Appendix 7-E: Marsh Park, Phase II Supporting Documents

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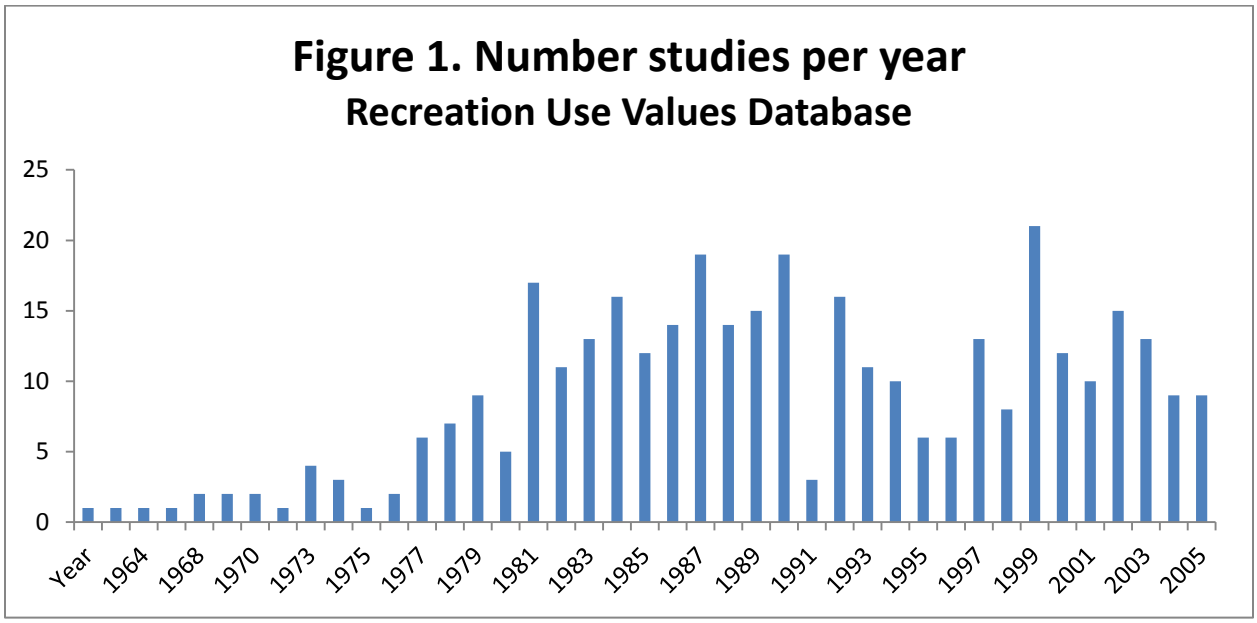
RECREATION USE VALUES DATABASE

Welcome to the Recreation Use Values Database for North America. What you will find here are links to the database, bibliography, and background information. If you have questions, comments and/or suggestions about the database, would like assistance in using this database for benefit transfer, or would like to submit documentation on North American studies not currently in the database, please contact Dr. Randall Rosenberger (R.Rosenberger@oregonstate.edu). We also are interested in how you apply benefit transfer for recreation valuation, so please submit documentation about your applications.

The database currently contains 352 documents of economic valuation studies that estimated the use value of recreation activities in the U.S. and Canada from 1958 to 2006, totaling 2,703 estimates in per person per activity day, adjusted to 2010 USD. Twenty-one primary activity types are provided, with several more available if segregated by activity mode, resource type, primary species sought, or little studied activities (i.e., 'other recreation' has an additional 22 activities identified). These recreation use value estimates are measures of net willingness-to-pay or consumer surplus for recreational access to specific sites, or for certain activities at broader geographic scales (e.g., state or province, national) in per person per activity day units—this database does not contain information on marginal values for changes in site quality or condition. The database is currently offered as an Excel workbook containing the database and coding protocols. It is currently sorted by primary activity by region—of course, you may download and sort it however you wish. The bibliography cross-references the database via the document code.

An overview of the database is provided below, including distributions of estimates and studies, and mean values by activity type by region.

Figures 1 and 2 display the distribution of the number of studies and number of estimates per year, respectively. The spikes in the number of estimates correspond with the estimates provided from U.S. Fish and Wildlife's National Surveys on fishing, hunting and wildlife viewing.



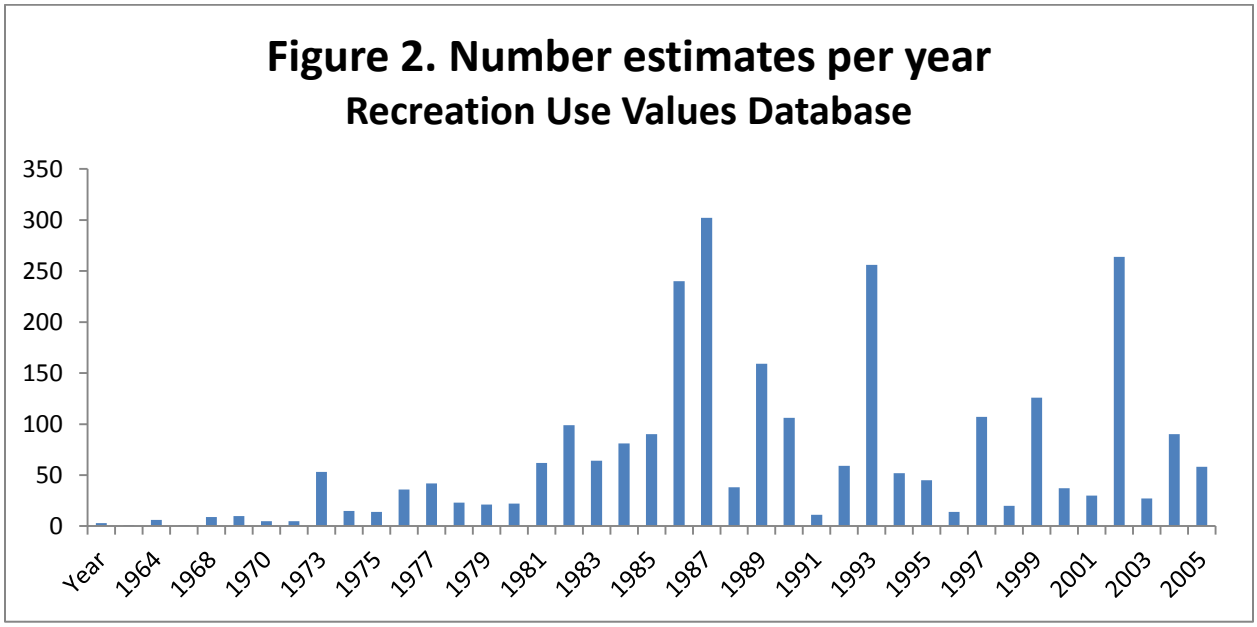


Figure 3 segregates the number of estimates by primary activity type. The spikes in number of estimates for freshwater fishing, big game hunting, and wildlife viewing coincide with the U.S. Fish and Wildlife's National Survey.

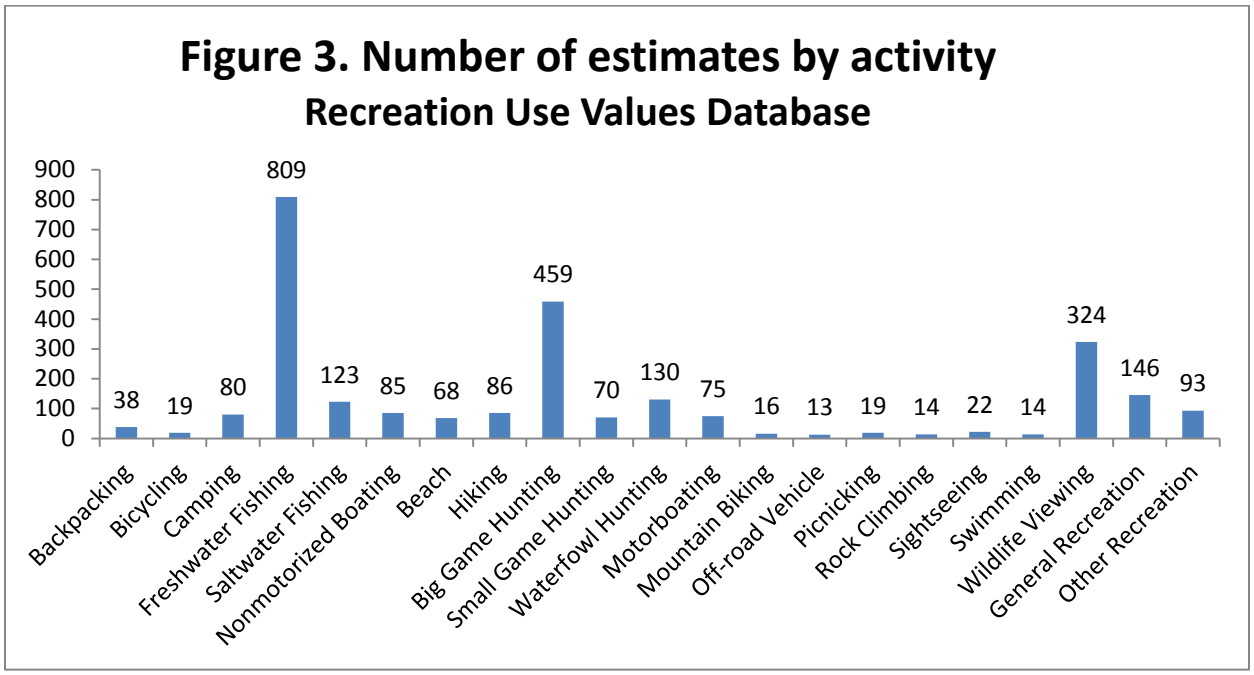


Figure 4 shows the distribution of consumer surplus estimates ($CS per person per activity day in 2010 USD) (mean = $59.60 per person per day; se = 1.3; n = 2703).

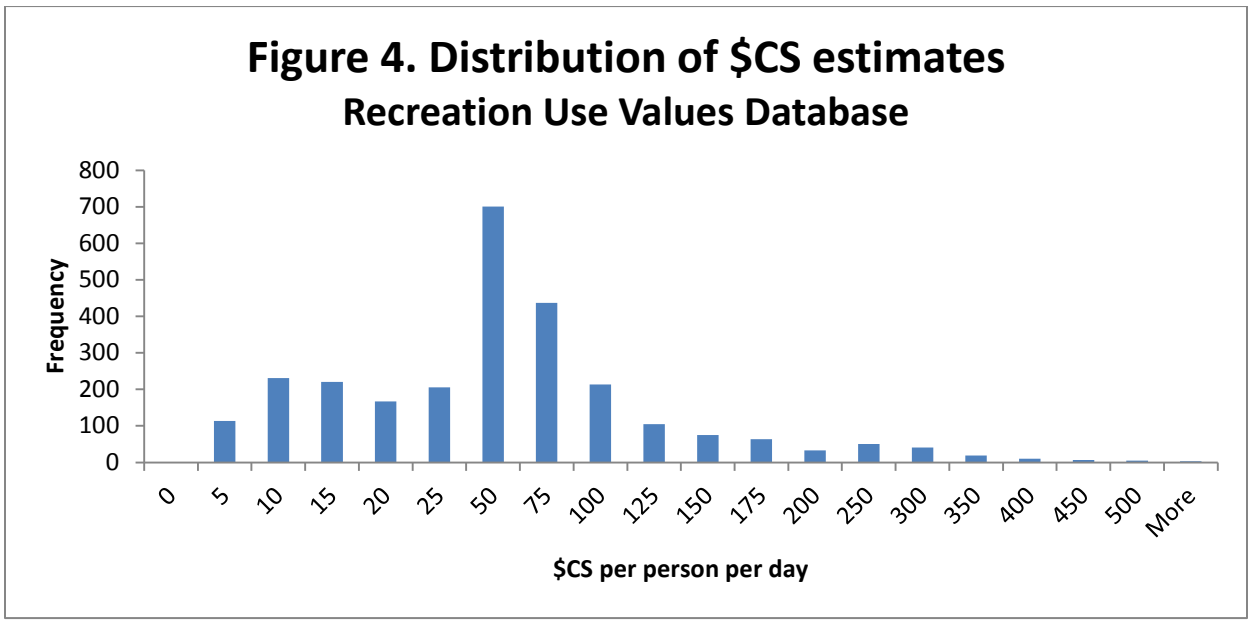


Figure 5 shows the mean consumer surplus ($CS) per person per day by primary activity type (aggregate mean = $59.60 per person per day, 2010 USD). The high mean value for mountain biking may be due to limited research on high profile mountain biking sites, along with the largest standard error among activity types reported (see Table 1). Saltwater fishing and nonmotorized boating have higher mean estimates than other activities; although with relatively larger standard errors (see Table 1). Backpacking and camping have lower mean estimates per person per day, but are similar when aggregated up to multiple day trips typical of overnight recreation activities.

