- Paved
- Dirt/Gravel
- On Street
- Planned

Other Trail
- Existing
- Planned

0 1 2 kilometers

0 1 2 miles

NOVATO
Indian Valley Rd
Novato Blvd
Rowland Blvd
Vintage Way
Scottsdale Pond
Deer Island Open Space Preserve
Marin Audubon Simmons Slough Wildlife Corridor
Port Sonoma Marina
Sonoma Baylands Tidal Marsh Restoration Area
Harbor Dr
Black Point
San Pablo Bay National Wildlife Refuge
Black Point Nature Preserve
Petaluma Point
Montego Park
Bel Marin Keys
Bel Marin Keys Restoration Area
Ignacio Blvd
Pacheco Pond
Loma Verde Open Space Preserve
Pacheco Valley Open Space Preserve
SMART (Sonoma-Marin Area Rail Transit)
Reservoir Hill
Hangar Ave
Hamilton Wetland Restoration Area
Lucas Valley Rd
Miller Creek Rd
Las Gallinas Ave
Saint Vincents
Las Gallinas Valley Sanitary District
Olema Rd
TERRA LINDA
Freitas Pkwy
Redwood Hwy
Gallinas Creek Marsh Restoration
Country Club
John F. McInnis County Park
Santa Venetia Marsh Open Space Preserve
FAIRFAX
Civic Center Lagoon Park
Marin County Civic Center
San Pedro Rd
SANTA VENETIA
Back Ranch Meadows
San Pablo Bay
Terra Linda Ridge/Sleepy Hollow Divide
Sir Francis Drake Blvd
Center Blvd
Bolinas Rd
SAN ANSELMO
San Pedro Mountain Open Space Preserve
Buckeye Point
Shoreline Trail
China Camp State Park
Weber Point
Rat Rock
China Camp Village
Red Hill Ave
Ross Ave
Fernhill Ave
4th St
2nd St
Mission Ave
Boyd Memorial Park
Grand Ave
Harry A. Barbier Memorial Park
ROSS
SAN RAFAEL
Shady Ln
Laurel Grove Ave
Bettinni Transit Center
B St
Dominican College
McNears Beach County Park
McNear's Beach
Mahon Creek Pathway
Beach Park
Lagoon
Cantera Way
San Pedro Hill
Point San Pedro
Andersen Dr
Point San Pedro Rd
Schoen Park
Pickleweed Park
Loch Lomond Marina
McNear Brickyard Rd
Kerner Blvd
Bellam Blvd
San Rafael Tidelands
Marin Islands National Wildlife Refuge
Kent Ave
KENTFIELD
Mt. Tamalpais State Park
Mt. Tamalpais
Magnolia Ave
Marin Rowing Association
Niven Park
Doherty Dr
Remillard Park
Larkspur Ferry
Francisco Blvd
Shoreline Park
LARKSPUR
Shorebird Marsh
Corte Madera Marsh Ecological Reserve
San Quentin State Prison
Point San Quentin
East Brother Island
San Pablo Point
West Brother Island
San Pablo Yacht Harbor
Tamalpais Dr
San Clemente Dr
CORTE MADERA
Muzzi Marsh
MILL VALLEY
Muir Woods National Monument
Edgewood Ave
Miller Ave
Blithedale Ave
Alto
Reed St
Bayfront Park
Mill Valley–Sausalito Path
Paradise Dr
San Clemente Park
Granada Park
Ring Mountain Preserve
Ring Mountain
Richmond–San Rafael Bridge
Point Molate
Point Molate Beach Park
Point Molate US Naval Fuel Depot
Castro Point
Toll plaza
Wildcat Marsh
Castro St
RICHMOND
Chevron Long Wharf
Garrard Blvd
Ohio Ave
Washington Park
POINT RICHMOND
Cypress Point
Keller Beach
Miller/Knox Regional Shoreline
Ferry Point
Brickyard Cove Marina
Inner Harbor Channel
Harbor Channel
Red Oak Victory Ship
Brooks Island Regional Preserve
TAMALPAIS JUNCTION
Bothin Marsh
Tennessee Valley Path
Strawberry Park
Harbor Cove Dock
Blackie's Pasture
Trestle Glen Blvd
Strawberry Landing
Richardson Bay Park
Paradise Cove
Paradise Beach County Park
Brickyard Park
Kappas Harbor
Strawberry Point
Richardson Bay
Golden Gate National Recreation Area
MARIN CITY
TIBURON
Romburg Tiburon Center
Tiburon Blvd
Belvedere Lagoon
Tiburon Uplands Nature Preserve
Tiburon Cove
Bridgeway
Marinship Park
Dunphy Park
Schoonmaker Park
Sausalito Yacht Harbor
BELVEDERE
Point Tiburon Shoreline Park
Bluff Point
Keil Cove
Ferry
Lyford Tower
Elephant Rock
Peninsula Point
Ayala Cove
SAUSALITO
Sausalito Point
Ferry
Tiffany Beach & Park
Swedes Beach
2nd St
Mt. Livermore Angel Island State Park
Hawk Hill
Ayala Vista Point
Fort Baker
Bay Area Discovery Museum
Point Cavallo
Point Diablo Lighthouse
Golden Gate Bridge
Lime Point
San Francisco Bay

SAN FRANCISCO Bay Trail

Appendix C: Marin County Bicycle Guide Sign System

Marin County Bicycle Guide Sign System North Figure C-1

Legend

- 5 Route Number
- Primary Bike Routes
- Future Connection
- School
- City Areas

0 0.5 1 2
Miles

DATA SOURCE MARINMAP

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Marin County Bicycle Guide Sign System Central Figure C-2

Legend

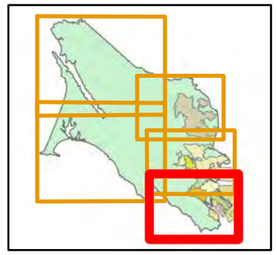
- 5 Route Number
- Primary Bike Routes
- Future Connection
- School
- City Areas

0 0.5 1 2
Miles

DATA SOURCE MARINMAP

\\co.marin.ca.us\fs1\CountyShare\DPW\Dan Dawson\Upate2017\PropExistgBikewaySignSystem_20180202_101c.mxd

Marin County Bicycle Guide Sign System South Figure C-3



Legend

- 5 Route Number
- Primary Bike Routes
- Future Connection
- School
- City Areas

0 0.5 1 2
Miles

DATA SOURCE MARINMAP

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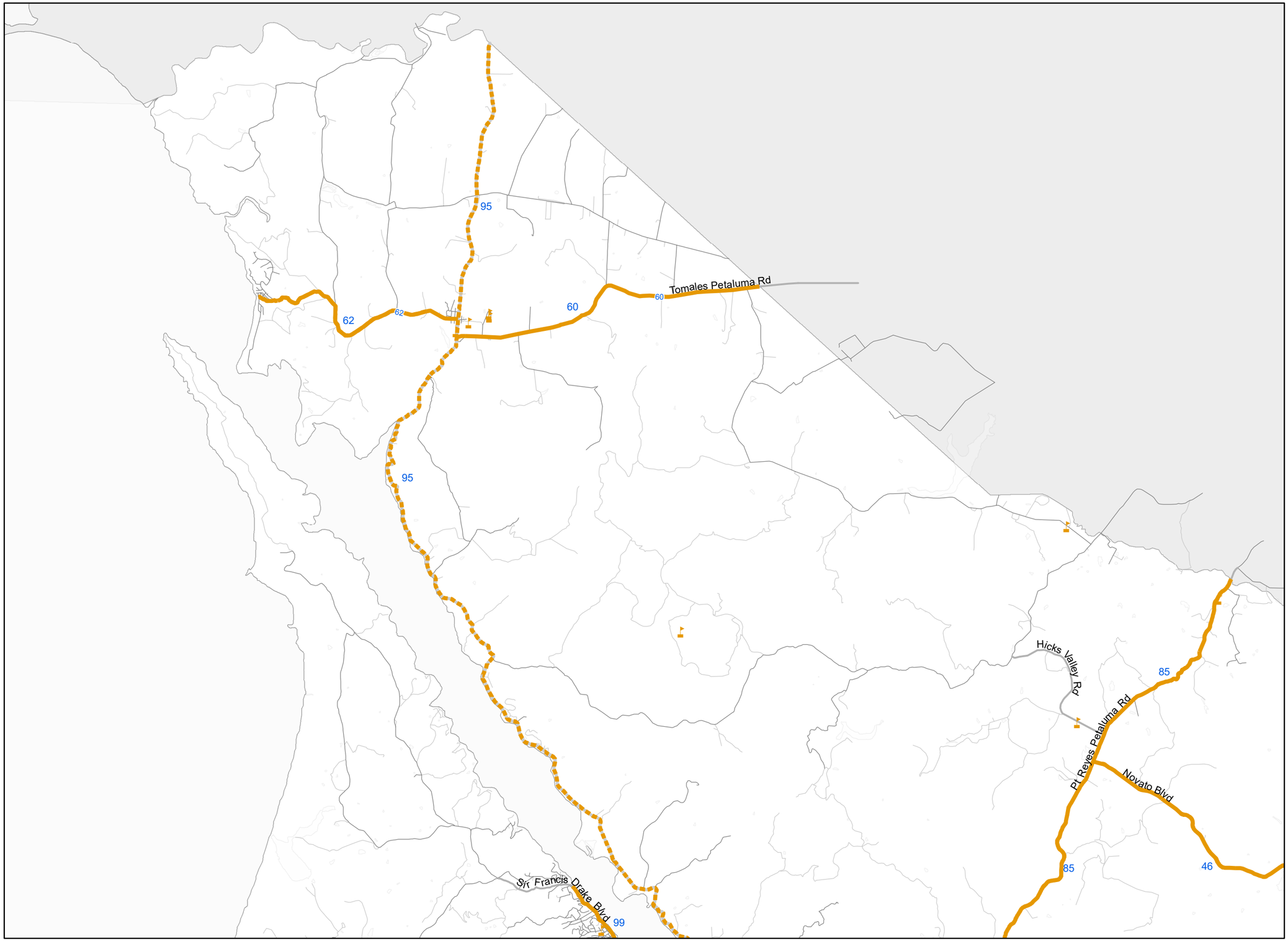
Marin County Bicycle Guide Sign System West Northern-portion Figure C-4



Legend

- 5 Route Number
- Primary Bike Routes
- Future Connection
- School
- City Areas

0 0.75 1.5 3

Miles

DATA SOURCE MARINMAP

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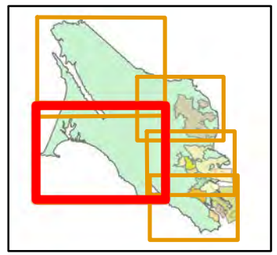
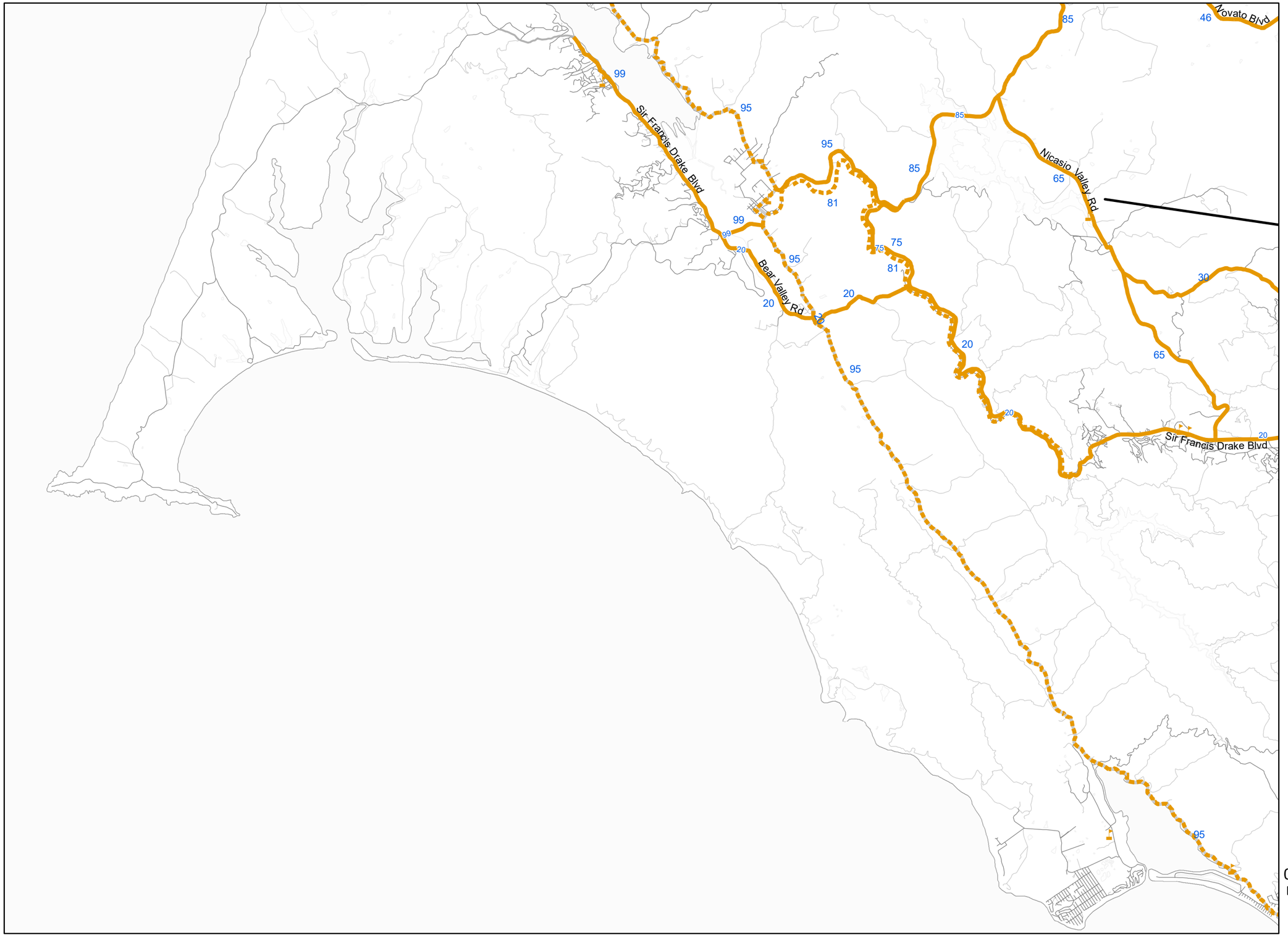
Marin County Bicycle Guide Sign System West Southern-portion Figure C-5





Legend

- 5 — Route Number
- Primary Bike Routes
- Future Connection
- School
- City Areas

0 0.75 1.5 3

Miles

DATA SOURCE MARINMAP

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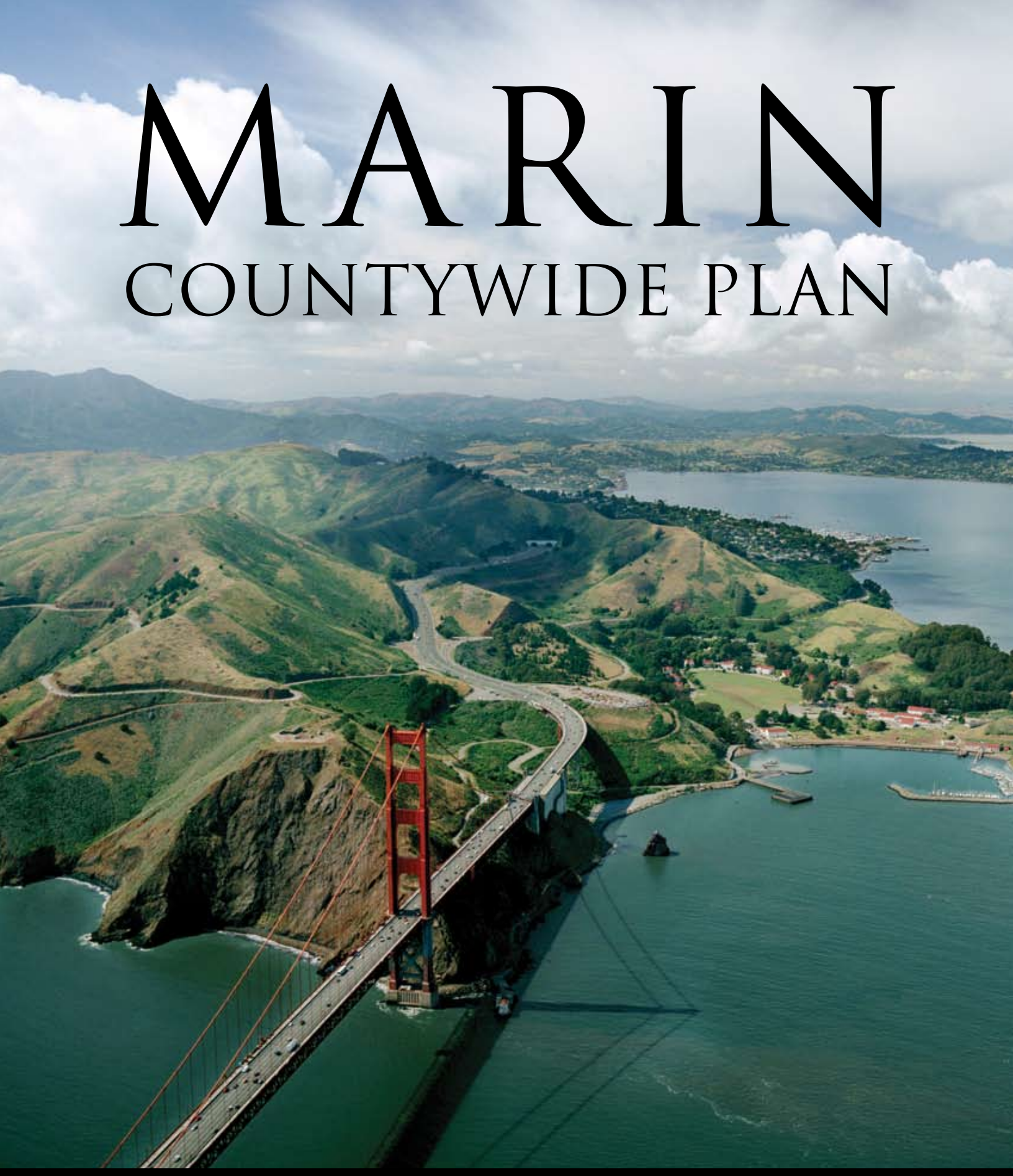
MARIN
COUNTYWIDE PLAN



ADOPTED NOVEMBER 6, 2007

Marin Countywide Plan

Adopted by the
Marin County Board of Supervisors

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November 6, 2007

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TABLE OF CONTENTS

The mission of the County of Marin is
to provide excellent services that
support healthy, safe and sustainable communities;
preserve Marin's unique environmental heritage; and
encourage meaningful participation
in the governance of the County for all.

STRATEGIC PLANNING GOALS

The following strategic planning goals have also been adopted by the Marin County Board of Supervisors

COMMUNITY GOALS

- Healthy Communities
- Safe Communities
- Sustainable Communities
- Environmental Preservation
- Community Participation

ORGANIZATIONAL GOALS

- Excellent Customer Service
- Employer of Choice
- Effective Communication
- Managing for Results
- Financial Responsibility

THE COUNTYWIDE PLAN

What is the Countywide Plan?

© Robert Campbell/Chamois Moon

The Marin Countywide Plan guides the conservation and development of Marin County. California law requires every city and county in the state to prepare and adopt a comprehensive long-range general plan for the physical development of the jurisdiction. While the law establishes specific requirements for the contents of the general plan, within that framework each community has the latitude to design its own future. Through extensive public participation, individual residents and representatives of many organizations have contributed to the creation of this document.

INTRODUCTION

Marin County has long maintained a tradition of environmental planning balanced with the recognition of the essential linkages between land use, transportation, and the need for affordable housing. The first Countywide Plan, adopted in 1973, remains a visionary document.

In the Countywide Plan, the 606 square miles of land and water that make up Marin County are designated as an environmental unit consisting of regions called *corridors*. Each corridor is based on specific geographical and environmental characteristics and natural boundaries formed by north- and south-running ridges (see Map 1-2). In the 1973 Plan, the following three environmental corridors were designated:

The Coastal Recreation Corridor (renamed the Coastal Corridor in this update) is adjacent to the Pacific Ocean and is primarily designated for federal parklands, recreational uses, agriculture, and the preservation of existing small coastal communities.

"Planning is best done in advance."

– Anonymous

The Inland Rural Corridor, in the central and northwestern part of the county, is primarily designated for agriculture and compatible uses, and for preservation of existing small communities.

The City-Centered Corridor, along Highway 101 in the eastern part of the county near San Francisco and San Pablo bays, is primarily designated for urban development and for protection of environmental resources. This corridor is divided into six planning areas generally based on watersheds.

The environmental features that focus development within the City-Centered Corridor have been updated and clarified as depicted in Maps 3-1a and 3-1b.

For over 30 years, these geographic designations have been widely recognized as the organizing principle of the Countywide Plan and have been modified only slightly in the course of three updates of the Plan. In this update of the Plan, the following fourth environmental corridor has been designated:

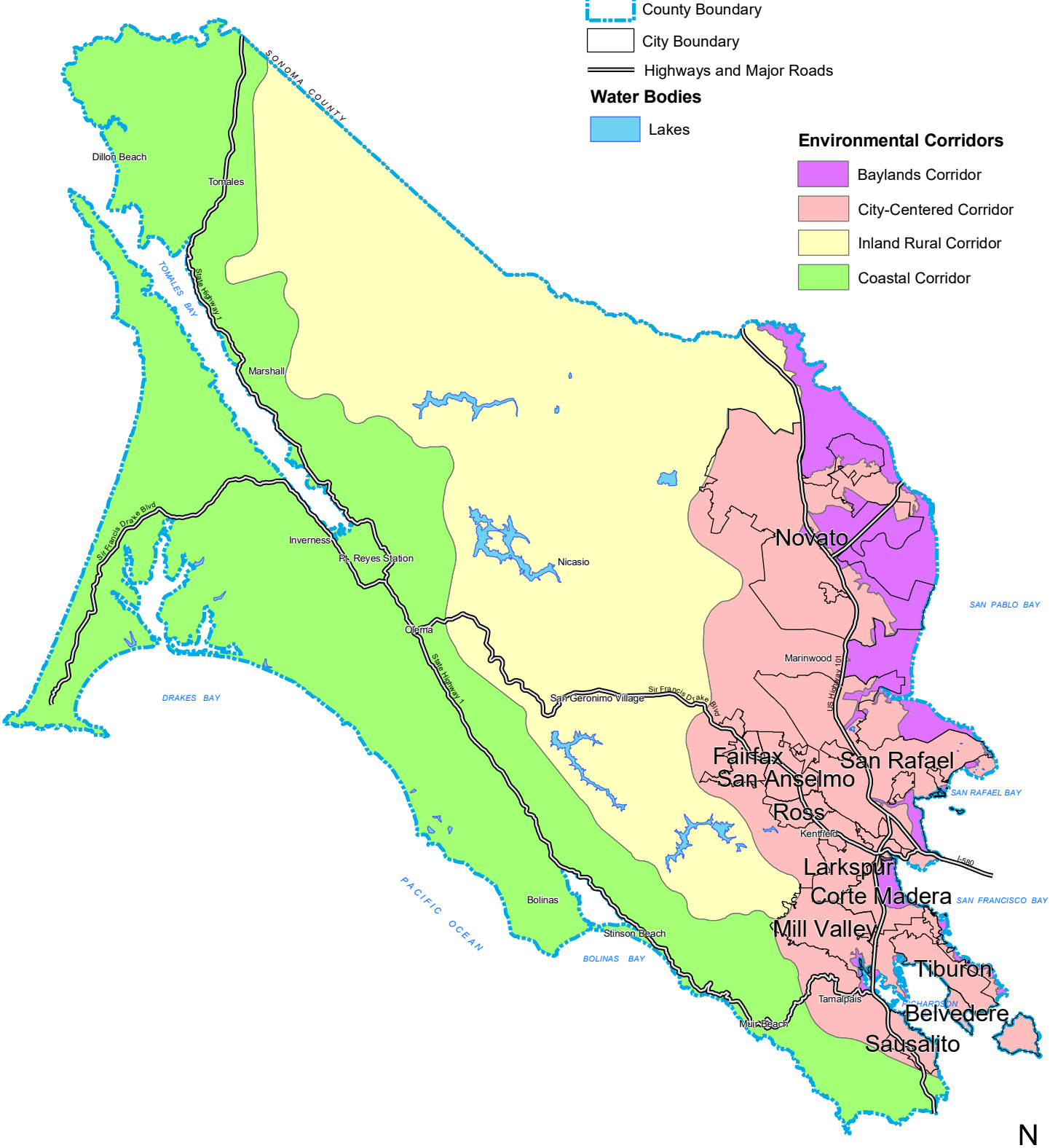
The Baylands Corridor, encompassing lands along the shoreline of San Francisco, San Pablo, and Richardson bays, provides heightened recognition of the unique environmental characteristics of this area and the need to protect its important resources. The area generally contains marshes, tidelands, and diked lands that were once wetlands or part of the bays, and adjacent, largely undeveloped uplands.

MAP 1-1
COUNTY OF MARIN

THIS MAP WAS DEVELOPED FOR GENERAL PLAN PURPOSES. THE COUNTY OF MARIN IS NOT RESPONSIBLE OR LIABLE FOR USE OF THIS MAP BEYOND ITS INTENDED PURPOSE.

Date: January 18, 2005 File: County of Marin.mxd

MAP 1-2
ENVIRONMENTAL CORRIDORS



THIS MAP WAS DEVELOPED FOR GENERAL PLAN PURPOSES. THE COUNTY OF MARIN IS NOT RESPONSIBLE OR LIABLE FOR USE OF THIS MAP BEYOND ITS INTENDED PURPOSE.

SOURCE: County of Marin

Date: January 27, 2009 File: EnvCorr with Bayland 1-2.mxd

History

The Countywide Plan, first adopted in 1973, was revised twice before the current update. The first update was adopted in 1982 and the second in 1994.

The 1973 Plan established the three environmental corridors. The Plan also focused on balancing environmental protection with the needs of present and future residents for housing, jobs, and recreation, and on the need for transportation options to reduce dependence on automobile use. Freeways and sprawling major development projects were proposed for pristine West Marin prior to adoption of the first Countywide Plan.

The public process culminating in the adoption of the Plan began a tradition of cooperation and coordination between the County and the 11 cities and towns. The public body that reviewed and commented on the Plan included elected officials, planning commissioners, and community members representing all the cities and towns as well as the County. This was a plan for the whole county, not just the unincorporated area.

"When one tugs at a single thing in nature, he finds it attached to the rest of the world."

—John Muir

The 1982 Plan, which was reviewed by a committee composed of elected officials from all 12 jurisdictions in the county, identified urban service areas around cities as suitable for annexation because urban levels of service could be provided in these locations. Recognizing funding limitations, the Plan included modest increases in transportation service and encouraged less costly transportation solutions, such as carpooling. The 1982 Plan also focused on energy conservation and the use of renewable energy sources. In 1993, the Countywide Planning Agency was formed by a joint powers agreement among all the cities/towns and Marin County to address planning and development issues of countywide concern, and to review and comment on the Countywide Plan as well as the general plans of the cities and towns.

The 1994 Plan was a comprehensive update using the newly available technologies of geographic information system (GIS) and transportation modeling to identify development potential and transportation capacity. Parcel-specific maps of land use designations were created. The 1994 Plan included an Agriculture Element and a Parks and Recreation Element. An Economic Commission was established to provide advice on economic issues and to write an Economic Element.

In 2007, the scope of the Countywide Plan has been revised to reflect the theme of planning sustainable communities and to recognize the adoption of Marin County government's first strategic plan in 2001, which sought to achieve excellence in public service. This latest version has also been enlarged to include such social equity and cultural issues as public health, environmental justice, child care, the economy, and arts and culture. This update also benefited from widespread community input resulting from a series of public outreach and working group meetings, as well as public access to the Countywide Plan website, prior to drafting Plan revisions.

Framework: Planning Sustainable Communities

Guiding Principles

To begin the curent Countywide Plan update process, a working group of local residents was convened to help prepare guiding principles. The efforts of this group resulted in the formation of the principles listed below. To show the linkage between these princliples and the goals throughout the Countywide Plan, a figure is included at the end of each section.

Planning Sustainable Communities is the overarching theme of the Marin Countywide Plan. Marin County government is committed to lead by example, promote public participation, and work in community partnerships to protect the natural systems that support life and improve our quality of life.

To design a sustainable future, we* will strive to accomplish the following:

1. **Link equity, economy, and the environment locally, regionally, and globally.**

   We will improve the vitality of our community, economy, and environment. We will seek innovations that provide multiple benefits.

2. **Minimize the use of finite resources, and use all resources efficiently and effectively.**

   We will reduce overall and individual consumption, and reuse and recycle resources. We will reduce waste by optimizing the full life cycle of products and processes.

3. **Reduce the use and minimize the release of hazardous materials.**

   We will continue to make progress toward eliminating the release of substances that cause damage to natural systems. We will use a precautionary approach to prevent environmentally caused diseases.

4. **Reduce greenhouse gas emissions that contribute to global warming.**

   We will join other communities addressing climate change by lowering our greenhouse gas emissions. We will increase the use of renewable resources which do not have a negative impact on the earth's climate.

5. **Preserve our natural assets.**

   We will continue to protect and restore open space, wilderness, and damaged ecosystems, and enhance habitats for biodiversity.

*"We" refers to the larger Marin community, including County government, other governmental bodies, local residents, businesses, employees, and visitors.

6. **Protect our agricultural assets.**

   We will protect agricultural lands and work to maintain our agricultural heritage. We will support the production and marketing of healthy, fresh, locally grown food.

7. **Provide efficient and effective transportation.**

   We will expand our public transportation system to better connect jobs, housing, schools, shopping, and recreational facilities. We will provide affordable and convenient transportation alternatives that reduce our dependence on single occupancy vehicles, conserve resources, improve air quality, and reduce traffic congestion.

8. **Supply housing affordable to the full range of our members of the workforce and diverse community.**

   We will provide and maintain well-designed, energy efficient, diverse housing close to job centers, shopping, and transportation links. We will pursue innovative opportunities to finance senior, workforce, and special needs housing, promote infill development, and reuse and redevelop underused sites.

"Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has."

— Margaret Mead

9. **Foster businesses that create economic, environmental, and social benefits.**

   We will support locally owned businesses and retain, expand, and attract a diversity of businesses that meet the needs of our residents and strengthen our economic base. We will partner with local employers to address transportation and housing needs.

10. **Educate and prepare our workforce and residents.**

    We will make high-quality education, workforce preparation, and lifelong learning opportunities available to all sectors of our community. We will help all children succeed in schools, participate in civic affairs, acquire and retain meaningful employment, and achieve economic independence.

11. **Cultivate ethnic, cultural, and socioeconomic diversity.**

    We will honor our past, celebrate our cultural diversity, and respect human dignity. We will build vibrant communities, and foster programs to maintain, share, and appreciate our cultural differences and similarities.

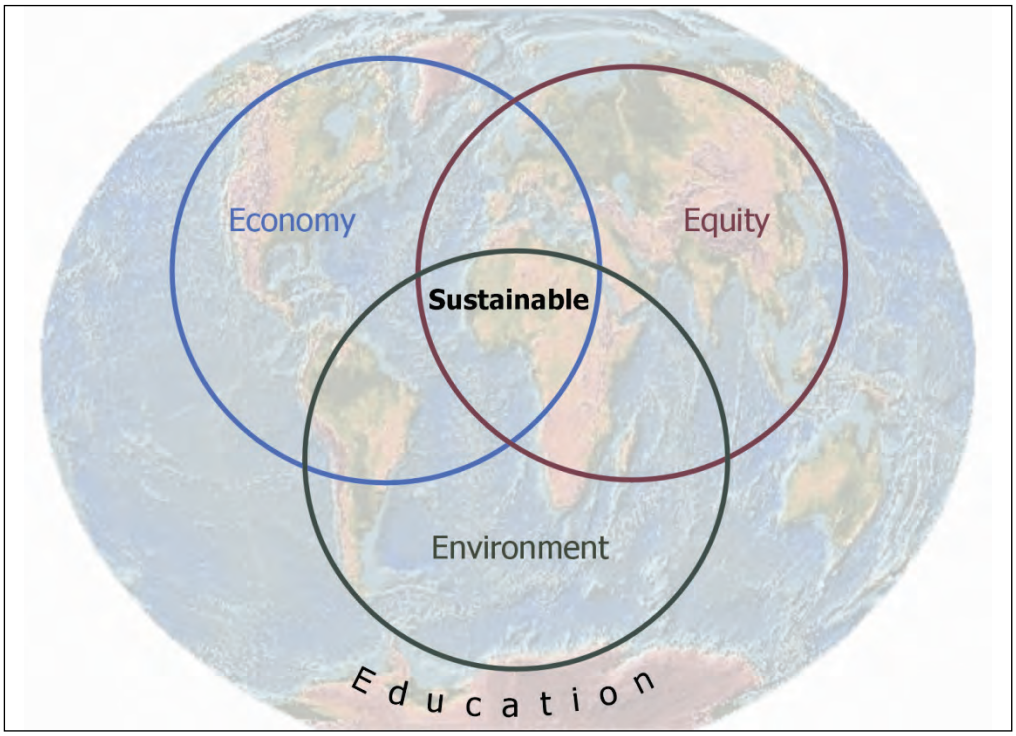
12. **Support public health, safety, and social justice.**

    We will live in healthy, safe communities and provide equal access to amenities and services. We will particularly protect and nurture our children, our elders, and the more vulnerable members of our community.

What Is Sustainability?

For the purpose of the Countywide Plan, *sustainability* is defined as aligning our built environment and socioeconomic activities with the natural systems that support life. In the long run, sustainability means adapting human activities to the constraints and opportunities of nature. Central to this definition is meeting the needs of both the present and the future.

The symbol below is a graphic representation of a sustainable community. Each ring represents one of the Three E's: the environment, the economy, and social equity. Each of these rings is connected to, and dependent upon, the others.



During the late 1970s and early 1980s, a number of independent scientists, activists, and other policy makers worldwide began working on responses to problems where issues of the environment were linked with human development. They began to use the term *sustainability* to describe the goal of joining economic prosperity with ecological health.

In 1987, the United Nations' World Commission on Environment and Development released a report, *Our Common Future,* which brought the term *sustainability* into widespread use. In defining sustainability, the United Nations' World Commission offered these five key concepts:

- The needs of the future must not be sacrificed to the demands of the present.
- Humanity's economic future is linked to the integrity of natural systems.
- The present world system is not sustainable because it is not meeting the needs of many, especially the poor.
- Protecting the environment is impossible unless we improve the economic prospects of the earth's poorest peoples.
- We must act to preserve as many options as possible for future generations, since they have the right to determine their own needs for themselves.

The American Planning Association identified the following four objectives in planning for sustainability:

1. Reduce dependence upon fossil fuels, extracted underground metals, and minerals.
2. Reduce dependence on chemicals and other manufactured substances that can accumulate in nature.
3. Reduce dependence on activities that harm life-sustaining ecosystems.
4. Meet the hierarchy of present and future human needs fairly and efficiently.

"We did not inherit the land from our fathers. We are borrowing it from our children."

– Amish proverb

Why Plan Sustainable Communities?

Current trends have demonstrated the need for planning healthy, safe, and sustainable communities. One trend is the increasing impact of greenhouse gases on the world's climate. Another trend is the decreasing supply of resources that support life.

The Role of Science

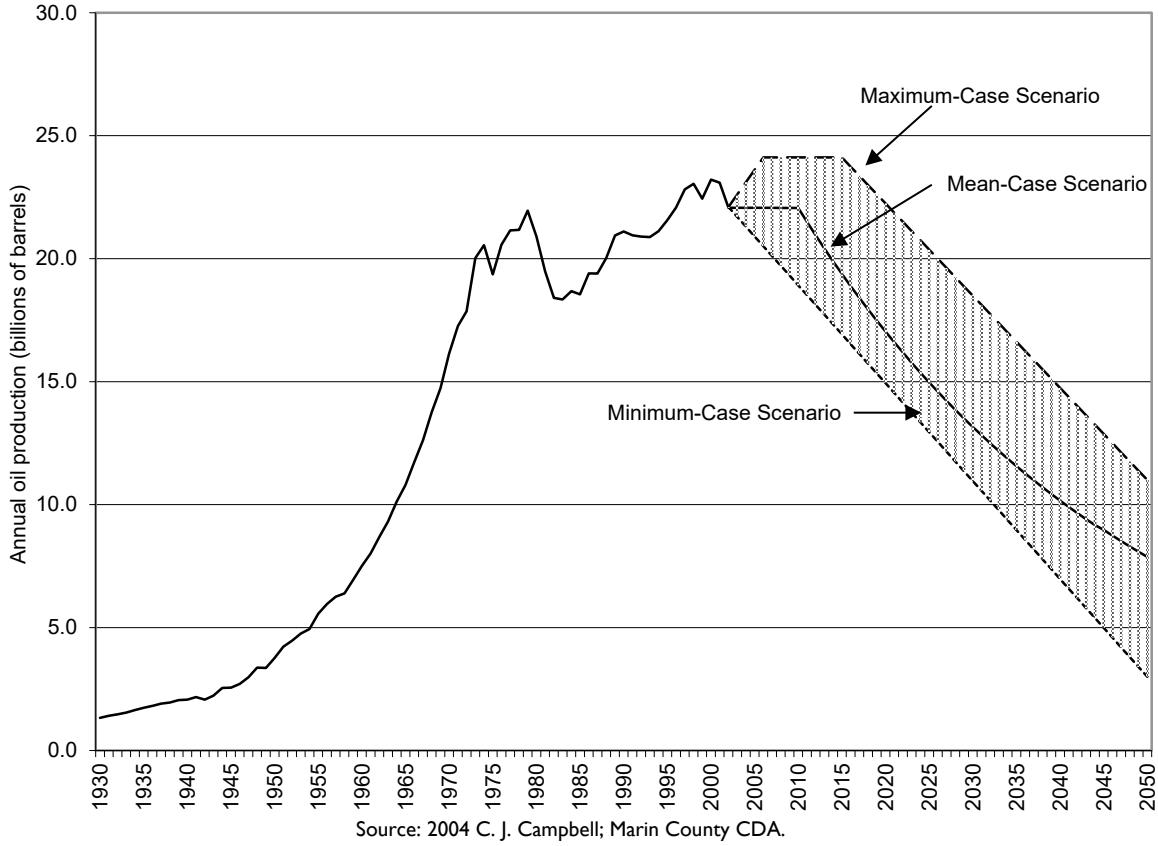
Achieving and maintaining sustainability requires keeping up with science. At times, land use and other public policy decisions operate within an institutional framework that does not reflect current scientific information. This is understandable, as cutting edge science is always on the move. For example, the multiple causes and effects of climate change, described below, are now well established, and current land use decision making needs to reflect the link between fossil fuel consumption and sea level rise.

Keeping up with science is an underlying principle of this Plan. Toward that end, employing evidence-based strategies combined with up-to-date scientific knowledge will provide sound guidelines for taking care of the land, our communities, and the generations that will follow us.

Climate Change

Much of our built environment is now powered by fossil fuels. Fossil fuel use creates the greenhouse gases that contribute to global warming. Increasing consequences of global warming raise concerns about the need to reduce the use of fossil fuels. On average, climate models suggest about a three-degree rise in global temperature over the next 50 to 100 years.

Figure 1-1 Global Oil Production 1930–2050: Maximum-, Minimum-, and Mean-Case Scenarios



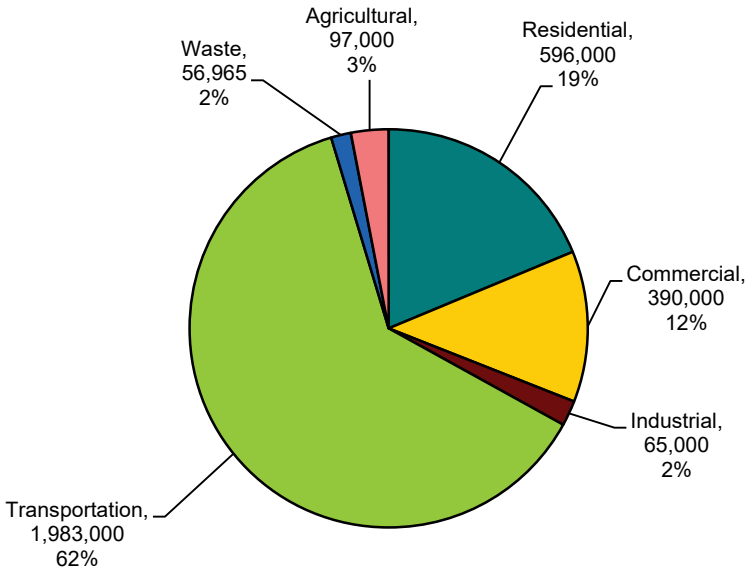
Source: 2004 C. J. Campbell; Marin County CDA.

As Figure 1-1 depicts, oil production is projected to begin a rapid decline sometime before 2020. This, combined with the negative impact of fossil fuel use on the climate, prompts the need to shift away from the use of fossil fuel.

The impact of global warming is compounded by a decreasing resource base. Water, forests, and productive farmland are diminishing. Social inequities mount along with competition for natural resources. Equitably providing the means for prosperity, while also improving environmental quality, is a core challenge.

Figure 1-2 illustrates the distribution of greenhouse gas emissions countywide by sector. This information is useful for developing policies and programs to reduce Marin's contribution to greenhouse gases.

Figure 1-2 Countywide Greenhouse Gas Emissions, 2005



Source: 2007 Marin County CDA.

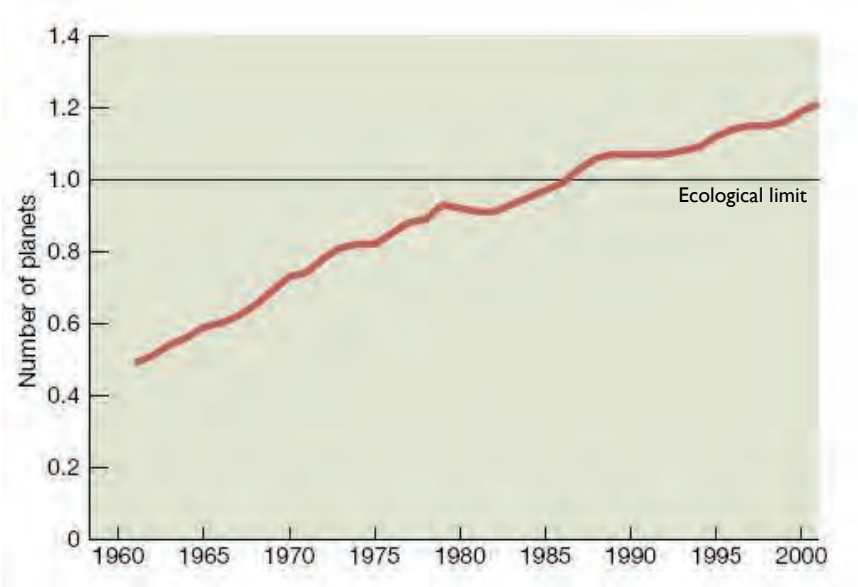
Resource Use

Research about ecological sustainability increasingly indicates that the worldwide use of resources is exceeding the earth's capacity to renew them. This is driven largely by energy and materials consumption in the United States and other industrialized nations, and, more recently, by increased levels in developing nations. *The Living Planet Report*, issued in 2004 by the World Wildlife Fund, describes how in the past 30 years human demand on natural resources has increased 160 percent while the health of natural systems (as measured by loss of wild species populations) has declined 40 percent.

"In today's world . . . we need to be sensitive to the concerns of others. . . . No one can afford to think in purely local terms."

– Kofi Annan

Figure 1-3 Humanity's Ecological Footprint



Source: 2004 World Wide Fund for Nature.

To learn more about the ecological footprint, go to www.footprintnetwork.org/ or www.redefiningprogress.org.