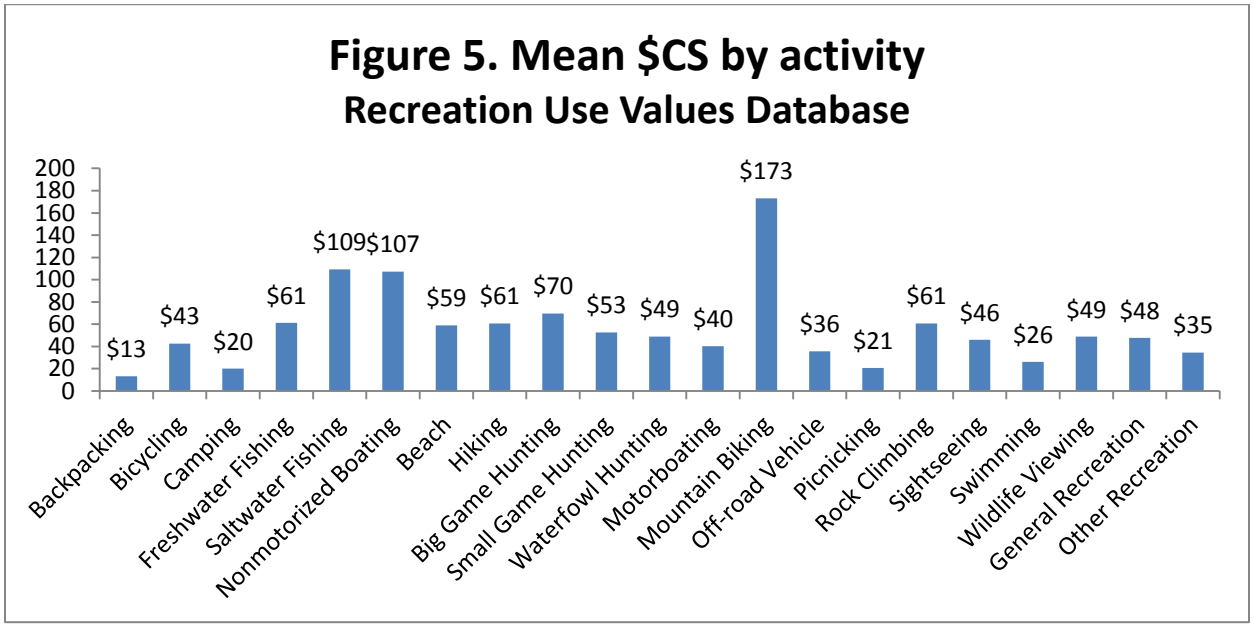


Table 1 reports mean consumer surplus ($CS) per person per day by primary activity type and region. Reported are the number of estimates, mean $CS, and standard error by cell. The bottom row aggregates by region whereas the last column aggregates by activity type. The overall aggregation for the database is reported in the lower right cell.

We hope you find this database useful in your work on recreation valuation in North America.

Sincerely,

Randall S. Rosenberger
Department of Forest Ecosystems & Society
Oregon State University
15 August, 2011

TABLE 1. Recreation Use Values per Person per Day by Activity and Region, in 2010 USD[a].

Activity	Northeastern U.S.[b]			Midwestern U.S.[b]			Southern U.S.[b]			Western U.S.[b]			Multiple Regions, U.S.[b]			Canada			Total		
	n	Mean	se[c]	n	Mean	se	n	Mean	se	n	Mean	se	n	Mean	se	n	Mean	se	n	Mean	se
Backpacking	31	$8.07	0.5	---	---	---	4	$31.70	9.1	2	$39.85	15.1	1	$49.67	---	---	---	---	**38**	**13.33**	**2.2**
Bicycling	---	---	---	6	$36.64	5.5	12	47.12	8.4	---	---	---	1	25.53	---	---	---	---	**19**	**42.67**	**5.6**
Camping	7	25.17	8.7	3	9.85	3.6	10	10.19	1.5	58	21.68	3.0	2	16.69	0.9	---	---	---	**80**	**19.98**	**2.4**
Freshwater Fishing[d]	126	61.59	3.8	188	39.30	4.0	152	54.07	4.0	302	81.81	4.4	20	55.10	10.2	21	$16.36	5.1	**809**	**61.21**	**2.2**
Saltwater Fishing[d]	19	62.75	13.0	---	---	---	54	106.63	16.7	40	143.46	18.4	10	76.62	26.0	---	---	---	**123**	**109.39**	**10.2**
Nonmotorized Boating[e]	4	39.55	3.4	4	18.09	7.1	26	134.84	26.0	45	112.12	18.0	3	41.08	8.6	3	73.42	0.5	**85**	**107.36**	**12.8**
Beach	12	52.22	13.8	10	13.08	4.4	26	80.66	15.0	20	57.81	15.7	---	---	---	---	---	---	**68**	**58.98**	**8.1**
Hiking	2	66.25	51.2	2	33.26	27.2	11	100.35	37.0	70	55.54	7.5	1	23.63	---	---	---	---	**86**	**60.63**	**7.9**
Big Game Hunting[f]	57	73.11	7.4	90	55.81	3.5	77	66.47	5.2	171	78.91	5.0	7	184.98	42.3	57	50.70	8.4	**459**	**69.69**	**2.8**
Small Game Hunting[f]	9	31.09	10.5	3	48.71	27.2	1	179.39	---	34	72.94	14.8	6	74.08	11.1	17	8.58	0.9	**70**	**52.51**	**8.3**
Waterfowl Hunting[f]	17	39.45	6.0	26	31.76	3.3	30	60.95	8.8	31	58.10	10.4	7	131.20	6.6	19	16.33	0.8	**130**	**48.88**	**4.0**
Motorized Boating	7	95.20	19.5	32	30.84	6.3	15	24.3	4.6	20	48.55	20.3	1	31.32	---	---	---	---	**75**	**40.27**	**6.7**
Mountain Biking	---	---	---	---	---	---	1	57.05	---	15	180.67	36.2	---	---	---	---	---	---	**16**	**172.95**	**34.7**
Off-road Vehicle	---	---	---	---	---	---	6	30.39	6.0	6	42.02	5.7	1	28.91	---	---	---	---	**13**	**35.64**	**4.0**
Picnicking	5	5.79	0.9	1	10.86	---	4	44.55	12.6	8	19.06	1.9	1	22.74	---	---	---	---	**19**	**20.70**	**4.1**
Rock Climbing	1	60.36	---	---	---	---	3	177.70	33.8	6	34.63	4.0	4	11.50	0.8	---	---	---	**14**	**60.52**	**18.5**
Sightseeing	---	---	---	2	30.88	9.3	6	61.94	27.6	12	44.28	11.9	2	22.92	4.4	---	---	---	**22**	**45.94**	**9.8**
Swimming	2	30.16	17.9	1	20.09	---	2	13.75	3.4	8	28.88	7.2	1	28.45	---	---	---	---	**14**	**26.24**	**4.7**

Activity	Northeastern U.S.[b]			Midwestern U.S.[b]			Southern U.S.[b]			Western U.S.[b]			Multiple Regions, U.S.[b]			Canada			Total		
	n	Mean	se[c]	n	Mean	se	n	Mean	se	n	Mean	se	n	Mean	se	n	Mean	se	n	Mean	se
Wildlife Viewing[g]	47	54.12	6.4	50	39.06	2.6	80	55.26	6.4	91	63.99	6.3	14	38.30	8.1	42	12.15	2.4	**324**	**48.72**	**2.8**
General Recreation[h]	---	---	---	14	154.26	25.7	36	56.96	12.6	83	31.97	4.2	---	---	---	13	8.05	0.5	**146**	**47.73**	**5.5**
Other Recreation[i]	4	34.62	10.8	4	25.85	5.0	8	59.73	19.2	64	33.25	6.5	13	27.82	4.3	---	---	---	**93**	**34.51**	**4.9**
Total	**350**	**54.04**	**2.5**	**436**	**44.03**	**2.4**	**564**	**66.08**	**3.1**	**1086**	**69.34**	**2.3**	**95**	**61.92**	**6.6**	**172**	**26.30**	**3.2**	**2703**	**59.60**	**1.3**

[a]Use value estimates are standardized to per person per day and adjusted to 2010 USD using U.S. consumer price index; Canadian estimates are adjusted to U.S. dollars using the current exchange rate at time of study. Use estimates measure access value and not marginal changes in site quality or condition. Estimates >$500 per person per day or identified as bad estimates by the authors of primary studies were removed from the database.

[b]Regions are defined as U.S. Census regions. Multiple regions or U.S. are studies with scope of multiple Census regions or national.

[c]Standard errors may be used to calculate 95% confidence intervals about the mean values as approximately: mean +/- 2* se.

[d]Freshwater and saltwater fishing values are not distinguished by resource type or primary species. See the database and study documents for more details regarding freshwater and saltwater fishing studies and values. See the database and study documents for more details regarding nonmotorized boating.

[e]Nonmotorized boating includes whitewater rafting/kayaking, canoeing, and rowing.

[f]Hunting values are not distinguished by resource type or primary species. See the database and study documents for more details regarding hunting values.

[g]Wildlife viewing values are not distinguished by resource type or primary species. See the database and study documents for more details regarding wildlife viewing values.

[h]General recreation is defined as primary studies that do not identify a primary activity.

[i]Other recreation is defined as activities with few primary studies, including cross-country skiing, downhill skiing, snowmobiling, snowboarding, shellfishing, jet skiing, scuba diving, snorkeling, water skiing, windsurfing, family gathering, horseback riding, jogging/running, walking, nature study, photography, gathering forest products, visiting nature centers, visiting arboretums, visiting historic sites, visiting prehistoric sites, and visiting aquariums. See the database and study documents for more details regarding other recreation values.

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Measuring the Economic Value *of a* City Park System

THE TRUST *for* PUBLIC LAND

CONSERVING LAND FOR PEOPLE

Cover Photos: Scott Parker (left), Nita Winter (right)

Measuring the Economic Value *of a* City Park System

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Produced under a grant from
The Graham Foundation for Advanced Studies in the Fine Arts, Chicago

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Table of Contents

Introduction

Cities are economic entities. They are made up of structures entwined with open space.

Successful communities have a sufficient number of private homes and commercial and retail establishments to house their inhabitants and give them places to produce and consume goods. Cities also have public buildings—libraries, hospitals, arenas, city halls—for culture, health, and public discourse. They have linear corridors—streets and sidewalks—for transportation. And they have a range of other public spaces—parks, plazas, trails, sometimes natural, sometimes almost fully paved—for recreation, health provision, tourism, sunlight, rainwater retention, air pollution removal, natural beauty, and views.

In successful cities the equation works. Private and public spaces animate each other with the sum greatly surpassing the parts. In unsuccessful communities some aspect of the relationship is awry: production, retail, or transportation may be inadequate; housing may be insufficient; or the public realm might be too small or too uninspiring.

In 2003, The Trust for Public Land's Center for City Park Excellence gathered two dozen park experts and economists in Philadelphia for a colloquium to analyze how park systems economically benefit cities. Based on this conversation and subsequent consultation with other leading economists and academics, the center identified seven attributes of city park systems that provide economic value and are measurable.

Not every aspect of a park system can be quantified. For instance, the mental health value of a walk in the woods is not known, and there is no agreed-upon methodology for valuing the carbon sequestration value of a city park. But seven major factors—*property value, tourism, direct use, health, community cohesion, clean water, and clean air*—have been enumerated. While the science of city park economics is still in its infancy, TPL has worked to carefully consider and analyze these values. Our report sets forth a summary of this methodology.

Two of the factors provide a city with ***direct income*** to its treasury. The first factor is increased property tax from the increase in property value because of proximity to parks. (This is also called "hedonic value" by economists.) The second is increased sales tax on spending by tourists who visit primarily because of the city's parks. (Beyond the tax receipts, these factors also bolster the ***collective wealth*** of residents through property appreciation and tourism revenue.)

Three other factors provide city residents with ***direct savings.*** By far the largest amount stems from residents' use of the city's free parkland and free (or low-cost) recreation opportunities, which saves them from having to purchase these items in the marketplace. The second is the health benefit—savings in medical costs—due to the beneficial aspects of exercise in the parks. And the third is the community cohesion benefit of people banding together to save and improve their neighborhood parks. This "know-your-neighbor" social capital helps ward off antisocial problems that would otherwise cost the city more in police and fire protection, prisons, counseling, and rehabilitation.

The last two factors provide ***environmental savings.*** The larger involves water pollution reduction—the retention of rainfall by the park system's trees, bushes, and soil, thus cutting the cost of treating stormwater. The other concerns air pollution—the fact that park trees and shrubs absorb a variety of air pollutants.

In the following chapters, after describing the value factor and the rationale for calculating it, we provide a real-life example of the mathematical outcome, based on the first five test cases undertaken in this program—the cities of Washington, D.C., San Diego, Boston, Sacramento, and Philadelphia.

Peter Harnik
Director, Center for City Park Excellence
March 2009

Increasing Hedonic (Property) Value

More than 30 studies have shown that parks have a positive impact on nearby residential property values. Other things being equal, most people are willing to pay more for a home close to a nice park. Economists call this phenomenon "hedonic value." (Hedonic value also comes into play with other amenities such as schools, libraries, police stations, and transit stops. Theoretically, commercial office space also exhibits the hedonic principle; unfortunately, no study has yet been carried out to quantify it.)

Hedonic value is affected primarily by two factors: distance from the park and the quality of the park itself. While proximate value ("nearby-ness") can be measured up to 2,000 feet from a large park, most of the value is within the first 500 feet. In the interest of being conservative, we have limited our valuation to this shorter distance. Moreover, people's desire to live near a park depends on characteristics of the park. Beautiful natural resource parks with great trees, trails, meadows, and gardens are markedly valuable. Other parks with excellent recreational facilities are also desirable (although sometimes the greatest property value is a block or two away if there are issues of noise, lights, and parking). Less attractive or poorly maintained parks are only marginally valuable. And parks with frightening or dangerous aspects can reduce nearby property values.

Determining an accurate park-by-park, house-by-house property value for a city is technically feasible but prohibitively time-consuming and costly. Therefore, we formulated a methodology to arrive at a reasonable estimate. Computerized mapping technology known as Geographic Information Systems (GIS) was used to identify all residential properties within 500 feet of every significant park. ("Significant" is defined as one acre or more; "park" includes every park in the city, even if owned by a county, state, federal, or other public agency.)

Coleen Gentles

Meridian Hill Park in Washington, D.C. provides extra value to the thousands of dwelling units surrounding it, and to the city itself through higher property tax receipts.

Unfortunately, because of data and methodology problems, it is difficult to determine exactly which of a city's parks confer "strongly positive," "slightly positive," and "negative" value to surrounding residences. Research into quantifying park quality continues; in the interim we have chosen to assign the conservative value of 5 percent as the amount that parkland adds to the assessed value of all dwellings within 500 feet of parks. (The preponderance of studies has revealed that excellent parks tend to add 15 percent to the value of a proximate dwelling; on the other hand, problematic parks can subtract 5 percent of home value. Taking an average of this range yields the 5 percent value that will be used until a park quality methodology can be established.)

Once determined, the total assessed value of properties near parks is multiplied by 5 percent and then by the tax rate, yielding the increase in tax dollars attributable to park proximity.

PARK VALUE IN ACTION

Increasing Property Values in Washington, D.C.

The most famous park in Washington, D.C. may be the National Mall with its museums and government agencies, but it is the many other parks—from huge Rock Creek Park to tiny Logan Circle, the ones surrounded by homes—that provide the city with the greatest property value benefit.

The city's abundance of green has placed much of Washington's real estate either directly abutting or within a stone's throw of a park. This makes it convenient for the capital's denizens to toss a ball around, enjoy a picnic, or just get a pleasurable view. The city's coffers are also reaping the benefits.

Getting to this number is fairly straightforward. Using GIS in combination with the city's assessment data, we find that the value of all residential properties (apartments, condominiums, row houses, and detached homes) within 500 feet of a park is almost $24 billion (in 2006 dollars). Using an average park value benefit of 5 percent, we see that the total amount that parks increased property value is just under $1.2 billion. Using the effective annual tax rate of 0.58 percent, we find that Washington reaped an additional $6,953,377 in property tax because of parks in 2006.

The Hedonic (Property) Value of Washington, D.C.'s Parks	
Value of properties within 500 feet of parks	$23,977,160,000
Assumed average value of a park	5%
Value of properties attributed to parks	**$1,198,858,025**
Effective annual residential tax rate	0.58%
Annual property tax capture from value of property due to parks	**$6,953,377**
Property values were obtained from the District of Columbia	

Income from Out-of-Town Park Visitor Spending (Tourists)

Though not always recognized, parks play a major role in a city's tourism economy. Some such as Independence National Historic Park in Philadelphia, Central Park in New York, Millennium Park in Chicago, or Balboa Park in San Diego are tourist attractions by themselves. Others are simply great venues for festivals, sports events, even demonstrations. Read any newspaper's travel section and you'll usually see at least one park among the "to see" picks.

Calculating parks' contribution requires knowing the number of park tourists and their spending. Unfortunately, most cities have little data on park visitation or visitor origin. (By definition, local users are not tourists—any spending they do at or near the park is money not spent locally somewhere else, such as in their immediate neighborhood.) Sometimes there are tourism numbers for one particularly significant park, but it is not possible to apply these numbers to the rest of the city's parks. To get around these missing data, visitation numbers and expenditures from other sources must be obtained and then used to make an educated guess about trips that are taken entirely or substantially because of parks or a park.

First, we estimate the number of park tourists. Then we reduce this to an estimate of the number of park tourists who came *because* of the parks. After dividing that number into day visitors (who spend less) and overnighters (who spend more), we multiply these numbers by the average spending per tourist per day (a figure that is usually well known by the local convention and visitors bureau). Finally, tax revenue to the city can be estimated by multiplying park tourism spending by the tax rate.

Jon Sullivan (www.pdphoto.org)

Beautiful Balboa Park—with its zoo, botanical gardens, numerous museums, sports fields, and public events—is the single biggest tourist attraction in San Diego.

PARK VALUE IN ACTION

Stimulating Tourism in San Diego

A visit to San Diego is not complete if it doesn't include a park—whether that's a beach, a harbor park, Old Town State Park, Mission Bay, or 1,200-acre Balboa Park. In fact, when the *New York Times* featured San Diego in its "36 Hours" travel series, it mentioned all of the above places. The role of parks in the city's tourism economy is huge.

Spending by Tourists Who Came Because of Parks, San Diego, 2006	
Overnight Visitors	
Overnight visitors to San Diego	16,050,000
Overnight visitors who visited parks (20%*)	3,210,000
Estimated 26%* who visited *because* of parks	834,600
Spending per overnight visitor per day	$107
Spending of overnight visitors because of parks	**$87,302,200**
Day Visitors	
Overnight visitors to San Diego	11,874,000
Overnight visitors who visited parks (20%)	2,374,800
Estimated 22% who visited because of parks	522,456
Spending per day visitor per day	$48
Spending of day visitors because of parks	**$25,077,888**
Total Spending (overnight and day visitors)	**$114,380,088**
Sales, meal, and hotel taxes (7.5% average) on park tourist spending	**$8,578,507**
Net profit (35% of tourist spending)	**$40,033,031**
*San Diego Convention and Visitors Bureau and California Travel and Tourism Commission, 2006.	

According to data from the San Diego Convention and Visitors Bureau (CVB), the California Travel and Tourism Commission, and a telephone survey by the Morey Group, an estimated 20 percent of tourists visited a park while in San Diego in 2007. The phone survey further revealed that 22 percent of San Diego park visitors came *because* of the parks. (Using this methodology assures that the count did not include the many tourists who came to San Diego for other reasons and happened to visit a park without planning to do so.) The conclusion was that just under 5 percent of San Diego tourism in 2007 was due to the city's parks—835,000 overnighters and 522,000 day visitors.

Knowing the average daily spending level of those tourists—$107 per overnight visitor and $48 per day visitor—we determined that total park-derived tourist spending in 2007 came to $114.3 million. With an average tax rate on tourist expenditures of 7.5 percent, tax revenue to the city was $8,579,000. In addition, since economists consider that an average of 35 percent of every tourist dollar is profit to the local economy (the rest is the pass-through cost of doing business), the citizenry's collective increase in wealth from park-based tourism was $40,033,000.

Direct Use Value

While city parks provide much indirect benefit, they also provide huge tangible value through such activities as team sports, bicycling, skateboarding, walking, picnicking, benchsitting, and visiting a flower garden. Economists call these activities "direct uses."

Most direct uses in city parks are free of charge, but economists can still calculate value by knowing the cost of a similar recreation experience in the private marketplace. This is known as "willingness to pay." In other words, if parks were not available in a city, how much would the resident (or "consumer") pay in a commercial facility? (Thus, rather than income, this value represents *savings* by residents.)

The model used to quantify the benefits received by direct users is based on the "Unit Day Value" method developed by the U.S. Army Corps of Engineers. Park visitors are counted by specific activity, with each activity assigned a dollar value by economists familiar with prices in the private martketplace. For example, playing in a playground is worth $3.50. Running, walking, or in-line skating on a park trail is worth $4, as is playing a game of tennis on a city court. For activities for which a fee is charged, like golf or ice skating, only the "extra value" (if any) is assigned; that is, if a round of golf costs $20 on a public course and $80 on a private course, the direct use value of the public course would be $60. Under the theory that the second and third repetitions of a park use in a given period are slightly less valuable than the first (i.e., the child visiting a playground gets somewhat less value the seventh time in a week than the first), we modified the model with diminishing returns for heavy park users. (For example, playground value diminishes from $3.50 for the first time in a week to $1.93 for the seventh.) We also estimated an average "season" for different park uses to take into account reduced participation rates in the off-season. (Although some people are active in parks 365 days a year, we conservatively eliminated seasons when participation rates drop to low levels.) Finally, for the few activities for which a fee is charged, such as golf, ice skating, and the use of fields for team sports, we subtracted the per-person fee from the assumed value.

The number of park visits and the activities engaged in is determined through a professionally conducted telephone survey of city residents. Residents are asked to answer for themselves; for those adults

Boston Parks and Recreation Department

The Frog Pond in the Boston Common is but one of the numerous park facilities that provide Bostonians with hundreds of millions of dollars of direct use value.

with children under the age of 18, a representative proportion are also asked to respond for one of their children. (Nonresidents are not counted in this calculation; their value is measured through out-of-town tourist spending.)

While some might claim that direct use value is not as "real" as tax or tourism revenue, it nevertheless has true meaning. Certainly, not all park activities would take place if they had to be purchased. On the other hand, city dwellers do get pleasure and satisfaction from their use of the parks. If they had to pay and if they consequently reduced some of this use, they would be materially "poorer" from not doing some of the things they enjoy.

PARK VALUE IN ACTION

Providing Direct Use Value in Boston

When Frederick Law Olmsted designed the park system of Boston, he envisioned a series of places of respite accessible to all. No need to pay for a trip out to the countryside—the park system could provide that—and more—right near home. Today that vision lives on in Boston's 5,040 acres of parks and the pastimes these parks offer: jogging down the Commonwealth Avenue median and into Boston Common, spending a morning at the playground, watching a tennis match, birdwatching across 1,765 natural acres, attending a summer festival, enjoying lunch in Post Office Square, walking the trails of 527-acre Franklin Park, admiring the flowers of the Public Garden, or taking in movie night in Jamaica Pond Park.

These and many more "direct uses" were measured in a telephone survey of Boston residents and were then multiplied by a specific dollar value for each activity. Based on the level of use and those values, it was found that in 2006 Boston's park and recreation system provided a total of $354,352,000 in direct use value.