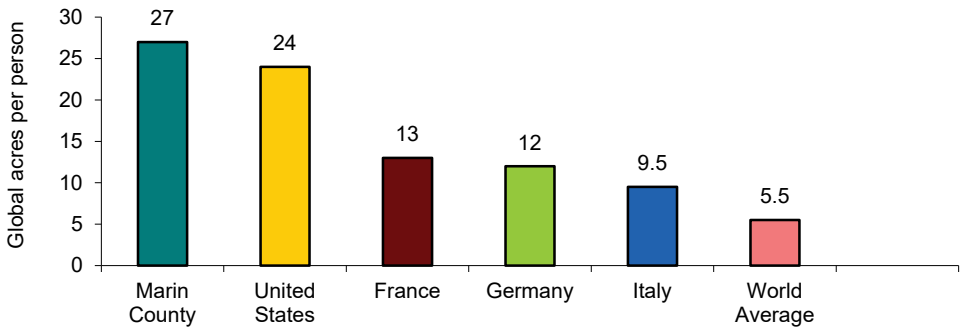
The *ecological footprint* measures the use of natural resources against the planet's actual biocapacity and its ability to supply these resources. It can be calculated for individuals, regions, countries, or the entire earth and is expressed as the number of *global acres* (acres with world average biological productivity) that it takes to support one person. Given the current global population, about 4.5 global acres are available to support each individual on earth. When humanity's footprint exceeds the amount of biocapacity, an overuse of natural capital occurs. Figure 1-3 shows that since the mid-1980s, humanity's demand for ecological resources has exceeded the earth's supply each year.

"Plans are the dreams of the wise."

— German proverb

For example, as Figure 1-4 illustrates, the average American uses 24 global acres per capita, while the average Marin resident requires 27 global acres. Other western democracies, such as France, Germany, and Italy, have footprints of 13, 12, and 9.5 global acres per person, respectively.

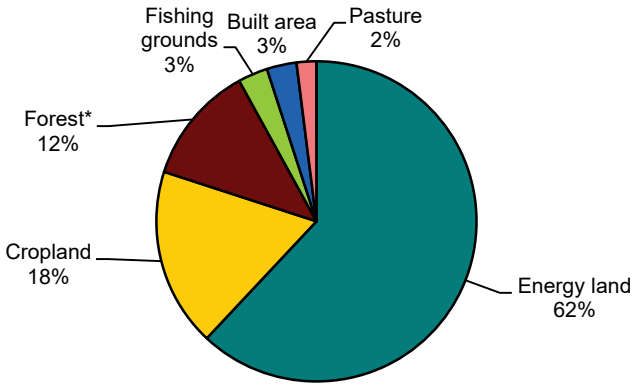
Figure 1-4 Ecological Footprint Comparison



Sources: *Redefining Progress,* Sustainable Sonoma County, World Wide Fund for Nature.

Figure 1-5 shows the breakdown of Marin County's footprint by the type of area used. The largest component is "energy land," the area of unharvested forest required to absorb the carbon dioxide that is produced when burning fossil fuels.

Figure 1-5 Ecological Footprint of Marin County, 2004



Source: 2004 Redefining Progress.

*Forest here refers to the area of forest harvested for timber and fuel wood purposes.

Figure 1-6 shows the amount of land required by Marin's footprint. The inner circle in this figure shows the amount of land that would be required if Marin residents had the same footprint as residents of Italy. Figure 1-7 shows the number of earths that would be required if everyone in the world had the footprint of a selected Bay Area county.

Figure 1-6 Footprint Land Requirements

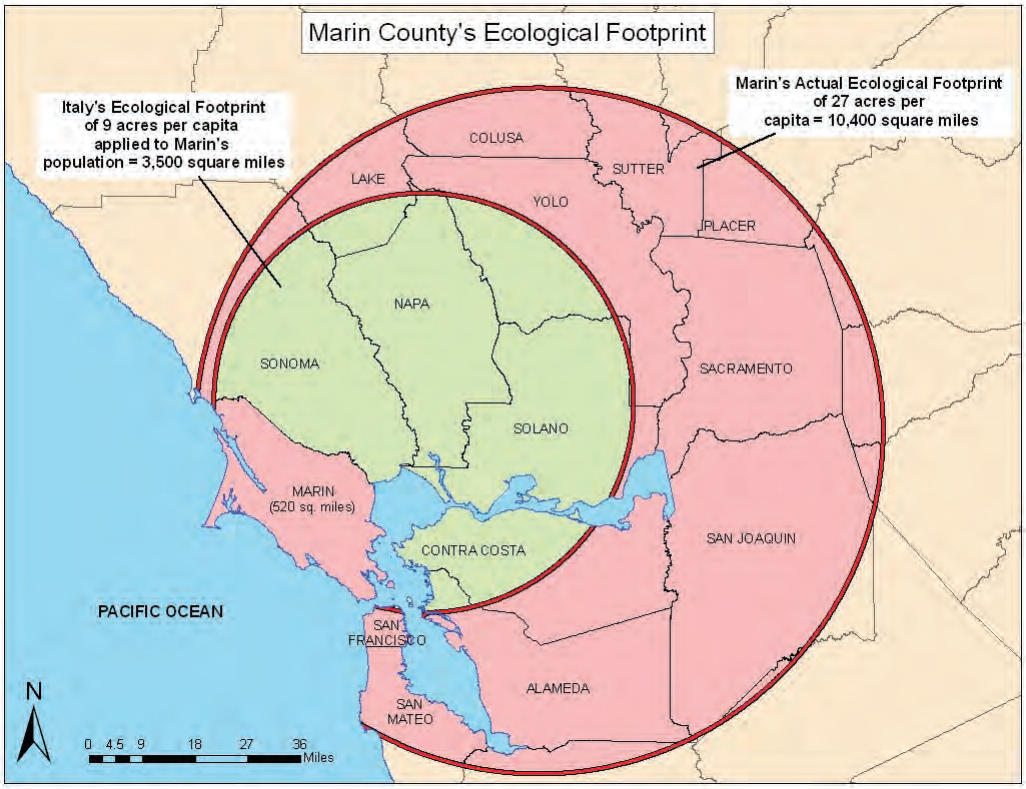
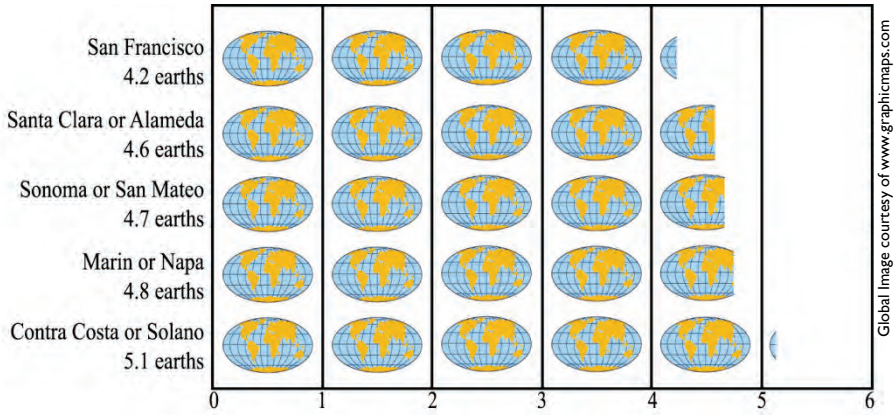


Figure 1-7 Number of Earths Required If the World Population Footprint Equaled a Bay Area County



Planning sustainable communities is of global importance, as distant decisions can affect the health of natural systems and consequently human well-being even in faraway places. Furthermore, the carrying capacity of an ecosystem, city, or bioregion is also affected by land use planning and human resource consumption.

How Can We Plan Sustainable Communities?

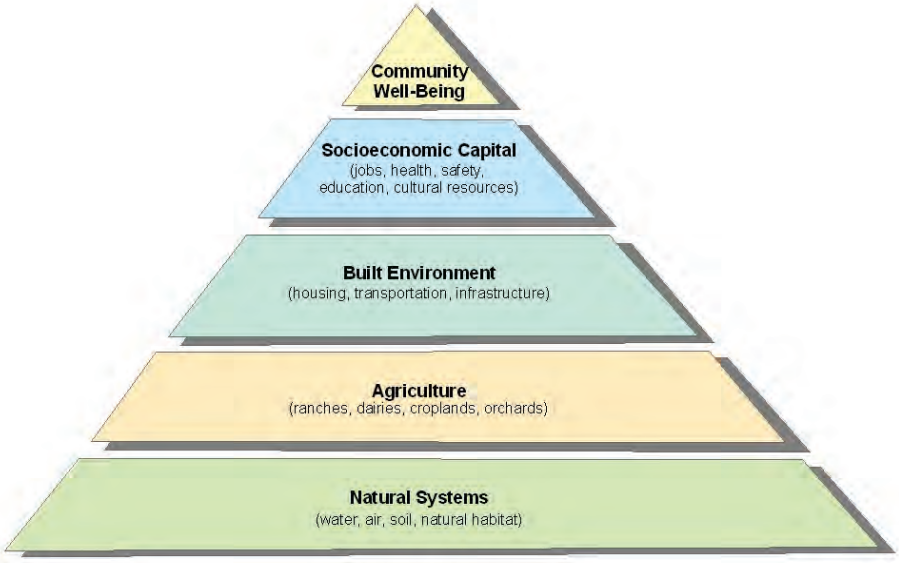
Marin County is a major contributor to the Bay Area's regional open space and agricultural greenbelt, and the Countywide Plan establishes land use policies intended to provide a balanced mix of jobs and housing. A strategic infill approach that supports affordable housing for members of the workforce at selected mixed-use locations near existing jobs and transit, along with an emphasis on green building and business practices, offers Marin communities a way to carry out the Three E's of sustainability (environment, economy, and social equity).

"We cannot direct the wind, but we can adjust the sails."

– Anonymous

During the development of this Plan, a conceptual framework designed by the economist Herman Daly was considered that integrates natural systems, social systems, and human aspirations, illustrated as a pyramid. As modified below to more closely correlate to the organization of the Countywide Plan, the pyramid has a foundation consisting of natural systems, such as water, air, soil, and natural habitats that support life. The illustration depicts the mutually supportive relationship of natural and built environments that, along with economic and social capital, provide the means to achieve individual and community well-being.

Framework for Sustainability



Daly's conceptual framework has three principles:

1. Renewable resources (such as groundwater, soil, and fish) should not be used faster than they regenerate.
2. Nonrenewable resources (such as minerals and fossil fuels) should not be used faster than renewable substitutes for them can be put into place.
3. Pollution and waste should not be emitted faster than natural systems can absorb, recycle, or render them harmless.

To accomplish these, it will be necessary to make significant changes in the way communities process and consume resources, a shift sometimes referred to as an "ecological U-turn." Toward this end, it is intended that the nonbinding targets listed in Plan implementation sections will be periodically monitored and reevaluated during future Countywide Plan updates throughout the 21st century.

The **precautionary principle**, another conceptual framework considered during the preparation of the Plan**,** carries the sense of foresight and preparation, and is the common-sense idea behind many adages: "Be careful." "Better safe than sorry." "Look before you leap." "First, do no harm." Historically, many environmentally harmful activities were stopped only after they resulted in environmental degradation or serious harm to many people. The precautionary principle is an approach characterized by minimizing or eliminating potential hazards at the onset of an activity instead of the approach that determines an "acceptable level of harm." In addition, the precautionary principle utilizes full cost accounting to assess the potential costs and benefits of a given activity or product.

The California Office of Planning and Research has also published General Plan Guidelines that include information regarding sustainable development. The Countywide Plan has been prepared consistent with these guidelines.

Countywide Goals

Countywide goals reflect core community values and identify what fundamental outcomes are desired. Although these overarching goals are not quantifiable or time dependent, implementation of the policies and programs of the Countywide Plan is intended to assist the larger Marin community in achieving the following:

- **A Preserved and Restored Natural Environment.** Marin watersheds, natural habitats, wildlife corridors, and open space will be protected, restored, and enhanced.
- **A Sustainable Agricultural Community.** Marin's working agricultural landscapes will be protected, and the agricultural community will remain viable and successfully produce and market a variety of healthy foods and products.
- **A High-Quality Built Environment.** Marin's community character, the architectural heritage of its downtowns and residential neighborhoods, and the vibrancy of its business and commercial centers will be preserved and enhanced.
- **More-Affordable Housing.** Marin's members of the workforce, the elderly, and special needs groups will have increased opportunities to live in well-designed, socially and economically diverse affordable housing strategically located in mixed-use sites near employment or public transportation.
- **Less Traffic Congestion.** Marin community members will have access to flexible work schedules, carpools, and additional transportation choices for pedestrians, bicyclists, and transit users that reduce traffic congestion.
- **A Vibrant Economy.** Marin's targeted businesses will be clean, be prosperous, meet local residents' and regional needs, and provide equal access to meaningful employment, fair compensation, and a safe, decent workplace.
- **A Reduced Ecological Footprint.** Marin residents and businesses will increasingly use renewable energy, fuel efficient transportation choices, and green building and business practices similar to the level of Western Europe.
- **Collaboration and Partnerships.** Marin public agencies, private organizations, and regional partners will reach across jurisdictional boundaries to collaboratively plan for and meet community needs.
- **A Healthy and Safe Lifestyle.** Marin residents will have access to a proper diet, health care, and opportunities to exercise, and the community will maintain very low tobacco, alcohol, drug abuse, and crime rates.
- **A Creative, Diverse, and Just Community.** Marin will celebrate artistic expression, educational achievement, and cultural diversity, and will nurture and support services to assist the more vulnerable members of the community.
- **A Community Safe from Climate Change.** Marin will be a leader in averting and adapting to all aspects of climate change.

> *"The world will not evolve past its current state of crisis by using the same thinking that created the situation."*
>
> — Albert Einstein

User Guide

How Is the Countywide Plan Organized?

While the basic components of a general plan are established by the requirements of California State planning law, the organization of the document is left to local discretion. The law states that each city and county must adopt a general plan that includes the following seven sections or elements: conservation, open space, safety, land use, housing, circulation, and noise. A city or county may also adopt optional elements. State law establishes that each element is of equal importance and that the elements must be consistent with one another.

"A hundred years after we are gone and forgotten, those who never heard of us will be living with the results of our actions."

— Oliver Wendell Holmes

This edition reorganizes the Countywide Plan into three sections. Most legally required general plan topics have been incorporated into the Natural Systems and Agriculture and Built Environment elements of this Plan, while most optional subjects have been concentrated in the Socioeconomic Element.

The Natural Systems and Agriculture Element focuses on nature and life support systems, including

- **biological resources**, including special-status species, sensitive natural communities, wetlands, riparian habitat, and the Baylands Corridor (addresses contents for the Conservation Element)
- **water resources**, including watersheds, hydrology, flooding, and water conservation (addresses contents for Conservation, Safety, and Land Use elements)
- **environmental hazards** from seismic activity, landslides, and fires (addresses contents for Safety Element)
- **open space** (addresses contents for Open Space Element)
- **trails** (addresses contents for Open Space Element)
- **agriculture and food** (addresses contents for Open Space and Conservation elements)

The Built Environment Element principally addresses villages, towns, and construction-related activities, including

- **community development** (addresses contents for Land Use Element)
- **community design**
- **energy and green building**
- **mineral resources** (addresses contents for Conservation Element)
- **housing** (implements portions of the County's Housing Element)
- **transportation** (addresses contents for Circulation Element)
- **noise** (addresses contents for Noise Element)
- **public facilities and services** (addresses contents for Circulation Element)
- **planning areas** (addresses contents for Land Use Element)

The Socioeconomic Element focuses on people and what they do for each other, including

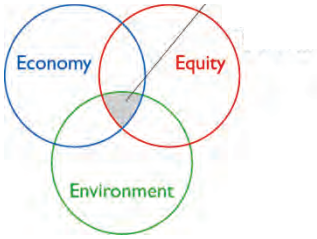
- **the economy**
- **child care**
- **public safety** (addresses contents for Safety Element)
- **community participation**
- **diversity**
- **education**
- **environmental justice**
- **public health**
- **arts and culture**
- **historical and archaeological resources**
- **parks and recreation** (addresses contents for Open Space Element)

Basic Building Blocks of the Plan

The Plan includes background information and key trends, as well as goals, policies, programs, and diagrams and maps. These components represent the development policies, diagrams and maps, objectives, principles, standards, and plan proposals called for in California's planning law.

Goal: An expression of community values and desired outcomes — a sought-after end state that is not quantifiable or time dependent. A graphic displays which of the Three E's (environment, economy, and social equity) are benefited by the goal as indicated within the overlapping circles.

Why is this important?
Goals are evaluated for their environmental, economic, and social equity benefits.



Policy: A statement derived from a goal that represents the jurisdiction's adopted position and guides action by decision-making bodies.

Program: A specific implementation measure to carry out goals and policies of the Countywide Plan.

Diagram: A graphic representation of the Plan's policies. While the Plan's land use diagrams and maps are not as specific as zoning maps, they do provide guidance about the appropriate uses of each parcel of land within the County's jurisdiction.

Each Element of the Plan is organized to answer the following questions:

- What are the desired outcomes? These discussions lay out the Plan's goals and policies.
- Why is it important? These discussions focus on how specific goals and policies in the Plan promote the Three E's of sustainability — environment, economy, and social equity.
- How will results be achieved? These discussions describe the Plan's programs (specific implementation measures).

- How will success be measured? The Plan includes *indicators*, *benchmarks*, and *targets* to help measure and evaluate progress in achieving goals and promoting related policies (indicators, benchmarks, and targets are discussed in more detail later in this section of the Plan).

Sidebars: Sidebars have been included throughout the Plan to highlight related information. In some cases, the sidebars contain information about ecological footprint impacts, as indicated with a footprint symbol:

Technical-Background Reports and Other Supporting Documents

Preparation of the Countywide Plan involved developing a series of technical-background reports. These included the following:

- 2005 Congestion Management Program
- Agriculture
- Air Quality
- Archaeology
- Biology
- Community Facilities
- Energy
- Flooding
- Geology
- Hydrology and Water Quality
- Noise
- Marin County Targeted Industries Study Final Report and Supplement
- Parks and Recreation
- Trails
- Transportation
- Watershed Management Plan

While these reports provided a basis for drafting the Countywide Plan, they are not part of the Plan.

Similarly, the Plan at times refers to various other documents produced and/or adopted by Marin County. These documents are also not a part of the Plan. How to Read the Countywide Plan.

How to Read the Countywide Plan

The following principles govern how the Marin Countywide Plan should be read, interpreted, and implemented.

Relationships between the Plan's various goals and policies. In California, the general plan is often characterized as being a community's "constitution" for development and conservation. A general plan

is called upon to address a range of diverse, sometimes divergent, public interests. A city or county enjoys broad discretion to weigh and balance competing interests in formulating general-plan policies.

All general plans, including this one, must address a host of concerns within a consistent, well-integrated policy framework. In implementing the Plan, it is the task of the Board of Supervisors (or its delegates) to make policy determinations in a manner that promotes the overall goals of the Plan and the public welfare, in accordance with existing resources, staffing, and priorities. Policy and program implementation will require reasonable and thoughtful consideration of other Plan policies. Such implementation decisions will come up on a case-by-case basis as the Board, Planning Commission, County staff, and others work to effectively implement the entire Plan.

Another overall principle to guide the reading, interpretation, and implementation of the Plan is that none of its provisions will be interpreted by the County in a manner that violates state or federal law. For example, Policy CD-5.2 ("Assign financial responsibility for growth") requires new development to pay for its fair share of the cost of public facilities. This policy will be implemented subject to applicable legal standards. In reading every provision of the Plan, one should infer that it is limited by the principle, "to the extent legally permitted."

Effect of headings and titles. The Plan's policies and programs are typically accompanied by a heading or title. These are provided for convenience only. To the degree that these headings or titles conflict with the text they accompany, the text shall govern.

Plan Implementation

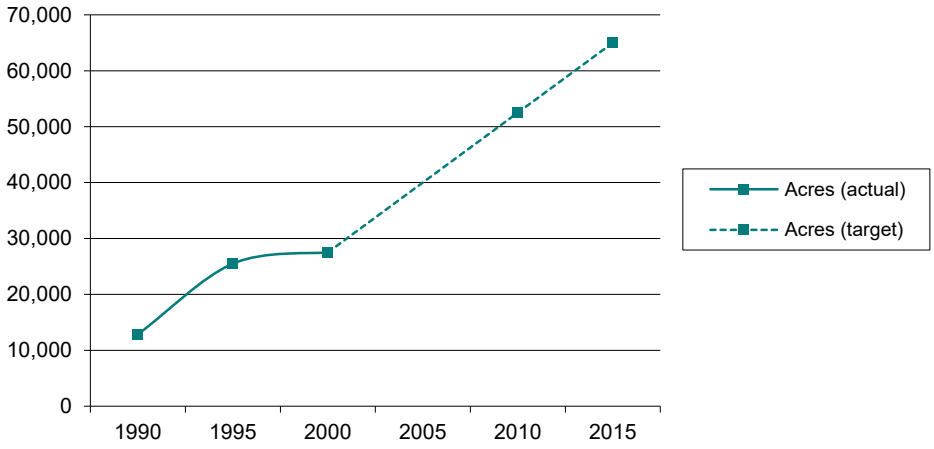
As described above, the Countywide Plan includes specific implementation measures or *programs*. The following principles guide Plan implementation.

- Implementation can take time, especially when needed resources are limited and required for more than one program.
- Because implementation can take time, the Board of Supervisors and those to whom the Board delegates, may need to prioritize programs. The Plan contemplates this ongoing process as part of Marin County's policy-making function.
- While the Plan identifies specific programs, implementation measures may be adjusted over time based on new information, changing circumstances, and evaluation of their effectiveness, so long as they remain consistent with the intent of the Plan.

Indicators, Benchmarks, and Targets

A frequent criticism of general plans and their implementation is that there is insufficient feedback to know whether progress is being made in meeting the plan's goals and promoting its policies. The Countywide Plan takes several important, innovative steps in addressing this concern by incorporating *indicators*, *benchmarks*, and *targets*. These are nonbinding informational tools to monitor progress. This process will provide an opportunity to consider the need for new or revised Countywide Plan strategies or implementation measures. In addition to Countywide Plan monitoring, these metrics are intended to go beyond the scope of the Plan and track progress in Marin in a variety of areas.

Figure 1-8 Marin Agricultural Land Trust Easements



Source: 2003 Marin Agricultural Land Trust.

Measuring progress is important to determining the effectiveness of any plan. An *indicator* is a measurement that assists in demonstrating movement toward or away from Plan goals and policies. Proposed indicators have been crafted to be understandable, representative, and relevant. *Benchmarks* establish a "starting point" — the state of an indicator as of a particular point in time (for example, the year 2000). A *target* is a quantifiable outcome that provides a framework for measuring progress.

It is important to note that by adopting indicators, benchmarks, and targets, which are not required to be included in a general plan, Marin County does not intend to establish additional general plan goals and policies. Rather, the intent is to establish a feedback loop that will help to monitor progress in meeting the various goals and policies of the Countywide Plan and will need to be periodically reviewed and updated. Because the indicators, benchmarks, and targets are intended only as an aid in implementation of the General Plan and are not policies or programs of the General Plan, they are included in the plan only for convenience and updates will not be considered amendments to the General Plan. Furthermore, progress towards reaching these targets is not the sole responsibility of Marin County government and will, in many circumstances, require federal or State participation as well as a countywide collaboration among local governments, residents, businesses and other affected parties.

The following are examples of indicators, benchmarks, and targets:

Indicator	Benchmark	Target
Acres preserved with agricultural easements.	28,377 acres preserved in 2000.	Increase by: 25,000 acres by 2010 12,500 additional acres by 2015.

Implementation Charts

The Countywide Plan contains implementation charts that identify responsibilities, potential funding, priorities, and estimated time frames for carrying out proposed programs.

In some cases, implementation of the Plan will occur through revisions to other land use plans and regulations. For example, the Countywide Plan will be implemented through revisions to the County's Development Code including, but not limited to, consideration of the following:

- modified stream conservation zoning standards for developed properties
- a uniform agricultural zoning district that resembles the current C-APZ district
- the definition of agriculture
- home-size limitations on agricultural and other lands
- increased energy efficiency standards
- community-based design and parking standards
- enhanced linkages between jobs, housing, and transportation

Land Use Categories

The Countywide Plan establishes and maps land uses according to the following categories. Additional policy guidance can be obtained from the various local community plans.

Agriculture

Agriculture and Conservation Land Use Categories

Agriculture and Conservation land use categories (AGC 1-3) are established for land with resource values for both agricultural production and wetlands and wildlife habitat. These lands may also have physical constraints, such as heavily wooded hillsides that limit their potential for agricultural production, and deserve protection on the basis of their habitat and visual resource values. Historically, 60 acres has been the minimum parcel size for most agricultural and resource conservation lands in the county.

Agricultural Land Use Categories

Agricultural land use categories (AG 1-3) are established to preserve and protect a variety of agricultural uses, and to enable the potential for agricultural production and diversification. Historically, 60 acres has been the minimum parcel size for most agricultural lands in the county.

Residential

Residential development categories are established at a full range of densities, with an emphasis on providing more affordable housing.

Very Low Density Residential

Very low density residential land use categories (Single-Family 1-2 with minimum lot sizes of 5 to 60 acres) are designated for single-family residential development on large properties in rural areas where public services are very limited or nonexistent, and on properties where physical hazards and/or natural resources significantly restrict development.

Rural/Residential

Rural/residential density land use categories (Single-Family 3-4 and Planned Residential with minimum lot sizes of 20,000 square feet to 10 acres) are established for single-family residential development in areas where public services are limited and on properties where physical hazards and/or natural resources may restrict development.

Low Density Residential

Low density residential land use categories (Single-Family 5-6 and Multi-Family 2 with minimum lot sizes of 10,000–20,000 square feet or less) are established for single-family and multi-family residential development in areas where some public urban services are available and where properties are not typically constrained.

Low to Medium Density Residential

Low to medium density residential land use categories (Multi-Family 3 and 3.5 allowing 5 to 16 units per acre) are established where moderate density and multi-family residential development can be accommodated in areas that are accessible to a range of urban services near major streets, public transit, and neighborhood shopping facilities.

Medium to High Density Residential

Medium to high density residential land use categories (Multi-Family 4 and 4.5 allowing 11 to 45 units per acre) are established within the City-Centered Corridor in communities where multi-family development can be accommodated with easy access to a full range of urban services at locations near major arterials, public transit, and community and regional shopping facilities.

Commercial and Mixed Use

The following land use categories are established for general, office, neighborhood and recreational commercial, and industrial uses. Mixed-use developments that incorporate residential units on commercial properties are encouraged to provide on-site housing for employees and other residents, and to contribute to fair share housing needs. Accordingly, residential uses may be permitted in all of the following commercial land use categories:

General Commercial/Mixed Use

The General Commercial land use category is established to allow for a wide variety of commercial uses, including retail and service businesses, professional offices, and restaurants, as well as moderate to high density mixed-use residential development.

Office Commercial/Mixed Use

The Office Commercial land use category is established to encourage a mixture of professional, administrative, and medical office uses, as well as medium to high density mixed-use residential development, where appropriate. Employee- and resident-serving retail and service businesses may also be permitted within this category.

Neighborhood Commercial/Mixed Use

The Neighborhood Commercial land use category is established to encourage smaller-scale retail and neighborhood-serving office and service uses, and mixed-use development oriented toward pedestrians and located in close proximity to residential neighborhoods.

Recreational Commercial

The Recreational Commercial land use category is established for resorts, lodging facilities, restaurants, and privately owned recreational facilities, such as golf courses and recreational boat marinas. Housing for employees or very low and low income households may also be permitted.

Industrial

The Industrial land use category is established for industrial uses such as warehouses, storage, laboratories, retail sales, mine processing, light manufacturing, and administrative offices. Housing for employees or very low and low income households may also be permitted.

Planned Designation

The Planned Designation land use category is established and includes the following subcategories: Planned Designation — Agricultural and Environmental Resource Area (PD–Agricultural and Environmental Resource Area), and Planned Designation — Reclamation Area (PD–Reclamation Area). This land use category enables the planning of reuse projects at major opportunity sites. In order to provide a forum for comprehensive community-based planning, projects in this land use category are subject to approval of a specific or master plan and consistency with the Countywide Plan, including policies promoting affordable housing, and innovative, environmentally friendly, transit-oriented and energy efficient designs.

Public, Quasi-Public, and Open Space

The Public, Quasi-Public, and Open Space land use categories are established for both public and quasi-public institutional purposes, including open space, schools, hospitals, cemeteries, government facilities, correctional facilities, power distribution facilities, sanitary landfills, and water facilities. The Public category is established for land owned by a governmental agency and used as a public institution. The Quasi-Public category is established for land owned by a non-governmental agency that is used as an institution serving the public. Lands in public ownership for open space purposes, such as recreation, and watershed and habitat protection and management, are designated open space. In addition, private lands may be designated open space when subject to deed restrictions or other agreements limiting them to open space and compatible uses. Lands designated as public or quasi-public facilities may be combined with another land use.

NATURAL SYSTEMS & AGRICULTURE ELEMENT

© Richard Blair

Marin County is known for its distinctive natural setting and environmental and agricultural heritage. Surrounded on three sides by water, Marin encompasses abundant environmental resources beautiful and rich in diversity, as well as working agricultural landscapes. From the quality of the air we breathe, the water we drink, and the food we eat, to the outdoors where we relax and rejuvenate, we depend on nature to provide for us. A responsibility to understand and protect the environment and agriculture is a fundamental component of this Element of the Countywide Plan. Reinforcing the critical role of watershed planning is an overarching concern.

Watershed functions, water quality, riparian habitat, wetlands, and baylands are all addressed in the Natural Systems and Agriculture Element. The topics addressed in this Element are interrelated, as are all the components of natural systems. Issues that threaten Marin County's biodiversity—such as water quality degradation, invasive flora, non-native animal species, habitat fragmentation, and loss of sensitive biological resources as a result of land conversion and development—are also threats to agriculture and food production. How we treat streams, marshes, and wetlands not only affects the plants and animals that depend on these aquatic habitats, but also creates flood-related and other impacts in low-lying areas.

Below are the topics covered in this portion of the Countywide Plan:

- Biological Resources
- Water Resources
- Environmental Hazards
- Atmosphere and Climate
- Open Space
- Trails
- Agriculture and Food

Topics related to naturally occurring environmental hazards are located in this Element, while hazardous materials issues are discussed under Public Safety in the Socioeconomic Element. Issues pertaining to environmental justice, public health, historic and archaeological resources, and parks and recreation are addressed in the Socioeconomic Element.

2.2 Key Trends and Issues

Biological Resources

> *"Trend is not destiny."*
> —Rene Dubois

Preservation of large parts of Marin County has served to protect important biological resources and the biodiversity of the region. Nevertheless, future development may threaten sensitive resources in Marin and contribute to further fragmentation of natural areas. In 2001, Marin ranked 17th among the 58 California counties in the number of special-status species documented here, indicating both an opportunity for preservation and a continued threat to sensitive resources. In fact, Lagunitas Creek supports the most important remnant population of federally endangered wild coho salmon from California's central coast. Despite positive efforts to protect and restore habitat, native biodiversity is still at risk. Factors contributing to these risks, such as the continued loss of habitat, fragmentation of natural areas, inadequate management of open space lands, potential for catastrophic wildfires, and invasion by exotic species, all pose significant threats to native plants and animals. Other risks and concerns include obstruction of wildlife movement corridors, filling of wetlands, and loss of oak woodlands to disease.

Water Resources

Providing adequate water for human use while supporting habitat for fish, other aquatic species, and terrestrial wildlife is very important and an increasingly difficult challenge. Water demand among Marin residents has risen while fish populations have declined. Human impacts are adversely affecting water quality. Urbanization increases the rate of storm runoff to local creeks. Excess runoff scours creeks and causes habitat loss.

Environmental Hazards

Marin's spectacular coastline, high ridges, and variety of landscapes have been influenced by natural phenomena such as earthquakes, wildfires, and flooding. These same phenomena can also significantly impact the built environment and human activity. The epicenter of the 1906 earthquake was near Olema on the San Andreas Fault. Massive wildfires occurred on Mount Tamalpais in 1929 and Mount Vision in 1995. Significant flooding has occurred throughout the county on various occasions during periods of sustained, heavy rainfall and high tides. Infrequent but significant events, as well as a multitude of more frequent smaller events throughout the county, are part of the natural process and are expected. While these events can have beneficial effects on the natural environment, they can also result in catastrophic and costly devastation when structures and human activities are in their path.

Atmosphere and Climate

Transportation and energy production are among the activities associated with the combustion of fossil fuels that is increasing the amounts and concentrations of greenhouse gases (carbon dioxide, methane, nitrogen oxide) in the atmosphere that contribute to global warming. The U.S. Environmental

Protection Agency estimates that by 2100 carbon dioxide concentrations could be up to three times higher than current levels. Much of the air pollution in Marin results from motor vehicle use, and many private automobile trips cover short distances, which tends to concentrate emissions in certain areas.

Open Space

The County Open Space District manages and protects ridgelands, baylands, and other environmentally sensitive lands. Open space lands also accommodate low-impact recreational uses. Most of the district budget goes toward managing open space, leaving little for land acquisition. The district relies increasingly on conservation or open space easements from private landowners to extend its preservation efforts. Parks and recreation services and their facilities are discussed in the Socioeconomic Element.

Trails

The Marin trail system is widely recognized as one of the best anywhere, and Marin has become a trail recreation destination. Demand by hikers, road and mountain bicyclists, and equestrians is increasing, as is commercial use, such as organized hiking, dog walking, and nature interpretation. Trail use also is rising among sports enthusiasts. Increased activity on trails has led to conflicts among users and with neighbors, especially regarding parking and private property issues. Parks and recreation services and their facilities are discussed in the Socioeconomic Element.

Agriculture and Food

Nearly one-fourth of Marin's agricultural land has been permanently protected from subdivision and development, but working ranches are increasingly threatened by the prospect of conversion to single-family residential estates. The majority of local agricultural operations are only marginally profitable. Major issues facing local agriculture include the high cost of land, regulation by multiple agencies, and difficulty recruiting younger generations to work in agriculture. Many local operations have begun diversifying to increase their viability, producing row crops and value-added products such as cheese, butter, organic foods, and grass-fed beef. Although agriculture is not technically considered a "natural system," most ranchers and farmers in Marin conduct agricultural activities in a manner compatible with the natural environment.

2.3 Framework

The Vision

The 21st century in Marin will include a restored natural environment that supports a rich array of native plants and animals, and provides for human needs. Residents and visitors will enjoy clean air and water. Native habitat and essential corridors for wildlife movement and plant dispersal will be protected. Watershed function will improve with enhancements to water infiltration, preservation of stream-flow capacity and riparian vegetation, and restoration of stream corridors, marshlands, and other natural wetlands.

Local agricultural heritage will be celebrated. Local farmers and ranchers will provide an increase in healthy food, much of which will be grown, processed, and consumed in the San Francisco Bay Area, enhancing food security and agricultural viability while shrinking our ecological footprint and reducing the costs associated with food transport. Expanded agricultural uses will provide needed products for county and regional residents, while protecting important biological resources.

Topics in the Natural Systems and Agriculture Element include the following:

Biological Resources (see Section 2.4): Marin is home to a wide variety of plants and animals, as well as a number of unique natural communities and highly sensitive biological and wetland resources. Protecting and restoring native habitat are the most effective methods of preserving plant and animal diversity.

Water Resources (see Section 2.5): Watersheds are dynamic systems that transport water, sediments, and nutrients from ridgetops to watercourses, and perform many vital water quality and storage functions along the way. Preserving and improving water and watershed quality depends on maintaining equilibrium between inflow and consumption, and avoiding human alterations that can diminish natural functions.

Environmental Hazards (see Section 2.6): Environmental conditions can threaten habitat, wildlife, the built environment, and human life. Since Marin is in a seismically active area, ground shaking from earthquakes is a major potential hazard, as are wildland fires and flooding. Countywide Plan policies and programs are proposed to minimize the impact of hazards related to these natural phenomena.

Atmosphere and Climate (see Section 2.7): Marin's relatively good air quality is compromised by high concentrations of ozone caused by vehicle traffic, and localized high volumes of particulate matter caused by construction activities, wood burning, off-road travel, and agricultural operations. Scientists generally concur that the earth's climate is changing through a buildup of gases that trap heat in the atmosphere. With the uncertainty about location, rate, and magnitude of possible climate-changing impacts, it is more important than ever to take steps to improve air quality and minimize greenhouse gas emissions.

Open Space (see Section 2.8): Public open space contributes significantly to the way people think and feel about Marin. Open lands are managed primarily for resource preservation, and secondarily for

lower-impact recreational uses such as hiking, horseback riding, and mountain biking. Preserving natural resources while providing access to open space lands poses an ongoing challenge.

Trails (see Section 2.9): Marin County has approximately 639 miles of public trails. The countywide trail system connects environmentally important areas (such as bayland, coastal, and ridgeland areas), parks and open space, and greenbelts between urban areas. Preserving existing trails, acquiring new rights-of-way, minimizing environmental impacts, and balancing access and property rights remain key issues in managing local trails.

Agriculture and Food (see Section 2.10): The viability of Marin farms and ranches is threatened by a combination of low profit margins and pressure to convert agricultural lands to single-family estates. Access to locally and responsibly grown, healthy food requires successful protection of agricultural land, support for local farmers and ranchers, and efforts to promote diversification of local products.

Clapper rail.

2.4 Biological Resources

Background

Marin is home to a number of diverse and important natural communities, from coastal marine environments to bay marshlands and mudflats, riparian habitats, and an upland mosaic of forests, woodlands, grasslands, and chaparral (see Map 2-1, Vegetation). Detailed information and maps of these ecosystems, their associated sensitive biological and wetland resources, and a summary of resource-protection regulations can be found in the *Biological and Wetland Protection Technical Background Report* (see the Introduction, "Technical Background Reports and Other Supporting Documents").

Special-status species are plants and animals that are legally protected under the State and/or federal Endangered Species Acts or other regulations, as well as other species that are considered rare enough by the scientific community and trustee agencies to warrant special consideration, particularly with regard to protection of isolated populations, nesting or denning locations, communal roosts, and other essential habitat. (See Figure 5-1, Special-Status Animal Species Known or Suspected from Marin County, and Figure 5-2, Special-Status Plant Species Known or Suspected from Marin County.)

Occurrences of special-status species are known throughout Marin (see Map 2-2). More than 90 special-status plant and animal species in Marin are monitored by the California Department of Fish and Game, and at least another 35 species that meet special-status criteria have been reported locally. The Community Development Agency maintains a current list of special-status species in Marin.

Human activity has had major adverse effects on the health and sustainability of these natural communities. Since the mid-19th century, grazing, logging, agriculture, road building, and development have markedly altered the natural landscape. This section of the Countywide Plan contains policies intended to preserve native habitat and protect sensitive resources through appropriate land use practices, and restoration and enhancement efforts. Sensitive resources include jurisdictional wetlands, occurrences of special-status species, occurrences of sensitive natural communities, wildlife nurseries and nesting areas, and wildlife movement corridors. Specific programs seek preservation of special-status species, sensitive natural communities, important wildlife habitat and movement corridors, wetlands, riparian habitats, coastal dunes, and baylands. The Water Resources Section of this Element contains related policies and programs.

Resource Protection

Federal and State laws regulate wetlands, stream channels, and plant and animal species vulnerable to change or threatened with extinction. The jurisdiction, resource management practices, and code enforcement activities of the federal and State regulatory agencies vary depending on the specific sensitive resource. Wetlands and special-status plants and animals listed as "endangered" or "threatened" receive the highest protection (see Map 2-2, Special-Status Species and Sensitive Natural Communities, shown for illustrative purposes only). Other plant and animal species that are not listed are still considered vulnerable enough to be recognized as special-status species (see Figure 5-1, Special-Status Animal Species Known or Suspected from Marin County) located in the Appendix of this Plan. In addition, a number of unique natural communities (*sensitive natural communities*) are recognized by the California Department of Fish and Game because of their scarcity and continued loss as a result of development.

The County development review process typically requires a site assessment by qualified professionals to confirm whether any sensitive resources could be

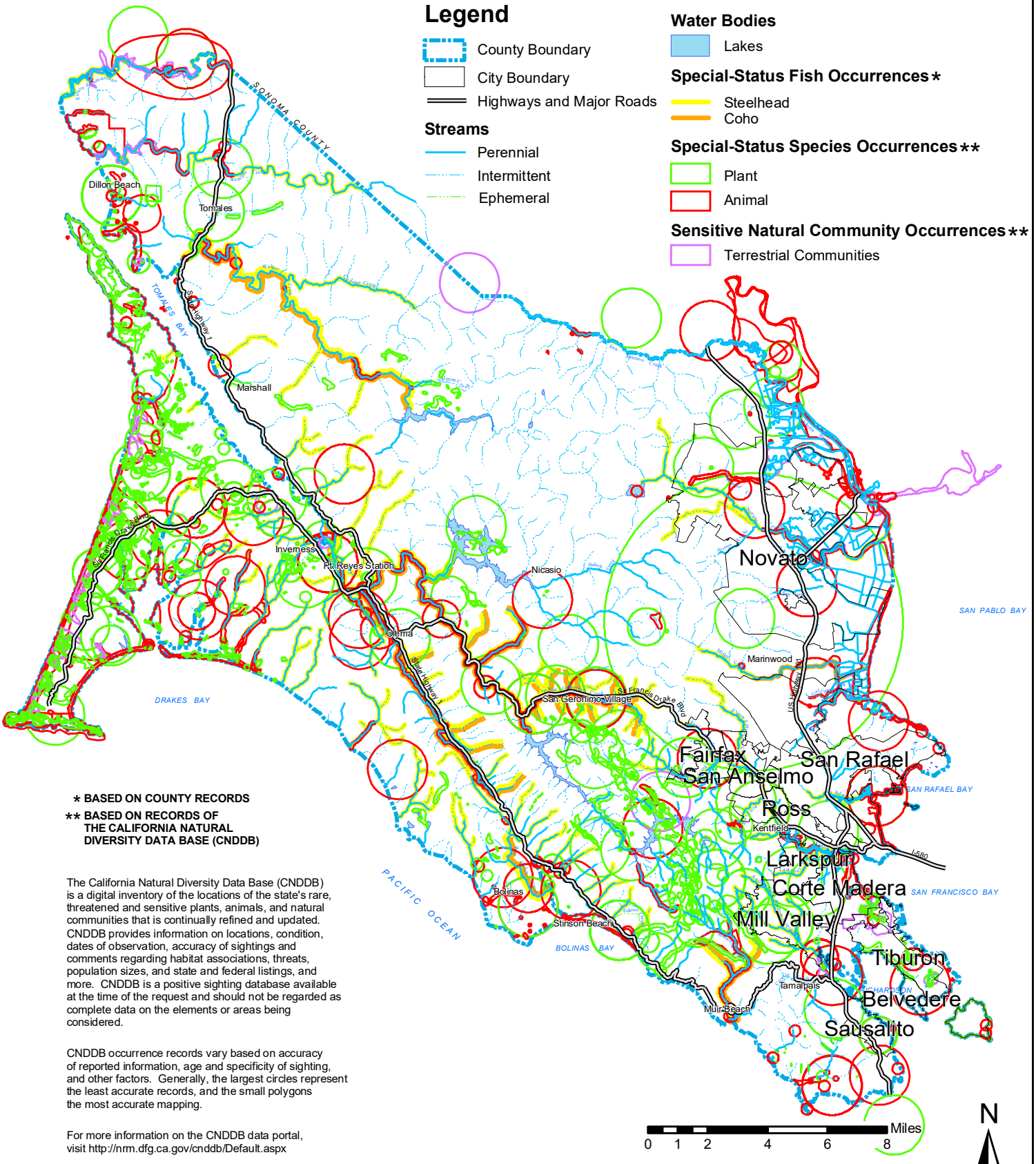
MAP 2-1
VEGETATION

The information provided in parenthesis are the vegetation type attributes used by the USDA Forest Service to identify vegetation.

2004 VEGETATION MAPPING SOURCE: Modified USDA Forest Service Pacific Southwest Region Remote Sensing Lab.
Additional information available at: http://www.fs.fed.us/r5/rsl/clearinghouse/aa-ref-sec263a.shtml

Date: February 5, 2007 File: Vegetation_2-1.mxd

MAP 2-2
SPECIAL-STATUS SPECIES AND SENSITIVE NATURAL COMMUNITIES



* BASED ON COUNTY RECORDS

** BASED ON RECORDS OF THE CALIFORNIA NATURAL DIVERSITY DATA BASE (CNDDB)

The California Natural Diversity Data Base (CNDDB) is a digital inventory of the locations of the state's rare, threatened and sensitive plants, animals, and natural communities that is continually refined and updated. CNDDB provides information on locations, condition, dates of observation, accuracy of sightings and comments regarding habitat associations, threats, population sizes, and state and federal listings, and more. CNDDB is a positive sighting database available at the time of the request and should not be regarded as complete data on the elements or areas being considered.