Shared Benefits: The Economic Value of Direct Use of Parks in Boston, 2006

Facility/Activity	Person-Visits	Average Value per Visit	Value ($)
General park use (playgrounds, trails, dog walking, picnicking, sitting, etc.)	76,410,237	$1.91	$146,230,236
Sports facilities use (tennis, team sports, bicycling, swimming, running, ice skating, etc.)	48,407,572	$3.05	$147,812,453
Special uses (golfing, gardening, festivals, concerts, attractions, etc.)	6,467,113	$9.33	$60,309,713
Totals	**131,284,922**		**$354,352,402**

Data were drawn from a telephone survey of 600 Boston residents.

Health Value

Several studies have documented the economic burden of physical inactivity. Lack of exercise is shown to contribute to obesity and its many effects, and experts call for a more active lifestyle. Recent research suggests that access to parks can help people increase their level of physical activity. The Parks Health Benefits Calculator measures residents' collective economic savings through the use of parks for exercise.

After identifying the common types of medical problems that are inversely related to physical activity, such as heart disease and diabetes, we created the calculator based on studies in seven different states that show a $250 cost difference between those who exercise regularly and those who don't. For people over the age of 65, the value is $500 because seniors typically incur two or more times the medical care costs of younger adults.

The key data input is the number of park users who indulge in a sufficient amount of physical activity to make a difference. (This is defined as "at least 30 minutes of moderate to vigorous activity at least three days per week.") To determine this number, we took a telephone park use survey of activities and age and eliminated low-heart-rate uses such as picnicking, sitting, strolling, and birdwatching. We also eliminated respondents who engage in strenuous activities but do so less than three times per week because they are not active enough for health benefit.

After obtaining the number (and age) of city dwellers engaged in strenuous park activities, we applied the multipliers (by age) and added the subtotals. The calculator makes one final computation, applying a small multiplier to reflect the differences in medical care costs between the city's region and the United States as a whole.

Sacramento Department of Parks and Recreation

With or without a stroller, a regular vigorous run can cut medical costs by an average of $250 a year. McKinley Park, Sacramento.

PARK VALUE IN ACTION

Promoting Human Health in Sacramento

Sacramento has 5,141 acres of parks that provide a multitude of ways to stay healthy. The city has 43 tennis courts, 101 baseball diamonds, 116 basketball hoops, 171 playgrounds, 78 soccer fields, 7 skate parks, 12 swimming pools, over 80 miles of trails, and many more facilities.

Using the Parks Health Benefits Calculator, we determined the medical savings realized by city residents because of park exercise and found that about 78,000 Sacramentans engage actively enough in parks to improve their health—72,000 of them under the age of 65 and about 6,000 older. Using the estimated dollar value attributable to those activities, we calculated the savings in 2007, which came to $19,872,000.

Health Care Savings: Physically Active Users of Sacramento Parks, 2007

Cost Description	Residents Physically Active in Parks*	Average Medical Cost Difference Between Active and Inactive Persons	Amount
Adult users under 65 years of age	71,563	$250	$17,890,750
Adult users 65 years of age and older	6,054	$500	$3,027,000
Subtotals combined	77,617	——	$20,917,750
Regional cost multiplier (based on statewide medical costs)			0.95
Total Value			**$19,871,863**

*People engaging in moderate, vigorous, or strenuous activity at least half an hour, three days per week

Community Cohesion

Numerous studies have shown that the more webs of human relationships a neighborhood has, the stronger, safer, and more successful it is. Any institution that promotes this kind of community cohesion—whether a club, a school, a political campaign, a religious institution, a co-op—adds value to a neighborhood and, by extension, to the whole city.

This human web, which Jane Jacobs termed "social capital," is strengthened in some cities by parks. From playgrounds to sports fields to park benches to chessboards to swimming pools to ice skating rinks to flower gardens, parks offer opportunities for people of all ages to interact, communicate, compete, learn, and grow. Perhaps more significantly, the acts of improving, renewing, or even saving a park can build extraordinary levels of social capital. This is particularly true in a neighborhood suffering from alienation partially due to the lack of safe public spaces.

While the economic value of social capital cannot be measured directly, it is instructive to tally the amount of time and money that residents devote to their parks. This can serve as a proxy. In cities with a great amount of social capital, park volunteers do everything from picking up trash and pulling weeds to planting flowers, raising playgrounds, teaching about the environment, educating public officials, and contributing dollars to the cause.

To arrive at the number, all the financial contributions made to "friends of parks" groups and park-oriented community organizations and park agencies are tallied. Also added up, through contacting each organization, are the hours of volunteer time donated to park organizations. This number is then multiplied by the value assigned to volunteerism by the national organization Independent Sector. (This value varies by year and by state.)

Philadelphia Department of Parks and Recreation

With more than 100 "friends of parks" groups, Philadelphia has few peers when it comes to park-based social capital.

PARK VALUE IN ACTION

Stimulating Community Cohesion in Philadelphia

Philadelphia parks have support galore. In fact, there are more than 100 "friends of parks" organizations. Two of them, the Philadelphia Parks Alliance and Philadelphia Green, operate on a citywide basis; the rest deal with individual parks.

This impressive web of formal and informal action greatly boosts the civic life of the city, and it is measurable economically. Using the "community cohesion" methodology, we tallied the financial contributions made to all these groups in 2007. Then we added up the total volunteer hours donated to parks and converted them to a dollar figure (at $18.17 per hour, the latest figure available for the state of Pennsylvania). Combining the two yielded a 2007 community cohesion value of $8,600,000.

Community Cohesion Value: Park Supporters in Philadelphia

Organization or Activity	Volunteer Hours	Value of Volunteer Hours*	Financial Contributions	Total
Fairmount Park Volunteers (54 friends groups)	154,209	$2,894,503	$3,318,713	$6,213,216
Independence National Historical Park	10,390	$195,017	——	$195,017
Pennsylvania Horticultural Society (52 friends groups)	65,052	$1,221,026	$694,680	$1,915,706
Other support groups, combined	452	$8,485	$267,961	$276,446
Total Value		**$4,319,031**	**$4,281,354**	**$8,600,385**

*Value of one hour of volunteer labor in Pennsylvania as determined by Independent Sector, 2005: $18.77.

Reducing the Cost of Managing Urban Stormwater

Stormwater runoff is a significant problem in urban areas. When rainwater flows off roads, sidewalks, and other impervious surfaces, it picks up pollutants. In some cases (cities with sewer systems that separate household sewage from street runoff), the polluted rainwater flows directly into waterways, causing significant ecological problems. In other cases (cities with combined household and street systems), the rainwater is treated at a pollution control facility, but larger storms dump so much water that the system is designed to overflow when capacity is exceeded, resulting in spillage of both rainwater and household sewage.

Parkland reduces stormwater management costs by capturing precipitation and/or slowing its runoff. Large pervious (absorbent) surface areas in parks allow precipitation to infiltrate and recharge the groundwater. Also, vegetation in parks provides considerable surface area that intercepts and stores rainwater, allowing some to evaporate before it ever reaches the ground. Thus urban green spaces function like ministorage reservoirs.

The Western Research Station of the U.S. Forest Service in Davis, California, developed a model to estimate the value of retained stormwater runoff due to green space in parks. First, land cover data are obtained through analysis of aerial photographs. This reveals forested as well as open grassy areas and also water surface; it also reveals impervious surfaces in parks—roadways, trails, parking lots, buildings, and hard courts.

Philadelphia Department of Parks and Recreation

With a wide vegetative buffer to catch runoff, Pennypack Park helps reduce Philadelphia's stormwater management costs.

Second, the same photographs are then analyzed for the amount of perviousness of the *rest* of a city—in other words, the city without its parkland and not counting surface water. (Pervious land in the city can consist of residential front and back yards as well as private natural areas such as cemeteries, university quadrangles, and corporate campuses.)

Third, the amount and characteristics of rainfall are calculated from U.S. weather data. The model (which combines aspects of two other models developed by researchers with the U.S. Forest Service) uses hourly annual precipitation data to estimate annual runoff. By comparing the modeled runoff (with parks) and the runoff that would occur from a city the same size and level of development (i.e., with streets, rooftops, parking lots, etc. but without any parks), we can calculate the reduction in runoff due to parks.

The final step involves finding what it costs to manage each gallon of stormwater using traditional methods (i.e., "hard infrastructure" such as concrete pipes and holding tanks rather than parkland). By knowing this number and the amount of water held back by the park system, we can assign an economic value to the parks' water pollution reduction.

PARK VALUE IN ACTION

Cutting Stormwater Costs in Philadelphia

Philadelphia's 10,334-acre park system is one of the oldest in the country, and it provides more than seven acres of parkland for every 1,000 residents. About 12 percent of the city is devoted to parkland, and the water retention value of the trees, grass, riparian corridors, and plants significantly reduce the amount (and cost) of runoff entering the city's sewer system.

Philadelphia's parkland is 81.3 percent pervious. The rest of the city is 34.9 percent pervious. Philadelphia receives an average of 43.29 inches of rain per year (with the characteristic mid-Atlantic mix of drizzles, showers, and downpours). The model developed by the Forest Service shows that Philadelphia's parks reduced runoff in 2007 by 496 million cubic feet compared with a scenario in which the city had no parks. It is estimated that Philadelphia stormwater management cost is 1.2 cents ($0.012) per cubic foot.

Thus, the park system provided a stormwater retention value of $5,949,000 in 2007.

Stormwater Costs in Philadelphia per Cubic Foot	
Rainfall on impervious surface	8,667,269,456 cu. ft.
Annual expenditure on water treatment	$100,000,000
Cost per cubic foot	**$0.012**

Cost Savings Due to Runoff Reduction: Philadelphia's Parks	
Results for Typical Year – 43.29 inches of rainfall	**Cubic Feet**
Annual rainfall over Entire City of Philadelphia	1,623,928,386
Amount of actual runoff from parks (81.3% perviousness)	168,480,901
Runoff if parks didn't exist and if that acreage were of the same permeability as rest of city (34.9% perviousness)	664,198,620
Reduction in runoff due to parkland's perviousness	495,717,719
Estimated stormwater costs per cubic foot	$0.012
Total savings due to park runoff reduction	**$5,948,613**

Removal of Air Pollution by Vegetation

Air pollution is a significant and expensive urban problem, injuring health and damaging structures. The human cardiovascular and respiratory systems are affected, and there are broad consequences for health-care costs and productivity. In addition, acid deposition, smog, and ozone increase the need to clean and repair buildings and other costly infrastructure.

Trees and shrubs remove air pollutants such as nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone, and some particulates. Leaves absorb gases, and particulates adhere to the plant surface, at least temporarily. Thus, vegetation in city parks plays a role in improving air quality and reducing pollution costs.

In order to quantify the contribution of park vegetation to air quality, the Northeast Research Station of the U.S. Forest Service in Syracuse, New York, designed an air pollution calculator to estimate pollution removal and value for urban trees. This calculator, which is based on the Urban Forest Effects (UFORE) model of the U.S. Forest Service, is location-specific, taking into account the air pollution characteristics of a given city. (Thus, even if two cities have similar forest characteristics, the park systems could still generate different results because of differences in ambient air quality.)

First, land cover information for all of a city's parks is obtained through analysis of aerial photography. (While every city has street trees and numerous other trees on private property, only the trees on public parkland are measured.)

Then the calculator determines the pollutant flow through an area within a given time period (known as "pollutant flux"), taking into account concentration and velocity of deposition. The calculator also takes into account characteristics of different types of trees and other vegetation and seasonal leaf variation.

National Park Service

Washington, D.C.'s Rock Creek Park has more than 1,500 acres of trees that trap and absorb pollutants from the city's air.

The calculator uses hourly pollution concentration data from the U.S. Environmental Protection Agency. The total pollutant flux is multiplied by tree-canopy coverage to estimate pollutant removal. The monetary value is estimated using the median U.S. externality value for each pollutant. (The "externality value" refers to the amount it would otherwise cost to prevent a unit of that pollutant from entering the atmosphere. For instance, the externality value of a short ton of carbon monoxide is $870; the externality value of the same amount of sulfur dioxide is $1,500.)

PARK VALUE IN ACTION

Cutting Air Pollution Costs in Washington, D.C.

The trees of Washington, D.C., are the city's lungs, inhaling and exhaling the air flowing around them.

Beyond the famous Japanese cherry trees around the Tidal Basin, the stately elms gracing the Reflecting Pool, and massive oaks of Lafayette Park, there are 4,839 acres of general tree cover in the city's 7,999 acres of parkland. Their aesthetic value is not countable, but the value of the air pollution they extract is. The Air Quality Calculator determined that they removed 244 tons of carbon dioxide, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide in 2005. Based on the dollar values assigned to these pollutants, the savings was $1,130,000.

Air Pollution Removal Value of Washington D.C.'s Parks, 2005

Pollutant Type	Tons of Pollutant Removed*	Dollars Saved per Ton Removed	Total Pollutant Removal Value
Carbon dioxide	10.4	$870	$9,089
Nitrogen dioxide	43.7	$6,127	$267,572
Ozone	83.7	$6,127	$512,771
Particular matter	70.3	$4,091	$287,709
Sulfur dioxide	35.5	$1,500	$53,246
Total	**243.6**	——	**$19,871,863**

*Based on the city's 60.5% tree cover (4,839 acres) of 7,999 acres total parkland.

Conclusion

While reams of urban research have been carried out on the economics of housing, manufacturing, retail, and even the arts, there has been until now no comprehensive study of the worth of a city's park system. The Trust for Public Land believes that answering this question—"How much value does an excellent city park system bring to a city?"—can be profoundly helpful to all the nation's urban areas. For the first time, parks can be assigned the kind of numerical underpinning long associated with transportation, trade, housing, and other sectors. Urban analysts will be able to obtain a major piece of missing information about how cities work and how parks fit into the equation. Housing proponents and others may be able to find a new ally in city park advocates. And mayors, city councils, and chambers of commerce may uncover solid justification to strategically acquire parkland in balance with community development projects.

Determining the economic value of a city park system is a science still in its infancy. Much research and analysis lie ahead. And cities themselves, perhaps in conjunction with universities, can help greatly by collecting more specific data about park usership, park tourism, adjacent property transactions, water runoff and retention, and other measures. In fact, every aspect of city parks—from design to management to programming to funding to marketing—would benefit from deeper analysis. In that spirit this report is offered: for the conversation about the present and future role of parks within the life and economy of American cities.

Appendix 1
Acknowledgments

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Appendix 2
Colloquium Participants

The following individuals took part in the colloquium "How Much Value Does a Park System Bring to a City" in Philadelphia in October 2003.

Susan Baird	Denver Department of Parks and Recreation	Denver
Kathy Blaha	The Trust for Public Land	Washington, D.C.
Blaine Bonham	Pennsylvania Horticultural Society	Philadelphia
Glenn Brill	Ernst & Young	New York
Valerie Burns	Boston Natural Areas Network	Boston
Patrice Carroll	Philadelphia Managing Director's Office	Philadelphia
Donald Colvin	Indianapolis Department of Parks and Recreation	Indianapolis
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Nancy Goldenberg	Philadelphia Center City Partners	Philadelphia
Peter Harnik	The Trust for Public Land	Washington, D.C.
Nancy Kafka	The Trust for Public Land	Boston
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Patrice Todisco	Boston GreenSpace Alliance	Boston
Susan Wachter	University of Pennsylvania	Philadelphia
Guijing Wang	Centers for Disease Control	Atlanta
Richard Weisskoff	Everglades Economics Group	North Miami
Wayne Weston	Mecklenburg Parks and Recreation Department	Charlotte, North Carolina
Jennifer Wolch	University of Southern California	Los Angeles
Kathleen Wolf	University of Washington	Seattle
Matt Zieper	The Trust for Public Land	Boston

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Greater Los Angeles County
Integrated Regional Water Management Plan

The Greater Los Angeles County Open Space for Habitat and Recreation Plan

(Integrated Regional Water Management Plan Update – 2012)

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LIST OF ACRONYMS AND ABBREVATIONS

AF	acre-feet
AF/yr	acre-feet/year
ASBS	Areas of Special Biological Significance
BMP	best management practices
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CRAM	California Rapid Assessment Methodology
CWA	Clean Water Act
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
GLAC	Greater Los Angeles County
Hazus	a geographic information system-based natural hazard loss estimation software package developed and freely distributed by FEMA.
HCP	Habitat Conservation Plan
HEP	Habitat Evaluation Procedures
HGM	Hydrogeomorphic Wetland Assessment Model
IBI	Index of Biological Integrity
IPCC	Intergovernmental Panel on Climate Change
IRWMP	Integrated Regional Water Management Plan
LSGLA	Lower San Gabriel and Los Angeles River Subregion
MPA	Marine Protected Area
NCCP	Natural Communities Conservation Planning
NEPA	National Environmental Protection Act
NOAA	National Oceanic and Atmospheric Administration's National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System

LIST OF ACRONYMS AND ABBREVATIONS (CONTINUED)

NSMB	North Santa Monica Bay Subregion
NWI	National Wetlands Inventory
OSHARP	Open Space for Habitat and Recreation Plan
PDM	Post-Delisting Monitoring
Region	Greater Los Angeles County Region
RWQCB	Regional Water Quality Control Board
SAMP	Special Area Management Plans
SEA	Significant Ecological Area
SEATAC	Significant Ecological Area Technical Advisory Committee
SSMB	South Santa Monica Bay Subregion
TAR	Treatment Area Ratio
ULAR	Upper Los Angeles River Subregion
USACE	United States Army Corp of Engineers
USFWS	United States Fish and Wildlife Service
USGRH	Upper San Gabriel and Rio Hondo Subregion
WET	Wetlands Evaluation Technique

EXECUTIVE SUMMARY

The Greater Los Angeles County (GLAC) region is 2,058 square miles and is one of the most densely populated, highly urbanized, and biologically diverse areas of the United States. Natural open space systems provide habitat and recreation opportunities, as well as other important functions related to water supply, water quality, and other services including flood management and climate adaptation. As the region has grown, much of these natural systems have been lost or fragmented.

The goal of the Open Space for Habitat and Recreation Plan (OSHARP) planning process was to provide direction to reverse this trend to 1) include open space as a consideration in the development of water management projects, and 2) to inform water management project developers of certain aspects to enhance open space. The objective is to provide a comprehensive regional framework for incorporating open space, both habitat and recreation, into project design features.

The OSHARP builds on information provided in the 2006 Greater Los Angeles County Integrated Regional Management Plan (IRWMP) and other significant regional planning efforts. It was developed through collaboration with key agency stakeholders throughout the GLAC Region, including the Los Angeles County Flood Control District, the Council for Watershed Health, the Santa Monica Bay Restoration Commission, and various City, County, and State agencies that serve on the IRWMP Habitat and Open Space Subcommittee.

This planning effort continued to recognize the five subregional IRWMP watershed planning areas established by the 2006 IRWMP. The subregions are as follows:

- North Santa Monica Bay Watershed (NSMB)
- Upper Los Angeles River Watershed (ULAR)
- Upper San Gabriel River and Rio Hondo Watersheds (USGRH)
- Lower San Gabriel River and Los Angeles River Watersheds (LSGLA)
- South Santa Monica Bay Watershed (SSMB)

<u>Open Space Continuum</u>

Open space encompasses a continuum of uses from natural resource lands to urban parks. The habitat continuum extends from upland areas to riparian and freshwater wetland areas to

coastal tidal wetlands, while the recreation continuum extends from natural open space areas to greenways to park and recreation areas.

By viewing open space habitat and recreation as a continuum that changes with the needs of the region, multiple options can be considered in determining how these elements can work together and complement each other in meeting the other IRWMP objectives for water supply, water quality, and flood management. To develop targets, criteria, and methodologies, the Open Space Team first looked at the interconnectivity of open space throughout the region as a whole and then looked at each of the subregions.

In the foothill cities, open space is differentiated from developed urban parklands and focuses on natural, undeveloped lands that have been designated as environmentally and ecologically significant. On the other hand, for the more urbanized areas of Los Angeles County or cities that are built out and contain little or no undeveloped or undisturbed lands, open space emphasizes urban lands used for recreation. These lands include neighborhood and community parks, sports fields, school facilities, greenways, bikeways, green streets, medians, utility easements, etc.

Open Space and Habitat

Southern California, along with the entire GLAC Region is an area rich in natural resources. Due the scale of the threat to its biodiversity, many scientists, including noted biologist E.O. Wilson, have designated it as a "biological hotspot." The objectives and targets for habitat seek to protect and restore these valuable natural resources in the context of water supply and management.

The objectives of the Open Space and Habitat section of the Plan are to increase the number of viable wetlands within the region, to provide adequate buffers along aquatic systems, and to create wildlife linkages using riparian corridors and less densely populated hillsides. In addition, the establishment of wildlife linkages, allowing species to migrate as conditions change, will help address the effects of climate change.

Wetlands

To simplify the presentation of wetland planning targets, wetlands, as defined ecologically based on the National Wetlands Inventory, were classified into three general categories: (1) tidal wetlands, (2) freshwater wetlands, and (3) riverine (or riparian) wetlands. Three distinct types of wetland habitat targets were developed: (1) protection of existing wetland habitat, (2) enhancement of existing wetland habitat, and (3) restoration or creation of

wetland habitat. For the GLAC Region, the total wetland area to be benefited by protection, enhancement, restoration or creation is 12,000 acres.

Uplands

Protection of water-dependent or wetland resources depends not only on managing the systems themselves, but also providing buffers to these systems and linkages through the landscape. Therefore, the provision of upland buffers and habitat linkages is important to maintaining habitat diversity. The targets for upland habitat acquisition and/or restoration were developed using Buffers and Buffer Zones (50 to 300-foot wide areas adjoining a wetland) and Wildlife Linkages or Corridors (wide areas of native vegetation that connects two or more large blocks of habitat). Targets are based on the acquisition and/or restoration of these two features. Targets for total potential linkage and buffer areas within the GLAC Region are 54,000 acres.

Open Space and Recreation

Over 9,000,000 people who live within the GLAC Region have access to more than 2,000 park and open space areas totaling 101,000 acres. In addition, there are almost 300,000 acres of public multi-use lands in the Angeles National Forest.

While there are many opportunities for recreation in the region, the recreation demand exceeds the supply. Recreation ranges from highly structured parks and recreation sites within communities, to regional parks that may offer developed active and undeveloped passive uses, to natural habitat and wildlands that contain trail-related hiking, biking, and equestrian uses, as well as outdoor/environment education opportunities. Three general recreation objectives were established to guide targets:

- Assist in providing urban neighborhood and community park areas that are accessible to underserved populations (and disadvantaged communities) based on average of 4 acres per thousand population.
- Enhance existing and planned greenways and regional trails within open space areas with outdoor recreation and environmental educational opportunities.
- Create or assure the preservation of 6 acres of open space lands per 1000 population that are available for passive public outdoor recreation and education purposes. These lands may incorporate: all or a portion of greenways; county, state, or national parks; US Forest Service lands; regional trails routes; and/or dedicated open space areas or any jurisdiction.

Based on existing standards, there is a need for approximately 16,500 acres of additional urban parkland (neighborhood and community parks). In addition, there is a need for approximately 30,000 to 45,000 acres of additional regional park and open space lands for recreation.

Open Space and Ecosystem Services

The benefits of open space lands within the region are extensive. In addition to water related management practices, there is a full range of societal and economic benefits attributable to open space. Ecosystem services provide one approach for framing the values and benefits of open space.

Ecosystem services within the GLAC Region include, but are not limited to, the following benefits:

- Providing Fresh Water
- Infiltration and Groundwater Recharge
- Water Conservation
- Improving Water Quality
- Flood Management
- Preserving Biodiversity
- Providing Carbon Management
- Providing Aesthetics
- Cultural Values

Open space from a habitat perspective allows people to fulfill their desire to be connected to nature. This connection contributes to a greater sense of community. Recreation occurring in open space areas, whether it is passive or active, improves physical health, mental health, social function and youth development and provides environmental and economic benefits to people and communities.

Surface and Groundwater Resources Management Benefits

There are benefits to both surface and groundwater resource management that can be quantified using project-specific methodology. This methodology has been applied at the regional level using the assumption that the targets for habitat and recreation will be

achieved. For example, there is an estimated potential to recharge an additional 28,000 acre feet of water per year on average and create 21,000 acre feet of storage for stormwater quality purposes throughout the GLAC Region if target habitat and recreation lands in areas with high recharge potential and/or poor water quality are developed or enhanced with stormwater Best Management Practices (BMPs).

Climate Benefits

The effects of climate change are wide-reaching and must be incorporated into long-term planning efforts. There are a number of strategies that can be implemented within the OSHARP that will mitigate the effects of climate change. Climate benefits include carbon storage and sequestration by natural habitats; providing additional local recreation areas and green travel routes to encourage walking and cycling; and, creating habitat connectivity through wildlife linkages, corridors, and buffers.