CNDDB occurrence records vary based on accuracy of reported information, age and specificity of sighting, and other factors. Generally, the largest circles represent the least accurate records, and the small polygons the most accurate mapping.

For more information on the CNDDB data portal, visit http://nrm.dfg.ca.gov/cnddb/Default.aspx

SOURCE: Modified from California Department of Fish & Game California Natural Diversity Data Base.
Additional information available at: www.dfg.ca.gov

THIS MAP WAS DEVELOPED FOR GENERAL PLAN PURPOSES. THE COUNTY OF MARIN IS NOT RESPONSIBLE OR LIABLE FOR USE OF THIS MAP BEYOND ITS INTENDED PURPOSE.

Date: October 31, 2007 File: CNDDB_2-2.mxd

affected, and to identify measures necessary to protect those resources and mitigate potential impacts. Detailed surveys are necessary where there is a potential for occurrence of sensitive resources. Consultation and permit authorization from regulatory agencies may be required where proposed development would affect essential habitat for listed special-status species or jurisdictional wetlands, although avoidance is the preferred mitigation whenever feasible. Enactment of local ordinances also serves to regulate potential loss of sensitive resources and establishes standards for protection and mitigation.

The continued loss of oak woodland, oak savannah, and other native woodland habitat through their conversion to primarily urban uses resulted in the adoption of the County Native Tree Preservation and Protection Ordinance in 1999. This regulates the removal of native trees and is intended to use local regulations to protect sensitive resources. This ordinance broadened the protection of native tree species not previously addressed by tree protection development standards and findings being applied through the discretionary permit review process. While this ordinance does serve to partially illustrate the opportunity to regulate sensitive biological resources on the local level, it should be amended and additional guidelines should be adopted to address a greater number of factors that contribute to woodland preservation and its relationship to wildlife habitat.

Effectively implementing resource protection policies and regulations is dependent in part upon the availability of accurate mapping and an understanding of the value of the remaining natural habitat. Expanding and improving the County's mapping of wetlands, streams, and vegetation types will assist in identifying potential impacts early in the development review process. Conveying this information to the public will also allow property owners and developers to be responsive to resource protection policies and standards in the design of their projects.

Wetlands

Wetlands (see Map 2-3, Wetlands/Streams) are considered important natural resources because of their

Sensitive natural communities are natural community types that are considered particularly rare or threatened by the California Natural Diversity Data Base of the California Department of Fish and Game. Sensitive natural community types in Marin include, but are not limited to, coastal and valley freshwater marsh, freshwater seep and spring, riparian forest and woodland, coastal brackish marsh, coastal terrace prairie, central dune scrub, coastal bluff scrub, northern coastal salt marsh, northern maritime chaparral, northern vernal pool, serpentine bunchgrass, valley needlegrass grasslands, old-growth redwood and Douglas fir forests, and deciduous woodlands dominated by valley oaks or Oregon white oak.

Wetlands are areas periodically or permanently inundated by surface or groundwater that support vegetation adapted to life in saturated soil, and are delineated based on hydrology, soils, and vegetation. Jurisdictional wetlands and unvegetated other waters are regulated by the U.S. Army Corps of Engineers and the Regional Water Quality Control Board. Certain wetlands, streams, and waters are also regulated by the California Department of Fish and Game under the Streambed Alteration Agreement program.

Wetlands are protected for their high inherent value to fish and wildlife, their role as storage areas for storm and floodwaters, and their water recharge, filtration, and purification functions (see Map 2-3, Wetlands/Streams). They provide essential habitat for aquatic invertebrates, amphibians, and fish; are important for large numbers of bird and mammal species; and are an important source of drinking water for terrestrial species. Characteristic wetland types in Marin include coastal saltmarsh, brackish marsh, freshwater marsh, the lower channel slopes of streams and riparian habitat, seasonal wetlands, vernal pools, and freshwater seeps and springs.

high inherent value to fish and wildlife, their role as storage areas for storm and floodwaters, and their water recharge, filtration, and purification functions. They provide essential habitat for aquatic invertebrates, amphibians, and fish; they are important for large numbers of bird and mammal species; and freshwater wetlands are an important source of drinking water for terrestrial species.

Proposed modifications to wetlands are regulated through a complex jurisdictional and permitting process of State and federal agencies, depending on the type, location, and functions and values of the existing wetlands. In general, loss or modifications to wetlands must be avoided given the difficulty and questionable success of re-creating wetlands, and the length of time required to replace habitat lost as a result of development. At a minimum, project applicants must demonstrate compliance with State and federal wetlands regulations. Additional County requirements may apply where necessary to protect sensitive habitat values and other functions.

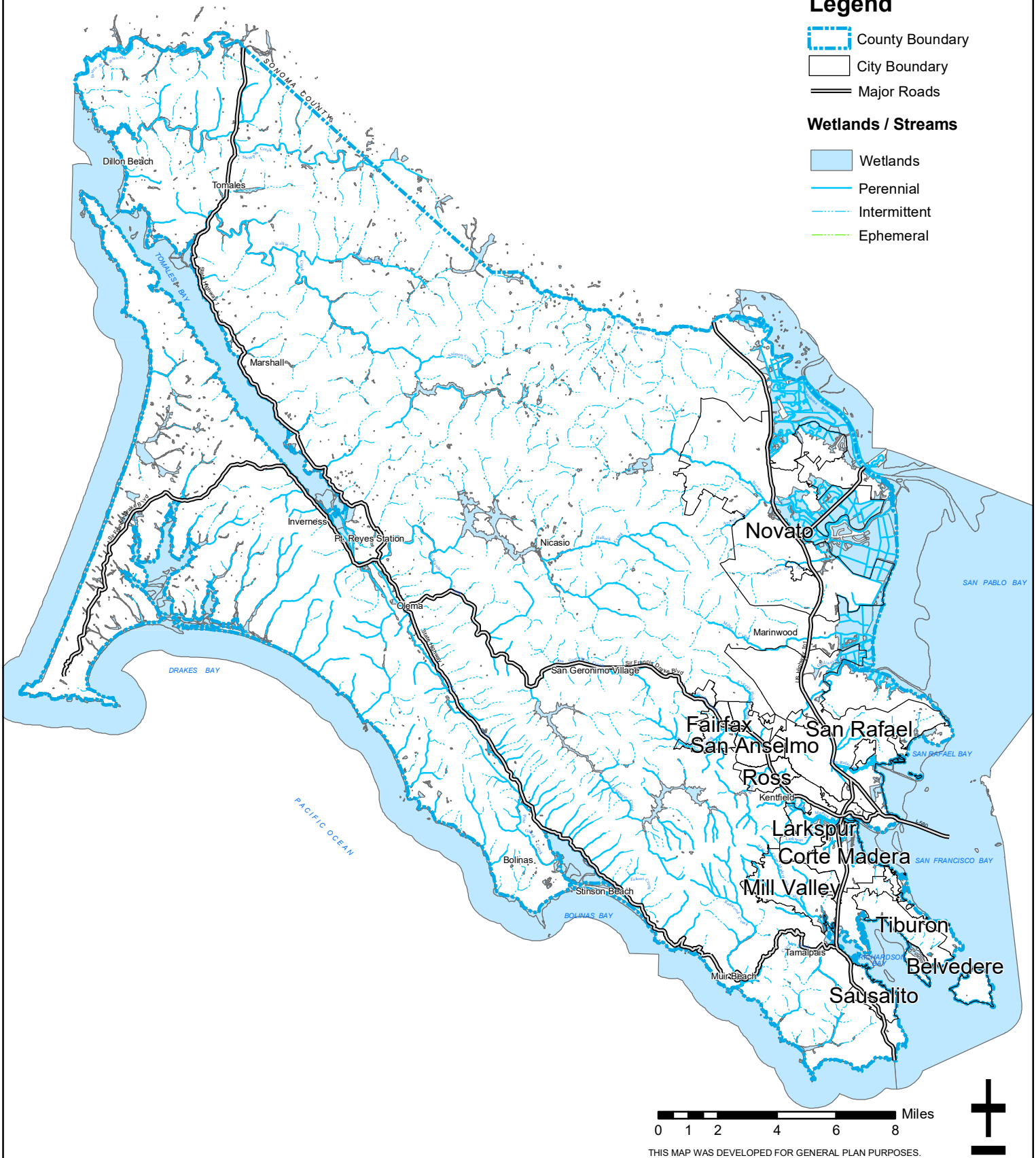
Marin County places a high priority on protecting and enhancing existing wetlands, and relies upon restoration or replacement as secondary measures where complete avoidance of wetlands cannot be accomplished. Additional and more precise mitigation criteria should be developed to establish a clear and consistent approach to preserving wetlands. Policies for wetlands protection also serve to prioritize land for restoration and open space acquisition.

Riparian Habitat. Riparian habitats are transitional zones between land and fresh water that occur along freshwater watercourses including perennial and intermittent streams, lakes, springs, and other bodies of fresh water. Riparian habitat is distinguished by characteristic woody vegetation, a variety of important ecological functions, and generally high wildlife habitat values.

Riparian Habitat

Streams convey, filter, and store sediment and nutrients. Their floodplains are important for recharge of groundwater aquifers and flood prevention. They also provide critical wildlife movement corridors between important habitats for both aquatic and terrestrial species. Ephemeral channels are important for maintaining healthy watersheds. Perennial and intermittent streams provide more permanent aquatic habitat and serve as fish migration, spawning, and rearing habitat (see Map 2-4, Watersheds with Streams and Observed Steelhead Trout

MAP 2-3
WETLANDS/STREAMS



SOURCE: Modified from the National Wetlands Inventory.
Additional information available at: www.nwi.fws.gov

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Date: November 18, 2004 File: Wetland_2-3.mxd

MAP 2-4
WATERSHEDS WITH STREAMS AND OBSERVED STEELHEAD TROUT AND COHO SALMON

THIS MAP WAS DEVELOPED FOR GENERAL PLAN PURPOSES. THE COUNTY OF MARIN IS NOT RESPONSIBLE OR LIABLE FOR USE OF THIS MAP BEYOND ITS INTENDED PURPOSE.

SOURCE: Bill Cox, California Department of Fish and Game
John O'Conner, SPAWN and Marin County Department of Public Works.

Date: April 19, 2005 File: CohoSteelhead_2-4.mxd

and Coho Salmon). Riparian vegetation is essential to proper functioning of stream systems and is a critical component of high-quality fish habitat. Woody vegetation provides shade that keeps water temperatures within tolerable ranges for fish and other aquatic organisms, stabilizes streambanks and floodplains, provides protective cover for wildlife, and contributes debris to stream channels for fish habitat structure. Herbaceous vegetation helps stabilize streambanks, and filters and traps sediments and pollutants.

The continued health and restoration of streams and riparian resources has become an increasingly important policy objective with the designation of the coho salmon and steelhead trout as special-status species by the State and federal governments. Stream Conservation Area policies were strengthened with the adoption of zoning regulations that expand and refine the applicability of stream setback requirements for development projects that have the potential for harming riparian vegetation and water quality. Additional development review procedures and standards are established or recommended in policies for stream conservation as an ongoing effort to create a well-balanced regulatory approach to protecting these important resources. Policies for riparian protections also serve to prioritize land for restoration and open space acquisition.

Baylands

Baylands ecosystems vital to the health of San Pablo, San Francisco, and Tomales bays have undergone tremendous change, as historical tidal areas were diked for agricultural use, marshes filled and drained for development, and channels dredged and straightened for navigation. The baylands ecosystem consists of the baylands themselves, together with a buffer on the remaining undeveloped uplands and the open waters of the deep bay and channels. The remaining agricultural baylands, used primarily for dryland farming and livestock grazing, support grassland cover and provide important winter habitat for shorebirds and waterfowl attracted to wet season ponding in fields.

Baylands, areas between historic high and low tide elevations, form a complex ecosystem of aquatic and upland habitats. The baylands ecosystem in Marin forms a varied pattern of open water, tidal marshes and mudflats, rocky shoreline, seasonal wetlands, and adjacent uplands.

The Baylands Corridor was established to protect important baylands and large adjacent undeveloped uplands along the San Pablo and San Francisco bays (see Maps 2-5a and 2-5b, Baylands Corridor). The Baylands Corridor reinforces and refines the current Bayfront Conservation Zone, protecting important tidelands and adjacent undeveloped uplands within the City-Centered Corridor (see Introduction, Map 1-2, Environmental Corridors). The Baylands Corridor encompasses much of the current Bayfront Conservation Zone along the entire shoreline of San Francisco Bay and San Pablo Bay, comprising most of the Tidelands Subzone, the Diked

The 1999 *Baylands Ecosystem Habitat Goals* at www.abag.ca.gov/bayarea/sfep contains information on the San Francisco Estuary baylands ecosystem and on key habitats, and recommendations for Marin County.

A number of State and federal agencies have regulatory authority over sensitive resources, including jurisdictional wetlands and waters, certain special-status species, and coastal areas. These agencies include the following

- **California Department of Fish and Game** (www.dfg.ca.gov)
- **California Coastal Commission** (www.coastalconservancy.ca.gov)
- **Regional Water Quality Control Board** (www.waterboards.ca.gov/sanfranciscobay)
- **U.S. Fish and Wildlife Service** (www.fws.gov)
- **National Marine (NOAA) Fisheries Service** (www.nmfs.noaa.gov)
- **U.S. Army Corps of Engineers** (www.usace.army.mil/inet/functions/cw/cecwo/reg/)

Bay Marshland and Agricultural Subzone, and the Shoreline Subzone, as defined in the 1994 Countywide Plan. Modifications have been made to boundaries of the current Bayfront Conservation Zone, where appropriate and to provide for more consistent mapping criteria. Establishment of a Baylands Corridor along Tomales Bay may be considered during the update of the Marin County Local Coastal Program. Policies for the Baylands Corridor also serve to prioritize land for restoration and open space acquisition.

Key Trends and Issues

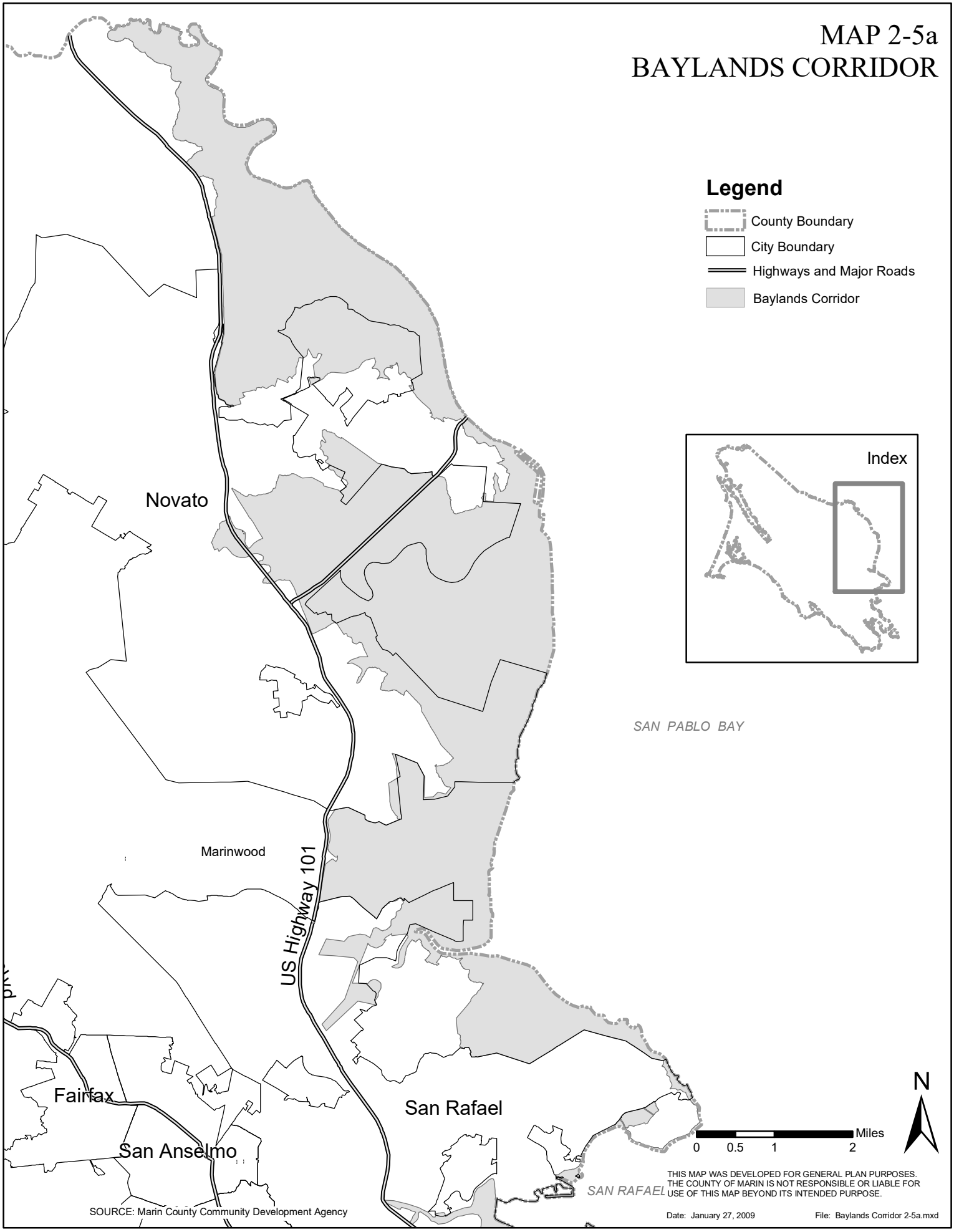
Are sensitive biological resources adequately protected?

A number of sensitive natural communities and species are becoming increasingly rare. These include, but are not limited to, bay marshlands and associated protected species such as the salt marsh harvest mouse, the California clapper rail, and Point Reyes's bird's beak; riparian corridors and associated protected species such as steelhead trout, coho salmon, the California red-legged frog, and California freshwater shrimp; and serpentine grasslands and associated protected species such as the Tiburon mariposa lily, the Tiburon Indian paintbrush, and the Marin western flax.

Not all special-status species receive adequate protection. The Department of Fish and Game Natural Diversity Data Base does not closely monitor at least 35 species reported locally that meet special-status criteria, and mapping is limited to known occurrences and does not identify all areas in which special-status species are present. Regulatory standards are generally not available to define appropriate development setbacks necessary to protect sensitive resources, requiring site-specific protective measures.

Natural communities, habitats, and corridors essential to wildlife health and movement and plant dispersal are vulnerable. Intensive development and inadequate buffers threaten streams, shorelines, wetlands, and protected open space lands. Riparian corridors, marshlands, and wetlands can be altered by filling, draining, removal of vegetative cover, and other modifications, eliminating their habitat values and functions. Wetlands and other sensitive resources can also be indirectly affected by development as a result of water quality degradation, lighting, introduction and spread of invasive exotic species, and increased activity of humans and pets.

MAP 2-5a
BAYLANDS CORRIDOR



SOURCE: Marin County Community Development Agency

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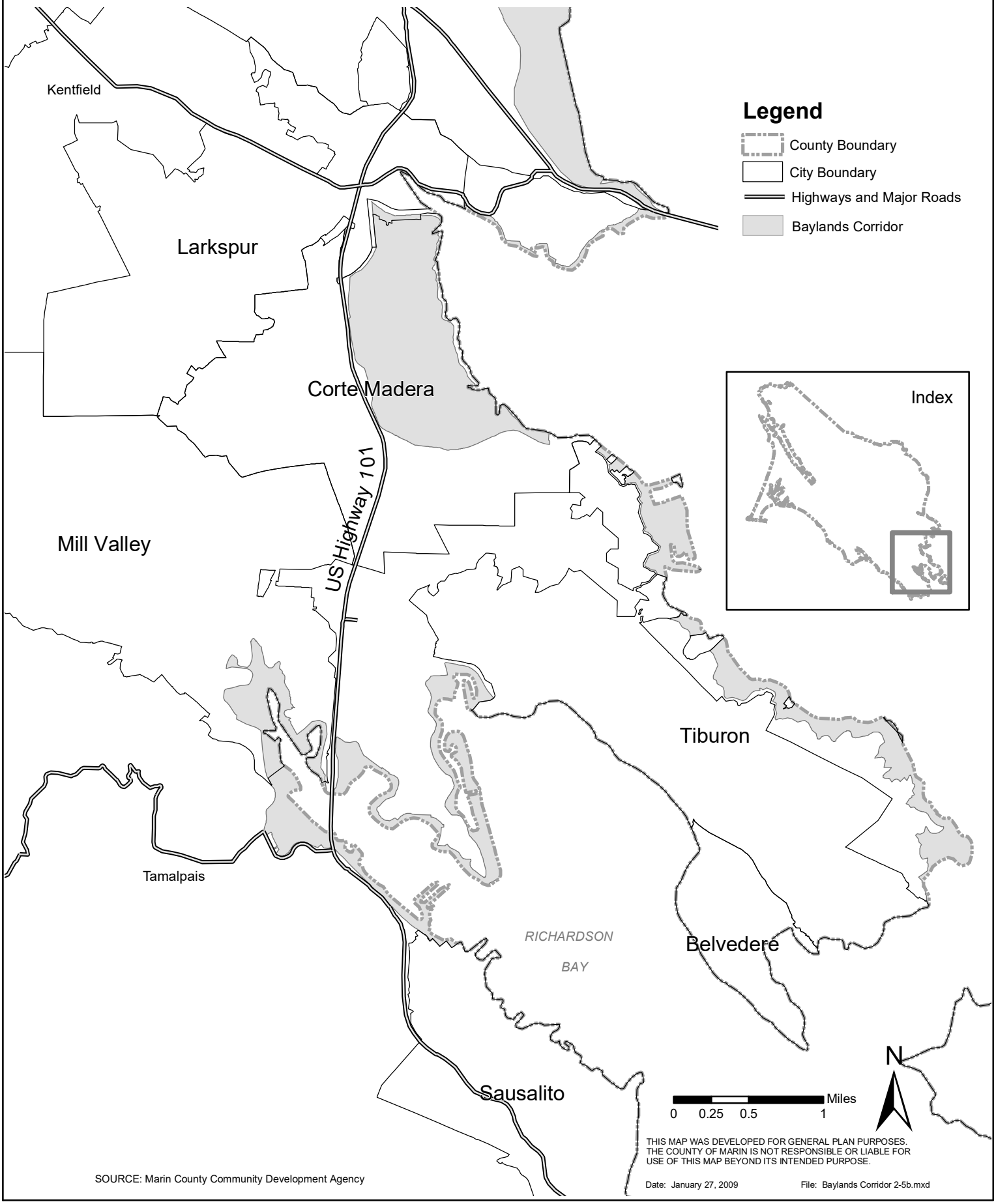
Date: January 27, 2009

File: Baylands Corridor 2-5a.mxd

MAP 2-5b
BAYLANDS CORRIDOR



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SOURCE: Marin County Community Development Agency

Date: January 27, 2009 File: Baylands Corridor 2-5b.mxd

Oak woodlands are threatened by Sudden Oak Death, development, and poor land management. Since its initial detection in the mid-1990s in Blithedale Canyon in Mill Valley, Sudden Oak Death (see Map 2-6, Sudden Oak Death) has had a major impact on native habitats in Marin. The pathogen believed to be a major cause of Sudden Oak Death, *Phytophthora ramorum,* is known to affect at least 31 species of plants. Studies of the cause and treatment of this disease, and management of woodlands to reduce the fire hazard posed by dead trees while still protecting habitat for special-status species and other wildlife, are all necessary in addressing the impacts of this disease. Oak woodland and savannah are also threatened by development. Indiscriminate development and poor land management practices, such as removal of native tree cover, filling of creeks and wetlands, and use of pesticides and herbicides, can contribute to further degradation of woodlands and other vital native habitat.

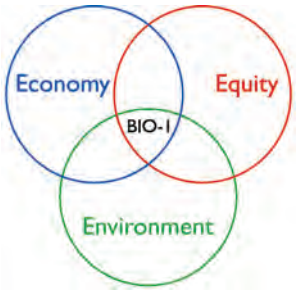
Development is encroaching on baylands and limiting the potential for restoration of historic diked and tidal areas. Major opportunities for preservation and enhancement of the baylands ecosystem in Marin exist north of Point San Pedro where a wide, continuous band of diked and tidal marsh stretches along the shores of China Camp State Park north to San Antonio Creek and along the Gallinas and Novato creek corridors. Threatened marshland complexes also fringe the Corte Madera shoreline and the Manzanita and western shorelines of Richardson Bay.

Future development may further impact public lands where it is proximate to sensitive habitat on public lands. Inappropriate development could, for example, fragment habitat or negatively impact adjacent sites. The Countywide Plan establishes or reaffirms policies that protect natural resources on and adjacent to public lands. For instance, the Ridge and Upland Greenbelt, Wetlands Conservation Area, Streamside Conservation Area, and Baylands policies all strive to limit impacts on sensitive sites and, by extension, public lands adjacent to them.

What Are the Desired Outcomes?

GOAL BIO-1

Enhanced Native Habitat and Biodiversity. Effectively manage and enhance native habitat, maintain viable native plant and animal populations, and provide for improved biodiversity throughout the County.



Policies

BIO-1.1 **Protect Wetlands, Habitat for Special-Status Species, Sensitive Natural Communities, and Important Wildlife Nursery Areas and Movement Corridors.** Protect sensitive biological resources, wetlands, migratory species of the Pacific flyway, and wildlife movement corridors through careful environmental review of proposed development applications, including consideration of cumulative impacts, participation in comprehensive habitat management programs with other local and

"Look deep into nature, and then you will understand everything better."

— Albert Einstein

resource agencies, and continued acquisition and management of open space lands that provide for permanent protection of important natural habitats.

BIO-1.2 Acquire Habitat. Continue to acquire areas containing sensitive resources for use as permanent open space, and encourage and support public and private partnerships formed to acquire and manage important natural habitat areas, such as baylands, wetlands, coastal shorelines, wildlife corridors, and other lands linking permanently protected open space lands.

BIO-1.3 Protect Woodlands, Forests, and Tree Resources. Protect large native trees, trees with historical importance; oak woodlands; healthy and safe eucalyptus groves that support colonies of monarch butterflies, colonial nesting birds, or known raptor sites; and forest habitats. Prevent the untimely removal of trees through implementation of standards in the Development Code and the Native Tree Preservation and Protection Ordinance. Encourage other local agencies to adopt tree preservation ordinances to protect native trees and woodlands, regardless of whether they are located in urban or undeveloped areas. See also Policy SV-1.7.

BIO-1.4 Support Vegetation and Wildlife Disease Management Programs. Support agency programs and proven methods to limit the impacts of Sudden Oak Death syndrome and any other diseases harmful to native vegetation and wildlife in Marin County, while addressing any potential adverse effects on sensitive resources.

"Thoreau suggested that every community should have its patch of woods where people could refresh themselves. His notion of Nature as having healing powers has now the force of revealed truth."

— Wallace Stegner, *Where the Bluebird Sings to the Lemonade Springs*, 1992

BIO-1.5 Promote Use of Native Plant Species. Encourage use of a variety of native or compatible non-native, non-invasive plant species indigenous to the site vicinity as part of project landscaping to improve wildlife habitat values.

BIO-1.6 Control Spread of Invasive Exotic Plants. Prohibit use of invasive species in required landscaping as part of the discretionary review of proposed development. Work with landowners, landscapers, the Marin County Open Space District, nurseries, and the multi-agency Weed Management Area to remove and prevent the spread of highly invasive and noxious weeds. Invasive plants are those plants listed in the State's Noxious Weed List, the California Invasive Plant Council's list of "Exotic Pest Plants of Greatest Ecological Concern in California," and other priority species identified by the agricultural commissioner and California Department of Agriculture. Species of particular concern include the following:

barbed goatgrass (*Aegilops triuncialis*), giant reed (*Arundo donax*), Italian thistle (*Carduus pycnocephalus*), distaff thistle (*Carthamus lanatus*), purple starthistle (*Centaurea calcitrapa*), yellow starthistle (*Centaurea solstitialis*), pampas grass (*Cortaderia selloana*), Scotch broom (*Cytisus scoparius*), Cape ivy (*Delairea odorata*), oblong spurge (*Euphorbia oblongata*), fennel (*Foeniculum vulgare*), French broom (*Genista monspessulana*), salt-water cord grass (*Spartina alterniflolia*), Spanish broom (*Spartium junceum*), medusahead (*Taeniatherum caput-medusae*), gorse (*Ulex europaeus*), and periwinkle (*Vinca major*), among others.

BIO-1.7 **Remove Invasive Exotic Plants.** Require the removal of invasive exotic species, to the extent feasible, when considering applicable measures in discretionary permit approvals for development projects unrelated to agriculture, and include monitoring to prevent re-establishment in managed areas.

BIO-1.8 **Restrict Use of Herbicides, Insecticides, and Similar Materials.** Encourage the use of integrated pest management and organic practices to manage pests with the least possible hazard to the environment. Restrict the use of insecticides, herbicides, or any toxic chemical substance in sensitive habitats, except when an emergency has been declared; the habitat itself is threatened; a substantial risk to public health and safety exists, including maintenance for flood control; or such use is authorized pursuant to a permit issued by the agricultural commissioner. Encourage nontoxic strategies for pest control, such as habitat management using physical and biological controls, as an alternative to chemical treatment, and allow use of toxic chemical substances only after other approaches have been tried and determined unsuccessful. Continue to implement the Integrated Pest Management ordinance for county-related operations.

BIO-1.9 **Control Spread of Non-Native Invasive Animal Species.** Work with landowners, the Marin County Open Space District, the California Department of Fish and Game, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the National Invasive Species Council, Point Reyes National Seashore, and other agencies and organizations to control and prevent the spread of non-native, invasive animal species. Species of particular concern include: introduced red fox (*Vulpes vulpes*), Chinese mitten crab (*Eriocheir sinensis*), bullfrog (*Rana catesbeiana*), and wild boar (*Sus scrofa*), among others. Wild turkey (*Meleagris gallopavo*) is also a non-native species of increasing abundance and concern in the county, and it requires careful management to prevent adverse impacts on native habitat.

Why is this important?

Sustaining native habitat secures essential habitat for special-status species and protects the remaining sensitive natural communities, wetlands, and other important biological resources in the county.

Environment: An estimated 47% of the county has been developed with urban, suburban residential, and agricultural uses, and anticipated future development continues to threaten the remaining native habitat and associated biodiversity. Adequate protection and effective management is essential to sustaining the health of the remaining natural areas.

Economy: Preserving and enhancing native habitat contributes to healthy working and living conditions, provides a continuing draw for tourism and recreational industries, and stimulates related economic investment opportunities.

Equity: Sustainable and diverse native habitat benefits the human population by contributing to healthy living conditions, providing a place for outdoor recreation and enjoyment, helping to clean water by filtering urban pollutants, stabilizing hillside slopes, and preserving environmental beauty and diversity for present and future generations.

How will results be achieved?

Implementing Programs

BIO-1.a ***Map Natural Communities.*** Work with other agencies to complete GIS mapping of vegetation, wetlands, and streams in the county according to the National Vegetation Classification system, consistent with methodology used to map vegetation in the Golden Gate National Recreation Area and Point Reyes National Seashore.

BIO-1.b ***Develop Habitat Monitoring Programs.*** Using countywide GIS mapping of natural communities and other information sources, work with other agencies to develop a program to monitor trends in habitat loss, protection, and restoration. Establish cumulative thresholds for habitat loss for particularly vulnerable natural communities and use as a basis for modifying standards for mitigation.

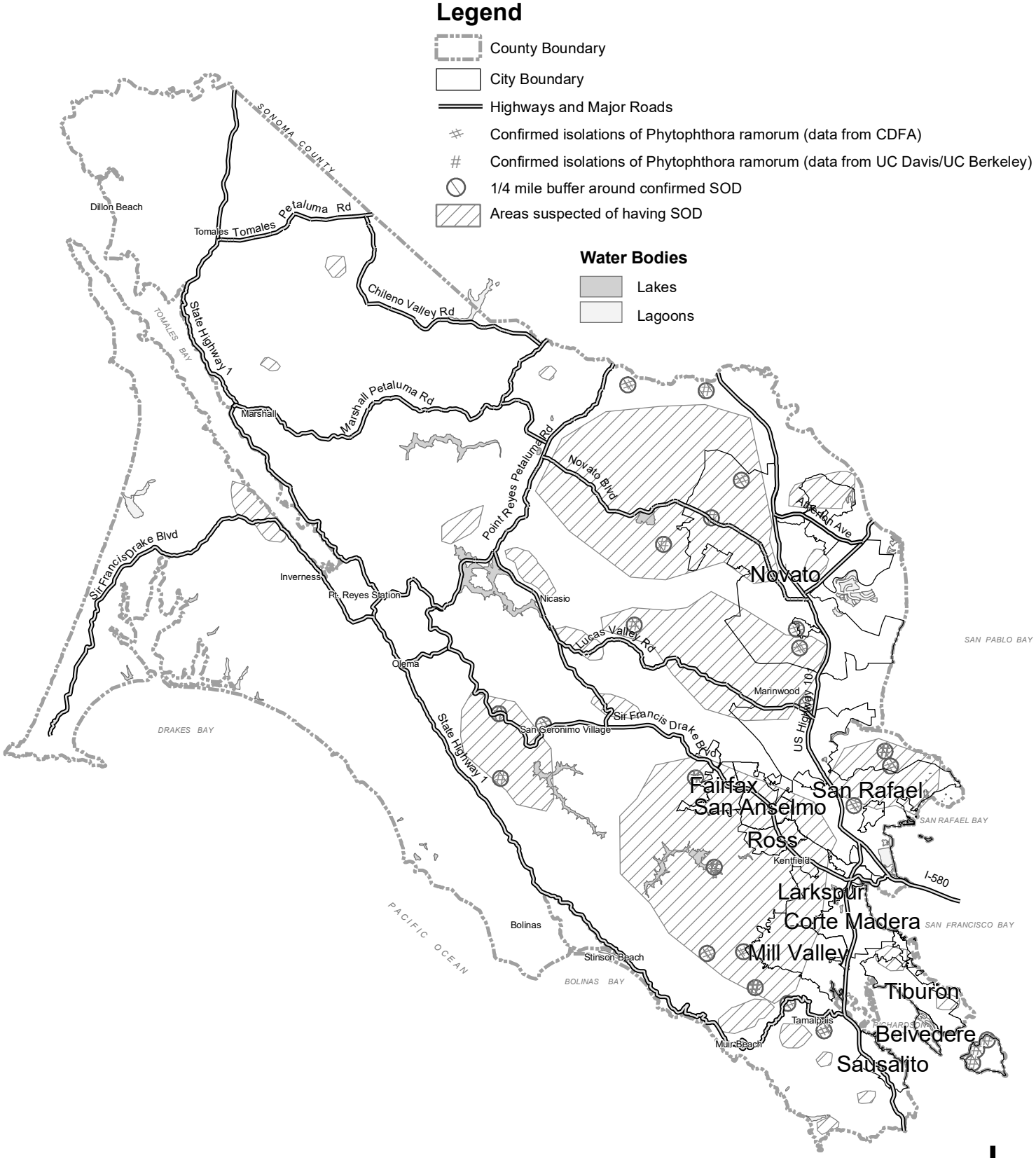
"All ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts. . . . The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land."

— Aldo Leopold (1886–1948), *A Sand County Almanac,* 1949

BIO-1.c ***Maintain a Natural Resource Information Program.*** Provide interested public, the cities/towns in the county, and landowners with up-to-date information on sensitive ecological resources and regulations enacted to protect these resources, to accurately assess the potential impacts of proposed development on species and habitat diversity, determine when additional detailed site environmental assessment is necessary, provide information on invasive exotic species control, and monitor development trends and habitat management activities. The Natural Resource Program should contain the following:

1. Up-to-date information on verified sightings of special-status species and sensitive natural communities compiled by the California Natural Diversity Data Base, California Department of Fish and Game, Non-Game Heritage Division.

MAP 2-6
SUDDEN OAK DEATH



SOURCE: Center for the Assessment and Monitoring of Forest and Environmental Resources at UC Berkeley.
Confirmed isolations of phytophthora ramorum provided by UC Davis/UC Berkeley/CDFA.
Areas suspected of having SOD provided by UC and UCCE field specialists.

Date: August 8, 2005 File: SOD 2-6.mxd

2. Reports and agency recovery programs for special-status species and sensitive natural communities, and related information summarizing regulations.

3. Up-to-date information from the U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration Fisheries, and California Department of Fish and Game, including lists of special-status species and their current status and lists of terrestrial natural communities and sensitive natural communities.

4. Available recovery plans for listed special-status species, mapping of critical habitat areas, and sightings and inventories of migratory species; reports, sightings, and recovery programs from credible, local sources such as the PRBO Conservation Science, California Native Plant Society, and Marin Audubon Society.

5. Biological reports completed as part of environmental review of proposed development projects and other studies, including information shared with cities and towns and districts within Marin County.

6. Lists of appropriate and inappropriate plant species for use in developing landscape plans to ensure that invasive exotic plants, plants with high water requirements, and, in fire hazard areas, species that are highly flammable, are excluded.

7. Summarized information for use by landowners addressing habitat protection and management of sensitive resources. This may include a list of references to existing and ongoing information sources pertaining to natural resource management, and production of brochures summarizing setback standards, appropriate and inappropriate lands use practices, and desired management programs.

"In the end, our society will be defined not only by what we create, but by what we refuse to destroy."

— John C. Sawhill (1936–2000), President, the Nature Conservancy, 1990–2000

BIO-1.d *Reevaluate County Native Tree Preservation and Protection Ordinance #3291.* Consider expanding existing provisions along with establishing a complementary education and outreach program to ensure woodland conservation and management, not simply protection of individual trees. Factors to address in the reevaluation include preserving stands or groups of trees, identifying and promoting representative species and a diversity of age classes, minimizing fragmentation and providing linkages and corridors, protecting and enhancing other components of forest and woodlands such as

understory species and associated wildlife, and providing for sustainable regeneration through natural processes.

BIO-1.e *Protect Against Vegetation and Wildlife Diseases.* Participate in developing public information programs and regulations addressing diseases, and in publicizing management practices to control their spread. Manage hazardous vegetation affected by Sudden Oak Death syndrome according to standards set by the California Oak Mortality Task Force.

BIO-1.f *Prepare Appropriate Landscape Lists.* Prepare lists of appropriate native and non-native landscape species that are not invasive plants, have habitat value, have low-water requirements, and, for high hazard areas of the county, have low flammability. Prepare a second set of lists of plant species to avoid that are highly flammable, inappropriate water-thirsty plants, or undesirable invasive exotic species for property owner use in developing new or enhancing existing landscaping. Require applicants for discretionary approval with parcels that share all or part of a boundary with publicly owned open space to develop landscape plans that fully conform to the lists of appropriate plants. Prepare lists with input from the California Department of Fish and Game, agricultural commissioner, University of California Cooperative Extension, California Native Plant Society, Marin Municipal Water District, National Park Service, and other appropriate sources to verify suitability.

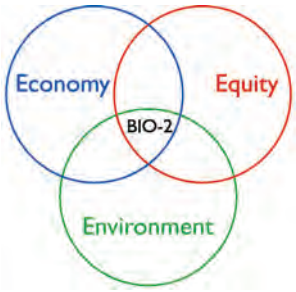
BIO-1.g *Expand Education, Outreach, and Regulatory Programs Regarding Control of Invasive Exotic Species.* Continue to work with the Marin/Sonoma Weed Management Area to promote the control and management of invasive exotic plant species. As part of the Natural Resource Information Program, provide interested public and landowners with information on invasive exotic species control and management, including up-to-date lists of invasive exotic plant and animal species of concern in Marin County, and links to other agencies and organizations involved in monitoring their status, such as the California Department of Fish and Game, U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration Fisheries, the National Invasive Species Council, and the California Invasive Plant Council. Explore the feasibility of creating an ordinance that prohibits the sale of selected invasive exotic plant species of particular threat to natural habitat in Marin County, such as Scotch broom and French broom.

BIO-1.h *Encourage Community Forest Programs.* Work with volunteer organizations and Marin cities and towns to encourage the creation of comprehensive, long-term community forestry programs in recognition of the multiple benefits that trees provide to our health, our communities, and the environment.

What Are the Desired Outcomes?

GOAL BIO-2

Protection of Sensitive Biological Resources. Require identification of sensitive biological resources and commitment to adequate protection and mitigation, and monitor development trends and resource preservation efforts.



Policies

BIO-2.1 **Include Resource Preservation in Environmental Review.** Require environmental review pursuant to CEQA of development applications to assess the impact of proposed development on native species and habitat diversity, particularly special-status species, sensitive natural communities, wetlands, and important wildlife nursery areas and movement corridors. Require adequate mitigation measures for ensuring the protection of any sensitive resources and achieving "no net loss" of sensitive habitat acreage, values, and function.

BIO-2.2 **Limit Development Impacts.** Restrict or modify proposed development in areas that contain essential habitat for special-status species, sensitive natural communities, wetlands, baylands and coastal habitat, and riparian habitats, as necessary to ensure the continued health and survival of these species and sensitive areas. Development projects should preferably be modified to avoid impacts on sensitive resources, or to adequately mitigate impacts by providing on-site or (as a lowest priority) off-site replacement at a higher ratio.

BIO-2.3 **Preserve Ecotones.** Condition or modify development permits to ensure that *ecotones*, or natural transitions between habitat types, are preserved and enhanced because of their importance to wildlife. Ecotones of particular concern include those along the margins of riparian corridors, baylands and marshlands, vernal pools, and woodlands and forests where they transition to grasslands and other habitat types.

"Health is the capacity of the land for self-renewal. Conservation is our effort to understand and preserve this capacity."

– Aldo Leopold

BIO-2.4 **Protect Wildlife Nursery Areas and Movement Corridors.** Ensure that important corridors for wildlife movement and dispersal are protected as a condition of discretionary permits, including consideration of cumulative impacts. Features of particular importance to wildlife for movement may include riparian corridors, shorelines of the coast and bay, and ridgelines. Linkages and corridors shall be

provided that connect sensitive habitat areas such as woodlands, forests, wetlands, and essential habitat for special-status species, including an assessment of cumulative impacts.

BIO-2.5 **Restrict Disturbance in Sensitive Habitat During Nesting Season.** Limit construction and other sources of potential disturbance in sensitive riparian corridors, wetlands, and baylands to protect bird nesting activities. Disturbance should generally be set back from sensitive habitat during the nesting season from March 1 through August 1 to protect bird nesting, rearing, and fledging activities. Preconstruction surveys should be conducted by a qualified professional where development is proposed in sensitive habitat areas during the nesting season, and appropriate restrictions should be defined to protect nests in active use and ensure that any young have fledged before construction proceeds.

BIO-2.6 **Identify Opportunities for Safe Wildlife Movement.** Ensure that existing stream channels and riparian corridors continue to provide for wildlife movement at roadway crossings, preferably through the use of bridges, or through over-sized culverts, while maintaining or restoring a natural channel bottom. Consider the need for wildlife movement in designing and expanding major roadways and other barriers in the county. Of particular concern is the possible widening of Highway 101 north of Novato to the county line, where maintenance of movement opportunities for terrestrial wildlife between the undeveloped habitat on Mount Burdell and the marshlands along the Petaluma River is critical.

BIO-2.7 **Protect Sensitive Coastal Habitat.** Protect coastal dunes, streams, and wetlands, and sensitive wildlife habitat from development in accordance with coastal resource management standards in the development code.

BIO-2.8 **Coordinate with Trustee Agencies.** Consult with trustee agencies (the California Department of Fish and Game, U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration Fisheries, U.S. Army Corps of Engineers, Environmental Protection Agency, Regional Water Quality Control Board, and Bay Conservation and Development Commission) during environmental review when special-status species, sensitive natural communities, or wetlands may be adversely affected.

BIO-2.9 **Promote Early Consultation with Other Agencies.** Require applicants to consult with all agencies with review authority for projects in areas supporting wetlands and special-status species at the outset of project planning.

Why is this important?