Evaluating Open Space Projects

An important component of the IRWMP is the application of scoring metrics to determine the suitability of proposed projects in meeting overall goals and objectives. Recommended criteria to evaluate proposed uplands, wetlands and recreation projects are included in the appendices and are based on the expertise of the Open Space Team, although the GLAC IRWMP Steering Committees will be guiding the scoring process as the final IRWMP is developed.

Opportunities and Challenges

One of the main benefits to including open space for habitat and recreation metrics in the IRWMP is the opportunity it creates for a more connected region. The OSHARP provides a mechanism for the County, cities, water resource agencies, conservancies, and stakeholders to work together to set region-wide goals and objectives. These goals and objectives can then be implemented at the subregional level through the IRWMP project grant program process.

The ability to form partnerships and collaborate to develop multi-purpose project and programs provides even greater opportunity to ensure the long-range success of the program. The 2006 IRWMP is considered a living document that will be reviewed and updated on a regular basis, which creates further opportunities to refine the criteria and targets developed during this planning effort as new information becomes available.

As with any undertaking that attempts to comprehensively address open spaces needs in a region the size of the GLAC there are challenges to be overcome. These include gaps in information, insufficient research, high levels of urbanization, and high land values. The OSHARP addresses these challenges by providing a series of recommendations, which if implemented over time will aid in achieving the targets.

Overall, one should be optimistic as challenges create opportunities. Judging from the level of participation throughout the development of the OSHARP, the support for open space and water resource management is comprised of a strong and vibrant network of committed public and private sector stakeholders.

Building Blocks for Solutions

The building blocks necessary to create solutions to the GLAC Region's open space habitat and recreation needs exist today.

Major topographic features in the region include the San Gabriel Mountains, Santa Monica Mountains, Verdugo Hills, San Jose Hills, Puente-Chino Hills, and Palos Verdes Peninsula. These mountains, hills, and peninsula define the San Fernando and San Gabriel Valleys.

The two largest watersheds of the region together drain 1,500 square miles and formed the Los Angeles basin. The Rio Hondo River hydrologically connects the two rivers. Other major watersheds in the region include Malibu Creek, Topanga Creek, Ballona Creek, and the Dominguez Channel. These rivers, watersheds and dozens of smaller rivers drain directly into Santa Monica or San Pedro Bay.

The diverse landscape, differences in climate, soils, and geology set the stage for a wide array of vegetation and wildlife. These regions' lagoons and freshwater marshes are especially important to over-wintering and migratory song birds and waterfowl in the Pacific Flyway in addition to providing year round habitat to resident species.

Existing outdoor recreation opportunities total approximately 101,000 acres. In addition, there are almost 300,000 acres of public, multiple use lands in the Angeles National Forest.

This is just a summary of the natural capital available in the GLAC Region. The social capital available is as extensive and diverse as the natural capital and is reflected in the existing studies, plans, and reports consulted in the Technical Memorandum for the Integrated Regional Water Management Plan for the Greater Los Angeles County Region as well as the participation in the development of the OSHARP as described previously. Overall, there are thousands of dedicated individuals working to develop projects that

protect and increase the regions open space opportunities. The OSHARP provides a framework to realize many of these opportunities and provides solutions to the GLAC Region's water supply and management needs.

1. INTRODUCTION

1.1 Background/Purpose

1.1.1 Overview of Integrated Regional Water Management Plan for the Greater Los Angeles County

The purpose of the 2006 Integrated Regional Water Management Plan (IRWMP) is to define a clear vision and direction for the sustainable management of water resources in the Greater Los Angeles County (GLAC). The plan provides a framework for the development of solutions that meet regional planning targets while integrating projects into other important issues that make up the urban context of the GLAC Region, including transportation, public education, land use, economic development, and quality of life. It also identifies the costs and benefits of those solutions to aid the GLAC in securing funding for the projects, both locally and with partners outside the region.

The IRWMP incorporates the following objectives to identify water resource management issues, increase the region's ecosystem services, and meet future water supply needs:

- Improve water supply
- Improve water quality
- Enhance open space for habitat and wildlands
- Enhance open space for recreation and greenways
- Sustain flood management

1.2 IRWMP Planning Areas

1.2.1 The Region

Given the size and complexity of the GLAC Region and the number of stakeholders and agencies, five subregional planning areas were established generally based on the watershed approach (Greater Los Angeles County Integrated Water Management Plan Region Acceptance Process Application, April 28 2009). Shown in Figure 1, the subregions are as follows:

1. North Santa Monica Bay Watersheds
2. Upper Los Angeles River Watersheds

3. Upper San Gabriel River and Rio Hondo Watersheds
4. Lower San Gabriel and Los Angeles Rivers Watersheds
5. South Santa Monica Bay Watersheds

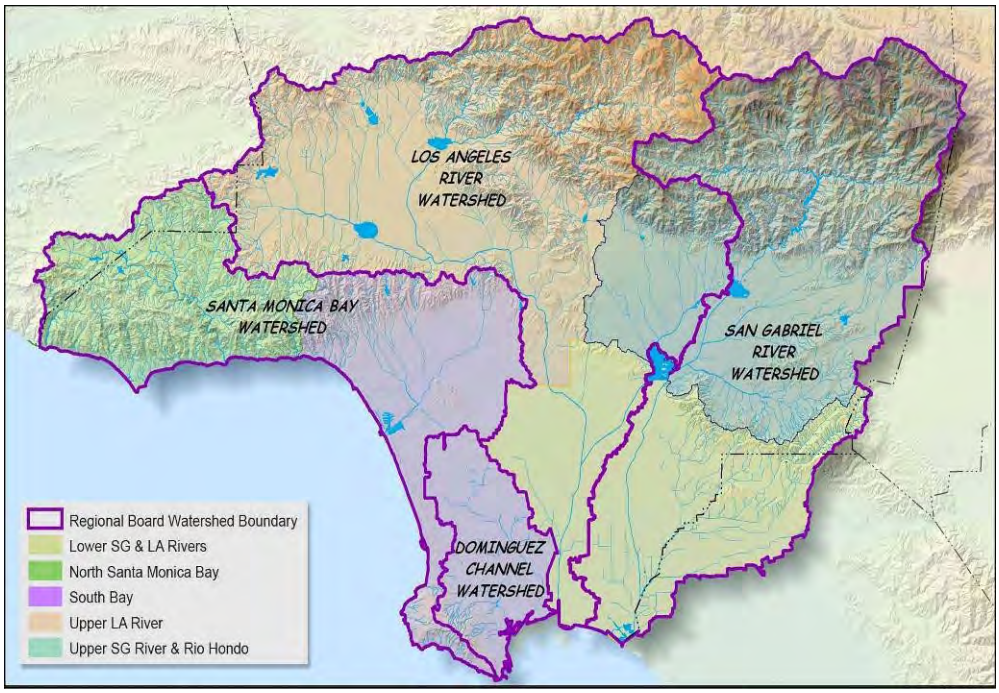

Figure 1. GLAC Subregional and Watershed Boundaries

1.3 2012 IRWMP Update

1.3.1 Living Document

The IRWMP is a living document. It is not intended to be filed away on a shelf, but rather to serve as the catalyst for solutions that can be implemented throughout the GLAC subregions.

The document is also intended to be reviewed regularly and updated as new information, technologies, and data become available.

1.3.2 IRWMP Planning Grant

The California Department of Water Resources (DWR) IRWM Program was created to encourage integrated regional strategies for managing water resources and to provide funding for both planning and implementation of projects that support management of water supply, water quality, environmental interests, drought protection, flood protections, and reduction of dependence on imported water. The current GLAC IRWM Plan was adopted in 2006.

In September 2010, the GLAC Region applied for $1,000,000 in Proposition 84 Planning Grant funds from DWR and on April 11, 2011, was awarded this sum. Funds from this grant are being used to update and expand the 2006 IRWMP.

1.3.3 Open Space Planning

One of the principal goals of the grant application was to develop a long-term open space vision for the GLAC Region that is supported by a clear rationale and based on available science.

The GLAC IRWMP Planning Grant Application stated that previous open space planning in the region had not been comprehensive. Instead it had focused on a geographic perspective and was often limited to specific areas or resources (e.g. the National Forest or coastal wetlands). The IRWMP open space planning effort is more comprehensive and addresses habitat conservation and restoration, human recreation, and water management in and around the urbanized areas at the scale of the GLAC IRWMP Region.

1.3.4 Landscape Scale Approach

To address the need to provide a comprehensive strategy for open space planning in the context of water resource management, the GLAC Open Space for Habitat and Recreation Plan (OSHARP) uses a landscape-scale approach to identifying opportunities to enhance aquatic and upland resources, improve planning for recreational opportunities, and facilitate the continuation of valuable ecosystem and cultural services across the region.

1.3.5 Open Space for Habitat and Recreation Plan (OSHARP) Component to the IRWMP

As stated earlier, developing the OSHARP is part of the 2011-2013 IRWMP revision process. As mentioned in the GLAC IRWMP grant application, previous open space

planning has not been comprehensive. The OSHARP provides an opportunity to integrate open space resource management into the regional water management solutions.

To integrate habitat and recreation and other recognized ecosystem services into a comprehensive framework, the current OSHARP builds on information provided in the 2006 IRWMP and other significant regional planning efforts.

By understanding how habitat and recreation support water quality and water supply and developing opportunities to incorporate the targets into the design of projects, the habitat and recreation objectives of the IRWMP can be realized. This will aid individual agencies, cities, and subregions in effectively implementing projects and programs that address more than one of the identified water management strategies.

1.4 Significant Regional Planning Efforts

In preparation for OSHARP, many regional Los Angeles County planning efforts were examined. Appendix A, Planning Documents Reviewed, details the projects, studies, and reports that were reviewed for references to watershed issues and habitat linkages.

The OSHARP report was developed through collaboration with key agency stakeholders throughout the GLAC Region, including the Council for Watershed Health, Santa Monica Bay Restoration Commission (see Table 1) and various city and county agencies, who comprised the IRWMP Habitat and Open Space Subcommittee. This collaboration occurred primarily through monthly subregional meetings, as well as four Habitat and Open Space Subcommittee meetings that were held at the Los Angeles River Center on the following dates: September 27, 2011; November 14, 2011; December 21, 2011; and April 23, 2011. During these meetings, OSHARP targets were developed through an iterative process, with targets presented and subsequent meetings used to further refine target methodology based on input from previous meetings. Subcommittee involvement also included additional in-person or phone meetings as requested by individual stakeholders, as well as email correspondence, to discuss methodology details. The OSHARP draft was released on April 6, 2012 to the subcommittee for comment. Comments were received from multiple stakeholders throughout the GLAC Region, which were incorporated into the final version of the report.

Table 1. List of Participating Agencies/Groups and Representative(s)

Organization	Representative
Army Corps of Engineers	Erin Jones
Arroyo Seco Foundation	Meredith McKenzie Tim Brick
Cities of Agoura Hills and Westlake Village	Joe Bellomo
City of Los Angeles Planning	Claire Bowin
City of Malibu	Barbara Cameron
Council for Watershed Health	Blake Whittington Nancy Steele
Los Angeles County	Timothy Pershing
Los Angeles County Flood Control	Phil Doudar Russ Bryden Rochelle Paras
Los Angeles County Parks and Recreation	Camille Johnson Norma Garcia
Las Virgenes Municipal Water District	Jan Dougall Randal Orton
Mountains Recreation and Conservation Authority	Dash Stolarz
Mountains Restoration Trust	Jo Kitz
Palos Verdes Peninsula Land Conservancy	Andrea Vona
Resource Conservation District of the Santa Monica Mountains	Clark Stevens Melina Watts
Rivers and Mountains Conservancy	Belinda Faustinos Mark Stanley Marybeth Vergara
Regional Water Quality Control Board	Shirley Birosik
Santa Monica Bay Restoration Commission	Shelley Luce
State Water Resources Control Board	Guangyu Wang
Tree People	Rebecca Drayse

2. THE OPEN SPACE CONTINUUM (NATURAL RESOURCE LANDS TO URBAN PARKS)

For general planning purposes, the definition of open space is "any parcel or area of land or water that is essentially unimproved and devoted to an open space use for the purposes of (1) the preservation of natural resources, (2) the managed production of resources, (3) outdoor recreation, or (4) public health and safety."[1] See Figure 2 for a visual description of the environmental Open Space Continuum from the region's mountains to the coast.

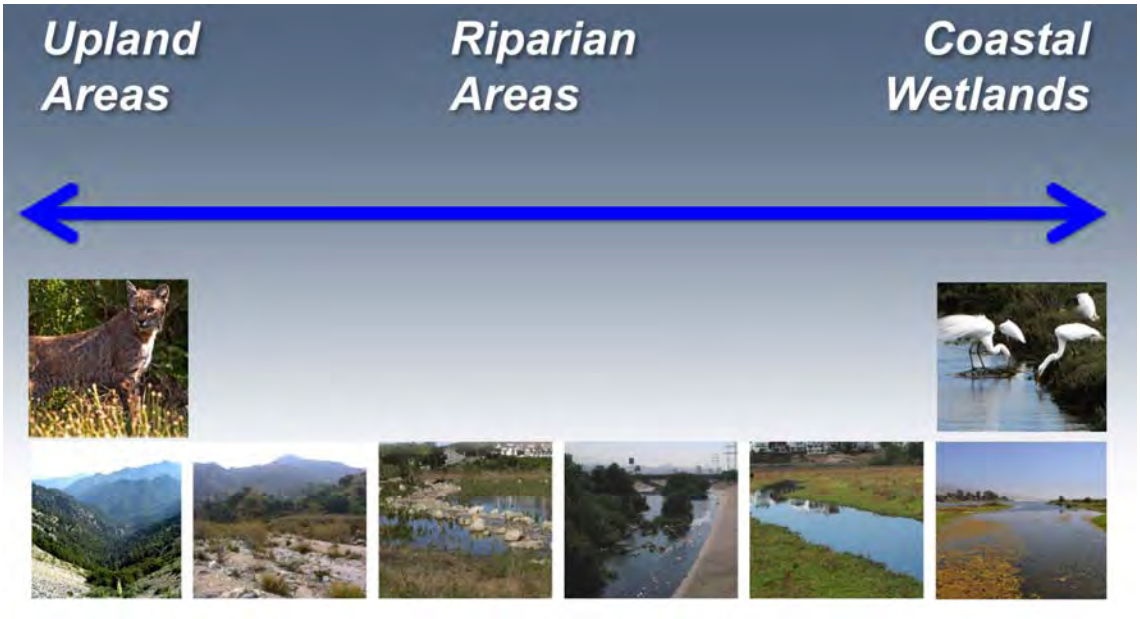

Figure 2. The Open Space Continuum – From Uplands to the Coast

From a planning perspective, open space conservation is typically addressed through state-required open space and conservation elements of General Plans. As a practical matter, the definition of open space is defined based on the community values of the individual jurisdiction and is therefore interpreted fairly widely by Los Angeles County and the 90 cities within the GLAC Region. The variations between jurisdictions are generally due to the

[1] State of California, Governor's Office of Planning and Research. *State of California General Plan Guidelines*. 2003.

interpretation of the phrase "essentially undeveloped," a relative term. See Figure 3 below for a visual description of the recreational Open Space Continuum.

Figure 3. The Open Space Continuum – From Regional Lands to Urban Parks

For the foothill cities, open space is differentiated from developed urban parklands and focuses on natural undeveloped lands that have been designated as environmentally and ecologically significant as wildlife habitat areas and corridors, or areas that provide a visual backdrop and amenity. These lands often include substantial hillside areas and canyons and may include rural and agricultural lands. Open space in these instances applies to land that is typically publicly owned, though not always, and in some instances public access may be restricted.

The definition of open space as used by the State of California for the preparation of General Plans provides a broad framework that includes many public benefits. Some open space benefits include:

- Habitat preservation and opportunities for restoration:
  - Ecosystem diversity and services
  - Wildlife corridor connectivity
  - Endangered species habitat
- Outdoor recreation opportunities:
  - Passive uses
  - Active uses
- Water supply:
  - Surface
  - Groundwater
- Water quality maintenance
- Air quality maintenance
- Historic and cultural resource protection
- Agricultural opportunity
- Forest management
- Scenic quality preservation
- Control of urban sprawl and associated benefits:
  - Community image / rural character
  - Ambient healthful living conditions
  - Reduced greenhouse gas emissions (air quality)
  - Quality of life

On the other hand, for the more urbanized areas of Los Angeles County or cities that are essentially built out and contain little or no undeveloped or undisturbed landscapes, such as Burbank, Gardena, or Compton, the expression of open space contained in their General Plans emphasizes urban lands used for recreation purposes. These lands include neighborhood and community parks and sports fields. Urban open spaces may even include public school facilities, greenways, bikeways, green streets and landscaped medians, open areas occupied by utilities such as flood control channels and utility easements, and private recreational facilities.

3. OPEN SPACE AND HABITAT

The GLAC Region is approximately 2,000 square miles located in coastal Southern California. The IRWMP project area is one of the most densely populated, highly urbanized, and biologically diverse areas of the United States. It is located within the Californian Floristic Province, which is a biodiversity hotspot. Designated a hotspot in 1996, it shares this distinction with 33 other places in the world.[2] Noted biologist E.O Wilson designated southern California as one of the world's eighteen "hotspots" – the only one in North America – because of the scale of the threat to its biodiversity. Climatically only two percent of the earth's surface has the Mediterranean-type climate found in southern California.

The study area is part of a complex landscape where the geomorphic provinces of the Transverse Ranges and Peninsular Ranges come together. Major topographic features in the region include the San Gabriel Mountains, Santa Monica Mountains, Verdugo Hills, San Jose Hills, Puente-Chino Hills, and Palos Verdes Peninsula. The mountains, hills, and peninsula define the San Fernando and San Gabriel Valleys and other portions of the Los Angeles basin and coastal plain.

The San Jose and Puente-Chino Hills contain relatively low density urban development as compared to the Los Angeles Basin and still retain areas with significant open space. Areas in the southern San Gabriel foothills are also developed at a lower density than the highly urbanized areas in the valleys and coastal plains. These foothills function as the urban/wildland interface and provide wildlife connections to river and stream corridors.

The two largest watersheds of the region are the San Gabriel River Watershed and the Los Angeles River Watershed. The San Gabriel River watershed drains 660 square miles and has its headwaters in the San Gabriel Mountains. The river reaches the Pacific Ocean at Los Alamitos Bay. The Los Angeles River watershed drains 830 square miles of land from the Santa Monica Mountains, the San Gabriel Mountains, and the Los Angeles basin, reaching the Pacific Ocean in Long Beach. These two rivers formed the Los Angeles basin, a large floodplain and alluvial fan. The Rio Hondo River hydrologically connects the Los Angeles River and San Gabriel River watersheds at the Whittier Narrows Reservoir. Other major watersheds in the region include Malibu Creek, Topanga Creek, Ballona Creek (which drain to Santa Monica Bay), and the Dominguez Channel (which drains to San Pedro Bay). Dozens of smaller watersheds drain directly to Santa Monica or San Pedro Bays.

[2] www.calacademy.org/exhibits/California_hotspot/overview.htm

In the mountains and foothills, including many of the coastal watersheds, the streams have seasonal flows and high-quality habitat. Downstream, the river systems have been engineered to protect homes and businesses from flooding and to provide for water conservation. In Los Angeles County, wetland losses exceed 95 percent. Despite their altered state, these urbanized channels still serve as habitat for wildlife.

The diverse landscape of the study area contains examples from most of the vegetation types and wildlife that are found in Southern California today. From the high peaks of the San Gabriel Mountains to the low coastal plain south of the Puente-Chino Hills, differences in climate, soils, and geology set the stage for a wide array of plant communities. Common plant communities include coastal strands and bluffs, lagoons, coastal sage scrub, chaparral, foothill woodlands, and coniferous forests in the mountains. Chaparral is the dominant native plant community in the study area.

Many of the region's native plant communities have been displaced due to grazing, agriculture, and urban development. Almost all of the native plant communities that remain contain sensitive, rare, or endangered flora and fauna. The GLAC Region is also home to 51 species that hold federal endangered, threatened, candidate for listing, or subject for post delisting monitoring (PDM) status. Table 2 below provides a list of federal endangered and threatened species found in the project area.[3]

Table 2. Federally Listed Species Occurring within the GLAC Region

Scientific Name	Common Name	Federal Status
PLANTS		
Acmispon (Lotus) dendroideus var. *traskiae*	San Clemente Island lotus	Endangered
Arenaria paludicola	marsh sandwort	Endangered
Astragalus brauntonii	Braunton's milk-vetch	Endangered
Astragalus pycnostachyus var. *lanosissimus*	Ventura marsh milk-vetch	Endangered
Astragalus tener var. *titi*	coastal dunes milk-vetch	Endangered

[3] http://www.fws.gov/carlsbad/TEspecies/CFWO_Species_List.htm

Scientific Name	Common Name	Federal Status
Berberis nevinii	Nevin's barberry	Endangered
Brodiaea filifolia	thread-leaved brodiaea	Threatened
Castilleja grisea	San Clemente Island Indian paintbrush	Endangered
Cercocarpus traskiae	Catalina Island mountain mahogany	Endangered
Cordylanthus maritimus (subsp.*maritimus)*	salt marsh bird's beak	Endangered
Chorizanthe parryi var. *Fernandina*	San Fernando Valley spineflower	Candidate
Delphinium variegatum subsp. *kinkiense*	San Clemente Island larkspur	Endangered
Dodecahema (Centrostegia) leptoceras	slender-horned spineflower	Endangered
Dudleya cymosa subsp. *Ovatifolia*	Santa Monica Mountains dudleya	Threatened
Helianthemum greenei	Island rush-rose	Threatened
Lithophragma maximum	San Clemente Island woodland star	Endangered
Malacothamnus clementinus	San Clemente Island bush mallow	Endangered
Navarretia fossalis	spreading navarretia	Threatened
Orcuttia californica	California Orcutt grass	Endangered
Pentachaeta lyonii	Lyon's pentachaeta	Endangered
Phacelia stellaris	Brand's phacelia	Candidate
Rorippa gambellii	Gambel's watercress	Endangered
Sibara filifolia	Santa Cruz Island rock-cress	Endangered
INVERTEBRATES		
Euphilotes battoides allyni	El Segundo blue butterfly	Endangered
Glaucopsyche lygdamus palosverdesensis	Palos Verdes blue butterfly	Endangered
Streptocephalus woottoni	Riverside fairy shrimp	Endangered
FISH		
Catostomus santaanae	Santa Ana sucker	Threatened
Gasterosteus aculeatus williamsoni	unarmored threespine stickleback	Endangered
Oncorhynchus mykiss	southern steelhead (So Cal DPS)	Endangered
AMPHIBIANS		
Anaxyrus californicus (Bufo microscaphus c.)	arroyo toad (a. southwestern t.)	Endangered
Rana draytonii	California red-legged frog	Threatened
Rana muscosa	mountain yellow-legged frog (So Cal	Endangered

Scientific Name	Common Name	Federal Status
	DPS)	
REPTILES		
Xantusia riversiana	island night lizard	Threatened
BIRDS		
Amphispiza belli clementeae	San Clemente sage sparrow	Threatened
Brachyramphus marmoratus	marbled murrelet	Threatened
Charadrius alexandrinus nivosus	western snowy plover	Threatened
Coccyzus americanus	yellow-billed cuckoo	Candidate
Empidonax traillii extimus	southwestern willow flycatcher	Endangered
Gymnogyps californianus	California condor	Endangered
Haliaeetus leucocephalus	bald eagle	PDM
Lanius ludovicianus mearnsi	San Clemente loggerhead shrike	Endangered
Pelecanus occidentalis	brown pelican	PDM
Phoebastria albatrus	short-tailed albatross	Endangered
Polioptila californica californica	coastal California gnatcatcher	Threatened
Rallus longirostris levipes	light-footed clapper rail	Endangered
Sternula (Sterna) antillarum browni	California least tern	Endangered
Vireo bellii pusillus	least Bell's vireo	Endangered
MAMMALS		
Dipodomys merriami parvus	San Bernardino kangaroo rat	Endangered
Enhydra lutris nereis	southern sea otter	Threatened
Perognathus longimembris pacificus	Pacific pocket mouse	Endangered
Urocyon littoralis catalinae	Santa Catalina Island fox	Endangered

The region's lagoons and freshwater marshes are especially important to over wintering and migratory songbirds and waterfowl on the Pacific Flyway in addition to providing year round habitat and critical resources for resident species.