The loss of critical, sensitive biological resources is well documented. To minimize further loss, it is necessary to identify remaining sensitive resources and their habitats to protect them from the impacts of development.

Environment: Marin County supports a high number of sensitive biological resources, because of both the wide diversity of habitats and their vulnerability to future threats. Over 120 plant and animal species and more than eight sensitive natural communities are monitored by the State because of their vulnerability. Continued monitoring is needed to fully understand ongoing threats and provide for adaptive management of essential habitat.

Economy: Protecting both sensitive resources and larger areas of surrounding natural habitat improves their long-term viability and the overall biodiversity of the region. Because many sensitive resources are highly regulated by State and federal agencies, leaving them in their natural state minimizes the need for costly mitigation and monitoring of replacement habitat.

Social Equity: Preserving essential habitat for sensitive resources provides additional opportunities for enjoyment of our natural resources, contributes to healthy living conditions, and provides opportunities for passive recreation and enjoyment for all.

How will results be achieved?

Implementing Programs

BIO-2.a ***Require Site Assessments.*** Require site assessment by a qualified professional for development applications that may adversely affect sensitive biological or wetland resources, including jurisdictional wetlands, occurrences of special-status species, occurrences of sensitive natural communities, and important wildlife nursery areas and movement corridors. The assessment should determine the presence or absence of any sensitive resources that could be affected by development, evaluate the potential impacts, and identify measures for protecting the resource and surrounding habitat. Require the assessment to be conducted by a qualified professional paid for by the applicant. Unless waived, the qualified professional should be hired directly by Marin County.

BIO-2.b ***Conduct Habitat Connectivity Assessment.*** Conduct a comprehensive assessment of habitat fragmentation and connectivity loss in coordination with resource agencies, landowners, and interested public. Develop recommendations for policies to protect essential habitat corridors and linkages, and to restore and improve opportunities for native plant and animal dispersal. Protection could include acquisition as open space in fee title, permanent preservation and management under a conservation easement, or other suitable methods. Important factors that should be considered as part of the assessment include the following: locations of sensitive resources such as special-status species and wetlands; methods to eliminate obstructions along streams that currently limit the functions and values of riparian corridors; effects of intensive development, major roadways, and fencing on plant and animal dispersal; and the need to protect and enhance linkages between baylands and undeveloped uplands through the eastern part of the county.

BIO-2.c ***Facilitate Agency Review.*** Coordinate County review with that of agencies with jurisdiction over proposed activities and areas, and require evidence of compliance

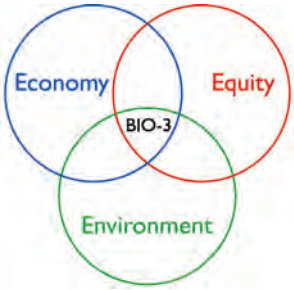
with any necessary permits from federal and State agencies prior to issuance of County grading or building permits.

BIO-2.d *Promote Early Agency Consultation.* Inform applicants upon initial contact with the County about other agencies that may have jurisdiction, and the policies and standards of those agencies that may regulate proposed development activities.

BIO-2.e *Participate in FishNet4C Program.* Continue to actively participate in the FishNet4C program and work cooperatively with participating agencies to implement recommendations to improve and restore aquatic habitat for listed anadromous fish species and other fishery resources.

What Are the Desired Outcomes?

GOAL BIO-3



Wetland Conservation. Require all feasible measures to avoid and minimize potential adverse impacts on existing wetlands and to encourage programs for restoration and enhancement of degraded wetlands.

Policies

BIO-3.1 Protect Wetlands. Require development to avoid wetland areas so that the existing wetlands and upland buffers are preserved and opportunities for enhancement are retained (areas within setbacks may contain significant resource values similar to those within wetlands and also provide a transitional protection zone). Establish a Wetland Conservation Area (WCA) for jurisdictional wetlands to be retained, which includes the protected wetland and associated buffer area. Development shall be set back a minimum distance to protect the wetland and provide an upland buffer. Larger setback standards may apply to wetlands supporting special-status species or associated with riparian systems and baylands under tidal influence, given the importance of protecting the larger ecosystems for these habitat types as called for under Stream Conservation and Baylands Conservation policies defined in Policy BIO-4.1 and BIO-5.1, respectively. Regardless of parcel size, a site assessment is required either where incursion into a WCA is proposed or where full compliance with all WCA criteria would not be met. Employ the following criteria when evaluating development projects that may impact wetland areas (see Figure 2-1):

City-Centered Corridor:

- For parcels more than 2 acres in size, a minimum 100-foot development setback from wetlands is required.
- For parcels between 2 and 0.5 acres in size, a minimum 50-foot development setback from wetlands is required.

- For parcels less than 0.5 acres in size, a minimum 20-foot development setback from wetlands is required. The developed portion(s) of parcels (less than 0.5 acres in size) located behind an existing authorized flood control levee or dike are not subject to a development setback.

- Regardless of parcel size, an additional buffer may be required based on the results of a site assessment, if such an assessment is determined to be necessary. Site assessments will be required and conducted pursuant to Program BIO-3.c, *Require Site Assessment.*

Coastal, Inland Rural, and Baylands Corridors:

- For all parcels, provide a minimum 100-foot development setback from wetlands (areas within setbacks may contain significant resource values similar to those within wetlands and also provide a transitional protection zone). An additional buffer may be required, based on the results of a site assessment, if such an assessment is determined to be necessary. Site assessments will be required and conducted pursuant to Program BIO-3.c, Require Site Assessment.

  Exceptions to full compliance with the WCA setback standards may apply only in the following cases:

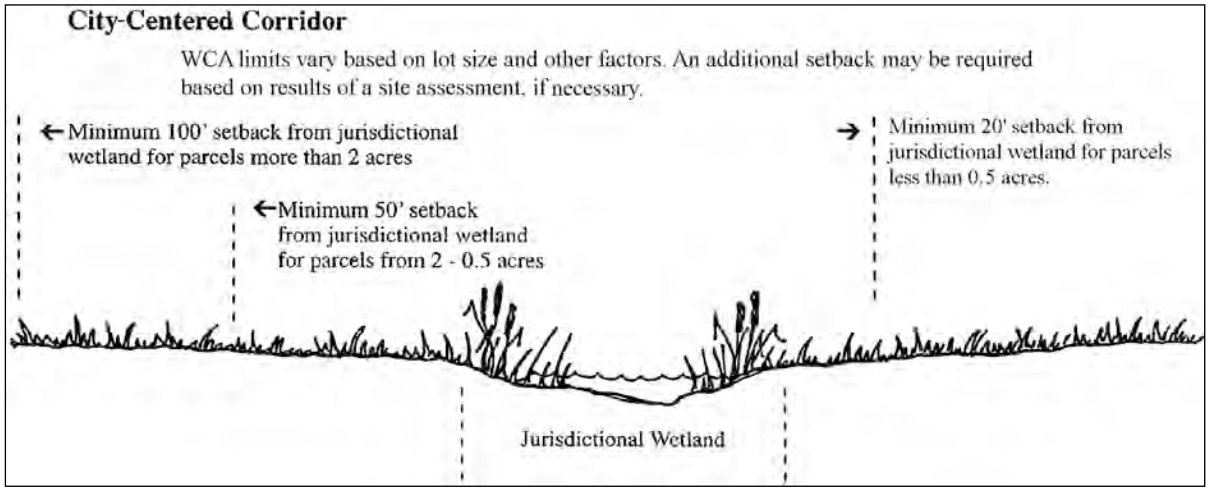
1. Parcel is already developed with an existing use, provided no unauthorized fill or other modifications to wetlands have occurred as part of ongoing use of the property.

2. Parcel is undeveloped and falls entirely within the WCA.

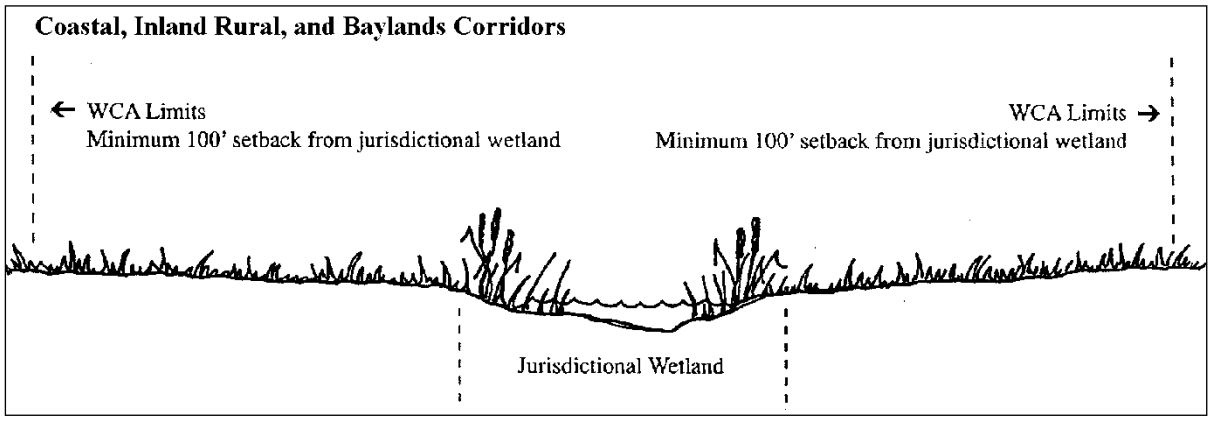
3. Parcel is undeveloped and potential impacts on water quality, wildlife habitat, or other sensitive resources would be greater as a result of development outside the WCA than development within the WCA, as determined by a site assessment.

4. Wetlands are avoided and a site assessment demonstrates that minimal incursion within the minimum WCA setback distance would not result in any significant adverse direct or indirect impacts on wetlands.

Figure 2-1 Typical Cross-Sections of Wetland Conservation Areas



- Minimum setback distance of 100 feet from jurisdictional wetlands for parcels more than 2 acres.
- Minimum setback distance of 50 feet from jurisdictional wetlands for parcels between 2 and 0.5 acres.
- Minimum setback distance of 20 feet for parcels less than 0.5 acres in size.
- An additional setback distance may be required, based on the results of a site assessment, if such an assessment is determined to be necessary. Site assessments will be required and conducted pursuant to program BIO-3.c, *Require Site Assessment.*
- Regardless of parcel size, a site assessment is required either where incursion into a WCA is proposed or where full compliance with all WCA criteria would not be met.



- Minimum setback distance of 100 feet from edge of jurisdictional wetlands regardless of parcel size, unless an exception is allowed because parcel falls entirely within WCA or development outside WCA is either infeasible or would have greater impact.
- An additional setback distance may be required, based on the results of a site assessment, if such an assessment is determined to be necessary. Site assessments will be required and conducted pursuant to program BIO-3.c, *Require Site Assessment.*
- Regardless of parcel size, a site assessment is required either where incursion into a WCA is proposed or where full compliance with all WCA criteria would not be met.

BIO-3.2 **Require Thorough Mitigation.** Where avoidance of wetlands is not possible, require provision of replacement habitat on-site through restoration and/or habitat creation at a minimum ratio of 2 acres for each acre lost (2:1 replacement ratio) for on-site mitigation and a minimum 3:1 replacement ratio for off-site mitigation. Mitigation wetlands should be of the same type as those lost and provide habitat for the species that use the existing wetland. Mitigation should also be required for incursion within the minimum WCA setback/transition zone.

Why is this important?

An estimated 90% of all wetlands in the nation have been eliminated by filling and dredging. Net losses could continue to occur unless wetlands are accurately mapped and protected, and efforts are made to effectively restore and enhance degraded wetlands.

Environment: Wetlands are both highly productive and sensitive resources biologically, supporting a great diversity of plant and animal species, providing essential habitat for a high number of special-status species and migratory birds and fish, and serving critical water purification and groundwater recharge functions. Development setbacks are necessary around wetlands to provide a buffer to prevent disturbance of important wildlife habitat, and to filter sediments and pollutants from disturbed areas and urban runoff.

Economy: Maintaining and enhancing wetlands serves to protect the long-term health of the county, and consequently makes it a desirable location for business and commerce. Protecting the natural water filtration and recharge functions of wetlands serves to reduce the costs of flood damage, water pollution, and water supply redistribution.

Equity: Protecting and restoring natural wetlands provides improved habitat for both wildlife and humans.

How will results be achieved?

Implementing Programs

BIO-3.a *Adopt Wetland Conservation Area Ordinance.* Prepare and adopt an ordinance to refine wetland standards pursuant to WCA polices. Setback distances and buffer criteria for smaller developed parcels within the City-Centered Corridor should allow flexibility based on site constraints, opportunities for avoidance, presence of sensitive biological resources, and options for alternative mitigation. As part of the new ordinance, consider including incentives to reduce the extent of existing development within a WCA, or improve conditions that may be impacting sensitive resources if the parcel is proposed for redevelopment.

BIO-3.b *Comply with Regulations to Protect Wetlands.* Continue to require development applications to include the submittal of a wetland delineation for sites with jurisdictional wetlands and to demonstrate compliance with these wetlands policies, standards, and criteria, and with State and federal regulations.

BIO-3.c *Require Site Assessment.* Require development applications to include the submittal of a site assessment prepared by a qualified professional where incursions into the WCA

are proposed, or adverse impacts to wetlands resources may otherwise occur. The assessment should be considered in determining whether any adverse direct or indirect impacts on wetlands would occur as a result of the proposed development, whether wetlands criteria and standards are being met, and to identify measures necessary to mitigate any significant impacts. The site assessment may also serve as a basis for the County to apply restrictions in addition to those required by State and federal regulations. The site assessment shall be paid for by the applicant. Unless waived, the qualified professional shall be hired directly by Marin County.

BIO-3.d *Prioritize Wetland Avoidance.* Amend the Development Code to require development to avoid wetlands and transition zones. Where avoidance of wetlands is not possible, require the provision of replacement habitat on-site through restoration and/or habitat creation, provided that no net loss of wetland area, wetland function, and habitat values occurs. On-site wetlands mitigation shall be provided at a minimum ratio of 2 acres for each acre lost (2:1 replacement ratio). Allow off-site wetland mitigation only when an applicant has demonstrated that no net loss of wetland area, wetland functions, and wetland values would occur, and that on-site mitigation is not possible. In those rare instances when on-site wetlands loss is unavoidable and on-site replacement is infeasible, require that a minimum of 3 acres be provided through mitigation for each acre lost (3:1 replacement ratio), preferably of the same habitat type as the wetland area that would be lost. The mitigation site should be close to the site of loss so that the mitigation wetland would provide habitat for the species that use the existing wetlands.

BIO-3.e *Establish Clear Mitigation Criteria.* Amend the Development Code to incorporate wetland impact mitigation measures that accomplish the following objectives:

a. No net losses shall occur in wetland acreage, functions, or values. This should include both direct impacts on wetlands and essential buffers, and consideration of potential indirect effects of development due to changes in available surface water and nonpoint water quality degradation. Detailed review of the adequacy of a proposed mitigation plan shall be performed as part of environmental review of the proposed development project to allow for a thorough evaluation of the anticipated loss, as well as the replacement acreage, functions, and values.

b. Mitigation shall be implemented prior to and/or concurrently with the project activity causing the potential adverse impact to minimize any short-term loss and modification to wetlands.

c. An area of adjacent upland habitat shall be protected to provide an adequate buffer for wetland functions and values. Development shall be set back the minimum distance specified in Policy BIO-3.1 to create this buffer, unless an exception is allowed and appropriate mitigation is provided where necessary, pursuant to Policy BIO-3.2.

d. Mitigation sites shall be permanently protected and managed for open space and wildlife habitat purposes.

e. Restoration of wetlands is preferred to creation of new replacement wetlands, due to the greater likelihood of success.

f. Mitigation projects must to the extent feasible minimize the need for ongoing maintenance and operational manipulation (dredging, artificial water-level controls, etc.) to ensure long-term success. Self-sustaining projects with minimal maintenance requirements are encouraged.

g. All plans to mitigate or minimize adverse impacts to wetland environments shall include provisions to monitor the success of the restoration project. The measures taken to avoid adverse impacts may be modified if the original plans prove unsuccessful. Performance bonds shall be required for all mitigation plans involving habitat creation or enhancement, including the cost of five years of post-completion monitoring.

h. Mitigation must be commensurate with adverse impacts of the wetland alteration and consist of providing similar values and greater wetland acreage than those of the wetland area adversely affected. All restored or created wetlands shall be provided at the minimum replacement ratio specified in Program BIO-3.d and shall have the same or increased habitat values as the wetland proposed to be destroyed.

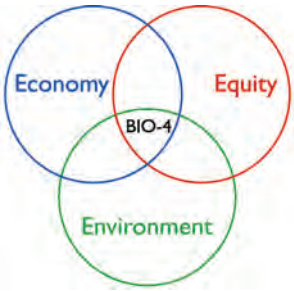
BIO-3.f ***Establish Criteria for Setbacks.*** Establish criteria to be used in the review of individual development applications for determining an adequate setback distance in upland habitat to protect resource values in the setback area and to serve as a buffer zone between development and wetland areas. Setbacks may contain significant resource values similar to those within wetlands. Setbacks should provide for minimum filtration functions to intercept sediments and prevent degradation of adjacent wetlands to be protected. The setbacks shall conform with distances specified in Policy BIO-3.1, with varied minimum setbacks in the City-Centered Corridor, and minimum 100-foot setback distances in the Coastal, Inland Rural, and Baylands corridors. Within the City-Centered Corridor, flexibility should be included in the criteria based on site constraints, opportunities to ensure the avoidance of sensitive wetlands and associated resources such as special-status species, and the feasibility of alternative mitigation options for already developed properties and exceptions for existing uses.

BIO-3.g ***Provide Landowner Education.*** Landowner education regarding the sensitivity of wetlands and adjacent upland buffer areas will be provided as part of the Natural Resource Information Program called for in Program BIO-1.c. An emphasis will be placed on educating owners of developed properties adjacent to wetlands where minimum upland setback distances are not provided. Information on regulations protecting wetlands and adjacent areas that may contain significant resource values should be available, together with general methods to minimize disturbance and improve habitat values. An updated list of regulatory agencies and their contact information should be maintained as part of the Natural Resource Information Program.

BIO-3.h ***Evaluate Wetlands Definitions.*** Conduct a study to evaluate whether to continue to rely on the Army Corps of Engineers definition of wetlands outside of the Coastal Zone or to expand the use of the Coastal Zone (or "Cowardin") definition to the entire county. The study should consider all of the following in developing a recommendation to the Board of Supervisors: (1) the effect of the expanded wetland definition when coupled with SCA and WCA requirements; (2) the extent of the geographic areas potentially affected by the expanded definition; (3) performance of wetland delineations for areas outside the Coastal Zone (in-house staff or consultants); (4) potential costs and workloads associated with delineations, administration, and appeals; (5) overall feasibility of implementation and enforcement responsibilities associated with an expanded definition; 6) benefits and challenges of a consistent definition throughout the county; (7) what percentage of wetlands would continue to be regulated by the Army Corps of Engineers; and (8) what percentage of cost could be paid for by the applicant.

What Are the Desired Outcomes?

GOAL BIO-4



Riparian Conservation. Protect and, where possible, restore the natural structure and function of riparian systems.

Policies

BIO-4.1 Restrict Land Use in Stream Conservation Areas. A *Stream Conservation Area* (SCA) is established to protect the active channel, water quality and flood control functions, and associated fish and wildlife habitat values along streams. Development shall be set back to protect the stream and provide an upland buffer, which is important to protect significant resources that may be present and provides a transitional protection zone. Best management practices[1] shall be adhered to in all designated SCAs. Best management practices are also strongly encouraged in ephemeral streams not defined as SCAs.

Exceptions to full compliance with all SCA criteria and standards may be allowed only if the following is true:

1. A parcel falls entirely within the SCA; or

2. Development on the parcel entirely outside the SCA either is infeasible or would have greater impacts on water quality, wildlife habitat, other sensitive biological resources, or other environmental constraints than development within the SCA.

SCAs are designated along perennial, intermittent, and ephemeral streams as defined in the Countywide Plan Glossary. Regardless of parcel size, a site assessment is required where incursion into an SCA is proposed or where full compliance with all

[1]Such as those outlined in *Start at the Source* and *Start at the Source Tools Handbook* (Bay Area Stormwater Managers Agencies Association).

SCA criteria would not be met. An ephemeral stream is subject to the SCA policies if it: (a) supports riparian vegetation for a length of 100 feet or more, and/or (b) supports special-status species and/or a sensitive natural community type, such as native grasslands, regardless of the extent of riparian vegetation associated with the stream. For those ephemeral streams that do not meet these criteria, a minimum 20-foot development setback should be required.

SCAs consist of the watercourse itself between the tops of the banks and a strip of land extending laterally outward from the top of both banks to the widths defined below (see Figure 2-2). The SCA encompasses any jurisdictional wetland or unvegetated other waters within the stream channel, together with the adjacent uplands, and supersedes setback standards defined for WCAs. Human-made flood control channels under tidal influence are subject to the Bayland Conservation policies. The following criteria shall be used to evaluate proposed development projects that may impact riparian areas:

City-Centered Corridor:

- For parcels more than 2 acres in size, provide a minimum 100-foot development setback on each side of the top of bank.
- For parcels between 2 and 0.5 acres in size, provide a minimum 50-foot development setback on each side of the top of bank.
- For parcels less than 0.5 acres in size, provide a minimum 20-foot development setback. The developed portion(s) of parcels (less than 0.5 acres in size) located behind an existing authorized flood control levee or dike are not subject to a development setback.
- Regardless of parcel size, an additional buffer may be required based on the results of a site assessment. A site assessment may be required to confirm the avoidance of woody riparian vegetation and to consider site constraints, presence of other sensitive biological resources, options for alternative mitigation, and determination of the precise setback. Site assessments will be required and conducted pursuant to Program BIO-4.g, *Require Site Assessment.*

Woody riparian vegetation includes plants that have tough, fibrous stems; vines; and branches covered with bark and composed largely of cellulose and lignin. Characteristic woody riparian species include willow, alder, box elder, big-leaf maple, cottonwood, dogwood, elderberry, elk clover, thimbleberry, and California blackberry, among others. See glossary for additional information on stream characteristics and definitions.

Coastal, Inland Rural, and Baylands Corridors:

- For all parcels, provide a development setback on each side of the top of bank that is the greater of either (a) 50 feet landward from the outer edge of woody riparian vegetation associated with the stream or (b) 100 feet landward from the top of bank. An additional setback distance may be required based on the results of a site assessment. A site assessment may be required to confirm the avoidance of woody riparian vegetation and to consider site constraints, presence of other sensitive biological resources, options for alternative mitigation, and determination of the precise setback. Site assessments will be required and conducted pursuant to Program BIO-4.g, *Require Site Assessment.* SCAs shall be measured as shown in Figure 2-2.

Allowable uses in SCAs in any corridor consist of the following, provided they conform to zoning and all relevant criteria and standards for SCAs:

- Existing permitted or legal nonconforming structures or improvements, their repair, and their retrofit within the existing footprint;
- Projects to improve fish and wildlife habitat;
- Driveway, road and utility crossings, if no other location is feasible;
- Water-monitoring installations;
- Passive recreation that does not significantly disturb native species;
- Necessary water supply and flood control projects that minimize impacts to stream function and to fish and wildlife habitat;
- Agricultural uses that do not result in any of the following:
  a. The removal of woody riparian vegetation;
  b. The installation of fencing within the SCA that prevents wildlife access to the riparian habitat within the SCA;
  c. Animal confinement within the SCA; and
  d. A substantial increase in sedimentation.

BIO-4.2 **Comply with SCA Regulations.** Implement established setback criteria for protection of SCAs through established discretionary permit review processes and/or through adoption of new ordinances. Environmental review shall be required where incursion into an SCA is proposed and a discretionary permit is required.

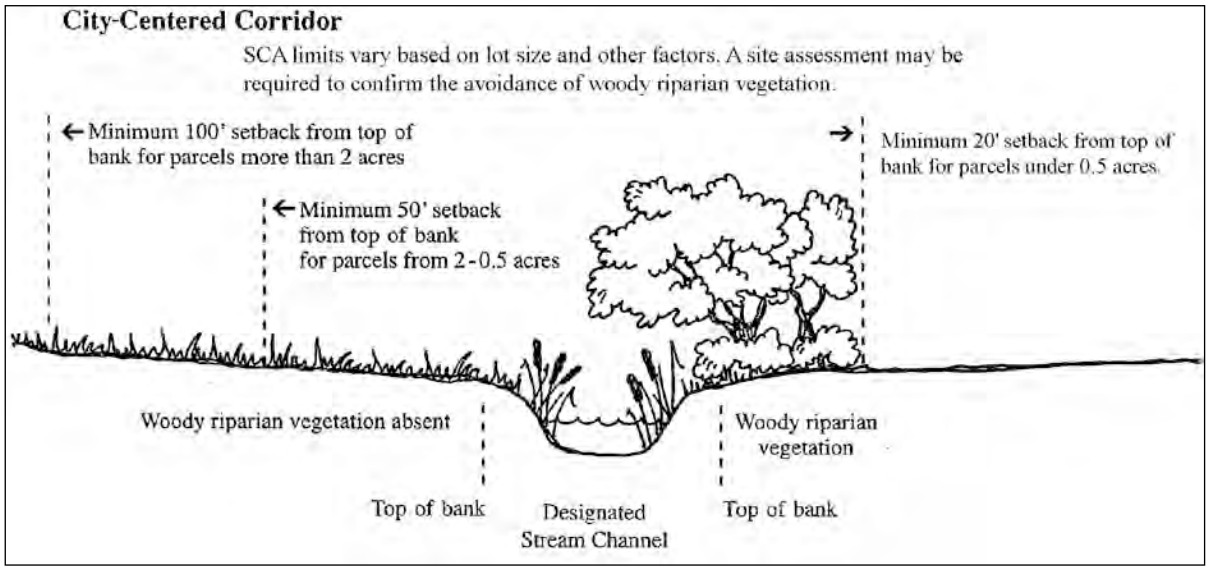
In determining whether allowable uses are compatible with SCA regulations, development applications shall not be permitted if the project does any of the following:

- Adversely alters hydraulic capacity;
- Causes a net loss in habitat acreage, value, or function;
- Degrades water quality.

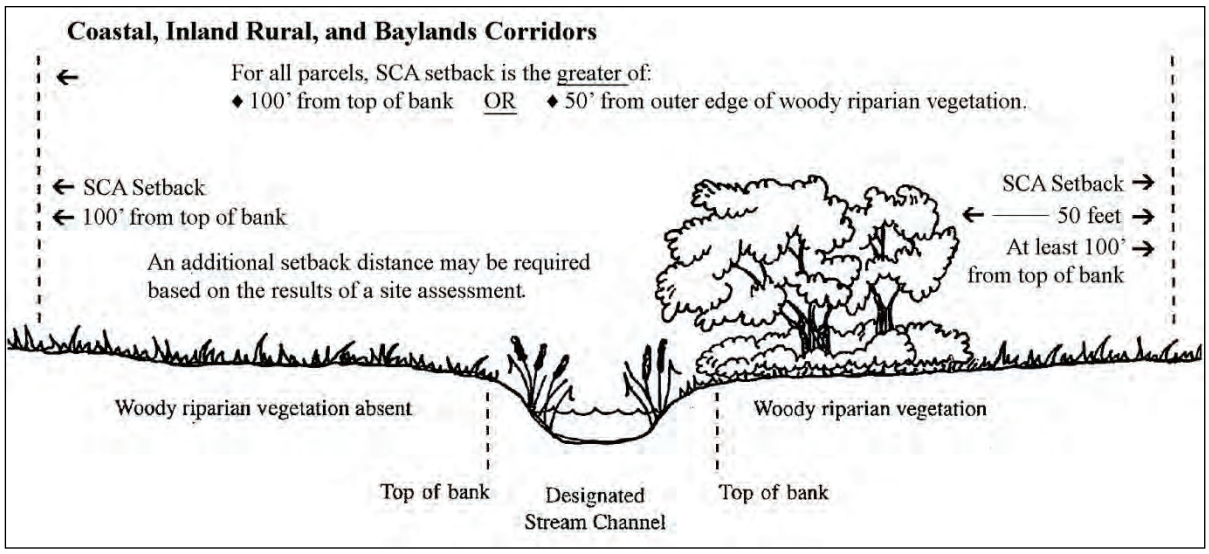
BIO-4.3 **Manage SCAs Effectively.** Review proposed land divisions in SCAs to allow management of a stream by one property owner to the extent possible.

BIO-4.4 **Promote Natural Stream Channel Function.** Retain and, where possible, restore the hydraulic capacity and natural functions of stream channels in SCAs. Discourage alteration of the bed or banks of the stream, including filling, grading, excavating, and installation of storm drains and culverts. When feasible, replace impervious surfaces with pervious surfaces. Protect and enhance fish habitat, including through retention of large woody debris, except in cases where removal is essential to protect against property damage or prevent safety hazards. In no case shall alterations that create barriers to fish migration be allowed on streams mapped as historically supporting salmonids. Alteration of natural channels within SCAs for flood control should be designed and constructed in a manner that retains and protects the riparian vegetation, allows for sufficient capacity and natural channel migration, and allows for reestablishment of woody trees and shrubs without compromising the flood flow capacity where avoidance of existing riparian vegetation is not possible.

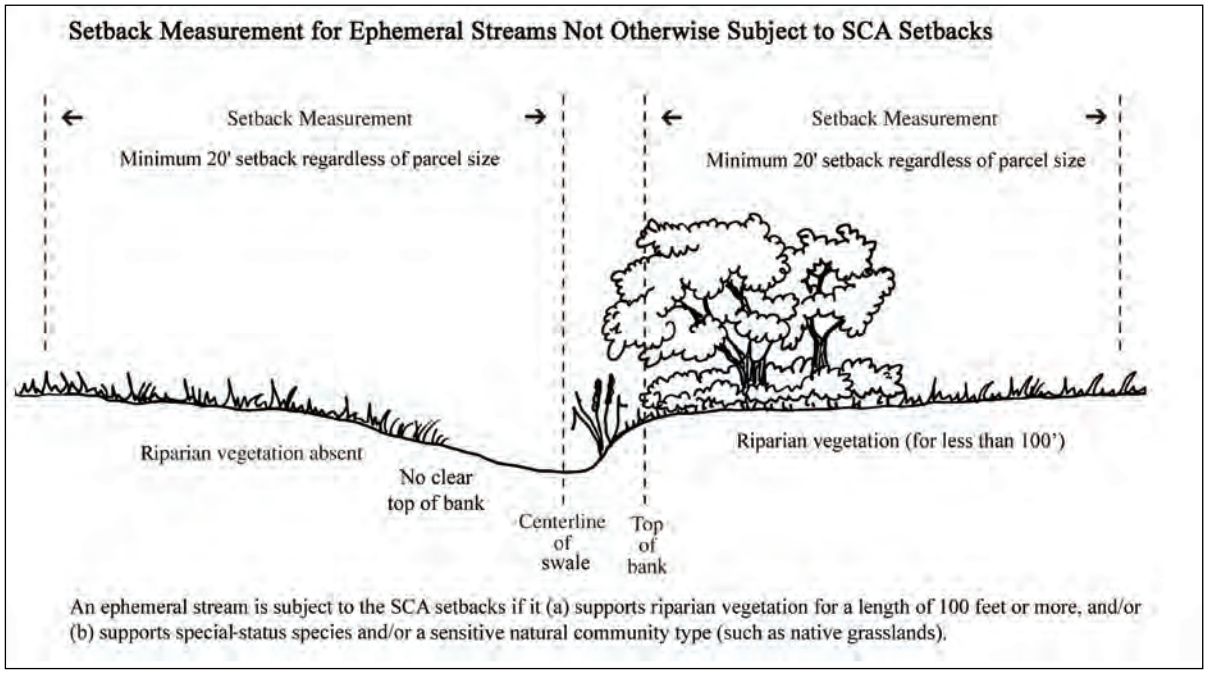
Figure 2-2
Typical Cross-Section of a Stream Conservation Zone



- Minimum setback distance of 100 feet from top of bank for parcels more than 2 acres.
- Minimum setback distance of 50 feet from top of bank for parcels between 2 and 0.5 acres.
- Minimum setback distance of 20 feet from top of bank for parcels less than 0.5 acres.
- A site assessment may be required to confirm the avoidance of woody riparian vegetation and to consider site constraints, presence of other sensitive biological resources, options for alternative mitigation, and determination of the precise setback. Site assessments will be required and conducted pursuant to Program BIO-4.g, *Require Site Assessment*.
- Regardless of parcel size, a site assessment is required where incursion into an SCA is proposed and where full compliance with all SCA criteria would not be met.



- For all parcels, minimum setback distance is 50 feet from outer edge of woody riparian vegetation but no less than 100 feet from top of bank, unless an exception is allowed because parcel falls entirely within SCA, or development outside SCA is either infeasible or would have greater impacts.
- An additional setback distance may be required, based on the results of a site assessment, if such an assessment is determined to be necessary.
- Regardless of parcel size, a site assessment is required where incursion into an SCA is proposed and where full compliance with all SCA criteria would not be met.



- For all parcels, regardless of corridor, minimum setback distance is 20 feet.
- A site assessment is required where incursion into the setback is proposed.

BIO-4.5 **Restore and Stabilize Stream Channels.** Pursue stream restoration and appropriate channel redesign where sufficient right-of-way exists that includes the following: a hydraulic design, a channel plan form, a composite channel cross-section that incorporates low flow and bankfull channels, removal and control of invasive exotic plant species, and biotechnical bank stabilization methods to promote quick establishment of riparian trees and other native vegetation.

BIO-4.6 **Control Exotic Vegetation.** Remove and replace invasive exotic plants with native plants as part of stream restoration projects and as a condition of site-specific development approval in an SCA, and include monitoring to prevent reestablishment.

BIO-4.7 **Protect Riparian Vegetation.** Retain riparian vegetation for stabilization of streambanks and floodplains, moderating water temperatures, trapping and filtering sediments and other water pollutants, providing wildlife habitat, and aesthetic reasons.

BIO-4.8 **Reclaim Damaged Portions of SCAs.** Restore damaged portions of SCAs to their natural state wherever possible, and reestablish as quickly as possible any herbaceous and woody vegetation that must be removed within an SCA, replicating the structure and species composition of indigenous native riparian vegetation.

BIO-4.9 **Restore Culverted Streams.** Replace storm drains and culverts in SCAs with natural drainage and flood control channels wherever feasible. Reopening and restoring culverted reaches of natural drainages should be considered part of review of development applications on parcels containing historic natural drainages where sufficient land area is available to accommodate both the reopened drainage and project objectives. Detailed hydrologic analysis may be required to address possible erosion and flooding implications of reopening the culverted reach, and to make appropriate design recommendations. Incentives should be provided to landowners in restoring culverted, channelized, or degraded stream segments. Where culverts interfere with fish migration but replacement is not possible, modify culverts to allow unobstructed fish passage.

BIO-4.10 **Promote Interagency Cooperation.** Work in close cooperation with flood control districts, water districts, and wildlife agencies in the design and choice of materials for construction and alterations within SCAs.

BIO-4.11 **Promote Riparian Protection.** Support agencies, organizations, and programs in Marin County that protect, enhance, and restore riparian areas.

BIO-4.12 **Support and Provide Riparian Education Efforts.** Educate the public and County staff about the values, functions, and importance of riparian areas. Landowner education regarding the sensitivity of riparian corridors will be provided as part of the Natural Resource Information Program called for in Program BIO-1.c. An emphasis will be placed on public outreach to owners of developed properties encompassing or adjacent to SCAs where minimum setback distances are not provided. Information on regulations protecting riparian corridors should be available, together with general

methods to minimize disturbance and improve habitat values. An updated list of regulatory agencies and their contact information should be maintained as part of the Natural Resource Information Program.

BIO-4.13 **Provide Appropriate Access in SCAs.** Ensure that public access to publicly owned land within SCAs respects the environment, and prohibit access if it will degrade or destroy riparian habitat. Acquire public lands adjacent to streams where possible to make resources more accessible and usable for passive recreation, and to protect and enhance streamside habitat.

BIO-4.14 **Reduce Road Impacts in SCAs.** Locate new roads and roadfill slopes outside SCAs, except at stream crossings, and consolidate new road crossings wherever possible to minimize disturbance in the SCA. Require spoil from road construction to be deposited outside the SCA, and take special care to stabilize soil surfaces.

BIO-4.15 **Reduce Wet Weather Impacts.** Ensure that development work adjacent to and potentially affecting SCAs is not done during the wet weather or when water is flowing through streams, except for emergency repairs, and that disturbed soils are stabilized and replanted, and areas where woody vegetation has been removed are replanted with suitable species before the beginning of the rainy season.

BIO-4.16 **Regulate Channel and Flow Alteration.** Allow alteration of stream channels or reduction in flow volumes only after completion of environmental review, commitment to appropriate mitigation measures, and issuance of appropriate permits by jurisdictional agencies based on determination of adequate flows necessary to protect fish habitats, water quality, riparian vegetation, natural dynamics of stream functions, groundwater recharge areas, and downstream users.

BIO-4.17 **Continue Collaboration with the Marin Resource Conservation District.** Continue to collaborate with, support, and participate in programs provided by the Marin Resource Conservation District and the Natural Resource Conservation Service to encourage agricultural operators who conduct farm or ranch activities within a Streamside Conservation Area to minimize sedimentation and erosion to enhance habitat values.

BIO-4.18 **Promote the Use of Permeable Surfaces When Hardscapes Are Unavoidable in the SCA and WCA.** Permeable surfaces rather than impermeable surfaces shall be required wherever feasible in the SCA and WCA.

BIO-4.19 **Maintain Channel Stability.** Applicants for development projects may be required to prepare a hydraulic and/or geomorphic assessment of on-site and downstream drainageways that are affected by project area runoff. This assessment should be required where evidence that significant current or impending channel instability is present, such as documented channel bed incision, lateral erosion of banks (e.g., sloughing or landsliding), tree collapse due to streambank undermining and/or soil loss, or severe in-channel sedimentation, as determined by the County.

Characteristics pertinent to channel stability would include hillslope erosion, bank erosion, excessive bed scour or sediment deposition, bed slope adjustments, lateral channel migration or bifurcation, channel capacity, and the condition of riparian vegetation. The hydraulic and/or geomorphic assessment shall include on-site channel or drainageway segments over which the applicant has control or access. In the event that project development would result in or further exacerbate existing channel instabilities, the applicant could either propose his/her own channel stabilization program subject to County approval or defer to the mitigations generated during the required environmental review for the project, which could include maintenance of peak flows at pre- and post-project levels, or less. Proposed stabilization measures shall anticipate project-related changes to the drainageway flow regime.

All project improvements should be designed to minimize flood hydrograph peak flow or flood volume increases into drainage courses. To this end, design features such as porous pavement, pavers, maximizing overall permeability, drainage infiltration, disconnected impervious surfaces, swales, biodetention, green roofs, etc., should be integrated into projects as appropriate.

For projects subject to discretionary review, the applicant may be required, as appropriate, to submit a pre-and post-project hydrology and hydraulic report detailing the amount of new impervious surface area and accompanying surface runoff from all improvement areas, including driveways — with a goal of zero increase in runoff (no net increase in peak off-site runoff). The applicant may be required to participate in a peak stormwater runoff management program developed pursuant to new Program BIO-4.20.

BIO-4.20 **Minimize Runoff.** In order to decrease stormwater runoff, the feasibility of developing a peak stormwater management program shall be evaluated to provide mitigation opportunities such as removal of impervious surface or increased stormwater detention in the watershed.

Why is this important?

Riparian habitats are irreplaceable, vital biological systems that provide critical functions for water purification, flood control, fish and wildlife movement, and native habitat. However, large portions of existing riparian systems have been eliminated by past stream channelization, agricultural expansion, and urban development.

Environment: Preserving and restoring riparian habitats is essential to maintaining habitat connectivity and improving degraded conditions for fish and wildlife species. Adequate setbacks and limitations on uses within designated Stream Conservation Areas are needed to minimize disturbance to sensitive resources and to maintain and improve wildlife habitat, flood protection, and water purification.

Economy: Maintaining healthy waterways and natural habitat areas is critical to the economic health and vitality of the county. Protecting and restoring native vegetation along riparian corridors minimizes

potential erosion, downstream sedimentation, and water quality degradation. Directing development out of floodways reduces potential costly flood damage and loss.

Equity: Protecting and restoring riparian corridors provide an opportunity to link urban and natural areas to benefit human beings as well as native plants and wildlife. This expands the network of open space lands, areas for healthy recreation and exercise, an appreciation of natural systems, and aesthetic benefits.

How will results be achieved?

Implementing Programs

BIO-4.a ***Adopt Expanded SCA Ordinance.*** Adopt a new SCA ordinance that would implement the SCA standards for parcels traversed by or adjacent to a mapped anadromous fish stream and tributary. Such an ordinance could, by way of example, require compliance with the incorporation of best management practices into the proposed project and could consider modest additions to existing buildings that would not result in significant impact to riparian resources, such as additions that do not exceed 500 square feet of total floor area and that do not increase the existing horizontal encroachment into the SCA, provided a site assessment first confirms the absence of adverse impacts to riparian habitats. As part of the new ordinance, consider including additional incentives, such as reduced fees or other similar incentives, to reduce the extent of existing development within an SCA or improve conditions that may be impacting sensitive resources.

BIO-4.b ***Reevaluate SCA Boundaries.*** Beginning with the City-Centered Corridor and smaller parcels, conduct a comprehensive study to reevaluate standards used to protect SCAs and regulate development adjacent to streams. The study shall consider available data on stream protection and management standards, their effectiveness, and the effectiveness of the current standards used in Marin County, including the 50- and 100-foot setback distances (plus additional setbacks from the edge of riparian vegetation where applicable). The study shall consider stream functions on a watershed-level basis, and include input from professionals such as a fluvial geomorphologist, hydrologist, wildlife biologist, and vegetation ecologist, together with resource agencies and interested members of the public. Each SCA should encompass all woody riparian vegetation and be of sufficient width to filter sediments and other pollutants before they enter the stream channel. Careful study may be needed to distinguish woody riparian vegetation from other types of woodland or forest vegetation in some areas.

BIO-4.c ***Prepare County Stream Map.*** Use the County GIS to map perennial, intermittent, and, where feasible, ephemeral streams subject to SCA policies. Use the resulting mapping in conjunction with USGS data and the "ephemeral stream" definition to confirm SCAs on parcels proposed for development. Add to and update the data on an ongoing basis as additional streams are surveyed.

BIO-4.d *Establish Functional Criteria for Land Uses in SCAs.* Develop detailed criteria for protection of riparian functions, and identify methods for their use in evaluating proposed development.

BIO-4.e *Identify Proposals Within SCAs.* Determine whether a proposed development falls wholly or partially within an SCA, through agency review by County staff, and as necessary by a qualified professional, of discretionary application materials and site inspection.

BIO-4.f *Identify Potential Impacts to Riparian Systems.* At the time of a development application, evaluate potential impacts on riparian vegetation and aquatic habitat, and incorporate measures to protect riparian systems into the project design and construction. Retain and minimize disturbance to woody and herbaceous riparian vegetation in SCAs and adjacent areas. (Tree growth may be cleared from the stream channel where removal is essential to protect against property damage or prevent safety hazards.)

BIO-4.g *Require Site Assessment.* Require development applications to include the submittal of a site assessment prepared by a qualified professional where incursions into the SCA are proposed, or adverse impacts to riparian resources may otherwise occur. Unless waived, the qualified professional shall be hired by Marin County. The site assessment shall be paid for by the applicant and considered in determining whether any adverse direct or indirect impacts on riparian resources would occur as a result of the proposed development, whether SCA criteria and standards are being met, and to identify measures necessary to mitigate any significant impacts. The site assessment may also serve as a basis for the County to apply restrictions in addition to those required by State and federal regulations.

BIO-4.h *Comply with SCA Criteria and Standards.* All development permit applications shall be reviewed for conformity with these SCA policies, criteria, and standards and in accordance with the California Environmental Quality Act. Proposals that do not conform to SCA policies, and cannot be modified or mitigated to conform, shall be denied. If a proposal involves the creation of a new parcel that is wholly or partially in an SCA, the land division shall be designed to ensure that no development occurs within the SCA.

BIO-4.i *Replace Vegetation in SCAs.* When removal of *native* riparian vegetation is unavoidable in an SCA, and mitigation is required, require establishment of native trees, shrubs, and ground covers within a period of five years at a rate sufficient to replicate, after a period of five years, the appropriate density and structure of vegetation removed. Require replacement and enhancement planting to be monitored and maintained until successful establishment provides for a minimum replacement or enhancement ratio of 2:1.

BIO-4.j *Continue Funding Fencing of Sensitive Stream Areas.* Encourage continued funding in conjunction with the Marin Resource Conservation District, the Natural Resource and Conservation Service, and other relevant agencies, to pay the cost of fencing sensitive streamside areas (on both public lands and private property) that could be impacted by cattle grazing.

BIO-4.k *Locate Trails Appropriately.* Situate trails at adequate distances from streams to protect riparian and aquatic habitat and wildlife corridors. Trails may occasionally diverge close to the top of bank to provide visual access and opportunities for interpretive displays on the environmental sensitivity of creek habitats. (See policies and programs in the Trails Section of this Element.)

BIO-4.l *Monitor Stream Conservation Areas.* Establish a system of monitoring SCAs, which may include mapping fenced streams and stream restoration areas to ensure the protection of vegetation, soils, water quality, and wildlife habitat along streams.

BIO-4.m *Encourage Conservation Plans Within the Stream Conservation Area.* Continue to collaborate with the Marin Resource Conservation District to encourage and support the continued implementation of the Marin Coastal Watersheds Permit Coordination Program, especially the preparation of management and conservation plans where appropriate for agricultural activities within the Stream Conservation Areas.

BIO-4.n *Provide Information to Reduce Soil Erosion and Sedimentation.* Provide information and fact sheets on programs offered by the Marin Resource Conservation District at the Community Development Agency front counter to landowners and applicants who submit development proposals within the Streamside Conservation Area in the Stemple, Walker, and Lagunitas creek watersheds.

BIO-4.o *Consider Culvert Restoration.* As part of the expanded SCA ordinance, consider additional policy language to encourage reopening culverted reaches and restoring channelized reaches of natural drainages. This may include adjustments in minimum standard setback distances where site constraints prevent complete compliance along the restored or enhanced channel reach. A detailed analysis may be required to demonstrate restoration feasibility and address possible effects on erosion and flooding potential. Incentives may be available to landowners to encourage restoration and enhancement efforts.

BIO-4.p *Implement NPDES Phase II.* Continue to implement NPDES Phase II permit requirements relating to peak flow controls to ensure that project related and cumulative impacts to peak flows are minimized or avoided through conditions on project approval as required by the ordinances.

BIO-4.q *Develop Standards Promoting Use of Permeable Materials.* Review existing permit requirements for development in SCAs and WCAs, and recommend additional standards for project review and corrective measures as needed to protect SCAs and WCAs from inappropriate ministerial and discretionary development. Develop

additional standards for requiring the use of best management practices, including measures such as the use of permeable materials in the SCA and WCA. A checklist of Best Management Practices should be made available to applicants.

BIO-4.r *Review Septic System Setbacks in SCA and WCA.* Review existing septic requirements within SCAs and WCAs, and revise requirements as necessary to provide monitoring and to protect SCAs and WCAs from impacts associated with septic systems. Consider adopting larger setback standards applied to new development for septic systems and their associated leachfields.

BIO-4.s *Continue Collaboration with the Marin Resource Conservation District and Agricultural Commissioner.* Continue to collaborate with, support, and participate in programs provided by the Marin Resource Conservation District, the Natural Resource Conservation Service, and the Agricultural Commissioner's Office to encourage agricultural operators who conduct farm or ranch activities within a Streamside Conservation Area to minimize pesticide use and activities that cause sedimentation and erosion, to enhance habitat values.

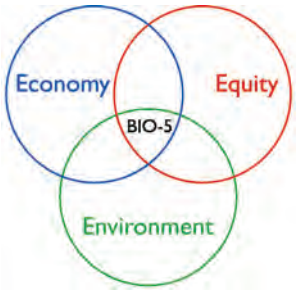
BIO-4.t **Collaborate with Groups to Address Implementation of Protections to SCAs and WCAs.** Collaborate with local, regional, State, and federal organizations (Marin Organic, MALT, SPAWN, Marin Audubon, RCD, Fish and Game, RWQCB, Sierra Club, Farm Bureau, Trout Unlimited, and affected property owners) to address long term habitat protection and develop funding mechanisms to address the issue.

BIO-4.u **Investigate Tax Delinquent Properties.** Investigate conversion of tax delinquent properties in SCAs into public ownership.

What Are the Desired Outcomes?

GOAL BIO-5

Baylands Conservation. Preserve and enhance the diversity of the baylands ecosystem, including tidal marshes and adjacent uplands, seasonal marshes and wetlands, rocky shorelines, lagoons, agricultural lands, and low-lying grasslands overlying historical marshlands.



The Baylands Corridor is described in Maps 2-5a and 2-5b. While the mapped areas include lands within incorporated cities, the policies, programs, and implementation measures related to the Baylands Corridor apply only within unincorporated Marin County.

The Baylands Corridor consists of areas previously included in the Bayfront Conservation Zones in the 1994 Countywide Plan, as well as all areas included in Bayfront Conservation Zone overlays adopted since the 1994 Countywide Plan. The Baylands Corridor consists of land containing historic bay marshlands based on maps prepared by the San Francisco Estuary Institute. Based upon information contained in studies completed during the preparation of this Plan,

the Baylands Corridor also includes associated habitat from the San Francisco Bay to Highway 101 in the Las Gallinas Planning Area. Except in the Tam Junction area and at the Rowland Boulevard and Highway 101 interchange in Novato, the Baylands Corridor does not extend west of Highway 101.

Where applicable for large parcels (more than 2 acres in size) that are primarily undeveloped, and based upon site-specific characteristics, an additional area of 300 feet or more of associated habitat is included. The inclusion of the 300-foot buffer is consistent with the minimum setback recommendations contained in the 1999 *Baylands Ecosystem Habitat Goals* report. This portion of the corridor serves both to recognize the biological importance of associated uplands adjacent to remaining tidelands, and to provide the opportunity to improve habitat values as part of future restoration of historic tidelands.

Within the Baylands Corridor, potential residential density and commercial floor area ratios shall be calculated at the lowest end of the applicable ranges. This provision does not apply to small parcels (2 acres or less in size) that were legally created prior to January 1, 2007. Within PD-AERA designation, the density and floor area ratios shall be as specified for those areas. Section 22.14.060 of the Development Code should be updated to reflect these policies.

For parcels of all sizes, existing lawful uses are grandfathered. For properties 2 acres or less in size within the Bayfront Conservation Zone on January 1, 2007, no additional regulations are imposed other than those previously applied to such lands. Creation of the Baylands Corridor will not subject currently allowed activities to additional County regulation. Such activities include repair and maintenance of bank erosion protection (riprap, plantings, etc.) and docks, levees, or dredging of existing dredged channels (such as Novato Creek), including existing dredge disposal sites.

Within the Baylands Corridor, public improvements at Gnoss Field and immediately adjacent properties pursuant to an approved Airport Master Plan or Airport Land Use Plan will not be subject to additional Baylands protection regulations.

The provisions of TR-1.7, Direct Aviation Uses to Appropriate Locations, and TR-1.p, Limit Aviation Uses, apply to Gnoss Field. Efforts to restore or enhance wetlands in the vicinity of Gnoss Field shall be consistent with an approved Airport Master Plan or Airport Land Use Plan and applicable FAA regulations. While the San Rafael airport is not in the Baylands Corridor, efforts to restore or enhance wetlands in the vicinity of the San Rafael Airport shall be consistent with the City of San Rafael's General Plan and other applicable City regulations, and shall also be consistent with safety considerations related to aircraft operations.

Small parcels not currently subject to tidal influence should be subject to mapping and analysis to determine whether they should be added to or omitted from the Baylands Corridor. In particular, historic marshland in the Richardson Bay and Bothin Marsh area should be included in the resource mapping and analysis to determine if these parcels meet the criteria for inclusion in the Baylands Corridor.

This mapping and analysis should do the following: (1) identify existing vegetative cover and sensitive features, such as streams, wetlands, and occurrences of special-status species; (2) use focal species and other similar ecological tools to determine the interrelationship between baylands and uplands; (3)

identify methods to maintain connectivity between sensitive habitat features and baylands; (4) specify criteria and thresholds used in determining the extent of upland habitat essential to the baylands ecosystem; (5) make recommendations on an appropriate biologically based boundary if the Baylands Corridor is to be expanded; and (6) identify lands that provide habitat, could be restored to provide habitat, or provide protection from sea level rise. Completion of the analysis does not require on-site evaluations.

All parcels added to the Baylands Corridor as a result of this study are subject to Baylands Corridor regulations in effect at that time.

Policies

BIO-5.1 **Protect the Baylands Corridor.** Ensure that baylands and large, adjacent essential uplands are protected, and encourage enhancement efforts for baylands, including those in the Baylands Corridor. The following criteria shall be used to evaluate proposed development projects that may impact the Baylands Corridor:

- For large parcels (over 2 acres in size), adhere to development setback standards for areas qualifying for protection under the WCA and SCA, but increase setback distances as necessary to ensure that hydrologically isolated features such as seasonal wetlands and freshwater marshes are adequately linked to permanently protected habitat. These additional development setbacks shall serve to prevent fragmentation and preserve essential upland buffers in the Baylands Corridor.

- For small parcels (2 acres or less in size), encourage property owners where suitable habitat exists to preserve up to 10 feet landward of mean high tide as a species refuge area for high water events. Site constraints, opportunities for avoidance of sensitive biological resources, and options for alternative mitigation, may also be considered.

- Minor redevelopment involving less than 25% of a structure on a residential or industrial parcel that is already filled and at least 50% developed may be exempted from the requirements for a site assessment, provided that no additional filling or modification to wetlands occurs. (See BIO-5.2.)

BIO-5.2 **Limit Development and Access.** Ensure that development does not encroach into sensitive vegetation and wildlife habitats, damage fisheries or aquatic habitats, limit normal wildlife range, or create barriers that cut off access to food, water, or shelter for wildlife. Require an environmental assessment where development is proposed within the Baylands Corridor.

BIO-5.3 **Leave Tidelands in Their Natural State.** Require that all tidelands be left in their natural state to respect their biological importance to the estuarine ecosystem. Any modifications should be limited to habitat restoration or enhancement plans approved by regulatory agencies.

BIO-5.4 **Restore Marshlands.** Enhance wildlife and aquatic habitat value of diked bay marshlands, and encourage land uses that provide or protect wetland or wildlife habitat and do not require diking, filling, or dredging.

BIO-5.5 **Protect Freshwater Habitats.** Preserve and, where possible, expand habitats associated with freshwater streams, seasonal wetlands, and small former marshes to facilitate the circulation, distribution, and flow of fresh water, and to enhance associated habitat values.

BIO-5.6 **Use Flood Basins for Seasonal Habitat.** Utilize natural or manage manmade flood basins to provide seasonal habitat for waterfowl and shorebirds, and prohibit development in these basins to protect habitat values.

BIO-5.7 **Limit Access to Wetlands.** Design public access to avoid or minimize disturbance to wetlands, necessary buffer areas, and associated important wildlife habitat while facilitating public use, enjoyment, and appreciation of bayfront lands.

BIO-5.8 **Control Shoreline Modification.** Ensure that any modifications to the shoreline do not result in a loss of biodiversity or opportunities for wildlife movement. Possible modifications may include construction of revetments, sea walls, and groins, as permitted by State and federal agencies.

BIO-5.9 **Allow Limited Agricultural Use.** Encourage only those agricultural uses that are compatible with protection of wetlands and other sensitive resources to remain in baylands. Conversion of non-agricultural lands to agriculture should occur only if wetlands or other sensitive biological resources would not be lost or adversely affected. Where possible, wetlands should be enhanced and restored as part of agricultural use or conversion.

BIO-5.10 **Encourage Acquisition of Essential Baylands.** Continue to acquire large, essential baylands for open space and habitat restoration purposes, and support public and private partnerships working to acquire baylands.

Why is this important?

An estimated 82% of the historic tidal marshlands along the edge of the San Francisco Bay–Delta Estuary has been filled or altered. The remaining baylands continue to be threatened by increasing human populations and associated pollution and disturbance to sensitive habitat; continued dredging, filling, and urban development; major water diversion projects; and other factors.

Environment: Adequate building setbacks and some restrictions on public access are needed to maintain the buffers that protect the sensitive habitat of the baylands.

Economy: As with all wetlands, maintaining and enhancing baylands protects the long-term health of the county, and its attractiveness as a desirable location for business and commerce. Protecting the

natural water filtration and recharge functions of baylands reduces the costs of flood damage, water pollution, and habitat degradation.

Equity: Protecting and restoring baylands provides for improved human and wildlife habitat.

How will results be achieved?

Implementing Programs

BIO-5.a ***Establish Criteria for Upland Setbacks in the Baylands Corridor.*** During the Development Code update, establish criteria to be used in the review of individual development applications for determining an adequate setback distance in adjacent uplands to serve as a buffer zone between development and remaining or historic tidelands and wetlands. Setbacks should provide for at least the minimum distances necessary to avoid adverse effects of increased human activity and potential disturbance to sensitive biological resources, and to provide essential linkages between important features such as seasonal wetlands, freshwater marsh, and roosting and nesting areas. This should include consideration of possible implications of future sea level rise on existing habitat. Use focus species, locational distribution of sensitive resources, and other ecological tools to establish criteria for determining essential habitat connectivity in site-specific planning that serves to preserve and enhance existing wildlife habitat values.

BIO-5.b ***Provide Landowner Education.*** Landowner education will be provided regarding the sensitivity of baylands and adjacent upland buffer areas as part of the Natural Resource Information Program called for in Program BIO-1.c. An emphasis will be placed on educating owners of developed properties adjacent to baylands where minimum upland setback distances are not provided. Information on regulations protecting baylands should be available, together with general methods to minimize disturbance and improve habitat values. An updated list of regulatory agencies and their contact information should be maintained as part of the Natural Resource Information Program.

BIO-5.c ***Update Development Code***. Update the Development Code, redefining the Bayfront Conservation Zone to reflect Baylands Corridor policies as well as including relevant aspects from the current Bayfront Conservation Zone. The updated Development Code shall identify criteria to be used in evaluating proposed development projects, and appropriate development restrictions necessary to protect sensitive biological and wetland resources.

BIO-5.d ***Enforce Tidelands Restrictions.*** Ensure that the Development Code prohibits diking, filling, or dredging in tidelands, unless the area is already developed and currently being dredged. Current dredging operations for maintenance purposes may continue, subject to environmental review, if necessary. In some cases, exceptions may be made for areas that are isolated or limited in productivity. In tidal areas, only land uses that

are water dependent shall be permitted, as consistent with federal, State, and regional policy. These include, but are not limited to the following:

- ports
- water-dependent industry and utilities
- essential water conveyance
- wildlife refuge and habitat restoration
- water-oriented recreation

Exemptions may be granted for emergency or precautionary measures taken in the public interest, such as protection from flooding or other natural hazards. Removal of native vegetation shall be discouraged, and secondary effects evaluated, such as potential reduction in available surface water and water quality degradation due to nonpoint discharge. Alteration of hydrology should only be allowed when it can be demonstrated that the impact will be beneficial or insignificant.

BIO-5.e *Enforce Diked Bay Marshlands Requirements.* Ensure that the updated Development Code allows only those land uses in diked bay marshlands that protect wetland or wildlife habitat and do not require diking, filling, or dredging, including the following:

- restoration to tidal status
- restoration to seasonal wetlands
- appropriate agricultural use
- flood basins
- wastewater reclamation areas
- maintenance and minor expansion of existing development located landward of existing dikes

Other uses that do not require diking, filling, or dredging may be allowed, consistent with zoning, if it can be demonstrated that impacts to baylands are minimized and adequately mitigated. Land uses that provide protection from flood or other natural hazards may be allowed if necessary to protect public health and safety. Existing dredging operations in developed areas may continue, subject to environmental review, if necessary. Priority shall be given to water-oriented uses, such as public access and low-intensity passive recreational and educational opportunities that include habitat protection and enhancement components.

BIO-5.f *Control Public Access.* Design public use areas to be clearly marked, to minimize possible conflicts between public and private uses, to provide continuous walkways from the nearest roads to the shoreline and along the shoreline, to be set back from any proposed structure, and to be buffered from wetlands. Restrict access to environmentally sensitive marshland and adjacent habitat, especially during spawning and nesting seasons.

BIO-5.g *Identify Baylands as a Priority for Open Space Acquisition.* Designate regionally significant baylands, including tidelands, diked marshlands, and adjacent uplands, as a priority for open space acquisition, particularly in areas known to support essential habitat for special-status species, wetlands, and important habitat linkages for wildlife (see policies and programs in the Open Space and Trails sections of this Element).

BIO-5.h *Encourage Baylands Protection in Cities and Towns.* Work with the cities and towns of Corte Madera, Larkspur, Mill Valley, Novato, San Rafael, Sausalito, Belvedere, and Tiburon to protect tidelands and remaining undeveloped, diked historic saltmarsh areas.

BIO-5.i *Conduct Mapping and Analysis.* Small parcels not currently subject to tidal influence should be subject to mapping and analysis to determine whether they should be added to or omitted from the Baylands Corridor. In particular, historic marshland in the Richardson Bay and Bothin Marsh area should be included in the resource mapping and analysis to determine if these parcels meet the criteria for inclusion in the Baylands Corridor.

This mapping analysis should do the following: (1) identify existing vegetative cover and sensitive features, such as streams, wetlands, and occurrences of special-status species; (2) use focal species and other similar ecological tools to determine the interrelationship between baylands and uplands; (3) identify methods to maintain connectivity between sensitive habitat features and baylands; (4) specify criteria and thresholds used in determining the extent of upland habitat essential to the baylands ecosystem; (5) make recommendations on an appropriate biologically based boundary if the Baylands Corridor is to be expanded; and (6) identify lands that provide habitat, could be restored to provide habitat, or provide protection from sea level rise. Completion of the analysis does not require on-site evaluations.

All parcels added to the Baylands Corridor as a result of this study are subject to Baylands Corridor regulations in effect at that time.

BIO-5.j *Consider Technical Group.* Consider establishing a technical working group on an as-needed basis to provide scientific expertise in evaluating natural resource issues regarding adequate protections when considering revisions for SCA and WCA regulations, and baylands mapping.

Figure 2-3 Relationships of Goals to Guiding Principles

This figure illustrates the relationships of each goal in this Section to the Guiding Principles.

Goals	Guiding Principles: 1. Link equity, economy, and the environment locally, regionally, and globally.	2. Minimize the use of finite resources and use all resources efficiently and effectively.	3. Reduce the use and minimize the release of hazardous materials.	4. Reduce greenhouse gas emissions that contribute to global warming.	5. Preserve our natural assets.	6. Protect our agricultural assets.	7. Provide efficient and effective transportation.	8. Supply housing affordable to the full range of our workforce and diverse community.	9. Foster businesses that create economic, environmental, and social benefits.	10. Educate and prepare our workforce and residents.	11. Cultivate ethnic, cultural, and socioeconomic diversity.	12. Support public health, safety, and social justice.
BIO-1 Enhanced Native Habitat and Biodiversity	•				•							
BIO-2 Protection of Sensitive Biological Resources	•				•							
BIO-3 Wetland Conservation	•			•	•							
BIO-4 Riparian Conservation	•			•	•	•						
BIO-5 Baylands Conservation	•			•	•							

How Will Success Be Measured?

Indicator Monitoring

Nonbinding indicators, benchmarks, and targets[1] will help to measure and evaluate progress. This process will also provide a context in which to consider the need for new or revised implementation measures.

Indicator	Benchmark	Target
Number of identified northern spotted owls.	75 pairs in 2000.	No decrease in the number of owls identified.

[1] Many factors beyond Marin County government control, including adequate funding and staff resources, may affect the estimated time frame for achieving targets and program implementation.

Program Implementation

The following table summarizes responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs. Program implementation within the estimated time frame[1] will be dependent upon the availability of adequate funding and staff resources.

Figure 2-4
Biological Resources Program Implementation

Programs	Responsibility	Potential Funding	Priority	Time Frame
BIO-1.a – Map Natural Communities.	Community Development Agency (CDA)	Existing budget and may require additional grants or revenue[2]	Medium	Med. term
BIO-1.b – Develop Habitat Monitoring Programs.	CDA, Resource Protection Agencies	Existing budget, will require additional grants or revenue[2]	Medium	Med. Term
BIO-1.c – Maintain a Natural Resource Information Program.	CDA, Resource Protection Agencies	Existing budget and may require additional grants or revenue[2]	High	Med. Term
BIO-1.d – Reevaluate County Native Tree Preservation and Protection Ordinance #3291.	CDA	Existing budget	High	Short term
BIO-1.e – Protect Against Vegetation and Wildlife Diseases.	Agricultural Commissioner, Fire Agencies, UCCE-FA[3]	Existing budget	Medium	Med. term
BIO-1.f – Prepare Appropriate Landscape Lists.	CDA	Existing budget	High	Ongoing
BIO-1.g – Expand Education, Outreach, and Regulatory Programs Regarding Control of Invasive Exotic Species.	CDA, Agricultural Commissioner, Resource Protection Agencies	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing
BIO-1.h – Encourage Community Forest Programs.	Marin ReLeaf	Prop 40, 12, 84 State of California	High	Ongoing
BIO-2.a – Require Site Assessments.	CDA	Existing budget	High	Ongoing
BIO-2.b – Conduct Habitat Connectivity Assessment.	CDA, Marin County Open Space District (MCOSD), Resource Protection Agencies	Will require additional grants or revenue[2]	Medium	Short term

[1]Time frames include: Immediate (0–1 years); Short term (1–4 years); Med. term (4–7 years); Long term (over 7 years); and Ongoing (existing programs already in progress whose implementation is expected to continue into the foreseeable future).
[2]Completion of this task is dependent on acquiring additional funding. Consequently, funding availability could lengthen or shorten the time frame and ultimate implementation of this program.
[3]UCCE-FA: University of California Cooperative Extension, FA: Farm Advisor.

Programs	Responsibility	Potential Funding	Priority	Time Frame
BIO-2.c – Facilitate Agency Review.	CDA	Existing budget	High	Ongoing
BIO-2.d – Promote Early Agency Consultation.	CDA	Existing budget	High	Ongoing
BIO-2.e – Participate in FishNet4C Program.	Department of Public Works (DPW)	Existing budget	High	Ongoing
BIO.3.a – Adopt Wetland Conservation Area Ordinance.	CDA	Existing budget	High	Ongoing
BIO-3.b – Comply with Regulations to Protect Wetlands.	CDA, Resource Protection Agencies	Existing budget	High	Ongoing
BIO-3.c – Require Site Assessment.	CDA	Existing budget	High	Ongoing
BIO-3.d – Prioritize Wetland Avoidance.	CDA, Resource Protection Agencies	Existing budget	High	Short term
BIO-3.e – Establish Clear Mitigation Criteria.	CDA	Existing budget	High	Short term
BIO-3.f – Establish Criteria for Setbacks.	CDA	Existing budget	Medium	Short term
BIO-3.g – Provide Landowner Education.	CDA, Resource Protection Agencies	Existing budget and may require additional grants or revenue[2]	High	Med. term
BIO-3.h – Evaluate Wetlands Definitions.	CDA	Existing budget and may require additional grants or revenue[2]	High	Short term
BIO-4.a – Adopt Expanded SCA Ordinance.	CDA	Existing budget	High	Short term
BIO-4.b – Reevaluate SCA Boundaries.	CDA, Resource Protection Agencies	Existing budget and may require additional grants or revenue[2]	High	Short term
BIO-4.c – Prepare County Stream Map.	CDA, DPW	Existing budget and may require additional grants or revenue[2]	High	Ongoing
BIO-4.d – Establish Functional Criteria for Land Uses in SCAs.	CDA	Existing budget and may require additional grants or revenue[2]	High	Short term
BIO-4.e – Identify Proposals Within SCAs	CDA	Existing budget	High	Short term
BIO-4.f – Identify Potential Impacts to Riparian Systems.	CDA	Existing budget	High	Short term
BIO-4.g – Require Site Assessment.	CDA	Existing budget	High	Ongoing

Programs	Responsibility	Potential Funding	Priority	Time Frame
BIO-4.h – Comply with SCA Criteria and Standards.	CDA	Existing budget	High	Ongoing
BIO-4.i – Replace Vegetation in SCAs.	CDA	Existing budget	High	Ongoing
BIO-4.j – Continue Funding Fencing of Sensitive Stream Areas.	Marin Resource Conservation District	Existing budget, private donations	High	Ongoing
BIO-4.k – Locate Trails Appropriately.	MCOSD, CDA	Existing budget and may require additional grants or revenue[2]	High	Ongoing
BIO-4.l – Monitor Stream Conservation Areas.	DPW, Marin Resource Conservation District	Will require additional grants or other revenue[2]	Medium	Long term
BIO-4.m – Encourage Conservation Plans Within the Stream Conservation Area.	CDA, Marin Resource Conservation District	Existing budget	Medium	Short term
BIO-4.n – Provide Information to Reduce Soil Erosion and Sedimentation.	CDA, Agricultural Commissioner	Existing budget	High	Short term
BIO-4.o – Consider Culvert Restoration.	CDA, DPW, Marin Resource Conservation District	Existing budget and may require additional grants or revenue[2]	High	Ongoing
BIO-4.p – Implement NPDES Phase II.	UCCE-FA[3]	Existing budget	High	Ongoing
BIO-4.q – Develop Standards Promoting Use of Permeable Materials.	CDA, DPW	Existing budget and may require additional grants or revenue[2]	Medium	Med. term
BIO-4.r – Review Septic System Setbacks in SCA and WCA.	CDA	Will require additional grants or revenue[2]	Medium	Long term
BIO-4.s – Continue Collaboration with the Marin Resource Conservation District and Agricultural Commissioner.	CDA	Existing budget	High	Short term
BIO-4.t – Collaborate with Groups to Address Implementation of Protections to SCAs and WCAs.	CDA, DPW	Existing budget and may require additional grants or revenue[2]	High	Immediate
BIO-4.u – Investigate Tax Delinquent Properties.	Treasurer Tax Collector, Department of Parks and Open Space, CDA	Existing budget	Medium	Med. term

Programs	Responsibility	Potential Funding	Priority	Time Frame
BIO-5.a – Establish Criteria for Upland Setbacks in the Baylands Corridor.	CDA	Existing budget	High	Short term
BIO-5.b – Provide Landowner Education.	CDA, Resource Protection Agencies UCCE-FA[3]	Existing budget and may require additional grants or revenue[2]	High	Med. Term
BIO-5.c – Update Development Code.	CDA	Existing budget and may require additional grants or revenue[2]	High	Short term
BIO-5.d – Enforce Tidelands Restrictions.	CDA, Resource Protection Agencies	Existing budget	High	Ongoing
BIO-5.e – Enforce Diked Bay Marshlands Requirements.	CDA, Resource Protection Agencies	Existing budget	Medium	Short term
BIO-5.f – Control Public Access.	CDA, MCOSD	Existing budget	Medium	Short term
BIO-5.g – Identify Baylands as a Priority for Open Space Acquisition.	MCOSD	Existing budget and public and private sources	Set annually by BOS	Ongoing
BIO-5.h – Encourage Baylands Protection in Cities and Towns.	CDA, Community Based Organizations (CBO's)	Existing budget	High	Ongoing
BIO-5.i – Conduct Mapping and Analysis.	CDA	Will require additional grants or revenue	Medium	Long term
BIO-5.j – Consider Technical Group.	CDA	May require additional grants and revenue[2]	Low	Med. term

Black Mountain at sunset.

2.5 Water Resources

Background

Marin watersheds are ridge-bounded ecosystems that drain into the bay or ocean (see Map 2-7, Major Watersheds, and Technical Background Reports and Other Supporting Documents). These systems carry water, sediments, and nutrients downstream, which also infiltrate the ground to recharge aquifers and springs (see discussion of riparian systems in the Biological Resources Section of this Element). While it takes many millennia for watersheds to achieve equilibrium, human activities can degrade their functions in a matter of years by increasing

Water Quality Regulations

Water quality is regulated under federal, State and local laws by the following agencies:

- State Water Resources Control Board
- Regional Water Quality Control Boards
- California Department of Fish and Game
- U.S. Environmental Protection Agency
- State Department of Health Services
- County Environmental Health and Public Works Departments (grading and stormwater ordinances)
- Stormwater Ordinance
- California Coastal Commission (in the Coastal Zone)

or concentrating runoff, altering drainages, or causing changes at outlets (such as rising sea level), affecting the availability and quality of water supplies.

Local drinking water comes primarily from surface sources (see discussion of water provision in the Public Facilities and Services Section of the Built Environment Element). Many substances considered pollutants occur naturally in watersheds and only become problems when unusually concentrated. For example, sediment is a product of natural erosion but in excess quantities becomes a pollutant. Because most fecal coliform levels do not distinguish between human and wildlife sources, it is often difficult to determine whether pollution results from natural processes, human activities, or both.

Sediment is a major concern countywide, as it can damage aquatic habitat and cause flooding by filling in channels and floodplains. Sediment sources include construction, road building, and agriculture. Other local water quality concerns include toxic chemicals (especially in urban areas), mercury (in Walker Creek and Tomales Bay), and nutrients such as nitrogen and phosphorous. Toxic runoff sources include oil and gas, pesticides, cleaning agents, and sewage. In rural areas, septic systems (see Map 2-8, Parcels with Buildings and Septic Systems) and livestock waste contribute to nutrient and pathogen contamination.

Watershed Management Plans that are under way or have been completed include Tomales Bay, Bolinas Lagoon, and Marin County. Marin County is refining its first *Watershed Management Plan,* which describes and maps local watersheds, and prescribes actions for maintaining and improving watershed health countywide. The plan presents detailed recommendations for modifying the development review and permitting process, changing construction and maintenance practices, supporting interagency planning efforts, and establishing educational outreach programs. This Section of the Countywide Plan contains policies and programs that reflect those recommendations in order to preserve and enhance watershed health and water quality in Marin.

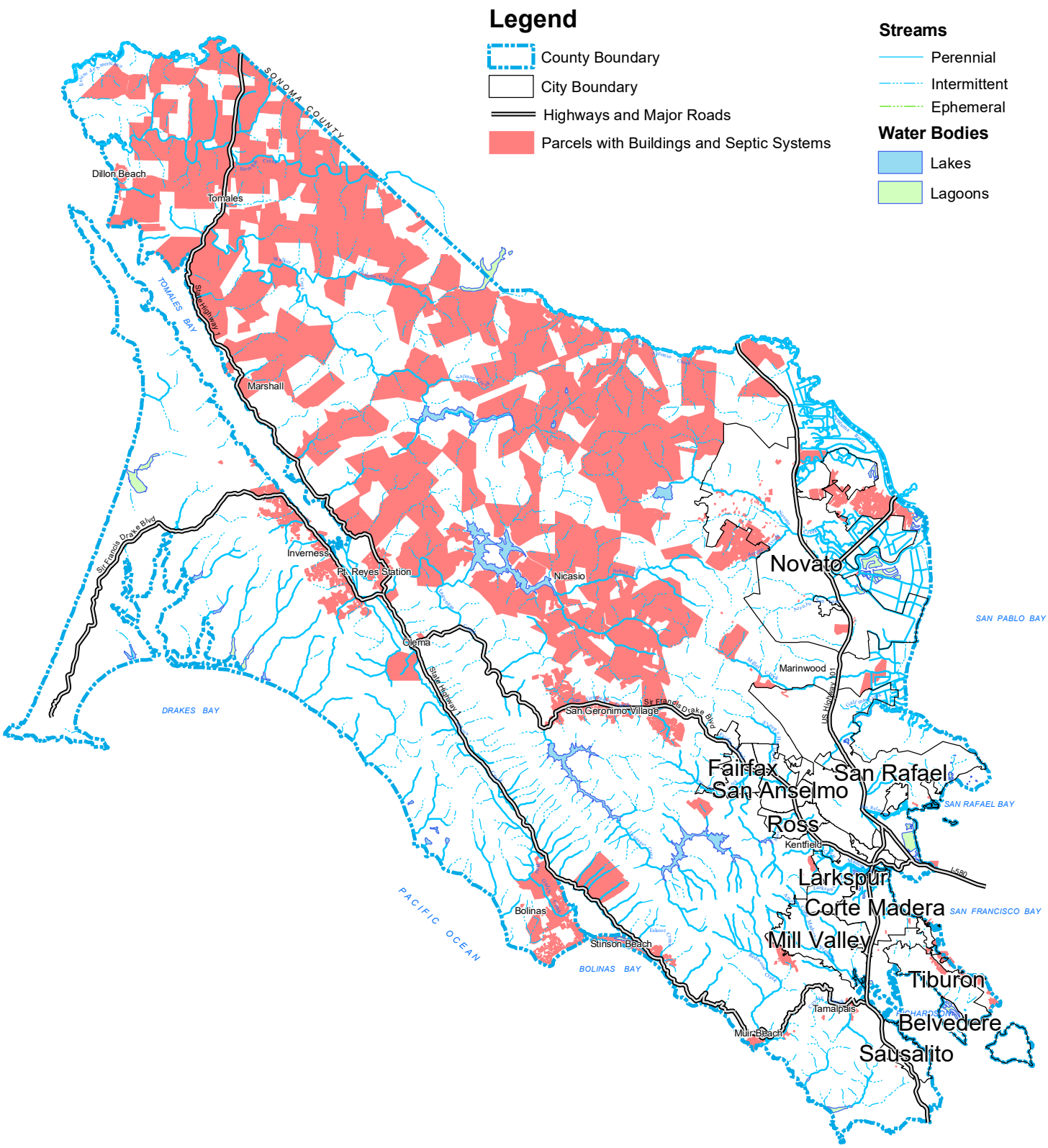
MAP 2-7
MAJOR WATERSHEDS

THIS MAP WAS DEVELOPED FOR GENERAL PLAN PURPOSES. THE COUNTY OF MARIN IS NOT RESPONSIBLE OR LIABLE FOR USE OF THIS MAP BEYOND ITS INTENDED PURPOSE.

SOURCE: Prunuske Chatham, Inc.

Date: July 6, 2005 File: watersheds 2-7.mxd

MAP 2-8
PARCELS WITH BUILDINGS AND SEPTIC SYSTEMS



THIS MAP WAS DEVELOPED FOR GENERAL PLAN PURPOSES. THE COUNTY OF MARIN IS NOT RESPONSIBLE OR LIABLE FOR USE OF THIS MAP BEYOND ITS INTENDED PURPOSE.

SOURCE: Marin County Community Development Agency

Date: February 7, 2005 File: Septic 2-8.mxd

Key Trends and Issues

Are water quality and watershed function threatened in Marin?

Recent studies list pollutants in local waters. The State has listed all urban streams in the City-Centered Corridor as impaired by the pesticide Diazinon, and San Pablo Bay as impaired by metals. Richardson Bay is identified as impaired by pathogens, while Tomales Bay is listed as impaired by metals (mercury), and excess sediment, nutrients, and pathogens. Walker Creek is impaired by metals, sediment, and nutrients while Lagunitas Creek is listed for sediment, nutrients, and pathogens. Pollutant levels are probably caused by urban and agricultural runoff.

Nonpoint source describes pollutants contributed by many small sources that cannot be easily distinguished but together degrade water quality. Pollution caused by release of waste or contaminated water through distinct structures such as pipes is termed *point source*. Because nonpoint source pollution can accumulate from diverse sources throughout a watershed, numerous small management changes can improve water quality.

Development has created extensive impervious surfaces. The Bay Area Stormwater Management Agencies Association has found that studies evaluating stream and wetland health consistently show that significant water quality impacts begin with impervious land coverage levels as low as 10%. At impervious land coverage over 30%, impacts on streams and wetlands become more severe and degradation is almost unavoidable without special measures. The Association of Bay Area Governments reports in its Projections 2003 that 10.1% of all land in Marin was developed in 2000 (compared with 4.4% in Napa County and 7.7% in Sonoma County).

Threatened and endangered fish are showing signs of recovery. Coho salmon, listed at the state and federal level as endangered, and steelhead, federally listed as a threatened species, have suffered significant losses in Marin, but the long-term trend may be changing. These species recently have shown limited signs of recovery in certain areas, most likely in response to concerted efforts aimed at restoring watershed function and riparian habitat. Lagunitas Creek watershed annually produces as much as 15% of the total population of California's estimated 5,000 spawning adult coho.

Methods to Increase Infiltration

- Use pervious pavements whenever possible. Drain water into cisterns, dry wells, or infiltration trenches.
- Keep vegetated areas undisturbed whenever possible. Reestablish groundcover and woody plants immediately after disturbance.
- Use grass-lined swales instead of hard-surfaced ditches.

Septic systems require maintenance, repair, and upgrades. Faulty septic systems have been identified as one of the possible sources of pathogens in Tomales Bay and connected waterways. A voluntary survey along the East Shore of Tomales Bay found that 40% of the inspected septic systems were functioning marginally or directly discharging to the bay. (Policies and programs in the Public Facilities and Services section of the Built

Environment Element address regulations for septic systems.)

Stream restoration practices have changed significantly in the past 15 years. The design and construction practices associated with the hydrologic restoration of streams and their associated biotic habitats have steadily evolved and are now recognized as credible alternatives to standard engineering channel design and stabilization measures (e.g., concrete lining, concrete retaining walls, rock riprap, and gabion revetments). The primary goal of a stream restoration project should be a natural channel restoration utilizing fluvial geomorphic design principles, including hydraulic engineering design and limited bank stabilization.

Agricultural and recreational uses impact water quality. The impacts of agricultural operations can be mitigated by using proper management practices for agricultural and livestock operations to prevent contribution of excess sediment, nutrients, and pathogens to downstream waters. Recreational aquatic uses also can contribute pathogens if human waste is not properly managed.

Ahwahnee Principles for Water Supply

This set of concepts was identified by the Local Government Commission to help guide communities in developing policies for water supply, water quality, and watershed integrity.

Communities should do the following:

- Recognize and live within the limits of available water resources.
- Promote a stewardship ethic to care for and sustainably manage water resources.
- Maximize self-sufficiency and reliability of water resources by developing a diverse portfolio of local and regional water supplies, and efficient water management practices.
- Maximize available potable supplies by ensuring that the type of water being used is matched with the appropriate end use.
- Support natural resources planning on a watershed basis and use whole-system management approaches when evaluating development. They should encourage adjacent communities to collaborate on such efforts within their watersheds.
- Protect and restore natural systems, habitats, groundwater recharge areas, and watersheds as an integral part of water management and local land use planning and development.
- Use natural systems wherever possible to achieve flood control, water quality, and water supply goals, and attempt to mimic and restore natural ecosystems and hydrologic functions when projects are constructed.
- Encourage the design of buildings, landscapes, and land use to maximize water efficiency, water reuse, and the beneficial use of stormwater, including groundwater recharge and water quality improvement.
- Evaluate the multiple benefits of a project or program, and incorporate this information into cost-effectiveness analyses.
- Fully engage the public and all stakeholders in water planning efforts.
- Encourage the State and federal resources agencies to conduct natural resource-based planning on a watershed basis, and to use whole-system management approaches.
- Participate as much as possible in regional, State, and federal planning for water resources.

Source: Local Government Commission, 2004.

What Are the Desired Outcomes?

GOAL WR-1

Healthy Watersheds. Achieve and maintain proper ecological functioning of watersheds, including sediment transport, groundwater recharge and filtration, biological processes, and natural flood mitigation, while ensuring high-quality water.

Policies

WR-1.1 **Protect Watersheds and Aquifer Recharge.** Give high priority to the protection of watersheds, aquifer-recharge areas, and natural drainage systems in any consideration of land use.

WR-1.2 **Restore and Enhance Watersheds.** Support watershed restoration efforts, coordinate County watershed activities with efforts by other groups, and simplify permit acquisition for watershed restoration and enhancement projects.

WR-1.3 **Improve Infiltration.** Enhance water infiltration throughout watersheds to decrease accelerated runoff rates and enhance groundwater recharge. Whenever possible, maintain or increase a site's predevelopment infiltration to reduce downstream erosion and flooding.

WR-1.4 **Protect Upland Vegetation.** Limit development and grazing on steep slopes and ridgelines in order to protect downslope areas from erosion and to ensure that runoff is dispersed adequately to allow for effective infiltration.

Why is this important?

According to the Bay Area Stormwater Management Agencies Association, watershed health suffers when impervious land coverage exceeds 10%. Impervious surfaces in Marin approach that threshold.

Environment: Sediment, pathogens, nutrients, and other chemical pollutants have devastating impacts on water quality and on watershed health and diversity. Local watershed areas vary from steep creek canyons with limited groundwater recharge capacity to tidal lands such as those bordering Tomales Bay. Tomales Bay alone is home to nearly 900 species of plants, 500 species of birds, and a mariculture industry. Proposed increases in the amount of paved and other unnatural surfacing should be carefully scrutinized and tightly controlled.

Economy: The use of best management practices and improvements in water quality, related regulations, and

"People have a fundamental yearning for great bodies of water. But the very movement of the people toward the water can also destroy the water."

– Christopher Alexander, Sara Ishikawa, and Murray Silverstein, *A Pattern Language: Towns, Buildings, Construction* (Oxford, 1977)

education are smart financial investments toward preventing watershed degradation, which can be costly to the local economy.

Equity: Water quality is vital to community health and prosperity. Pollutants from nonpoint sources and improperly functioning septic systems pose significant human and nonhuman health risks.

How will results be achieved?

Implementing Programs

WR-1.a ***Support Watershed Education and Outreach.*** Continue to support and fund the Marin County Stormwater Pollution Prevention Program and local county stormwater program efforts to encourage residents to adopt practices that increase groundwater infiltration, and to educate them about how they can make a significant difference.

"Wetlands have a poor public image. . . . Yet they are among the earth's greatest natural assets . . . mankind's waterlogged wealth."

— Edward Maltby, *Waterlogged Wealth*, 1986

WR-1.b ***Establish Development Standards for Infiltration.*** Establish qualitative standards to maximize groundwater infiltration and minimize surface water runoff based on criteria developed by the Bay Area Stormwater Management Agency Associates. Standards should regulate the amount of impervious surfaces; vary by project type, land use, building-site placement, soils, and area characteristics; and provide for water impoundments, protecting and planting vegetation, cisterns, and other measures, such as restricting wet weather grading to increase groundwater recharge and reduce sedimentation.

WR-1.c ***Seek Watershed Assessment and Monitoring Assistance.*** Pursue federal and State funding to conduct baseline assessments and trend monitoring of water quality, aquatic habitat, sensitive species, and restoration in County watersheds.

WR-1.d ***Coordinate Watershed Efforts.*** Work with land and water management agencies, community-based watershed restoration groups, and private property owners to explore methods and programs for maintaining and improving watershed health, including carrying out the actions recommended in the *Marin County and Tomales Bay Watershed Plans* and *Redwood Creek Watershed, Vision for the Future*, July 2003.

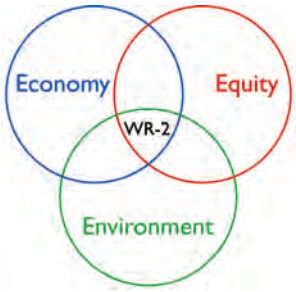
WR-1.e ***Require Restoration of Degraded Areas.*** Require replanting of vegetation and remediation of associated erosion in conjunction with requested land use approvals, especially those including roads and over-grazing on steep slopes.

WR-1.f ***Require Stream Restoration Projects.*** Require restoration of streams in conjunction with associated land use approvals to improve groundwater recharge and filtration and to ensure high-quality water. Restoration projects should follow the design principles of natural channel restoration utilizing geomorphic concepts.

What Are the Desired Outcomes?

GOAL WR-2

Clean Water. Ensure that surface and groundwater supplies are sufficiently unpolluted to support local natural communities, the health of the human population, and the viability of agriculture and other commercial uses. (Policies on water availability are found in the Public Facilities and Services Section of the Built Environment Element.)



Policies

WR-2.1 **Reduce Toxic Runoff.** Reduce the volume of urban runoff from pollutants — such as pesticides from homes, golf courses, cleaning agents, swimming pool chemicals, and road oil — and of excess sediments and nutrients from agricultural operations.

WR-2.2 **Reduce Pathogen, Sediment, and Nutrient Levels.** Support programs to maintain pathogen and nutrient levels at or below target levels set by the Regional Water Quality Control Board, including the efforts of ranchers, dairies, agencies, and community groups to address pathogen, sediment, and nutrient management in urban and rural watersheds.

WR-2.3 **Avoid Erosion and Sedimentation.** Minimize soil erosion and discharge of sediments into surface runoff, drainage systems, and water bodies. Continue to require grading plans that address avoidance of soil erosion and on-site sediment retention. Require developments to include on-site facilities for the retention of sediments, and, if necessary, require continued monitoring and maintenance of these facilities upon project completion.

WR-2.4 **Design County Facilities to Minimize Pollutant Input.** Design, construct, and maintain County buildings, landscaped areas, roads, bridges, drainages, and other facilities to minimize the volume of toxics, nutrients, sediment, and other pollutants in stormwater flows, and continue to improve road maintenance methods to reduce erosion and sedimentation potential.

WR-2.5 **Take Part in Water Quality Education.** Continue to support local stormwater and community watershed group efforts to inform the public about practices and programs to minimize water pollution.

Why is this important?

Stormwater runoff is increasingly trapped above impervious surfaces picking up pollutants before running off into streams, lakes, and estuaries.

Environment: Runoff from urban and agricultural uses is contributing to excessive pollutant levels in local streams and bays. Reducing the source volume of pollutants is necessary so that levels of sediment, nutrients, pathogens, and other pollutants do not threaten the health of natural and human communities.

Economy: Maintaining nonpolluted water sources supports local businesses that depend on clean water, including agriculture, mariculture, tourism, and recreation.

Equity: Ensuring that runoff is free of harmful pollutants is essential to maintaining healthy living and working conditions.

How will results be achieved?

Implementing Programs

WR-2.a ***Participate in Updating Standards.*** Work with the Regional Water Quality Control Boards and interested parties in the development and implementation of reasonable and achievable standards for clean water. Participate in the development and implementation of Total Maximum Daily Load (TMDL) standards for impaired water bodies, both for pollutants from the built environment and from agricultural and rural activities as identified by the Regional Boards, to achieve to the maximum extent practicable compliance with adopted TMDLs. (See also Agriculture and Food Program AG-1.r.)

The State Porter-Cologne Act (enacted 1969) authorizes Regional Boards to address nonpoint sources through local watershed planning. The federal Clean Water Act (originally enacted 1972) emphasizes control of nonpoint pollutants such as nutrients, pathogens, and chemicals (in descending order of importance).

WR-2.b ***Integrate Bay Area Stormwater Management Agencies Association (BASMAA) Stormwater Quality Protection Guidelines into Permitting Requirements for All Development and Construction Activities.*** All projects should integrate stormwater pollution prevention design features for water quality protection to the extent feasible, such as those included in the BASMAA *Start-at-the-Source* manual and the *Tools Handbook*.

WR-2.c ***Research and Implement Safe and Effective Alternative Waste Options.*** Research the potential to expand the use of alternative waste disposal methods — such as pretreatment drip dispersal septic systems, graywater systems, composting toilets, waterless urinals, and other techniques — and community systems to help reduce the potential for contaminants to pollute water bodies and create human health hazards. Continue to allow carefully monitored demonstration projects for experimental systems to ensure consistency with local public health protection standards. Revise the appropriate codes to permit technologies and practices that prove safe and effective. (Also see Program PFS-2.p in the Public Facilities and Services Section of the Built Environment Element.)

WR-2.d *Continue Alternative Septic/Waste System Monitoring.* Establish a Septic/Waste Alternatives Maintenance and Inspection Program to ensure the proper installation, maintenance, and use of alternative septic systems. Work with manufacturers, suppliers, and installers to provide guidelines for approvable alternative septic/waste systems.

WR-2.e *Continue Providing High-Priority Inspections.* Continue providing no-cost inspections of on-site wastewater systems if funds are available and make improvement recommendations to decrease impacts of high-priority systems near waterways.

WR-2.f *Continue Alternative Septic System Monitoring.* Conduct alternative septic system inspections and participate in manufacturer feedback regarding efficacy of the systems.

WR-2.g *Inspect Septage Haulers.* Review reports from septage haulers, and ensure compliance with health and safety requirements.

WR-2.h *Establish Additional County Service Areas.* Establish a Marshall County Service Area to relocate septic systems away from Tomales Bay, and to instigate monitoring of on-site septic systems in a risk-based, comprehensive, and cost-effective manner. The proposed boundary of the County Service Area should include the entire East Shore planning area. Additional County Service Areas should include the rural communities of Tomales and Nicasio. In addition to wastewater services, County Service Areas should provide water supply services.

WR-2.i *Establish a Septic Inspection, Monitoring, and Maintenance District.* Establish a countywide Septic Inspection, Monitoring and Maintenance District that would include all or portions of unincorporated areas with septic systems. Modify applicable codes to enable the inspection and monitoring of on-site septic systems in a risk-based, comprehensive, and cost-effective way. Establishment requires a petition or election to put the district in place.

WR-2.j *Continue Public Outreach Regarding Toxic Chemical Use.* Continue to educate homeowners, the public, businesses, and agricultural operators about toxicity issues related to use of pesticides, cleaning agents, and other commonly used chemicals through the Marin County Stormwater Pollution Prevention Program.

WR-2.k *Establish Educational Partnerships to Protect Water Quality.* Initiate discussions with the Regional Water Quality Control Board, Marin Resource Conservation District, University of California Cooperative Extension, Natural Resources Conservation Service, Marin County Stormwater Pollution Prevention Program, watershed groups, the public, stakeholders, and other interested parties to develop and implement public education programs and provide technical assistance to find alternatives and minimize erosion and sedimentation, pathogen and nutrient, and chemical sources of water pollution. This would begin with letters to establish a lead agency to direct the effort. It would include soliciting input from local, State, and federal recreation management

agencies to educate boaters and other recreational groups regarding proper management and disposal of human waste.

WR-2.l *Implement County Ordinances.* Continue to implement County ordinances addressing nonpoint source pollution, erosion and sediment control, and surface runoff pollution control plans to ensure that project-related and cumulative impacts to water quality standards are minimized or avoided through conditions of project approval as required by the ordinances.

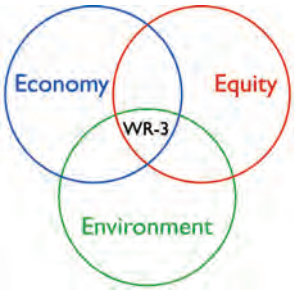
WR-2.m *Nontoxic Building Materials Standards.* Consider adoption of standards for nontoxic exterior building materials to reduce the potential of toxics entering stormwater.

WR-2.n *Implement Least Toxic Methods for Maintenance and Pest Control.* Utilize Integrated Pest Management (IPM) practices for County facilities. Develop a maintenance program for all County facilities that specifies least toxic methods. Minimize the need for toxic materials by designing and constructing facilities and landscaping to be durable, easily maintained, and pest resistant.

WR-2.o *Establish a Groundwater Monitoring Program for Unincorporated County Areas.* Establish a countywide groundwater monitoring program that would include all or portions of unincorporated areas that use groundwater. Conduct periodic water level measuring and water quality sampling with regular reporting (at least annually) to the Board of Supervisors.

What Are the Desired Outcomes?

GOAL WR-3



Adequate Water for Wildlife and Humans. Ensure that the available supply of surface and groundwater is used responsibly, so that the needs of both wildlife and human populations are met.

Policies

WR-3.1 Conserve Water and Develop New Sustainable Sources. Reduce the waste of potable water through efficient technologies, conservation efforts, and design and management practices, and by better matching the source and quality of water to the user's needs.

WR-3.2 **Mitigate Water Demand in New Development.** Assess and mitigate the impacts of new development on potable water supplies and water available for wildlife.

Why is this important?

Present water use is exceeding the amount of water available to support our population and local ecosystems. Water-efficient technologies and sustainable water supplies will benefit the environment, economy, and communities as a whole.

Environment: Conservation efforts countywide can increase the amount of groundwater left in the natural environment to support wildlife and the rest of the local ecosystem.

Economy: Conserving water and developing sustainable, alternative supply sources are cost-saving measures that benefit businesses.

Equity: Designing homes and institutions to be more water efficient also makes them more affordable to maintain over the long term.

Potable Water. Because of the hilly terrain and dry climate in Marin, providing clean water to county residents requires a large amount of energy. The water consumed each year by a family of four in Marin has an energy footprint larger than half a football field.

Water Facts:
Did You Know . . . ?

- Humans require about 2½ quarts of water a day.
- The average individual uses about 125 gallons of water per day.
- A faucet that drips 60 times in one minute would waste over 3 gallons a day, 1,225 gallons per year.
- It takes about 1 gallon of water to process a quarter pound of hamburger.
- It takes 39,000 gallons of water to manufacture a new car, including tires.
- Four quarts of oil can cause an 8-acre oil slick if spilled or dumped down a storm sewer.
- One gram of 2,4-D (a common household herbicide) can contaminate 2.6 million gallons (10 million liters) of drinking water.

How will results be achieved?

Implementing Programs

WR-3.a ***Support Water Conservation Efforts.*** Support the efforts of a variety of interested individuals and groups countywide in improving water conservation techniques and applying them to existing and new development, household and commercial practices, and agricultural operations (see policies and programs under Goals AG-1 in the Agriculture and Food Section of this Element and PFS-2 in the Public Facilities and Services Section of the Built Environment Element).

WR-3.b ***Support and Integrate Water District Conservation Efforts.*** Assist the efforts of the water districts to reduce waste and increase reuse of water and wastewater through integrated planning of programs and complementary land use and building regulations. Assess and remove barriers to integrated water planning, and mitigate the demand for water in new development. Assess the degree of demand hardening. (Also see policies and programs under Goals AG-1 in the Agriculture and Food Section of this Element, and PFS-2 in the Public Facilities and Services Section of the Built Environment Element).

Figure 2-5 Relationships of Goals to Guiding Principles

This figure illustrates the relationships of each goal in this Section to the Guiding Principles.

Goals	Guiding Principles: 1. Link equity, economy, and the environment locally, regionally, and globally.	2. Minimize the use of finite resources and use all resources efficiently and effectively.	3. Reduce the use and minimize the release of hazardous materials.	4. Reduce greenhouse gas emissions that contribute to global warming.	5. Preserve our natural assets.	6. Protect our agricultural assets.	7. Provide efficient and effective transportation.	8. Supply housing affordable to the full range of our workforce and diverse community.	9. Foster businesses that create economic, environmental, and social benefits.	10. Educate and prepare our workforce and residents.	11. Cultivate ethnic, cultural, and socioeconomic diversity.	12. Support public health, safety, and social justice.
WR-1 Healthy Watersheds	•		•	•	•	•						•
WR-2 Clean Water	•		•		•	•						•
WR-3 Adequate Water for Wildlife and Humans	•	•		•	•	•						

How Will Success Be Measured?

Indicator Monitoring

Nonbinding indicators, benchmarks, and targets[1] will help to measure and evaluate progress. This process will also provide a context in which to consider the need for new or revised implementation measures.

Indicators	Benchmarks	Targets
Water quality – standard industry measure: beneficial water uses.	16 beneficial uses in 2004.	No decline in water quality through 2015.
Healthy aquatic habitat standard industry measure: macroinvertebrate diversity.	See Index of Biological Integrity (www.krisweb.com).	No decrease in macroinvertebrate diversity due to water quality through 2015.
Reported pesticide use countywide.	54,328 pounds in 2000.	No increase through 2015 using a five-year average.

[1] Many factors beyond Marin County government control, including adequate funding and staff resources, may affect the estimated time frame for achieving targets and program implementation.

Program Implementation

The following table summarizes responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs. Program implementation within the estimated time frame[1] will be dependent upon the availability of adequate funding and staff resources.

Figure 2-6
Water Resources Program Implementation

Programs	Responsibility	Potential Funding	Priority	Time Frame
WR-1.a – Support Watershed Education and Outreach.	MCSTOPPP UCCE-FA[2]	Will require additional grants or other revenue[3]	High	Ongoing/Long term
WR-1.b – Establish Development Standards for Infiltration.	DPW (MCSTOPPP)	Will require additional grants or other revenue[3]	Medium	Long term
WR-1.c – Seek Watershed Assessment and Monitoring Assistance.	DPW (MCSTOPPP) UCCE-FA[2]	Will require additional grants or other revenue[3]	Medium	Long term
WR-1.d – Coordinate Watershed Efforts.	MCSTOPPP, Agricultural Commissioner UCCE-FA[2]	Existing budget and may require additional grants or revenue[3]	High	Ongoing
WR-1.e – Require Restoration of Degraded Areas.	CDA, Agricultural Commissioner, Resource Protection Agencies	Existing budget	High	Ongoing
WR-1.f – Require Stream Restoration Projects.	CDA, Resource Protection Agencies	Existing budget	High	Ongoing
WR-2.a – Participate in Updating Standards.	RWQCB, MCSTOPPP, CDA	Existing budget	High	Ongoing
WR-2.b – Integrate Bay Area Stormwater Management Agencies Association (BASMAA) Stormwater Quality Protection Guidelines into Permitting Requirements for All Development and Construction Activities.	CDA, MCSTOPPP	Existing budget	Medium	Ongoing

[1]Time frames include: Immediate (0–1 years); Short term (1–4 years); Med. term (4–7 years); Long term (over 7 years); and Ongoing (existing programs already in progress whose implementation is expected to continue into the foreseeable future).

[2]UCCE-FA: University of California Cooperative Extension, FA: Farm Advisor.

[3]Completion of this task is dependent on acquiring additional funding. Consequently, funding availability could lengthen or shorten the time frame and ultimate implementation of this program.

Programs	Responsibility	Potential Funding	Priority	Time Frame
WR-2.c – Research and Implement Safe and Effective Alternative Waste Options.	CDA, RWQCB	Existing budget	Medium	Ongoing
WR-2.d – Continue Alternative Septic/Waste System Monitoring.	CDA	Existing budget and may require additional grants or revenue[3]	High	Med. term
WR-2.e – Continue Providing High-Priority Inspections.	CDA	Acquire additional funding	High	Ongoing
WR-2.f – Continue Alternative Septic System Monitoring.	CDA	Existing budget	Medium	Ongoing
WR-2.g – Inspect Septage Haulers.	CDA	Will require additional grants or other revenue[3]	Low	Ongoing
WR-2.h – Establish Additional County Service Areas.	CDA, CAO	Assessments and may require additional grants or revenue[3]	High	Ongoing
WR-2.i – Establish a Septic Inspection, Monitoring and Maintenance District.	EHS, CAO	Assessments and may require additional grants or revenue[3]	High	Ongoing
WR-2.j – Continue Public Outreach Regarding Toxic Chemical Use.	DPW	Will require additional grants or other revenue[3]	Medium	Ongoing/Long term
WR-2.k – Establish Educational Partnerships to Protect Water Quality.	DPW (MCSTOPPP) UCCE-FA[2]	Will require additional grants or other revenue[3]	Medium	Long term
WR-2.l – Implement County Ordinances.	MCSTOPPP, cities and towns	MCSTOPP funds, city and town funds	High	Ongoing
WR-2.m – Nontoxic Building Materials Standards.	CDA	Existing budget, and may require additional grants or revenue[3]	Medium	Med. term
WR-2.n – Implement Least Toxic Methods for Maintenance and Pest Control.	DPW, Parks, Agricultural Commissioner	Existing budget, and may require additional grants or revenue[3]	High	Ongoing
WR-2.o – Establish a Groundwater Monitoring Program for Unincorporated County Areas.	CDA, Water districts	Will require additional grants or revenue	Medium	Med. term

Programs	Responsibility	Potential Funding	Priority	Time Frame
WR-3.a – Support Water Conservation Efforts.	Water districts, CDA, Agricultural Commissioner, UCCE-FA[2]	Existing budget, and may require additional grants or revenue[3]	High	Ongoing
WR-3.b – Support and Integrate Water District Conservation Efforts.	Water districts, CDA	Existing budget, and may require additional grants or revenue[3]	Medium	Ongoing

Mount Vision fire.

2.6 Environmental Hazards

Background

The policies and programs in this Section of the Countywide Plan are intended to minimize harm to people and property due to environmental hazards from seismic activity, geologic conditions, flooding, and fire. The County maintains an Emergency Operations Plan to guide agency and public natural disaster preparedness and response, as described under Goal PS-3 in the Public Safety Section of the Socioeconomic Element.

Earthquakes can produce surface rupture and displacement, but ground shaking is a more likely threat, especially on looser soils (see Map 2-9, Seismic Shaking Amplification Hazards).

The San Andreas is the only local fault subject to the Alquist-Priolo Act (see Map 2-10, Fault Hazards), which prohibits specified types of habitable structures within 50 feet of an active trace. Shaking of water-saturated soil can result in liquefaction, another potential source of damage (see Map 2-11, Liquefaction Susceptibility Hazards). Earthquakes also can generate tsunamis — ocean waves that threaten coastal areas, and seiches — waves in enclosed waters that can overtop dams and flood downstream.

Landslides on steep slopes can be triggered by earthquakes or heavy rainfall. Rain also can cause expansive soils to swell and damage overlying structures. Buildings may suffer damage from subsidence of bay mud and other weak soils, or differential settlement due to placement on multiple soil types. Erosion and slope instability can threaten structures built on coastal bluffs.

Flooding can originate from storm runoff, tidal activity, or high surf. Areas near streams may be flooded after heavy rainfall, while high tides combined with heavy rains can cause flooding in bayfront and coastal areas. Dam failure and subsequent flooding can also result from earthquake activity (see Map 2-12, Flooding).

The absence of large fires in recent history has resulted in areas with high fuel loading. For example, areas surrounding Mount Tamalpais have not burned since 1945, resulting in a forest overstocked with trees and brush with high concentrations of dead material. To make matters worse, Sudden Oak Death has created additional tinder that amplifies the threat of wildland fire to homes and communities on the urban interface. (See Map 2-13, Urban-Wildland Interface Zone.) Insufficient water pressure and supply, and difficult access also contribute to the risk of property damage, injury, and loss of life from fire in some locations. The County provides structural fire protection to most unincorporated areas of the County (see Map 2-14, State Responsibility Areas for Fire Protection), while some rural and all urbanized areas are served by local fire protection districts, volunteer protection, and fire departments. State and local protection is provided to wildland areas.

Marin County is subject to tsunamis and seiches. Tsunamis are long-period waves generated by shifting of a large volume of water. Seiches are related to tsunamis and are triggered by the same sources, but occur in enclosed and semi-enclosed bodies of water, such as bays, inlets, lakes, and reservoirs. Tsunamis are generally associated with seismic activity and are a common hazard in tectonically active portions of the world. The west coast of North America is susceptible to this hazard. Seiches could occur in any reservoir located in the County and in San Pablo and San Francisco Bays. A tsunami is considered to be a greater potential hazard. Once a tsunami reaches land, the damage is determined by the wave run-up and the extent of inundation. The exposure of the Marin coastline to a tsunami hazard will vary locally, depending on the many factors involved. The creation of tsunami run-up and inundation maps help to identify the extent of hazard. Currently, tsunami inundation maps do not include the Marin County coast. However, a map has been completed for the San Francisco-San Mateo County area.

To prepare for and respond to emergencies, the Marin County Sheriff's Department established the Office of Emergency Services (OES). The function of the OES is to coordinate efforts to develop

disaster-resistant communities and to educate residents on emergency preparedness. In the event of a major emergency or disaster, the OES has established a fully functional Emergency Operations Center (EOC) from which centralized emergency management can be performed. In April 2005 the Board of Supervisors adopted the Marin County Operational Area Hazard Mitigation Plan, which describes strategies for sustaining and building on existing mitigation activities to ensure the future and safety of lives, preservation of property, and protection of the environment during times of disaster. The Marin County Operational Area Hazard Mitigation Plan is adopted by reference and integrated into the Environmental Hazards section of the Countywide Plan to ensure consistency.

The United States Coast Guard military installations in Point Reyes Station and Point Bonita are located in areas of known fire and geologic hazards. Any proposed development at these facilities should assess the potential impacts of these hazards and include careful planning, siting, and construction to lessen the hazard potential.

Policies and programs addressing emergency and disaster preparedness and hazardous materials are contained in the Public Safety Section of the Socioeconomic Element.

Key Trends and Issues

Are threats from environmental hazards increasing?

Many structures lie in hazardous areas, and land for new development may be even more hazard-prone. With most easily buildable land already developed, construction increasingly is being proposed on the remaining marginal lots with difficult access and steep hillsides, which are subject to slope instability and are vulnerable to rapid changes in fire behavior. Bluff erosion is threatening coastal homes built when bluff edges seemed safely distant. Vegetation that can fuel fires has increased because natural fires have been suppressed, and residential development continues to encroach on wildlands. Proliferation of impermeable surfaces, alteration of natural drainage patterns, and the effects of climate change have increased the frequency and severity of flood events, and estimates indicate that sea level could rise as much as 36 inches by 2100. Maps 2-9 through 2-15 are utilized by the County in reviewing land use activities proposed in areas with hazard potential.

How can hazards be avoided?

Careful planning, siting, and construction can lessen hazard potential. Limiting development densities (see Policy CD 8.6 in the Community Development Section of the Built Environment Element) and ensuring adequate access for emergency vehicles and evacuation in areas with hazard potential can reduce risks to people and property. Appropriate placement and engineering of foundations can render buildings less prone to ground shaking and liquefaction. Adequate site clearing and construction techniques such as fire sprinklers can help reduce the threat of fire. County zoning and development standards help mitigate flood damage by limiting what can be built in flood-prone areas. Special attention must be paid to land use activities at the urban-wildland interface zone, where people and property may be particularly susceptible to environmental hazards.

Historic development trends have allowed homes to be built on hillsides or steep slopes, sometimes with limited access and surrounded by brush and trees. An aggressive education campaign has been

undertaken for building clearance space, limiting development on hillsides, and improving site access. Older neighborhoods with limited access remain. This Plan proposes an aggressive program on evacuation route education.

Will County public safety employees be available during a major emergency?

Most public safety employees live outside Marin. According to the 2002 Marin County Employee Housing Options Report, approximately 80% of County Sheriff and Fire Department employees live out of the county, with about 60% residing in Sonoma County. Their need to travel to the Emergency Operations Center, isolated fire stations, and other key locations during a major event could result in inadequate public safety in emergency situations. (Program HS-4.a in the Housing Section of the Built Environment Element describes mechanisms for helping public safety employees locate housing in Marin.)

Urban-Wildland Interface Zone: That geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

Source: 2003 International Urban Wildlife Interface Code.

Can adequate defensible space be created?

The urban-wildland interface areas in the County are particularly threatened because of the many jurisdictions and private properties maintaining lands in this area (see Map 2-13, Urban-Wildland Interface Zone). Designation of wildland-urban boundary areas, along with applicable regulations, will be used to impose defensible space requirements for new and substantially remodeled structures.

Fire risk potential is based on a variety of factors, including the amount of surrounding fuels (vegetation), slope, and parcel exposure. The fire risk map (see Map 2-15, Fire Risk) illustrates which areas of the county have the greatest potential for large, damaging fires based on these factors. As depicted on the map, some of the most hazardous locations are in water district and federal lands that interface with a variety of communities.

Is adequate emergency service provided for our aging population?

The demand for emergency services will continue to increase along with our increased population age. First-response fire personnel will continue to have medical training.

MAP 2-9
SEISMIC SHAKING AMPLIFICATION HAZARDS

SOURCE: 2000, Seekins, Linda C.,Boatwright, Jack, and Fumal, Tom,
Soil Type and Shaking Hazard in the San Francisco Bay Area,
http://quake.wr.usgs.gov/prepare/soil_type/index.html,
Earthquake Hazards Program-Northern California,
U.S. Geological Survey, 2000.

Legend

- County Boundary
- City Boundary
- Highways and Major Roads

Water Bodies

- Lakes
- Lagoons

Soil Type

Soil Types A and B (Vs* > 1500 m/sec and 1500 m/sec > Vs > 750 m/sec, respectively).
Soil types A and B do not contribute greatly to shaking amplification.
Soil type A occurs infrequently in the bay areas and includes unweathered intrusive igneous rock.
Soil type B includes volcanics, most Mesozoic bedrock, and some Franciscan Bedrock.

Soil Type C (750 m/sec > Vs > 350 m/sec). **The shaking amplification for soil type C would likely be not as significant as for soil types D and E.** Soil type C includes some Quaternary sands, sandstones and mudstones, some Upper Tertiary sandstones, mudstones and limestones, some Lower Tertiary mudstones and sandstones, and Franciscan melange and serpentinite.

Soil Type D (350 m/sec > Vs> 200 m/sec). **Significant amplification of shaking by these soils is generally expected.** Soil type D includes some Quaternary muds, sands, gravels, silts and muds.

Soil Type E (200 m/sec > Vs). **The strongest amplification of shaking is expected for this soil type.**
Soil type E includes water-saturated mud and artificial fill.

* Site amplification is the velocity at which the rock or soil transmit shear waves (Vs). Shaking is stronger where the shear wave velocity is lower.
Source: (Seekins et al., 2000)

N

0 1 2 4 6 8 Miles

Date: September 28, 2007 File: Shake 2-9.mxd

MAP 2-10
FAULT HAZARDS

BLOOMFIELD FAULT
AMERICANO CREEK FAULT
SONOMA COUNTY
RODGERS CREEK FAULT ZONE
TOLAY FAULT
BURDELL MOUNTAIN FAULT
POINT REYES FAULT
SAN ANDREAS FAULT ZONE
HAYWARD FAULT
DRAKES BAY
PACIFIC OCEAN
BOLINAS BAY
SAN PABLO BAY
SAN RAFAEL BAY
SAN FRANCISCO BAY
RICHARDSON BAY

Dillon Beach
Tomales
Marshall
Inverness
Pt. Reyes Station
Nicasio
Olema
Bolinas
Stinson Beach
Novato
Marinwood
San Geronimo Village
Fairfax
San Anselmo
San Rafael
Ross
Kentfield
Larkspur
Corte Madera
Mill Valley
Tiburon
Belvedere
Tamalpais
Muir Beach
Sausalito

Legend

- County Boundary
- City Boundary
- Highways and Major Roads
- Alquist Priolo Zone
- Historic (200 yrs to today)
- Holocene (10,000 yrs to today)
- Late Quaternary (700,000 yrs to today)
- Quaternary (1,600,000 yrs to today)
- Pre-Quaternary (4.5 billion to 1,600,000 yrs ago)

Water Bodies

- Lakes
- Lagoons

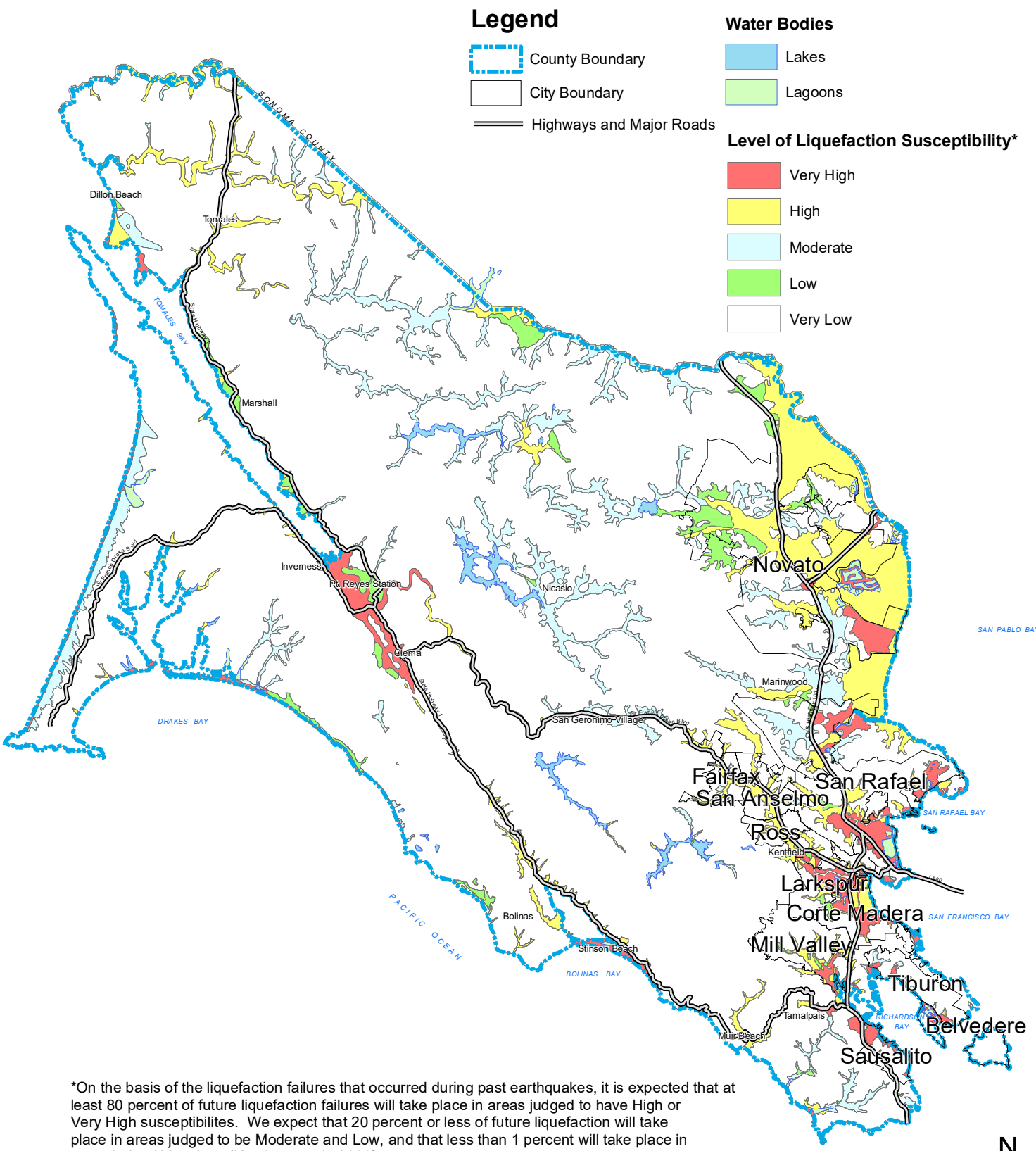
SOURCE: California Department of Conservation, Division of Mines and Geology, Digital Database of Faults from the Fault Activity Map of California and Adjacent Areas, CD 2000-006, California Department of Conservation, Division of Mines and Geology, 2000.

0 1 2 4 6 8 Miles

N

Date: September 28, 2007 File: Fault 2-10.mxd

MAP 2-11
LIQUEFACTION SUSCEPTIBILITY HAZARDS

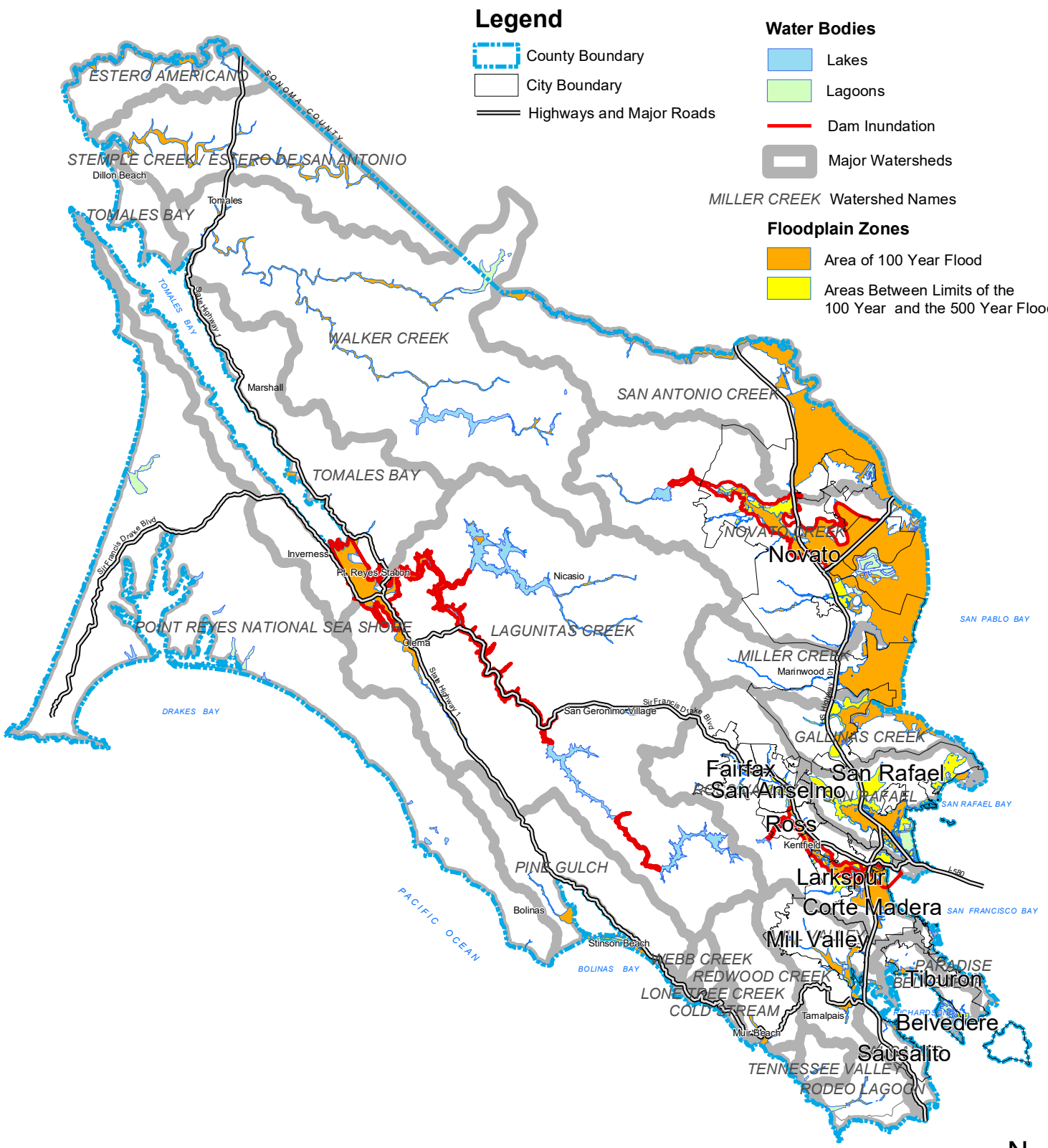


*On the basis of the liquefaction failures that occurred during past earthquakes, it is expected that at least 80 percent of future liquefaction failures will take place in areas judged to have High or Very High susceptibilites. We expect that 20 percent or less of future liquefaction will take place in areas judged to be Moderate and Low, and that less than 1 percent will take place in areas judged Very Low (Knudson et al., 2000).

SOURCE: Knudson, K. L., Sowers, J. M., Witter, R. C., Wentworth, C. M., and Helley, E. J., Preliminary Maps of Quaternary Deposits and Liquefaction Susceptibility, Nine-County San Francisco Bay Region, California: A Digital Database, Open-File Report 00-44, Online Version 1.0, U.S. Geological Survey, 2000.

Date: September 28, 2007 File: Liqu 2-11.mxd

MAP 2-12
FLOODING

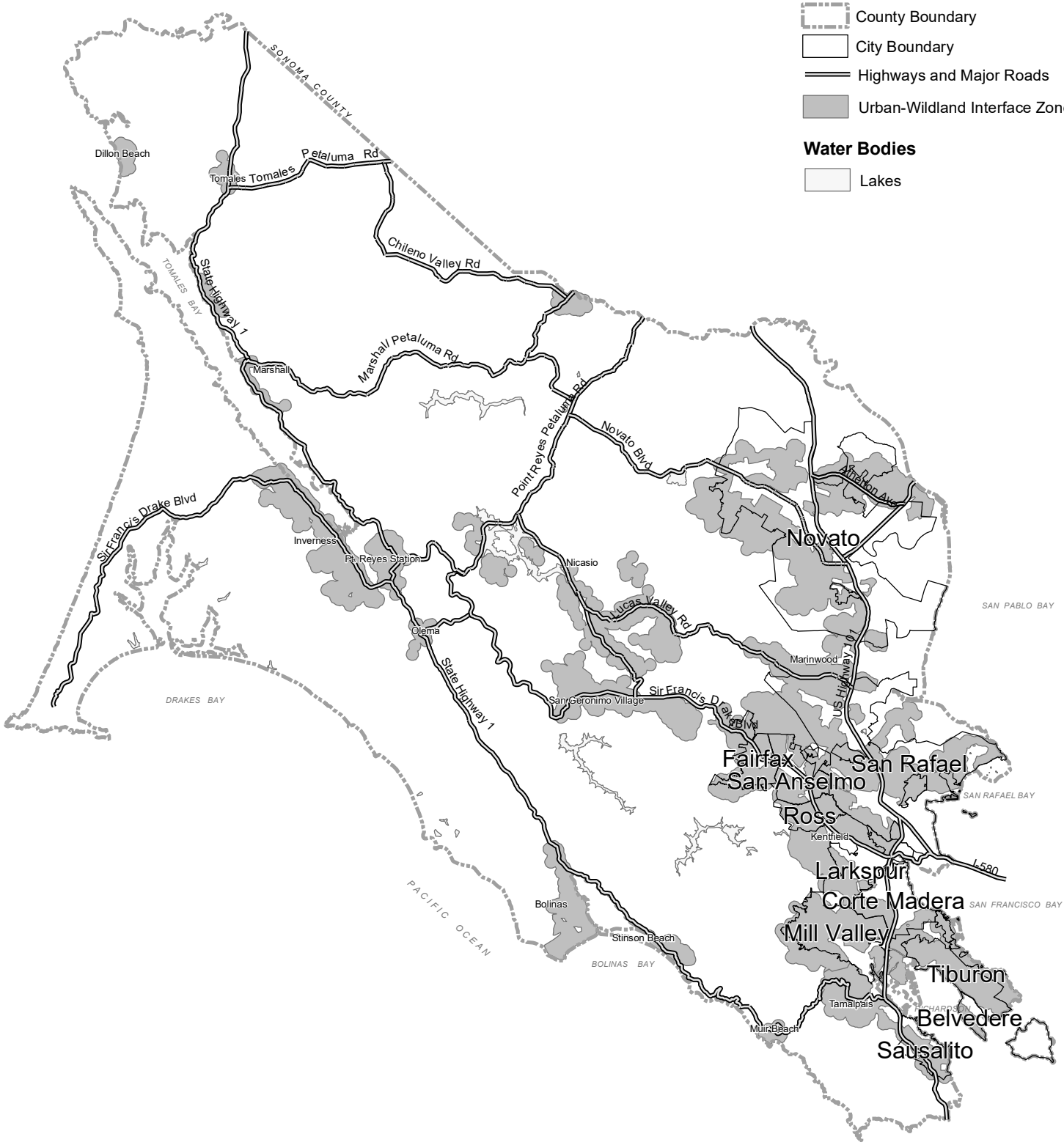


THIS MAP WAS DEVELOPED FOR GENERAL PLAN PURPOSES. THE COUNTY OF MARIN IS NOT RESPONSIBLE OR LIABLE FOR USE OF THIS MAP BEYOND ITS INTENDED PURPOSE.

SOURCE: National Flood Insurance Program Q3 Flood Data

Date: September 28, 2007 File: Flood 2-12.mxd

MAP 2-13
URBAN-WILDLAND INTERFACE ZONE

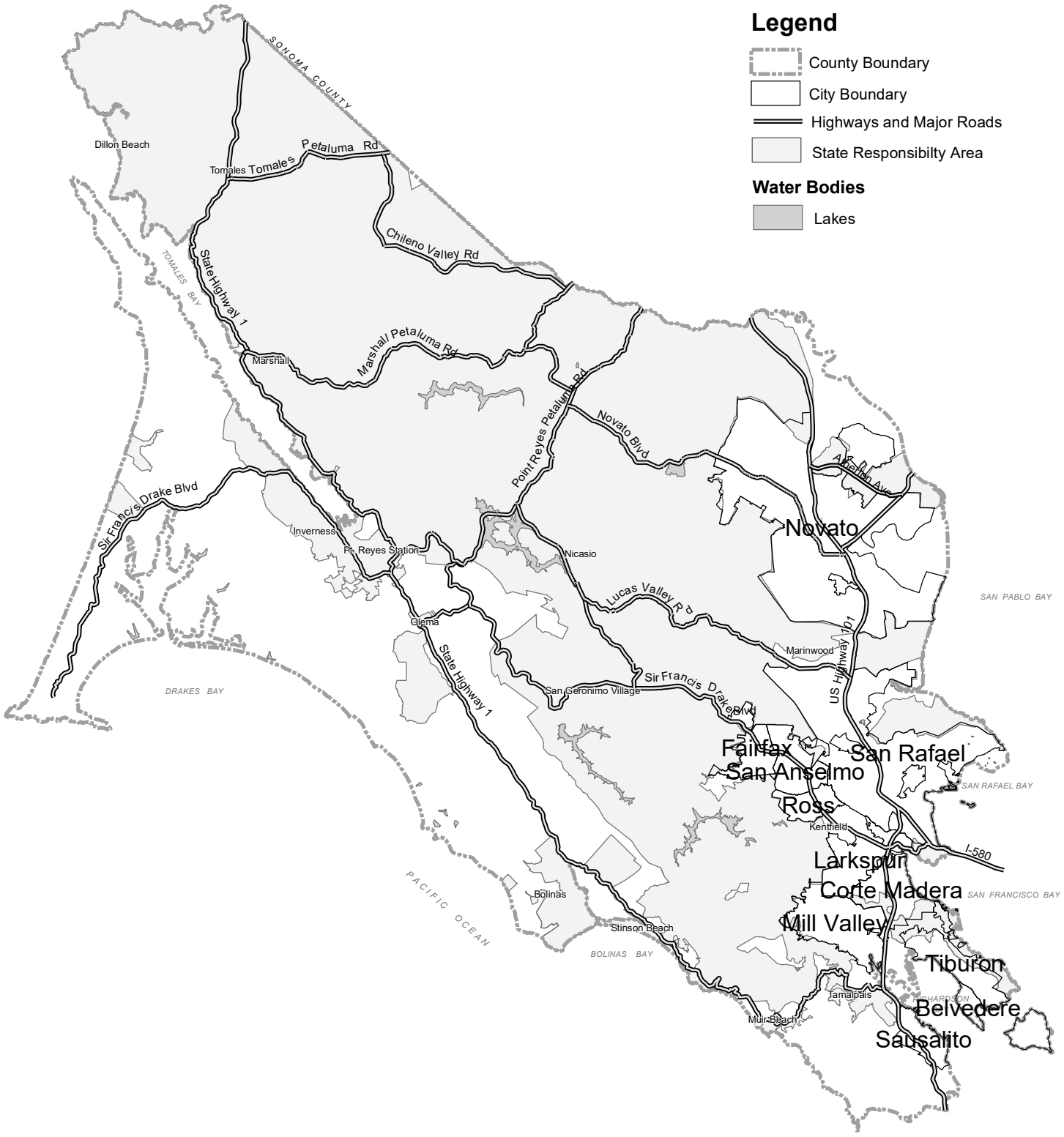


THIS MAP WAS DEVELOPED FOR GENERAL PLAN PURPOSES. THE COUNTY OF MARIN IS NOT RESPONSIBLE OR LIABLE FOR USE OF THIS MAP BEYOND ITS INTENDED PURPOSE.

SOURCE: Marin County Fire Department, November 2004.

Date: August 8, 2005 File: Urban Interface.mxd

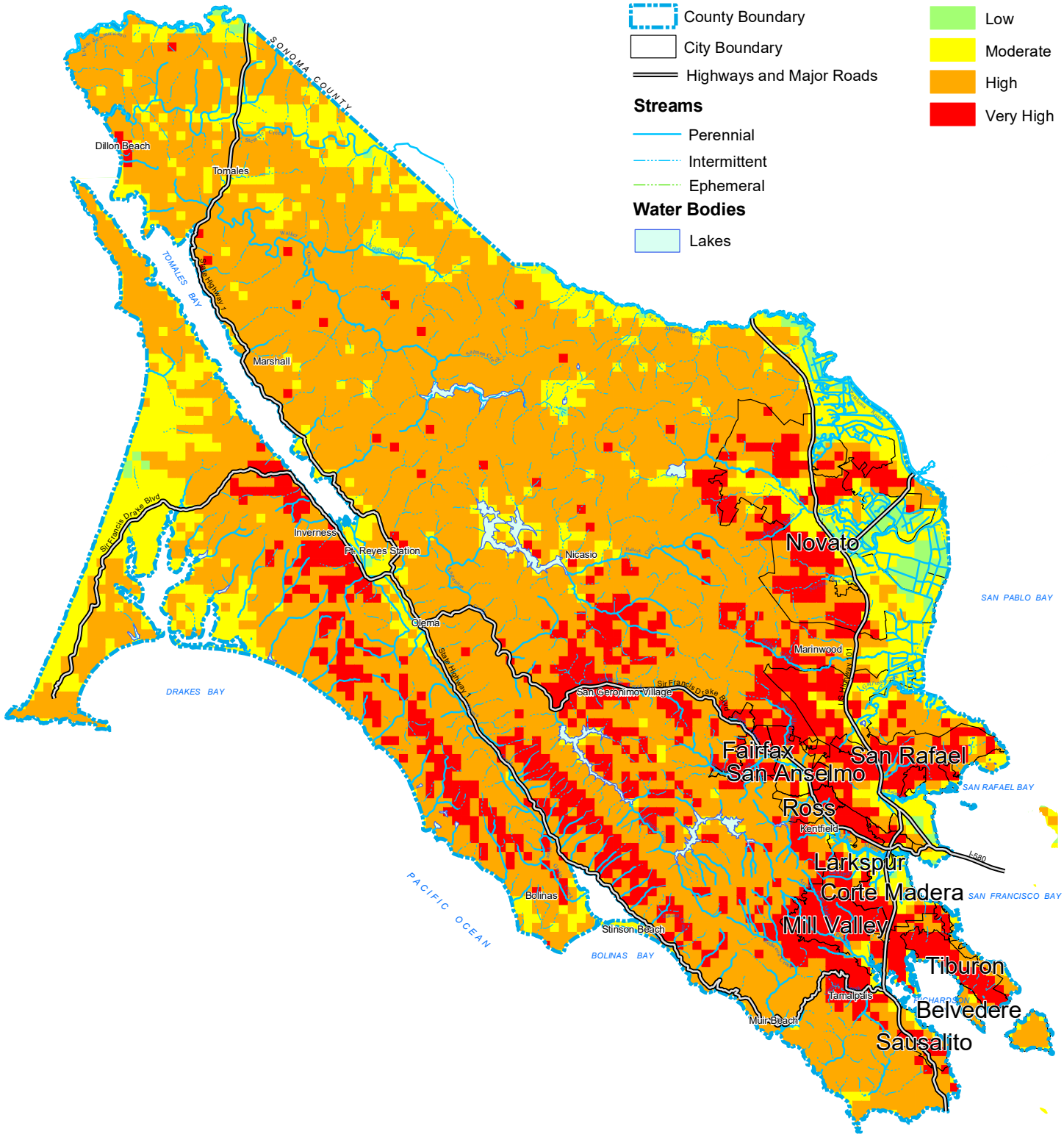
MAP 2-14
STATE RESPONSIBILITY AREAS (SRA's) FOR FIRE PROTECTION



THIS MAP WAS DEVELOPED FOR GENERAL PLAN PURPOSES. THE COUNTY OF MARIN IS NOT RESPONSIBLE OR LIABLE FOR USE OF THIS MAP BEYOND ITS INTENDED PURPOSE.

Date: August 8, 2005 File: SRA 2-14.mxd

MAP 2-15
FIRE RISK



Note: Cell size is 50 acres.

SOURCE: Marin County Fire Department

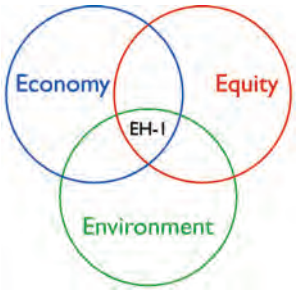
THIS MAP WAS DEVELOPED FOR GENERAL PLAN PURPOSES. THE COUNTY OF MARIN IS NOT RESPONSIBLE OR LIABLE FOR USE OF THIS MAP BEYOND ITS INTENDED PURPOSE.

Date: June 14, 2005 File: Fire Risk.mxd

What Are the Desired Outcomes?

GOAL EH-1

Hazard Awareness. Raise public awareness and responses about potential environmental hazards.



Policies

EH-1.1 **Enhance Public Awareness.** Advise the public regarding the availability of countywide and local area environmental hazards studies, sources of hazard information, and public services.

EH-1.2 **Improve Information Base.** Support scientific studies that increase and refine the body of knowledge regarding hazardous conditions in Marin County.

EH-1.3 **Identify Evacuation Routes.** Provide the public with information identifying accessible evacuation routes for fire, geologic, and other hazards.

Why is this important?

The public needs accurate and reliable information to cope with a variety of life-threatening natural hazards, including earthquakes, landslides, floods, and fires.

Environment: Expanded knowledge about hazards can protect the local environment and can improve the way in which environmental resources are managed.

Economy: Increased hazard awareness and data can help people make decisions about where they want to invest in homes and businesses. Well-informed decisions are financially sound decisions.

Equity: Providing the public with information about the potential for hazards can help save lives and reduce property damage.

How will results be achieved?

Implementing Programs

EH-1.a ***Provide Educational Materials.*** Work with the real estate community, homeowner associations, civic organizations, fire districts, and other groups to prepare and distribute materials, in multiple languages as appropriate, informing prospective and current property owners about potential safety hazards and appropriate evacuation routes.

EH-1.b ***Distribute Maps.*** Prepare and make available to the public maps depicting evacuation routes and areas prone to environmental hazards.

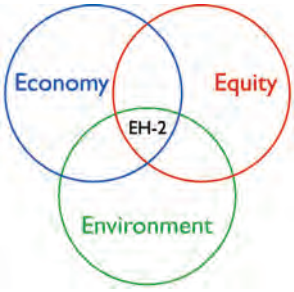
EH-1.c *Improve Soils Information.* Compile and make available drilling log data that helps define the hazard potential due to specific soil conditions, such as areas with expansive soils, artificial fill, or bay mud.

EH-1.d *Facilitate Scientific Investigation.* Continue to support scientific study of hazard potential in Marin, including by providing investigators with access to public land and facilitating access to other areas.

EH-1.e *Support Emergency Preparedness Training.* Support the activities of Local Disaster Councils and fire departments in offering community emergency response training courses.

What Are the Desired Outcomes?

GOAL EH-2



Safety from Seismic and Geologic Hazards. Protect people and property from risks associated with seismic activity and geologic conditions.

Policies

EH-2.1 Avoid Hazard Areas. Require development to avoid or minimize potential hazards from earthquakes and unstable ground conditions.

EH-2.2 Comply with the Alquist-Priolo Act. Continue to implement and enforce the Alquist-Priolo Earthquake Fault Zoning Act.

EH-2.3 Ensure Seismic Safety of New Structures. Design and construct all new buildings to be earthquake resistant. The minimum level of design necessary would be in accordance with seismic provisions and criteria contained in the most recent version of the State and County Codes. Construction would require effective oversight and enforcement to ensure adherence to the earthquake design criteria.

EH-2.4 Protect Coastal Areas from Tsunamis. When inundation maps become available, address tsunami wave run-up and inundation when reviewing proposed development along coastal areas of Marin County.

Why is this important?

Lives can be saved and property protected when buildings are located safely.

Environment: Well-planned development protects the environment and minimizes impacts to natural systems when structures or facilities are damaged.

Economy: Careful planning in the placement and construction of buildings can help ensure safety during a hazardous event and provide for a speedy recovery. This lessens the severity and duration of the economic impact caused by a seismic event and/or unpredictable geologic conditions.

Equity: The future health and prosperity of the community depend on our ability to cope with a major hazardous event. Earthquakes on the San Andreas and Hayward-Rodgers Creek fault systems could significantly affect Marin.

How will results be achieved?

Implementing Programs

EH-2.a *Require Geotechnical Reports.* Continue to require any applicant for land division, master plan, development approval, or new construction in a geologic hazard area to submit a geotechnical report prepared by a State-certified Engineering Geologist or a Registered Geotechnical Engineer that:

- evaluates soil, slope, and other geologic hazard conditions;
- commits to appropriate and comprehensive mitigation measures sufficient to reduce risks to acceptable levels, including post-construction site monitoring, if applicable;
- addresses the impact of the project on adjacent lands, and potential impacts of off-site conditions; and
- meets the requirements of other agency regulations with jurisdiction in the hazard area, such as BCDC requirements for the safety of fills consistent with the Bay Plan.

EH-2.b *Require Construction Observation and Certification.* Require any work or construction undertaken to correct slope instability or mitigate other geologic hazard conditions to be supervised and certified by a geotechnical engineer and/or an engineering geologist.

EH-2.c *Prohibit Structures in Active Fault Traces.* Prohibit placement of specified types of structures intended for human occupancy within 50 feet of an active fault trace in compliance with the Alquist-Priolo Earthquake Fault Zoning Act.

EH-2.d *Limit Building Sites in Alquist-Priolo Zones.* Prohibit new building sites in any Alquist-Priolo Earthquake Fault Zone, unless a geotechnical report prepared by a professional geologist establishes that the development will comply with all applicable State and County earthquake standards and regulations.

EH-2.e *Retrofit County Buildings and Critical Facilities.* Identify and remedy any County-owned structures and critical facilities in need of seismic retrofit or other geotechnical/structural improvement, including eliminating any potentially hazardous features, and/or relocating services if necessary.

EH-2.f *Avoid Known Landslides Areas.* Continue to prohibit development in landslide areas and on landslide-prone deposits on steep slopes, except where the required geotechnical report indicates that appropriate mitigation measures can stabilize the site for construction.

EH-2.g ***Identify Compressible Soil Potential.*** Require that geotechnical reports for projects on land underlain by compressible materials (such as fill, bay mud, and marsh or slough areas) delineate locations where settlement will be greatest and subsidence may occur, and recommend site preparation and construction techniques necessary to reduce risk and public liability to an acceptable level.

EH-2.h ***Match Uses to Conditions.*** Amend the Development Code to limit uses in areas with high potential for slope instability or differential soil activity to those that would not be damaged by ground movement and provide minimum inducement to slope failure or differential settlement.

EH-2.i ***Minimize Impacts of Site Alteration.*** Amend the Development Code to strictly limit the extent of any proposed fill, excavation, or other grading activities that could create or exacerbate risks in areas susceptible to geologic hazards. These are shown for illustrative purposes only, in Maps 2-9, 2-10, and 2-11.

EH-2.j ***Seek Supplemental Expertise.*** Continue to hire consultants expert in soils engineering as necessary for evaluating specific developments proposed on bay mud and fill prone to differential settlement.

EH-2.k ***Address Tsunami Potential.*** Review tsunami wave run-up and inundation maps, when available, along with other applicable information to be considered in coastal planning and development.

EH-2.l ***Reliability of Lifelines and Access (Evacuation) Routes.*** In cooperation with utility system providers, emergency management agencies, and others, assist in the development of strategies to reduce adverse effects of geologic hazards, especially fault surface rupture and landslides to critical public lifelines, and access (i.e., evacuation) routes in an emergency.

EH-2.m ***Implement Geological Assessment Ordinances.*** Continue to implement ordinances requiring geological assessment (e.g., Preliminary Soils, Soils Investigation, and Geologic/Geotechnical reports) for new subdivisions and grading permits to identify the presence of surface fault rupture.

EH-2.n ***Post-Earthquake Damage Assessment.*** Undertake immediate damage assessment of essential service buildings and facilities and then other buildings as part of the emergency response planning in response to a damaging earthquake.

EH-2.o ***Geologic Hazard Areas.*** Update Geologic Hazard Area maps as updated information becomes available. These maps should be used to determine the need for geologic and geotechnical reports for proposed development or redevelopment.

EH-2.p ***Implement Stability Report Ordinances.*** Continue to implement ordinances requiring a Stability Report for new construction in areas specified on County slope stability maps, assessment of storm-related landslide damage, and limits to slope steepness. In

addition, continue to implement ordinances requiring geological assessment (e.g., Preliminary Soils, Soils Investigation, and Geologic/Geotechnical reports) for new subdivisions and grading permits to identify hazards associated with landsliding.

EH-2.q *Implement Subsidence Evaluation Guidelines.* Continue to implement ordinances that provide guidelines for subsidence evaluations of land that is or could be prone to subsidence. Require geological assessment (e.g., Preliminary Soils, Soils Investigation, and Geologic/Geotechnical reports) for new subdivisions and grading permits to identify hazards associated with subsidence and settlement.

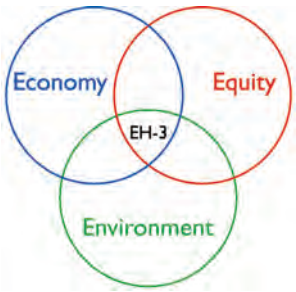
EH-2.r *Implement Soil Classification and Design Guidelines.* Continue to implement ordinances that provide soil classification guidelines and design considerations for development in areas of expansive soils, as well as requiring geological assessment (e.g., Preliminary Soils, Soils Investigation, and Geologic/Geotechnical reports) for new subdivisions and grading permits to identify hazards associated with expansive soils.

EH-2.s *Make Marin County TsunamiReady.* Become a National Weather Service TsunamiReady community in order to promote public awareness and community preparedness, and facilitate quick recovery, in the event of a tsunami.

What Are the Desired Outcomes?

GOAL EH-3

Safety from Flooding and Inundation. Protect people and property from risks associated with flooding and inundation. (Also see the Public Facilities and Water Resources sections.)



Policies

EH-3.1 **Follow a Regulatory Approach.** Utilize regulations instead of flood control projects whenever possible to minimize losses in areas where flooding is inevitable.

EH-3.2 **Retain Natural Conditions.** Ensure that flow capacity is maintained in stream channels and floodplains, and achieve flood control using biotechnical techniques instead of storm drains, culverts, riprap, and other forms of structural stabilization.

EH-3.3 **Monitor Environmental Change.** Consider cumulative impacts to hydrological conditions, including alterations in drainage patterns and the potential for a rise in sea level, when processing development applications in watersheds with flooding or inundation potential.

EH-3.4 **Consider Flood Inundation.** Consider flood inundation resulting from upstream dam failures when assessing flood hazards for environmental review and implementing associated programs within the County.

Why is this important?

With increases in sea level due to global warming, flooding is predicted to increase in the future. Locating development in flood-prone areas can expose structures to damage and create risks for inhabitants in the immediate and surrounding areas.

Environment: Prohibiting development in the floodplain helps preserve valuable habitat, vital groundwater recharge capacity, and other natural systems.

Economy: Significant flooding with associated economic impacts has occurred in portions of Corte Madera, Larkspur, Greenbrae, Ross, San Anselmo, San Rafael, and Novato over the last 30 years. Flooding has also occurred in Mill Valley, Fairfax, and Muir Beach. Extensive property damage could be expected in inundated valleys, especially those downstream from major dam/reservoir complexes. Protecting property from future flooding risks contributes to economic stability.

Equity: Limiting development in floodplain and coastal areas contributes to the protection of residents and their property.

How will results be achieved?

Implementing Programs

EH-3.a ***Regulate Development in Flood and Inundation Areas.*** Continue to require all improvements in Bayfront, Floodplain, Tidelands, and Coastal High Hazard Zones to be designed to be more resistant to damage from flooding, tsunamis, seiches, and related water-borne debris, and to be located so that buildings and features such as docks, decking, floats, and vessels would be more resistant to damage.

EH-3.b ***Update Maps.*** Annually review those areas covered by the Countywide Plan that are subject to flooding, identified by floodplain mapping prepared by the Federal Emergency Management Agency (FEMA) or Department of Water Resources, and update Figure 2-12 and other General Plan maps accordingly. Periodically review and overlay County zoning maps to show flood, tsunami, and inundation hazard areas along the San Francisco Bay, San Pablo Bay, Tomales Bay, and the Pacific Ocean, the Bayfront Conservation Zone, and the Coastal Zone.

EH-3.c ***Revise Regulations.*** Consider expanding the F-1 and F-2 Floodway Districts to include areas of the unincorporated county that lie within primary and secondary floodways, and/or establishing an ordinance that will ensure that land use activities in flood hazard areas will be allowed only in compliance with federal standards.

EH-3.d ***Alert Property Owners.*** Notify owners of property in areas with inundation or flooding potential regarding those hazards when they seek development review or other related County services.

EH-3.e ***Restrict Development in Flood Prone Areas.*** Continue to regulate development in Special Flood Hazard areas by applying the County's Floodplain Management

Ordinance, Federal Emergency Management Agency regulations, and environmental review pursuant to the California Environmental Quality Act (CEQA).

EH-3.f ***Require Hydrologic Studies.*** Continue to require submission of detailed hydrologic and geologic studies for any proposed development that could increase sedimentation of a watercourse or alter natural drainage patterns. Amend the Development Code to include findings to continue to regulate development in flood prone areas to ensure public health and safety and to preserve the hydraulic and geomorphic integrity of the stream system and associated habitat.

EH-3.g ***Locate Critical Facilities Safely.*** Amend the Development Code to prohibit placement of public safety structures within tsunami inundation or flood-prone areas.

EH-3.h ***Retain Ponding Areas.*** Maintain publicly controlled flood ponding areas in a natural state for flood control, and continue to promote compatible uses in ponding areas, such as agriculture, open space, and recreation.

EH-3.i ***Update Dam Inundation Maps.*** Update and make public inundation maps for dam/reservoir complexes where downstream valleys are inhabited and the risk of loss of life and extensive property damage is significant.

EH-3.j ***Review and Inspect Dams.*** Maintain permit authority over and continue to oversee construction of dams too small to be regulated by the State or federal government.

EH-3.k ***Anticipate Climate Change Impacts, Including Sea Level Rise.*** Recent predictions of sea level rise for the San Francisco Bay region by BCDC and USGS based on climate models and hydrodynamic modeling of the San Francisco Bay Estuary Institute indicate 16 inches of rise by mid-century and 55 inches by 2100. Cooperate with the U.S. Geological Survey, the San Francisco Bay Conservation and Development Commission, the California Landscape Cooperative's Climate Commons project and other monitoring agencies to track bay and ocean levels and share baseline topographic and resource data obtained by the County in implementing its own projects to enhance hydrodynamic and ecosystem modeling efforts and assessment of regional climate change impacts. Use official estimates for mean sea level rise and topographic data for environmental review. Environmental review for development applications and County infrastructure shall incorporate official mid-century sea level rise estimates, and require adaptive strategies for end-of-century sea level rise for any such project with expected life times beyond 2050.

EH-3.l ***Limit Seawall Barriers.*** Limit repair, replacement, or construction of coastal sea walls and erosion barriers consistent with Local Coastal Program requirements, and as demonstrated to be necessary to protect persons and properties from rising sea level.

EH-3.m ***Maintain Flood Controls.*** Continue to implement adopted flood control programs, including limitations on land use activities in flood hazard areas and through repair and maintenance of necessary flood control structures.

EH-3.n ***Plan for Climate Change Impacts, Including Sea Level Rise.*** Consider sea level rise in future countywide and community plan efforts. Apply for membership in the National Flood Insurance Program's (NFIP) Community Rating System (CRS), and as appropriate through revisions to the Marin County Code, obtain reductions in flood insurance rates offered by the NFIP to community residents. Cooperate with FEMA in its efforts to comply with recent congressional mandates to incorporate predictions of sea level rise in its Flood Insurance Studies and FIRM. For development of watershed management plans and flood control infrastructure consider official mid-century and end-of-century sea level rise estimates in hydraulic/hydrodynamic modeling, as well as climate adaptation strategies, including: avoidance/planned retreat, enhance levees, setback levees to accommodate habitat transition zones, buffer zones and beaches, expanded tidal prisms for enhanced natural scouring of channel sediments, raising and flood proofing structure, provision for additional floodwater pumping stations, and inland detention basin to reduce riverine peak discharges. Participate in the Bay Area Climate & Energy Resilience Project and its March 2013 Proposed 12-Month Action Plan, developed by the Bay Area Joint Policy Committee of the Association of Bay Area Governments. Revise the Marin County Hydrology manual to, at a minimum, incorporate use of updated rainfall frequency data from NOAA's Atlas 14 Volume 6, Vers. 2.1 California (rev. 2012).

EH-3.o ***Seek Levee Assistance.*** Pursue funding for levee reconstruction in those areas threatened by sea level rise, including but not limited to Santa Venetia.

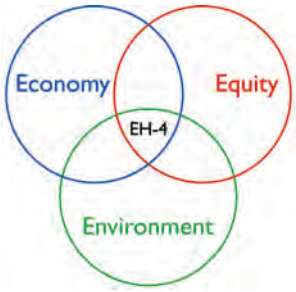
EH-3.p ***Assess the Cumulative Impacts of Development in Watersheds on Flood Prone Areas.*** Consider the effects of upstream development, including impervious surfaces, alteration of drainage patterns, reduction of vegetation, increased sedimentation, and others, on the potential for flooding in low-lying areas. Consider watershed studies to gather detailed information.

EH-3.q ***Develop Watershed Management and Monitoring Plans.*** Develop watershed-specific, integrated watershed management and monitoring plans that include development guidelines, natural flood mitigation measures, biomechanical technologies, and the enhancement of hydrological and ecological processes. The guiding principles of the watershed plans shall equally consider habitat and species protection and monitoring as well as the protection of human life and property.

What Are the Desired Outcomes?

GOAL EH-4

Safety from Fires. Protect people and property from hazards associated with wildland and structural fires.



Policies

EH-4.1 **Limit Risks to Structures.** Ensure that adequate fire protection is provided in new development and when modifications are made to existing structures.

EH-4.2 **Remove Hazardous Vegetation.** Abate the buildup of vegetation around existing structures or on vacant properties that could help fuel fires. (See also Natural Systems and Agriculture Element, BIO-1.4, Support Vegetation and Wildlife Disease Management Programs).

EH-4.3 **Adopt and Implement a Fire Management Plan.** Develop a proactive approach to manage wildfire losses by identifying hazard risks and enacting effective mitigation strategies.

EH-4.4 **Ensure Adequate Emergency Response.** Ensure that there is an adequate number of trained and certified emergency medical technicians to address the increase in medical demand.

EH-4.5 **Regulate Land Uses to Protect from Wildland Fires.** Use land use regulations, including but not limited to subdivision approvals and denials, as means of protecting people and property from hazards associated with wildland fires.

Why is this important?

Fire plays a critical role in California's diverse ecology, and protecting people and property from fires will be a continuing challenge.

Environment: Using measures such as controlled burning to remove vegetation that has built up because of historic fire suppression efforts improves firefighting effectiveness and can help restore environmental balance in the county.

Economy: Fire costs can soar to millions of dollars a day from suppression costs, destruction of homes, loss of home-based businesses, damage to utilities, and impacts on recreation areas. Minimizing flammable vegetation can reduce potential economic impacts and help speed recovery.

Equity: Marin County has numerous structures located within the wildland-urban interface. Homes with wood siding, wood decks, and wood shingled roofs are at extreme risk from a wildland fire. Designing

structures to be fire resistant protects all occupants as well as neighboring areas by limiting fuel available to a spreading fire.

How will results be achieved?

Implementing Programs

EH-4.a *Provide Information About Fire Hazards.* Work with FIRESafe Marin, the Marin County Fire Department, and local, regional, and State agencies to make maps of areas subject to wildland fire hazard publicly available, and to provide public information and educational programs regarding fire hazards, and techniques for reducing susceptibility to fire damage and areas of low water pressure.

EH-4.b *Restrict Land Divisions.* Prohibit new land divisions in very high and high fire hazard areas unless the availability of adequate water for fire suppression is demonstrated and guaranteed; access for firefighting vehicles and equipment is provided from more than one point; necessary fire trails and fuel breaks are provided; fire-resistant materials are used exclusively in construction; and adequate clearances from structures and use of fire-resistant plants in any landscaping is required.

EH-4.c *Require Compliance with Fire Department Conditions.* Continue to refer land development and building permit applications to the County Fire Department or local fire district for review, and incorporate their recommendations as conditions of approval as necessary to ensure public safety. Continue to require compliance with all provisions of the most recently adopted version of the California Fire Code (with local amendments).

EH-4.d *Review Applications for Fire Safety.* Require applicants to identify defensible space and compliance with fire safety standards, and continue to work with local and State fire agencies to ensure that California Fire Code (with local amendments), County Development Code, and State standards for construction are applied uniformly countywide.

EH-4.e *Require Sprinkler Systems.* Continue to require installation of automatic fire sprinkler systems in all new structures and existing structures undergoing substantial remodeling, and provide incentives for sprinkler installation in all other habitable structures, especially those in high fire hazard areas.

EH-4.f *Require Fire-Resistant Roofing and Building Materials.* Continue to require and provide incentives for Class A fire-resistant roofing for any new roof or replacement of more than 50% of an existing roof. Work with Marin County fire departments to prepare and adopt an ordinance requiring fire-resistant building materials in extreme and high fire hazard areas.

EH-4.g *Develop and Maintain Fuel Breaks and Access Routes.* Work with public agencies and private landowners to construct and maintain fuel breaks and emergency access routes to facilitate effective fire suppression.

EH-4.h *Require Adequate Clearance.* Require standards for clearance of vegetation on vacant lots, and around structures, and landscaped areas to ensure timely and adequate removal of potential fire fuel on both public and private property.

EH-4.i *Use Varied Methods to Provide Fuel Breaks and Fire Suppression.* Use the best fuel reduction methods (depending on the time of year, fuel types, reduction prescriptions, and cost) to implement the Marin County Community Wildfire Protection Plan. This may include using CDF inmate crews, the Tamalpais Fuel Crew, the Marin Conservation Corps, animal grazing, or fuel reduction contractors.

EH-4.j *Conduct Life Safety Assessments.* Conduct a life safety assessment that considers the costs of fire safety maintenance prior to the County purchase of new land and facilities.

EH-4.k *Adopt Amended Urban Wildlands Interface Regulations.* Work with Marin fire departments to prepare and adopt urban wildlands interface regulations for new development and substantial remodels in order to reduce fire hazards in high and extreme fire hazard areas.

EH-4.l *Continue FIRESafe Marin Program.* Continue the various education efforts and safety projects sponsored by FIRESafe Marin and implemented through each neighborhood.

EH-4.m *Continue to Use Technology to Promote Fire Safety.* Continue to apply computer technology, such as Geographic Information Systems, vegetation inventory, and air movement modeling programs, to identify, analyze, and plan for potential fire hazards. Notify affected parties of any relevant findings.

EH-4.n *Evaluate Development Standards.* Request Fire Department review of County requirements for peak-load water supply and roadways (especially on hillsides) to determine whether those provisions need modification, such as limiting one-way road use, grade/slope limits, minimum radius, and turnaround widths, to ensure adequate fire protection and suppression.

EH-4.o *Support a Fire Management Plan.* Adopt a resolution supporting a Fire Management Plan (including a fuel break plan), and encourage Marin cities and towns to also support its recommendations.

EH-4.p *Provide Paramedics as Needed.* Assess the adequacy and number of firefighters trained as emergency medical technicians, and train more paramedics or firefighters, as needed.

Figure 2-7 Relationships of Goals to Guiding Principles

This figure illustrates the relationships of each goal in this Section to the Guiding Principles.

Goals	Guiding Principles: 1. Link equity, economy, and the environment locally, regionally, and globally.	2. Minimize the use of finite resources and use all resources efficiently and effectively.	3. Reduce the use and minimize the release of hazardous materials.	4. Reduce greenhouse gas emissions that contribute to global warming.	5. Preserve our natural assets.	6. Protect our agricultural assets.	7. Provide efficient and effective transportation.	8. Supply housing affordable to the full range of our workforce and diverse community.	9. Foster businesses that create economic, environmental, and social benefits.	10. Educate and prepare our workforce and residents.	11. Cultivate ethnic, cultural, and socioeconomic diversity.	12. Support public health, safety, and social justice.
EH-1 Hazard Awareness.	●									●		●
EH-2 Safety from Seismic and Geologic Hazards.	●									●		●
EH-3 Safety from Flooding and Inundation.	●		●							●		●
EH-4 Safety from Fires.	●		●		●					●		●

How Will Success Be Measured?

Indicator Monitoring

Nonbinding indicators, benchmarks, and targets[1] will help to measure and evaluate progress. This process will also provide a context in which to consider the need for new or revised implementation measures.

Indicators	Benchmarks	Targets
Number of Marin residents trained in emergency preparedness.	1,000 residents (.4%) trained as of 2004.	1% of county population trained by 2010 and 1.5% trained by 2015.
Number of county employees trained as disaster service workers to federal standards.	50% of employees trained as of 2004.	100% of county emergency first responders, Emergency Operations Center staff, and other County employees with designated disaster response roles by 2010 and maintain through 2015.

[1] Many factors beyond Marin County government control, including adequate funding and staff resources, may affect the estimated time frame for achieving targets and program implementation.

Program Implementation

The following table summarizes responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs. Program implementation within the estimated time frame[1] will be dependent upon the availability of adequate funding and staff resources.

Figure 2-8
Environmental Hazards Program Implementation

Program	Responsibility	Potential Funding	Priority	Time Frame
EH-1.a – Provide Educational Materials.	OES, CDA	Existing budget and may require additional grants or revenue.[2]	Low	Ongoing
EH-1.b – Distribute Maps.	CDA, OES	Existing budget and may require additional grants or revenue[2]	High	Ongoing
EH-1.c – Improve Soils Information.	CDA, United States Geological Survey (USGS)	Existing budget and may require additional grants or revenue[2]	Low	Ongoing
EH-1.d – Facilitate Scientific Investigation.	OES, CDA	Existing budget	Medium	Ongoing
EH-1.e – Support Emergency Preparedness Training.	OES, Fire departments	Existing budget	High	Ongoing
EH-2.a – Require Geotechnical Reports.	CDA	Existing budget	High	Ongoing
EH-2.b – Require Construction Observation and Certification.	CDA	Existing budget	High	Ongoing
EH-2.c – Prohibit Structures in Active Fault Traces.	CDA	Existing budget	High	Ongoing
EH-2.d – Limit Building Sites in Alquist-Priolo Zones.	CDA	Existing budget	High	Ongoing

[1]Time frames include: Immediate (0–1 years); Short term (1–4 years); Med. term (4–7 years); Long term (over 7 years); and Ongoing (existing programs already in progress whose implementation is expected to continue into the foreseeable future).

[2]Completion of this task is dependent on acquiring additional funding. Consequently, funding availability could lengthen or shorten the time frame and ultimate implementation of this program.

Program	Responsibility	Potential Funding	Priority	Time Frame
EH-2.e – Retrofit County Buildings and Critical Facilities.	DPW	Will require additional grants or other revenue[2]	Medium	Long term
EH-2.f – Avoid Known Landslides Areas.	CDA	Existing budget	High	Ongoing
EH-2.g – Identify Compressible Soil Potential.	CDA	Existing budget	Medium	Med. term
EH-2.h – Match Uses to Conditions.	CDA	Existing budget and may require additional grants or revenue[2]	Medium	Med. term
EH-2.i – Minimize Impacts of Site Alteration.	CDA	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing
EH-2.j – Seek Supplemental Expertise.	CDA	Existing budget	High	Ongoing
EH-2.k – Address Tsunami Potential.	CDA, California Coastal Commission (CCC), USGS	Existing budget and may require additional grants or revenue[2]	Medium	Med. term
EH-2.l – Reliability of Lifelines and Access (Evacuation) Routes.	EOC	Will require additional grants or other revenue[2]	High	Long term
EH-2.m – Implement Geological Assessment Ordinances.	CDA/DPW	Existing budget	High	Ongoing
EH-2.n – Post-Earthquake Damage Assessment.	EOC	Will require additional grants or other revenue[2]	Low	Long term
EH-2.o – Geologic Hazard Areas.	CDA	Existing budget	Low	Ongoing
EH-2.p – Implement Stability Report Ordinances.	CDA/DPW	Existing budget	High	Ongoing
EH-2.q – Implement Subsidence Evaluation Guidelines.	CDA/DPW	Existing budget	High	Ongoing
EH-2.r – Implement Soil Classification and Design Guidelines.	CDA/DPW	Existing budget	High	Ongoing

Program	Responsibility	Potential Funding	Priority	Time Frame
EH-2.s – Make Marin County TsunamiReady	EOC	Will require additional grants or other revenue[2]	Low	Long term
EH-3.a – Regulate Development in Flood and Inundation Areas.	CDA, DPW, OES	Existing budget, Fees	High	Ongoing
EH-3.b – Update Maps.	CDA, DPW	Existing budget	Medium	Med. term
EH-3.c – Revise Regulations.	CDA, DPW	Existing budget and may require additional grants or revenue[2]	High	Ongoing
EH-3.d – Alert Property Owners.	CDA, DPW	Existing budget	High	Ongoing
EH-3.e – Restrict Development in Flood Prone Areas.	CDA, DPW	Existing budget	High	Ongoing
EH-3.f – Require Hydrologic Studies.	CDA, DPW	Existing budget	High	Ongoing/Med. term
EH-3.g – Locate Critical Facilities Safely.	CDA	Existing budget	High	Ongoing
EH-3.h – Retain Ponding Areas.	DPW	Will require additional grants or other revenue[2]	High	Ongoing/Long term
EH-3.i – Update Dam Inundation Maps.	CDA, OES	Existing budget	Medium	Med. term
EH-3.j – Review and Inspect Dams.	CDA, DPW	Existing budget	Medium	Ongoing
EH-3.k – Anticipate Climate Change Impacts, Including Sea Level Rise.	USGS, BCDC, CCC, CDA	Existing budget and may require additional grants or revenue[2]	Medium	Med. term
EH-3.l – Limit Seawall Barriers.	CDA, CCC	Existing budget	High	Ongoing
EH-3.m – Maintain Flood Controls.	Flood Control Districts	Existing budget and may require additional grants or revenue[2]	High	Ongoing
EH-3.n – Plan for Climate Change Impacts, Including Sea Level Rise.	CDA & DPW	Will require additional grants or other revenue[2]	Medium	Long term
EH-3.o – Seek Levee Assistance.	DPW	Will require additional grants or other revenue[2]	Medium	Long term

Program	Responsibility	Potential Funding	Priority	Time Frame
EH-3.p – Assess the Cumulative Impacts of Development in Watersheds on Flood Prone Areas.	CDA & DPW	Will require additional grants or other revenue[2]	Medium	Long term
EH-3.q – Develop Watershed Management and Monitoring Plans.	CDA & DPW	Will require additional grants or other revenue[2]	Medium	Long term
EH-4.a – Provide Information About Fire Hazards.	County Fire Departments, CDF, CDA	Existing budget	High	Ongoing
EH-4.b – Restrict Land Divisions.	CDA	Existing budget	High	Ongoing
EH-4.c – Require Compliance with Fire Department Conditions.	CDA (Building & Safety), County Fire Departments/Districts	Existing budget	High	Ongoing
EH-4.d – Review Applications for Fire Safety.	County Fire Department	Existing budget	High	Ongoing
EH-4.e – Require Sprinkler Systems.	CDA, County Fire Departments	Existing budget	High	Ongoing
EH-4.f – Require Fire-Resistant Roofing and Building Materials.	CDA, County Fire Departments	Existing budget	High	Ongoing
EH-4.g – Develop and Maintain Fuel Breaks and Access Routes.	County Fire Department/Fire Districts	Existing budget	High	Ongoing
EH-4.h – Require Adequate Clearance.	CDA, County Fire Department/Fire Districts	Existing budget	High	Ongoing
EH-4.i – Use Varied Methods to Provide Fuel Breaks and Fire Suppression.	County Fire Department	Existing budget and may require additional grants or revenue[2]	High	Ongoing
EH-4.j – Conduct Life Safety Assessments.	MCOSD, Parks, DPW (Flood control)	Existing budget	High	Ongoing
EH-4.k – Adopt Amended Urban Wildlands Interface Regulations.	County Fire Department	Existing budget and may require additional grants or revenue[2]	High	Ongoing
EH-4.l – Continue FIRESafe Marin Program	County Fire Department	Will require additional grants or revenue[2]	High	Ongoing

Program	Responsibility	Potential Funding	Priority	Time Frame
EH-4.m – Continue to Use Technology to Promote Fire Safety.	County Fire Department	Existing budget	High	Ongoing
EH-4.n – Evaluate Development Standards.	CDA, County Fire Department	Existing budget	Medium	Med. term
EH-4.o – Support a Fire Management Plan.	Fire Departments, BOS	Existing budget	High	Medium
EH-4.p – Provide Paramedics as Needed.	Fire Departments	Existing budget	High	Ongoing

2.7 Atmosphere and Climate

Background

Although air quality in Marin County is generally very good, emissions from within the county may contribute to pollution problems elsewhere in the region and climate changes that are occurring on a global scale. In some parts of the Bay Area, ozone levels exceed National Ambient Air Quality Standards and particulate concentrations exceed State standards (Figures 2-9 and 2-13). Vehicle traffic produces most of the emissions leading to increased ozone levels, while construction activities, wood burning, off-road travel, and agriculture generate some measured particulate matter.

The Bay Area Air Quality Management District (BAAQMD) encourages local jurisdictions to implement policies that will help improve regional air quality, and to especially recognize sensitive receptors. This Section of the Countywide Plan provides a regulatory framework for articulating air quality objectives consistent with regional air quality programs. The Transportation, Energy and Green Building, Public Facilities and Services, and Community Development sections of the Built Environment Element also include policies and programs intended to reduce the impact of future development on air quality and global warming.

On a global scale, data indicate an increase in mean surface air temperatures over historic levels and climate models predict this warming will continue. Scientists expect that the average global surface temperature could rise 1°F to 4.5°F in the next 50 years, and 2.2° to 10°F in the next century. A rise of this magnitude is significant: For example, the difference in temperature between 1995 and the temperature during the ice ages was 5°F to 8°F. Mounting scientific evidence suggests that the discharge by human activities of gases that trap heat in the atmosphere is largely responsible for this trend. A major consequence of global warming is melting glaciers and warmer waters, which cause the oceans to expand and rise. Sea level rise and higher evaporation rates are expected to increase storm frequency and severity. The resulting economic loss from increased storm activity will be equally dramatic: It has already increased tenfold over the past 40 years. Climate change will amplify existing environmental problems, such as erosion, storm-surge floods, and landslide risk, and changes to the water cycle will further stress domestic water supply as well as indigenous plant and animal populations. Further complicating the issue of climate change is the high level of complexity and uncertainty associated with modeling and predicting climate behavior. While it is clear that damage resulting from weather-related events is already on the rise, it is not known whether future changes will be gradual or abrupt. Nor is it clearly understood what the full spectrum of impacts will be. Given the global risks to economic, environmental, and social stability, it is imperative that climate change be addressed at all levels of government.

> *"Everybody talks about the weather, but nobody does anything about it."*
>
> — Mark Twain

Fortunately, local governments can play a meaningful role in addressing climate change, by instituting measures that reduce the vulnerability and increase the adaptability of Marin's physical infrastructure, economic activities, and natural systems. Furthermore, steps taken to address climate change will yield positive benefits in local efforts to improve air quality, as vehicle traffic and energy generation are major contributors to both greenhouse gases and air pollution. For example, construction of a modern world class transportation system in Marin County will contribute to further reducing greenhouse gas emissions and improving air quality.

The issue of climate change is ultimately part of the larger challenge of fostering sustainable communities. Climate change goals are more effectively accomplished when efforts are focused on integrating principles of sustainability within sectors such as transportation, buildings, ecosystems, and water systems. While the aim of this Section is to provide a framework for addressing atmosphere and

climate change, the detailed policies and programs that address climate protection are located throughout the Countywide Plan and are referenced here in this section.

Key Trends and Issues

How clean is the air in Marin?

Air quality indicators show improvement. Marin has experienced a drop both in the total number of days exceeding State Ambient Air Quality Standards and in the number of days exceeding safe levels of ozone since 1996. Marin also has had a reduction in the number of days that safe levels of particulate matter have been exceeded in the county since 1996 (Figure 2-9). Ozone precursor pollutants have decreased locally, and are expected to continue to decline.

Figure 2-9 Summary of Measured Air Quality Exceedances

Pollutant	Standard	Monitoring Station	Days Exceeding Standard				
			2000	2001	2002	2003	2004
Ozone (O_3)	NAAQS 1-hr	San Rafael	0	0	0	0	0
		BAY AREA	3	1	2	1	0
	NAAQS 8-hr	San Rafael	0	0	0	0	0
		BAY AREA	4	7	7	7	0
	CAAQS 1-hr	San Rafael	0	0	0	0	0
		BAY AREA	12	15	16	19	7
Fine Particulate Matter (PM_{10})	NAAQS 24-hr	San Rafael	0	0	0	0	0
		BAY AREA	0	0	0	0	0
	CAAQS 24-hr	San Rafael	0	2	2	0	1
		BAY AREA	7	10	6	6	7
Fine Particulate Matter ($PM_{2.5}$)	NAAQS 24-hr	San Rafael	0	--	--	--	--
		BAY AREA	1	5	7	0	1
All Other (CO, NO_2, Lead, SO_2)	All Other	San Rafael	0	0	0	0	0
		BAY AREA	0	0	0	0	0

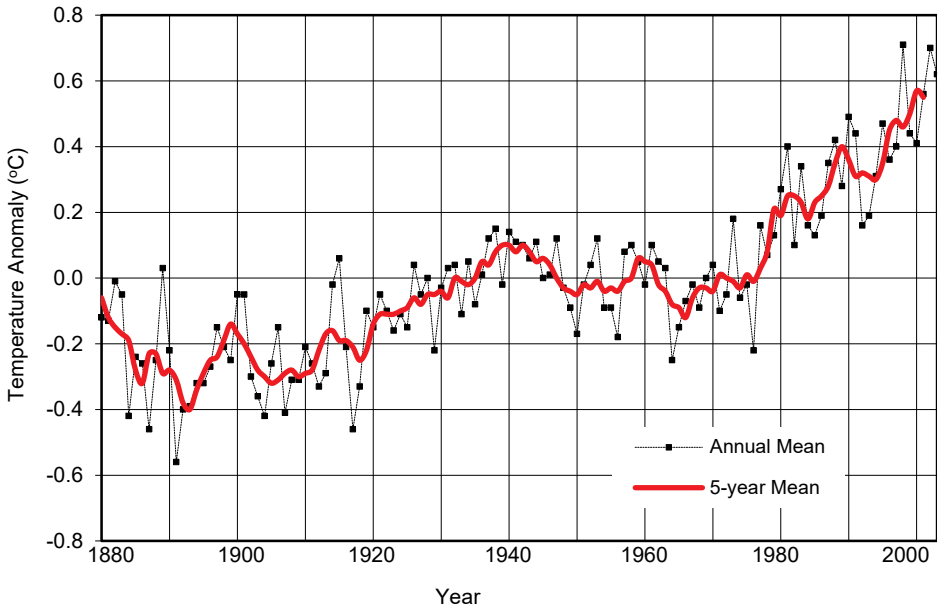
Source: 2000-2004 Bay Area Air Quality Management District.

Pollution levels can be reduced. Most particulate matter comes from areawide sources, such as combustion of wood and other nonclean fuels, and from homes and businesses without emission-control devices. Simple measures such as requiring clean-burning stoves can achieve improvements in air quality. Reducing motor vehicle use can result in significantly cleaner air.

Are temperatures rising globally?

The 10 warmest years of the 20th century all occurred after 1985, with 1998 the warmest year on record. The average of all global climate models suggests about a 3°F to 10°F rise in global temperature over the next 50 to 100 years. Global surface temperatures have increased about 1°F over the 20th century, with approximately 70% (or 0.7°F) of that change occurring in the last 25 years. The following graph illustrates the increasing rate and magnitude of global surface air temperatures.

Figure 2-10 Global Temperature



Source: NASA Goddard Institute for Space Studies.

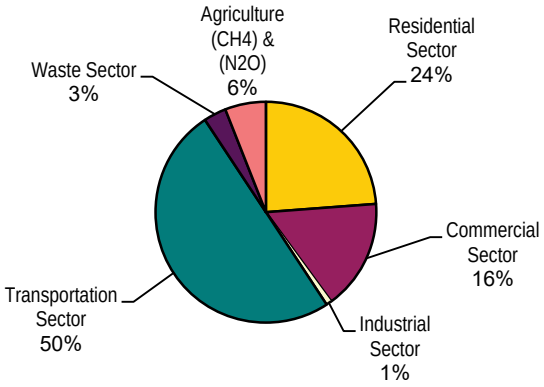
Is sea level rising?

Globally, sea level has risen 4 to 8 inches over the past century. The Intergovernmental Panel on Climate Change (IPCC) notes it is very likely that the 20th-century warming has contributed significantly to rising sea levels, through thermal expansion of seawater and loss of land ice. The EPA estimates that sea level is likely to rise 1.8 feet along most of the West Coast by 2100. By comparison, the San Francisco Bay level has increased about 4 inches since 1850. Given a 1-foot rise in sea level, the current 100-year high in the storm surge felt on the levee system of inland San Francisco Bay and Delta would become the 10-year high. In other words, the frequency of a 100-year event would increase tenfold.

What activities are contributing to the greenhouse gases in Marin?

Marin emits nearly 3 million tons of carbon dioxide every year. Vehicle traffic accounts for 50% of the total emissions, and energy use by buildings (residential, commercial and industrial combined) accounts for 41%.

Figure 2-11 Countywide Emissions Analysis



Source: Community Development Agency, *Greenhouse Gas Emissions Analysis Report 2000.*

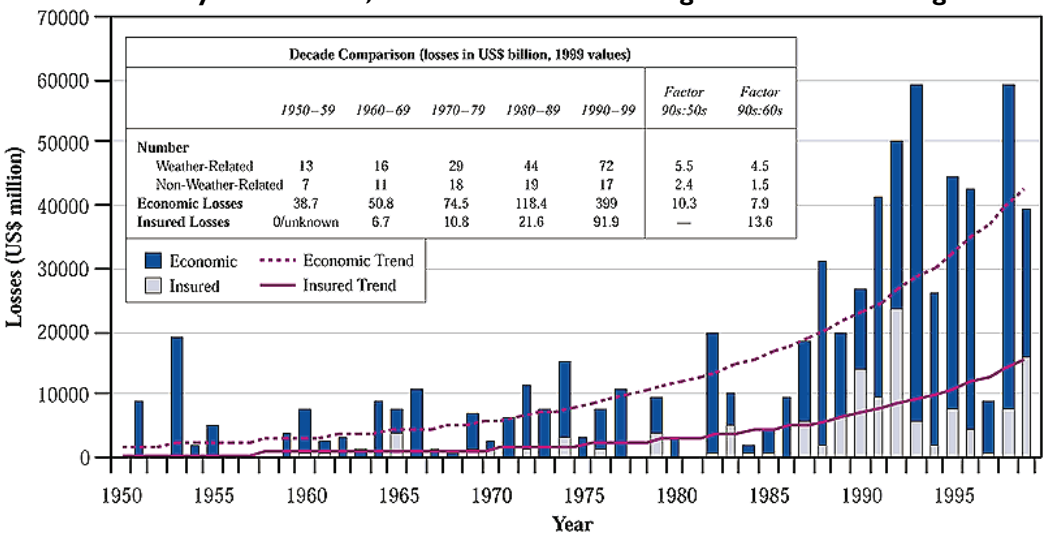
Has climate change affected the global economy?

Challenges resulting from weather- and climate-related events include changes to world food production and supply, migration, and access to clean water and energy. As indicated in the table below, costs have increased substantially since 1980.

"The climate system is being pushed hard enough that change will become obvious to the man in the street in the next decade."

– James E. Hansen, director of NASA's Goddard Institute for Space Studies, quoted in *Newsweek*, January 22, 1996

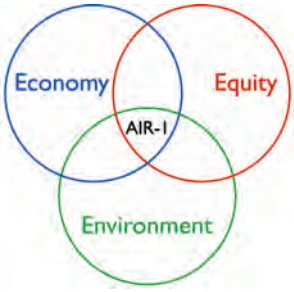
Figure 2-12
Cost to Society of Insurable, Weather-Related Damages from 1950 through 1999



Source: International Panel on Climate Change, 2001.

What Are the Desired Outcomes?

GOAL AIR-1



Improved Regional Air Quality. Promote planning and programs that result in the reduction of airborne pollutants measured within the county and the Bay Area.

Policies

AIR-1.1 Coordinate Planning and Evaluation Efforts. Coordinate air quality planning efforts with local, regional, and State agencies, and evaluate the air quality impacts of proposed plans and development projects.

AIR-1.2 **Meet Air Quality Standards.** Seek to attain or exceed the more stringent of federal or State Ambient Air Quality Standards for each measured pollutant (Figure 2-13).

AIR-1.3 **Require Mitigation of Air Quality Impacts.** Require projects that generate potentially significant levels of air pollutants, such as quarry, landfill operations, or large construction projects, to incorporate best available air quality mitigation in the project design.

Why is this important?

It is essential to use a regional approach to improving air quality, since polluted air flows from one place to another.

Environment: Cleaner air and water mean healthier marine and terrestrial ecosystems.

Economy: Poor air quality is linked to a higher incidence of public health costs associated with respiratory illnesses. The California Air Resources Board (CARB) suggests that the annual health impacts of exceeding state health-based standards for ozone and particulate matter include 6,500 premature deaths, 4,000 hospital admissions for respiratory disease, and 350,000 asthma attacks. The loss of productive workdays also affects the local economy. The American Lung Association (ALA) states that asthma accounts for an estimated three million lost workdays for adults nationally.

Equity: Poor air quality is linked to a higher incidence of respiratory illnesses. Asthma, which can be triggered and/or caused by poor air quality, currently affects 2.3 million Californians. In Marin, there were 17,083 cases of asthma in 2004, which translates to an impact on 7% of the population.

How will results be achieved?

Implementing Programs

AIR-1.a *Inform Local and Regional Agencies.* Notify local and regional jurisdictions of proposed projects in unincorporated areas that may affect regional air quality, as identified by project type and size thresholds in the *BAAQMD CEQA Guidelines, Assessing the Air Quality Impacts of Projects and Plans* (Figure 2-14).

AIR-1.b *Evaluate Air Quality Impacts of Proposed Projects and Plans.* As part of the Environmental Review Process, use the current BAAQMD CEQA Guidelines to evaluate the significance of air quality impacts from projects or plans, and to establish appropriate minimum submittal and mitigation requirements necessary for project or plan approval.

AIR-1.c *Take Part in Regional Programs.* Continue to participate in the Cities for Climate Protection and Spare the Air programs.

AIR-1.d *Cooperate to Enforce Air Quality Standards.* Cooperate with the U.S. Environmental Protection Agency (EPA), the California Air Resources Board, and the BAAQMD to measure air quality at emission sources (including transportation corridors) and to enforce the provisions of the Clean Air Act and State as well as regional policies and established standards for air quality.

Figure 2-13 California and National Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	National Standards [a]	
			Primary [b,c]	Secondary [b,d]
Ozone	8-hour	0.07 ppm (154 µg/m^3)	0.08 ppm (176 µg/m^3)	—
	1-hour	0.09 ppm (180 µg/m^3)	— [e]	Same as primary
Carbon Monoxide	8-hour	9 ppm (10 µg/m^3)	9 ppm (10 µg/m^3)	—
	1-hour	20 ppm (23 µg/m^3)	35 ppm (40 µg/m^3)	—
Nitrogen Dioxide	Annual	—	0.053 ppm (100 µg/m^3)	Same as primary
	1-hour	0.25 ppm (470 µg/m^3)	—	—
Sulfur Dioxide	Annual	—	0.03 ppm (80 µg/m^3)	—
	24-hour	0.04 ppm (105 µg/m^3)	0.14 ppm (365 µg/m^3)	—
	3-hour	—	—	0.5 ppm (1,300 µg/m^3)
	1-hour	0.25 ppm (655 µg/m^3)	—	—
PM_{10}	Annual	20 µg/m^3	50 µg/m^3	Same as primary
	24-hour	50 µg/m^3	150 µg/m^3	Same as primary
$PM_{2.5}$	Annual	12 µg/m^3	15 µg/m^3	—
	24-hour	—	65 µg/m^3	—
Lead	Calendar quarter	—	1.5 µg/m^3	Same as primary
	30-day average	1.56 µg/m^3	—	—

Notes: (a) Standards, other than four ozone and those based on annual averages, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.
(b) Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis.
(c) Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the EPA.
(d) Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
(e) The national one-hour ozone standard was revoked by U.S. EPA on June 15, 2005.

Source: 2004 Bay Area Air Quality Management District.

Figure 2-14
Projects with Potentially Significant Emissions

Land Use Category	Trip Generation Rate	Size of Project Likely to Generate 80 lb/day NOx
Housing		
Single Family	9.4/d.u.	320 units
Apartments	5.9/d.u.	510 units
Retail		
Discount Store	48.3/1000 sq.ft.	87,000 sq.ft.
Regional Shopping Center	96.2/1000 sq.ft.	44,000 sq.ft.
Supermarket	178/1000 sq.ft.	24,000 sq.ft.
Office		
General Office	10.9/1000 sq.ft.	280,000 sq.ft.
Government Office	68.9/1000 sq.ft.	55,000 sq.ft.
Office Park	12.8/1000 sq.ft.	210,000 sq.ft.
Medical Office	37.1/1000 sq.ft.	110,000 sq.ft.
Other		
Hospital	13.8/1000 sq.ft.	240,000 sq.ft.
Hotel	8.7/room	460 rooms

Note: Trip rates for many land uses will vary depending upon size of project. See latest edition of Trip Generation, Institute of Transportation Engineers.

Source: 1999 Bay Area Air Quality Management District.

AIR-1.e ***Conduct Public Education Program.*** Educate regarding the reason for requiring using best management practices to improve air quality.

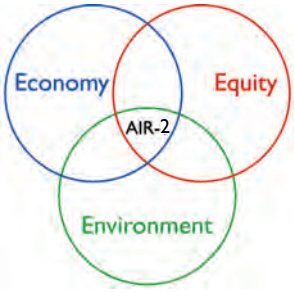
AIR-1.f ***Limit Residential Wood Burning.*** Continue to implement the ordinance that phases out the use of older, polluting wood-burning appliances and limits the installation of wood-burning devices in new or renovated homes to pellet stoves, EPA-certified woodstoves and fireplace inserts, or natural gas or propane appliances.

AIR-1.g ***Require Control Measures for Construction and Agricultural Activity.*** Require reasonable and feasible measures to control particulate emissions (PM-10 and PM-2.5) at construction sites and during agricultural tilling activity, pursuant to the recommendations in the BAAQMD CEQA Guidelines, which may include the following:

- Watering active construction or agricultural tilling areas.
- Covering hauled materials.
- Paving or watering vehicle access roads.
- Sweeping paved and staging areas.

What Are the Desired Outcomes?

GOAL AIR-2



Protection from Emissions. Minimize the potential impacts from land uses that may emit pollution and/or odors on residential and other land uses sensitive to such emissions (see Map 2-16, Sensitive Receptor Sites in Unincorporated Marin County).

Policy

AIR-2.1 Buffer Emission Sources and Sensitive Land Uses. Consider potential air pollution and odor impacts from land uses that may emit pollution and/or odors when locating (a) air pollution sources, and (b) residential and other pollution-sensitive land uses in the vicinity of air pollution sources (which may include freeways, manufacturing, extraction, hazardous materials storage, landfill, food processing, wastewater treatment, and other similar uses).

Why is this important?

People and sensitive plants and animals need to be protected from sources of air pollution.

Environment: Air pollution creates stress on fragile and sensitive ecosystems by reducing reproductive capacity and food sources.

Economy: Lowering pollutants from area-wide and point sources would lower public health costs associated with respiratory illnesses and lead to fewer sick days at the workplace.

Equity: Children, people who are ill, and elderly people are particularly sensitive to air pollution. Places where they congregate need protection from polluted air.

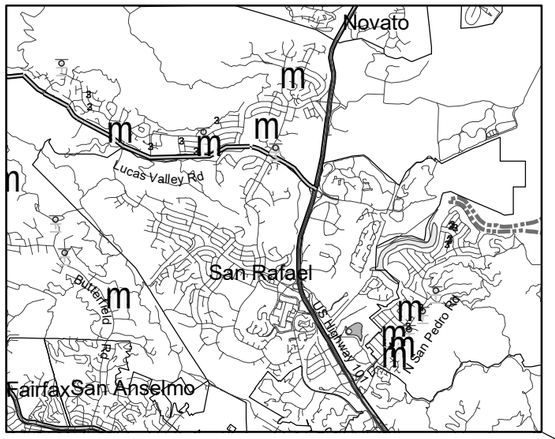
How will results be achieved?

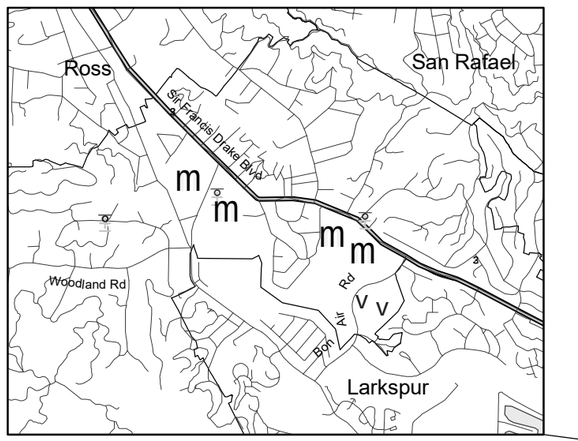
Implementing Programs

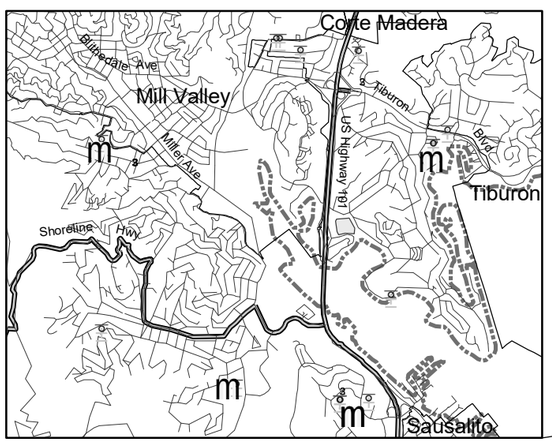
AIR-2.a ***Require Separation Between Air Pollution Sources and Other Land Uses.*** Only allow (a) emission sources or (b) other uses in the vicinity of air pollution or odor sources if the minimum screening distances between sources and receptors established in the BAAQMD CEQA Guidelines can be met, unless detailed project-specific studies demonstrate compatibility with adjacent uses despite separations that do not meet the screening distance requirements.

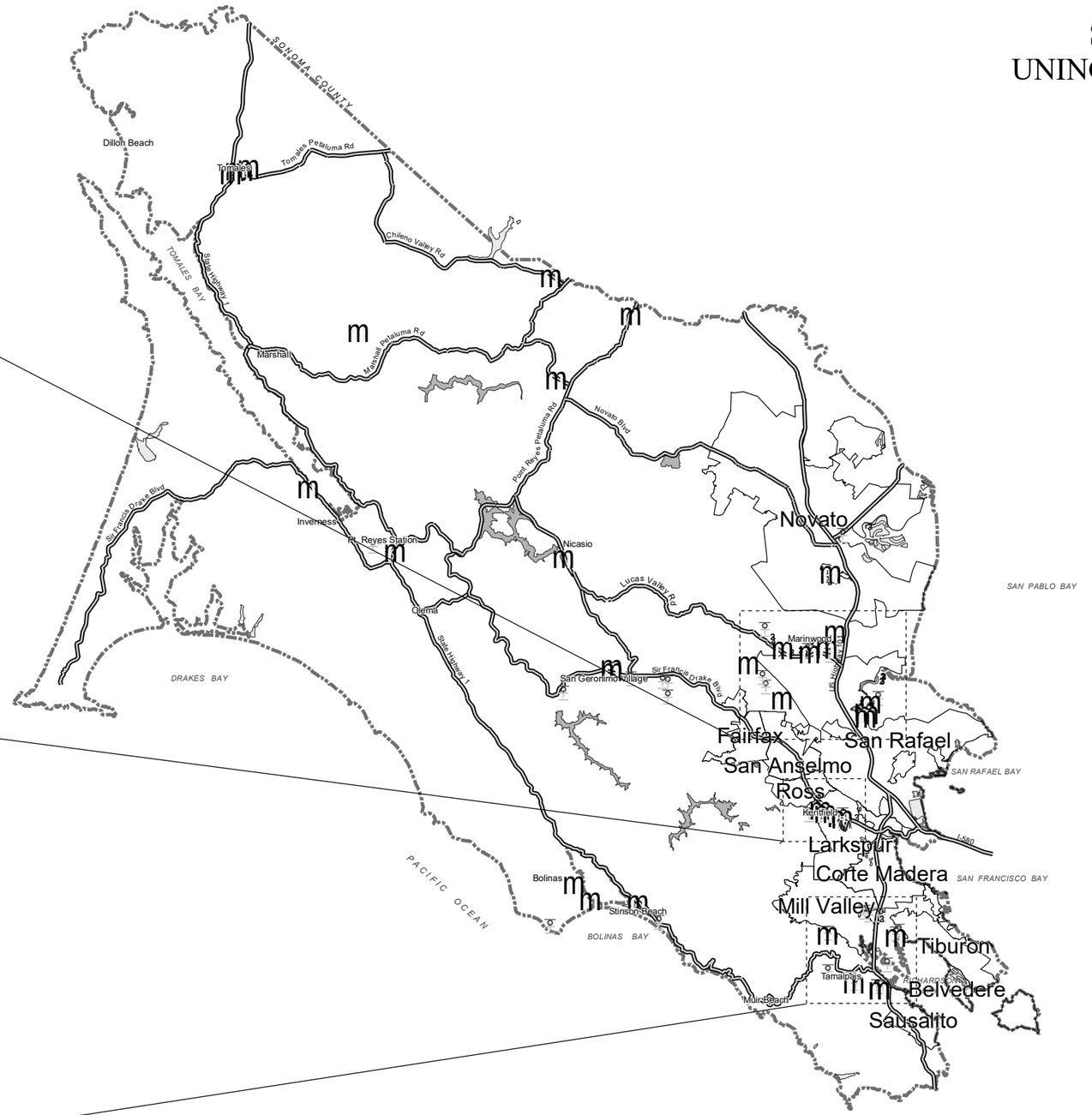
AIR-2.b ***Protect Sensitive Receptors Near High-Volume Roadways.*** Amend the Development Code to require mitigation measures such as increased indoor air filtration to ensure the protection of sensitive receptors (facilities where individuals are highly susceptible to the adverse effects of air pollutants, such as housing, child care centers, retirement homes, schools, and hospitals) near freeways, arterials, and other major transportation corridors.

MAP 2-16
SENSITIVE RECEPTOR SITES IN UNINCORPORATED MARIN COUNTY









Legend

- County Boundary
- City Boundary
- Highways and Major Roads
- Child Care
- Retirement Home
- School
- Medical Clinic / Center

Water Bodies

- Lakes
- Lagoons

Miles
0 1 2 4 6 8

SOURCE: Marin County Community Development Agency

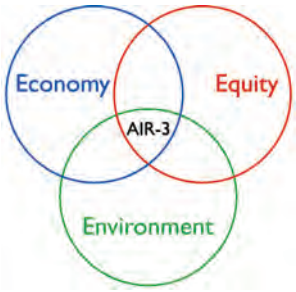
Date: August 8, 2005 File: Receptor 2-16.mxd

AIR-2.c ***Health Risk Analysis for Sensitive Receptors.*** Environmental review for applications for new projects involving locating sensitive receptors near roadways and stationary sources identified as posing potentially significant TAC or $PM_{2.5}$ exposure using BAAQMD CEQA Analysis Tools, shall include an analysis of the potential health risks. Mitigation measures that achieve compliance with adopted standards of the BAAQMD for exposure of sensitive receptors to odor/toxics shall be identified in order to reduce these risks to acceptable levels.

What Are the Desired Outcomes?

GOAL AIR-3

Reduction of Vehicle-Generated Pollutants. Reduce vehicle trips and emissions, and improve vehicle efficiency, as means of limiting the volume of pollutants generated by traffic.



Policy

AIR-3.1 **Institute Transportation Control Measures.** Support a transportation program that reduces vehicle trips, increases ridesharing, and meets or exceeds the Transportation Control Measures recommended by BAAQMD in the most recent Clean Air Plan to reduce pollutants generated by vehicle use.

Why is this important?

Vehicle emissions are a major source of air pollution, and reduction of vehicle trips will improve air quality.

Environment: Vehicle travel is responsible for 54% of nitrogen oxides, 73% of carbon monoxide, and 79% of the particulate matter released in Marin. These pollutants create stress on Marin's marine and terrestrial ecosystems through a loss of species diversity and reproduction capacity.

Economy: In addition to alleviating the economic burden of public health costs, a reduction in vehicle trips will reduce traffic congestion. In 2006, over 9,400 productive hours were lost each weekday as a result of traffic congestion and delay.

Equity: Based on EPA's most current data, vehicle generated sources are responsible for 91% of the air-related cancer risk in Marin County. Furthermore, lower income neighborhoods tend to be nearest to major transportation routes; thus, these residents are exposed to higher levels of mobile source pollutants. One study finds that in the Bay Area, prevalence of asthma and bronchitis symptoms is about 7% higher for children in neighborhoods with higher levels of traffic pollutants compared with other children in the study.

How will results be achieved?

Implementing Programs

AIR-3.a *Support Voluntary Employer-Based Trip Reduction.* Provide assistance to regional and local ridesharing organizations, and advocate legislation to maintain and expand employer ridesharing incentives, such as tax deductions or credits.

AIR-3.b *Utilize Clean Vehicle Technology.* Promote new technologies and other incentives, such as allowing zero or partial zero emission vehicles rated at 45 miles or more per gallon in Marin County carpool lanes, and replacing fleet vehicles with these and similar clean vehicles.

"Adding lanes to solve traffic congestion is like loosening your belt to solve obesity."

— Glen Hemistra

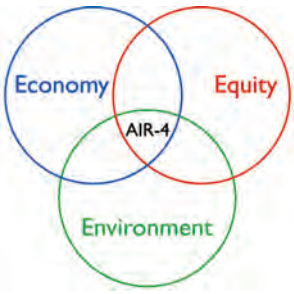
AIR-3.c *Consider Model Clean Vehicle Requirements.* Research and consider adoption of an ordinance or standards that provide a set of voluntary measures to incorporate clean vehicles in fleets and promote the use of clean alternative fuels.

AIR-3.d *Reduce Peak-Hour Congestion.* Implement recommended Bay Area Air Quality Management District (BAAQMD) Transportation Control Measures in the Clean Air Plan to reduce vehicle emissions and congestion during peak commute periods.

AIR-3.e *Improve Arterial Traffic Management.* Modify arterial roadways to allow more-efficient bus operation, including possible signal preemption, and expand signal-timing programs where air quality benefits can be demonstrated.

What Are the Desired Outcomes?

GOAL AIR-4



Minimization of Contributions to Greenhouse Gases. Prepare policies that promote efficient management and use of resources in order to minimize greenhouse gas emissions. Incorporate sea level rise and more extreme weather information into the planning process.

Policies

AIR-4.1 **Reduce Greenhouse Gas Emissions.** Adopt practices that promote improved efficiency and energy management technologies; shift to low-carbon and renewable fuels and zero emission technologies.

AIR-4.2 **Foster the Absorption of Greenhouse Gases.** Foster and restore forests and other terrestrial ecosystems that offer significant carbon mitigation potential.

Why is this important?

Major contributors to greenhouse gas emissions, such as vehicle traffic and building energy use, can be reduced on a local level through the implementation of sustainable development policies.

Environment: Increased greenhouse gas emissions lead to climate change, which could include increases in temperature and shifting amounts of rainfall. Changes in temperature and water availability affect terrestrial and marine ecosystems. Furthermore, higher temperatures lead to higher evaporation rates, as well as reductions in stream flow and an increased frequency of droughts. Droughts are a problem in Marin, where 80% of our water comes from rainfall.

Economy: Mitigation measures that reduce emissions can result in substantial savings. The Tellus Institute estimates that California can save 1.9 billion dollars annually by 2020 through adoption of more stringent building codes and standards, efficiency programs, and increased supply of energy from renewable sources.

Equity: Access to clean water, energy, and mineral resources, and availability of productive arable land are all threatened by changes in climate. Weather- and temperature-related issues will add strain to an already overburdened public health system. Furthermore, low income families will be disproportionately impacted as they will be the least able to adapt to the effects of climate change.

How will results be achieved?

Implementing Programs

AIR-4.a ***Reduce Greenhouse Gas Emissions Resulting from Energy Use in Buildings.*** Implement energy efficiency programs and use of renewable energy. (Also see EN-1, EN-2, PFS-2, and TR-4.)

Carbon Dioxide

The Ecological Footprint shows that the single largest human demand on ecosystems comes from carbon dioxide emissions. The land area required to absorb this waste product makes up over half the Ecological Footprint of the average Marin resident. If Marin County reduced its carbon dioxide emissions by 20%, it could reduce its total footprint by an area equal to almost the entire size of Marin County.

Changing Scientific Understanding of Human Influences on Climate Change

1990: "Our judgment is that global mean surface air temperature has increased [though] the unequivocal detection of the enhanced greenhouse effect is not likely for a decade or more."

1995: "The balance of evidence suggests a discernible human influence on global climate."

2001: "The Earth's climate system has demonstrably changed on both global and regional scales. There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities."

AIR-4.b ***Reduce Greenhouse Gas Emissions Resulting from Transportation.*** Increase clean-fuel use, promote transit-oriented development and alternative modes of transportation, and reduce travel demand. (Also see TR-4, AIR-3, DES-2, HS-2, HS-3, CD-2, CD-3, and EC-1.)

AIR-4.c ***Reduce Methane Emissions Released from Waste Disposal.*** Encourage recycling, decrease waste sent to landfills, require landfill methane recovery, and promote methane recovery for energy production from other sources. (See PFS-3.)

Cities for Climate Protection Milestones

In August 2002, the Board of Supervisors partnered with the Cities for Climate Protection Campaign to address climate change through five actions:

1. Analyze baseline greenhouse gas emissions.
2. Set a target for reducing emissions.
3. Develop a local action plan for pursuing emissions reductions measures.
4. Implement local action plan.
5. Monitor progress.

Source: www.iclei.org.

"New analyses suggest that 15%–37% of a sample of 1,103 land plants and animals would eventually become extinct as a result of climate changes expected by 2050."

— *Nature Medicine*, 2004

AIR-4.d ***Reduce Greenhouse Gas Emissions from Agriculture.*** Compile an inventory of agricultural greenhouse gas emissions. Partner with AgStar, the U.S. Department of Agriculture, and the U.S. Department of Energy to encourage the use of methane recovery technologies and determine potential use in energy production.

AIR-4.e ***Reduce County Government Contributions to Greenhouse Gas Emissions.*** Where feasible, replace fleet vehicles with hybrid fuel and other viable alternative fuel vehicles, increase energy efficiency of County-maintained facilities, increase renewable energy use at County-maintained facilities, adopt purchasing practices that promote emissions reductions, and increase recycling at County-maintained facilities. (Also see EN-1, EN-2, PFS-3, TR-4, EC-1 and PH-1.)

AIR-4.f ***Establish a Climate Change Planning Process.*** Continue implementation of the approved Marin County Greenhouse Gas Reduction Plan. Integrate this plan into long-range and current planning functions of other related agencies. Establish and maintain a process to implement, measure, evaluate, and modify implementing programs, using the Cities for Climate Protection Campaign as a model (see the sidebar).

AIR-4.g ***Work with Bay Area Governments to Address Regional Climate Change Concerns.*** Play a leading role to encourage other local governments to commit to addressing climate change. Participate in programs such as the Cities for Climate Protection Campaign to address local and regional climate change concerns.

AIR-4.h *Evaluate the Carbon Emissions Impacts of Proposed Developments.* Incorporate a carbon emissions assessment into land use plans and the environmental impact report for proposed projects.

AIR-4.i *Work with Appropriate Agencies to Determine Carbon Uptake and Storage Potential of Natural Systems.* Study Marin's wetlands, forests, baylands, and agricultural lands to determine the potential to sequester carbon over time. Determine their value as carbon sinks.

AIR-4.j *Acquire and Restore Natural Resource Systems.* Take and require all technically feasible measures to avoid or minimize potential impacts on existing natural resource systems that serve as carbon sinks. (Also see CD-1, BIO-2, BIO-3, BIO-4, BIO-5, OS-1, and OS-2.)

AIR-4.k *Encourage the Planting of Trees.* Adopt urban forestry practices that encourage re-forestation as a means of storing carbon dioxide. (Also see BIO-1, DES-3.)

AIR-4.l *Preserve Agricultural Lands.* Protect agricultural lands and soils that serve as carbon sinks. (Also see AG-1.)

AIR-4.m *Focus Development in Urban Corridors.* Build in urban corridors and limit development in natural resource areas. Encourage green spaces that serve as carbon sinks in urban corridors. (Also see CD-1, CD-2, and DES-3.)

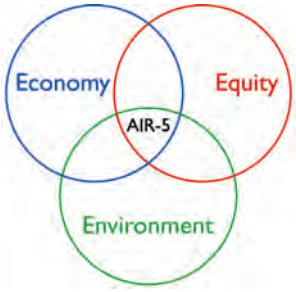
AIR-4.n *Monitor for Carbon Storage Research.* Monitor federal and international research on technological approaches to carbon storage.

AIR-4.o *Implement Proposed State Programs to Reduce Greenhouse Gas Emissions.* Implement proposed State programs to reduce greenhouse gas emissions, including the Renewable Portfolio Standards, California Fuel Efficiency (CAFE) standards, and carbon cap and trade programs.

What Are the Desired Outcomes?

GOAL AIR-5

Adaptation to Climate Change. Adopt policies and programs that promote resilient human and natural systems in order to ease the impacts of climate change.



Policies

AIR-5.1 **Determine Marin-Specific Climate Change.** Participate in research that examines the effects of climate change on human and natural systems in Marin.

AIR-5.2 **Prepare Response Strategies for Impacts.** Prepare appropriate response strategies that aid systems in adapting to climate change based on sound scientific understanding of the potential impacts.

Why is this important?

Adapting to climate change will require accurate scientific understanding as well as an institutionalized policy framework.

Environment. Wildlife distributions, population size, population density, and behavior are directly affected by changes in climate and indirectly through changes in vegetation. As wildlife tries to adapt to changes in the environment caused by shifting temperature and precipitation patterns, the already high number of threatened and endangered species could see a marked increase. New analyses suggest that 15% to 37% of a sample of 1,103 land plants and animals would eventually become extinct as a result of climate changes expected by 2050.

"My interest is in the future, because I am going to spend the rest of my life there."

— Charles Kettering

Economy. Aquaculture products brought $2.4 million into Marin's economy, representing 5.4% of Marin's entire agriculture industry. Warmer ocean waters and saltwater inundation due to climate change may impact coastal ecosystems by speeding the decline in fish populations and marine ecosystems already stressed from habitat loss and reduced freshwater flows. A report sponsored by the United Nations stated that worldwide economic losses could soar to $150 billion a year within the next 10 years.

Equity. Adopting and fostering resilience within the natural and built environments will save significant resources, speed recovery, and protect public health and safety for people of all income levels.

How will results be achieved?

Implementing Programs

AIR-5.a ***Coordinate with Local and Regional Agencies.*** Coordinate with the U.S. Geological Survey, Bay Conservation and Development Commission, California Coastal Commission and other monitoring agencies to study near-term and long-term high-probability climate change effects. Explore funding and collaborations with Bay Area partners in the Cities for Climate Protection Campaign in order to share resources, achieve economies of scale, and develop plans and programs that are optimized to address climate change on a regional scale.

AIR-5.b ***Study the Effect of Climate Change.*** Determine how climate change will affect the following:

Natural Systems: Changes in water availability, shifting fog regimes (and the effect on coastal redwoods and fire ecology), temperature changes, and shifting seasons.

Biological Resources: Changes in species distribution and abundance in estuary ecosystems resulting from salinity changes and flooding. For marine ecosystems, determine changes in distribution and abundance resulting from warmer waters, rising sea level, and changes in ocean currents and freshwater inflows.

Environmental Hazards: Runoff, fire hazards, floods, landslides and soil erosion, and the impact on coastal and urban infrastructure.

Built Environment: Effect of flooding and rising sea level on sewage systems, property, and infrastructure.

Water Resources: Runoff, changes in precipitation, increases and decreases in drought, salinity changes, sea level rise, and shifting seasons.

Agricultural and Food Systems: Food supply, economic impacts, and effect on grazing lands.

Public Health: Temperature-related health effects, air quality impacts, extreme weather events, and vector-, rodent-, water-, and food-borne diseases.

AIR-5.c *Prepare Response Strategies.* In coordination with the California Coastal Commission, the Bay Conservation and Development Commission, water districts, wildlife agencies, and flood control districts, prepare response strategies for Marin's human and natural systems. Current response strategies include the following:

Water Resources: Improve drainage systems, harvesting flows, and recharge designs in order to direct runoff to landscaped areas where the water can percolate into the soil. (See WR-1.)

Biological Resources: Limit development such that coastal wetlands are able to migrate inland in response to sea level rise, wildlife corridors and ecotones are protected, and development impacts are minimized. Promote the restoration of wetlands and riparian areas to provide capacity for high water and flood flows. (Also see BIO-2, BIO-4, BIO-5, OS-2, DES-1, and DES-5.)

Public Health: General strengthening of public health infrastructure and health-oriented environmental management, such as with air and water quality, and community and housing design.

Built Environment: Assess development located in coastal areas that are subject to sea level rise and increased flooding, and develop a response strategy, such as a planned retreat program, for the relocation of facilities in low-lying areas. Work with the County flood control and water districts to prepare a plan for responding to a potential rise in the sea level, consider developing flood control projects, and amend County Code Chapters 11, 22, 23, and 24 to include construction standards for areas potentially subject to increased flooding from a rise in sea level.

Environmental Hazards: Develop response strategies that cope with increasing storm events, flooding, fire, landslides, and soil erosion. Establish surveillance systems. With the development of advanced (spatial) surveillance technology, it is conceivable that such systems will be expanded to address forest health and productivity, monitoring biotic vectors and natural elements, as well as tree and storm responses. (Also see EH-3, EH-4, BIO-1, and PH-1.)

"The causes and effects of climate change occur around the world. Individuals, communities, and nations must work together cooperatively to stop global climate change."

— The Environmental Justice and Climate Change Initiative

AIR-5.d ***Monitor Local Climate Change.*** Encourage appropriate local and regional agencies to track the following environmental indicators of climate change:

- Sea level (also see EH-3)
- Minimum and maximum temperature
- Precipitation
- Timing and volume of river flow
- River temperatures
- Sea surface temperatures
- Diversity and abundance of fish stocks and sea birds

AIR-5.e ***Seek Resources for Response Strategies.*** Explore funding and collaborative opportunities that share resources, to develop plans and programs that are optimized on a regional scale.

AIR-5.f ***Protect and Enhance Native Habitats and Biodiversity.*** Effectively manage and enhance native habitat, maintain viable native plant and animal populations, and provide for improved biodiversity throughout Marin. Require identification of sensitive biological resources and commitment to adequate protection and mitigation. (Also see BIO-1 and BIO-2.)

"It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change."

— Charles Darwin

AIR-5.g ***Conduct Public Outreach and Education.*** Increase public awareness about climate change, and encourage Marin residents and businesses to become involved in activities and lifestyle changes that will aid in reducing greenhouse gas emissions.

AIR-5.h ***Implement Floodplain Ordinances.*** Continue to implement ordinances that regulate floodplain development to ensure that project-related and cumulative flooding impacts are minimized or avoided through conditions of project approval as required by the ordinances.

AIR-5.i ***Modify Construction Standards.*** Amend the Marin County Code to include construction standards for areas threatened by future sea level rise.

Figure 2-15 Relationships of Goals to Guiding Principles

This figure illustrates the relationships of each goal in this Section to the Guiding Principles.

Goals	Guiding Principles: 1. Link equity, economy, and the environment locally, regionally, and globally.	2. Minimize the use of finite resources and use all resources efficiently and effectively.	3. Reduce the use and minimize the release of hazardous materials.	4. Reduce greenhouse gas emissions that contribute to global warming.	5. Preserve our natural assets.	6. Protect our agricultural assets.	7. Provide efficient and effective transportation.	8. Supply housing affordable to the full range of our workforce and diverse community.	9. Foster businesses that create economic, environmental, and social benefits.	10. Educate and prepare our workforce and residents.	11. Cultivate ethnic, cultural, and socioeconomic diversity.	12. Support public health, safety, and social justice.
AIR-1 Improved Regional Air Quality	•		•	•	•							•
AIR-2 Protection from Emissions	•		•	•	•							•
AIR-3 Reduction of Vehicle-Generated Pollutants	•		•	•	•		•					•
AIR-4 Minimization of Contributions to Greenhouse Gases	•	•	•	•		•	•		•			•
AIR-5 Adaptation to Climate Change					•	•				•		•

How Will Success Be Measured?

Indicator Monitoring

Nonbinding indicators, benchmarks, and targets[1] will help to measure and evaluate progress. This process will also provide a context in which to consider the need for new or revised implementation measures.

Indicators	Benchmarks	Targets
Number of days of poor air quality.	No exceedences in 2000.	No increase through 2015.
Amount of greenhouse gas emissions countywide.	2,849,000 tons CO_2 in 1990.	Reduce 15% by 2015.
Amount of greenhouse gas emissions from County government sources.	15,200 tons CO_2 in 1990.	Reduce 15% – 20% by 2015.

[1]Many factors beyond Marin County government control, including adequate funding and staff resources, may affect the estimated time frame for achieving targets and program implementation.

Program Implementation

The following table summarizes responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs. Program implementation within the estimated time frame[1] will be dependent upon the availability of adequate funding and staff resources.

Figure 2-16
Atmosphere and Climate Program Implementation

Programs	Responsibility	Potential Funding	Priority	Time Frame
AIR-1.a – Inform Local and Regional Agencies.	CDA	Existing budget	High	Ongoing
AIR-1.b – Evaluate Air Quality Impacts of Proposed Projects and Plans.	CDA	Existing budget	High	Ongoing
AIR-1.c – Take Part in Regional Programs.	CDA	Existing budget	High	Ongoing
AIR-1.d – Cooperate to Enforce Air Quality Standards.	CDA, EPA, CA Air Resources Board, BAAQMD	Existing budget, State and federal funds	High	Ongoing
AIR-1.e – Conduct Public Education Program	CDA, BAAQMD	Existing budget and may require additional grants or revenue.[2]	High	Ongoing
AIR-1.f – Limit Residential Wood Burning.	CDA	Existing budget, Tobacco Settlement Funds	Medium	Ongoing
AIR-1.g – Require Control Measures for Construction and Agricultural Activity.	CDA, Agricultural Commissioner	Existing budget	High	Ongoing
AIR-2.a – Require Separation Between Air Pollution Sources and Other Land Uses.	CDA, BAAQMD	Existing budget	High	Ongoing
AIR-2.b – Protect Sensitive Receptors Near High-Volume Roadways.	CDA	Existing budget	Medium	Long term
AIR-2.c – Health Risk Analysis for Sensitive Receptors.	CDA	Existing budget	Medium	Short term

[1]Time frames include: Immediate (0–1 years); Short term (1–4 years); Med. term (4–10 years); Long term (10–20 years); and Ongoing (existing programs already in progress whose implementation is expected to continue into the foreseeable future).

[2]Completion of this task is dependent on acquiring additional funding. Consequently, funding availability could lengthen or shorten the time frame and ultimate implementation of this program.

Programs	Responsibility	Potential Funding	Priority	Time Frame
AIR-3.a – Support Voluntary Employer-Based Trip Reduction.	DPW, Transportation Authority of Marin (TAM), CDA	Existing Budget, will require additional grants or other revenue[2]	Medium	Med. Term
AIR-3.b – Utilize Clean Vehicle Technology.	1. CDA/CalTrans-carpool lanes, 2. DPW- County fleet	1. Existing budget, 2. Will require additional grants or other revenue[2]	1. Medium, 2. Medium	1. Ongoing, 2. Long term
AIR-3.c – Consider Model Clean Vehicle Requirements.	DPW	Will require additional grants or other revenue[2]	Medium	Long term
AIR-3.d – Reduce Peak-Hour Congestion.	TAM	TFCA	Medium	Ongoing
AIR-3.e – Improve Arterial Traffic Management.	DPW, TAM	Grants, traffic mitigation fees, transportation sales tax[2]	Medium	Ongoing
AIR-4.a – Reduce Greenhouse Gas Emissions Resulting from Energy Use in Buildings.	CDA	Existing budget and may require additional grants or revenue[2]	Medium	Med. Term
AIR-4.b – Reduce Greenhouse Gas Emissions Resulting from Transportation.	1. TAM, CDA, 2. DPW	General Fund, TAM budget, TLC/HIP Grants, and will require additional grants or other revenue[2]	1. Medium, 2. Medium	1. Ongoing, 2. Long term
AIR-4.c – Reduce Methane Emissions Released from Waste Disposal.	DPW	Will require additional grants or other revenue[2]	Medium	Long term
AIR-4.d – Reduce Greenhouse Gas Emissions from Agriculture.	Agricultural Commissioner, CDA, USDA, USDOE	Grants, existing budget	Medium	Ongoing
AIR-4.e – Reduce County Government Contributions to Greenhouse Gas Emissions.	DPW	Will require additional grants or other revenue[2]	High	Pending
AIR-4.f – Establish a Climate Change Planning Process.	CDA	Existing budget and may require additional grants or revenue[2]	High	Immediate
AIR-4.g – Work with Bay Area Governments to Address Regional Climate Change Concerns.	CDA, ABAG, International Council for Local Environmental Initiatives (ICLEI)	Existing budget and may require additional grants or revenue[2]	High	Ongoing
AIR-4.h – Evaluate the Carbon Emissions Impacts of Proposed Developments.	CDA	Existing budget and may require additional grants or revenue[2]	High	Ongoing

Programs	Responsibility	Potential Funding	Priority	Time Frame
AIR-4.i – Work with Appropriate Agencies to Determine Carbon Uptake and Storage Potential of Natural Systems.	CDA, California Energy Commission (CEC), BAAQMD, other municipalities	Will require additional grants or revenue[2]	Low	Long term
AIR-4.j – Acquire and Restore Natural Resource Systems.	MCOSD	Will require additional grants or revenue[2]	High	Ongoing
AIR-4.k – Encourage the Planting of Trees.	CDA, NGO's, CBO's	Will require additional grants or revenue[2]	Medium	Ongoing
AIR-4.l – Preserve Agricultural Lands.	CDA, MALT, CBO's	Will require additional grants or revenue[2]	High	Ongoing
AIR-4.m – Focus Development in Urban Corridors.	CDA	Existing budget	High	Ongoing
AIR-4.n – Monitor for Carbon Storage Research.	CDA, ICLEI	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing
AIR-4.o – Implement Proposed State Programs to Reduce Greenhouse Gas Emissions.	CDA	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing
AIR-5.a – Coordinate with Local and Regional Agencies.	CDA, Bay Conservation and Development Commission (BCDC), CCC, BAAQMD, USGS, ICLEI	Existing budget and may require additional grants or revenue[2]	High	Ongoing
AIR-5.b – Study the Effect of Climate Change.	CDA, BCDC, CCC, BAAQMD, USGS, ICLEI	Will require additional grants or revenue[2]	Medium	Ongoing
AIR-5.c – Prepare Response Strategies.	CDA, CCC, BCDC, Water Districts, Resource Protection Agencies, ICLEI	Existing budget, will require additional grants or revenue[2]	High	Ongoing
AIR-5.d – Monitor Local Climate Change.	CDA, CCC, BCDC, Water Districts, Resource Protection Agencies, ICLEI	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing
AIR-5.e – Seek Resources for Response Strategies.	CDA, CCC, BCDC, Water Districts, Resource Protection Agencies, ICLEI	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing

Programs	Responsibility	Potential Funding	Priority	Time Frame
AIR-5.f – Protect and Enhance Native Habitats and Biodiversity.	Parks & Open Space, CDA, CBO's	Existing budget and may require additional grants or revenue[2]	High	Ongoing
AIR-5.g – Conduct Public Outreach and Education.	CDA, CBO's, ICLEI	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing
AIR-5.h – Implement Floodplain Ordinances.	CDA/DPW	Existing budget	High	Ongoing
AIR-5.i – Modify Construction Standards.	CDA/DPW	Existing budget and may require additional grants or revenue[2]	Medium	Long term