Within all five subregions, there are special designated areas called "critical habitat" that protect listed plant and animal species. The United States Fish and Wildlife Service (USFWS) through the Endangered Species Act (ESA) defines critical habitat as "a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that will be needed for

its recovery." A critical habitat designation typically has no impact on property or developments that do not involve a Federal agency, such as a private landowner developing a property that involves no Federal funding or permit. However, when such funding or permit is needed, the impacts to critical habitat are considered during the consultation with the USFWS. Each of the five subregions contain areas designated as critical habitat. Table 3 shows the designated critical habitat for each species across the subregions by acreage.

Table 3. Designated Critical Habitat for Federally Listed Species

Critical Habitat Acreage by Subregion					
Species	**Lower San Gabriel and Lower Los Angeles Rivers**	**North Santa Monica Bay**	**South Bay**	**Upper Los Angeles River**	**Upper San Gabriel and Rio Hondo Rivers**
Arroyo toad	0	0	0	1,190.0	0
Brauton's milk-vetch	0	710	510	270	280
California red-legged frog	0	4,950	0	4	0
Coast California gnatcatcher	9,350	0	5,040	9,920	4.580
Lyon's pentachaeta	0	1,970	0	0	0
Mountain yellow-legged frog	0	0	0	0	3,240
Palos Verdes blue butterfly	0	0	90	0	0

The location of the designated critical habitat is provided in Figure 4.

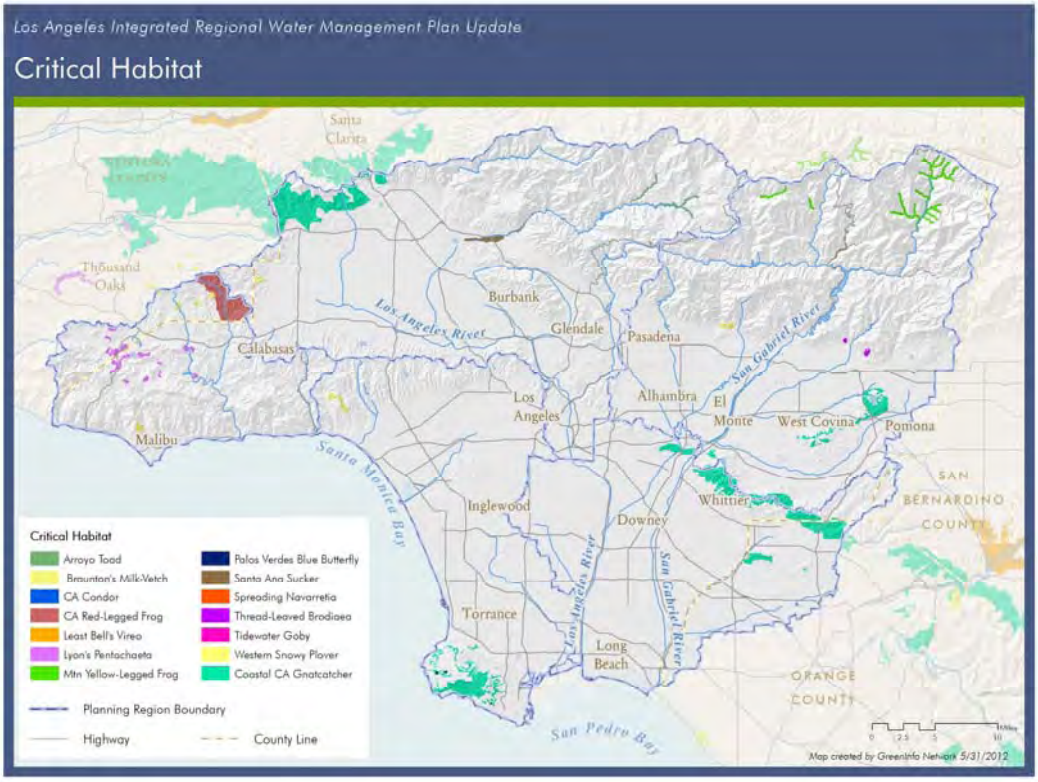

Figure 4. USFWS Designated Critical Habitat Areas

3.1 Regulatory Context

3.1.1 National Environmental Protection Act (NEPA)

NEPA, adopted in 1969 (42 U.S.C. Section 4321 et seq.), establishes a framework for protecting the national environment. "NEPA's basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment."[4] All projects and activities that involve federal activities or property must comply with NEPA.

[4] epa.gov/lawsregs/laws/nepa.html

3.1.2 California Environmental Quality Act (CEQA)

CEQA, adopted in 1970 (Public Resource Code Section 21000 et seq.), is California's broadest environmental law. It guides local and state agencies in protecting the environment through the issuance of permits and approval of projects. "CEQA applies to all discretionary projects proposed to be conducted or approved by a California public agency, including private projects requiring discretionary government approval."[5] Any proposed project or activity by an individual or state governmental entity that impacts the environment are subject to CEQA regulations.

3.1.3 United States Army Corps of Engineers (USACE)

Regulatory Program

The USACE has regulatory permit authority from Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act of 1899. Section 404 gives the USACE jurisdiction over all water of the United States including wetlands, perennial and intermittent streams, ponds, and lakes. The USACE is responsible for the day-to-day administration and permit review and the United States Environmental Protection Agency (EPA) provides program oversight. Any person or public agency proposing to discharge dredged or fill material into waters of the United States is required to obtain a permit. Any work in traditionally navigable waters also requires a permit. "Permit review and issuance follows a sequence process that encourages avoidance of impacts, followed by minimizing impacts and, finally, requiring mitigation for unavoidable impacts to the aquatic environment."[6]

Special Area Management Program (SAMP)

Special Area Management Plans (SAMPs) provide a comprehensive review of aquatic resources in an entire watershed rather than the USACE's traditional project-by-project review pursuant to its regulatory program. Potential watershed impacts are analyzed over time in order to identify priority areas for preservation, identify potential restoration areas, determine the least environmentally damaging locations for proposed projects, and establish alternative permitting processes appropriate for the SAMP area.

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[5] http://dfg.ca.gov/habcon/ceqa/ceqapolicy/html
[6] http://www.fws.gov/habitatconservation/cwa.html

The goal of a SAMP is to achieve a balance between aquatic resource protection and reasonable economic and infrastructure development. Geographic areas of special sensitivity under intense development pressure are well-suited for this planning process. These comprehensive and complex efforts require the participation of multiple local, state, and federal agencies, as well as public and stakeholder involvement.

Mitigation Banking

The regulatory program provides a preference for the use of mitigation banking to offset unavoidable impacts to jurisdictional areas (33 CFR 332 et seq.). A mitigation bank is created when a government agency, corporation, nonprofit organization, or other entity undertakes providing mitigation for itself or others under a formal agreement with a resource or regulatory agency. Mitigation banks are a form of "third-party" compensatory mitigation, in which the responsibility for compensatory mitigation implementation and success is assumed by the bank operator rather than by the project developer. The bank operator is responsible for the design, construction, monitoring, ecological success, and long-term protection of the bank site (Mitigation Banking Factsheet, US EPA). To offset impacts to wetlands, streams, lakes, and other aquatic sites, mitigation banks must be approved by the USACE. This and other mitigation requirements are discussed in the USACE rule regarding mitigation for the loss of aquatic resources (33 CFR 332 et seq.).

3.1.4 United States Fish and Wildlife Services

Endangered Species Act (ESA)

USFWS and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA) administer the ESA. "The ESA provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found."[7] The law requires consultation with federal agencies (e.g. USFWS and/or NOAA) to ensure that actions they authorize, fund, or carry out are not likely to impact the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. ESA prohibits any action that causes a "taking" of any listed species of fish or wildlife.[8]

[7] http://www.epa.gov/lawsregs/laws/esa.html
[8] http://www.epa.gov/lawsregs/laws/esa.html

Habitat Conservation Plans

The ESA, under section 10(a)(1)(B), also outlines a habitat conservation planning process that subsequently allows for USFWS and NOAA to issue incidental take permits for otherwise lawful activities. Projects impacting listed species and/or their habitat that do not have a federal project nexus (i.e. do not partner with a federal agency or use federal funds) are required to go through the 10(a)(1)(B) process and prepare a Habitat Conservation Plan (HCP). The HCP process ensures that a project, when finally approved by the agencies, adequately minimizes and mitigates impacts to listed species to the maximum extent possible. The size and scope of HCPs vary depending on the project proponent (i.e. HCPs can be developed for a single project or can be large-scale and multijurisdictional in nature and cover a variety of project types) (USFWS, 1996).

Conservation Banking

A conservation bank is similar to a mitigation bank. It too is a form of "third-party" compensatory mitigation created when an entity undertakes providing mitigation for itself or others under a formal agreement with a resource or regulatory agency. The conservation bank operator then becomes responsible for the design, construction, monitoring, ecological success, and long-term protection of the bank site. To offset impacts to wetlands, streams, lakes, and other aquatic sites, mitigation banks must be approved by the USACE. The difference is that the conservation bank is to offset impacts to listed species and their habitat.

3.1.5 Regional Water Quality Control Board (RWQCB)

California's Porter-Cologne Act

Under this Act adopted in 1969, the RWQCB has the authority over California water rights and water quality policy. It has jurisdiction over all of California's aquatic resources. The Act established the nine RWQCBs throughout the State of California to oversee water quality at the local and regional level. Each regional board prepares and updates Basin Plans, issues permits to control pollution and regulate all pollutant or nuisance discharges impacting surface water or groundwater.[9]

[9] Ceres.ca.gov/wetlands/permitting/ porter_summary.html

Section 401 of the Clean Water Act Certification

If a project requires a Section 404 permit, a Section 401 certification from the RWQCB is also needed. The federal CWA, in Section 401(a)(1), specifies that states must certify that any activity subject to a permit issued by a federal agency meets all state water quality standards:

> *"This program protects all waters in its regulatory scope, but has special responsibility for wetlands, riparian areas, and headwaters because these water bodies have high resource value, are vulnerable to filling, and are not systematically protected by other programs. The Program encourages basin-level analysis and protection, because some functions of wetlands, riparian areas, and headwater streams - including pollutant removal, flood water retention, and habitat connectivity - are expressed at the basin or landscape level"*[10]

Depending on the location of the project or activity, a Section 401 certification is obtained by applying to the applicable RWQCB region in which the project is located. The RWQCB also requires that the project file all other required permits and showing of compliance with NEPA and CEQA.

National Pollutant Discharge Elimination System (NPDES) Permits

Under the U.S. Environmental Protection Agency, each of the nine RWQCBs has the responsibility of granting CWA NPDES permits, for certain point-source discharges. NPDES permits set specific requirements managing the characteristics of the discharged water based on national technology-based effluent limitations and water quality standards. The permits establish the level of performance the permittee or discharger is required to maintain and specify monitoring, inspection, reporting requirements and additional actions necessary to achieve compliance with NPDES regulations. "Point source" is defined as any discernible, confined and discrete conveyance, such as a pipe, ditch, channel, tunnel, conduit, discrete fissure, or container."[11] Each Regional Boards has different waste discharge requirements and other regulatory actions.[12]

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[10] http://www.waterboards.ca.gov/water_issues/programs/cwa401/
[11] http://www.campuserc.org/virtualtour/grounds/drains/Pages/NPDES-Overview.aspx
[12] Ceres.ca.gov/wetlands/permitting porter_summary.html

Areas of Special Biological Significance (ASBS)

In the mid-1970s, thirty-four areas on the coast of California were designated as areas requiring protection by the State Water Resources Control Board and were called Areas of Special Biological Significance (ASBS). The Public Resources Code states that point source waste and thermal discharges into ASBS are prohibited or limited by special conditions, and nonpoint sources discharging into ASBSs must be controlled to the extent practicable. There is one ASBS, the Mugu Lagoon to Latigo Point ASBS, within the study region.

3.1.6 California Department of Fish and Game

Streambed Alteration Agreements (Section 1600 of the Fish and Game Code)

The CDFG Code (Sections 1600-1616) regulates activities that would alter the flow, bed, banks, channel, or associated riparian areas of a river, stream, or lake. The law requires any person, state or local governmental agency, or public utility to notify CDFG before beginning an activity that will substantially modify a river, stream, or lake. These activities also must be consistent with any other applicable environmental laws such as Section 404 and 401 of the Clean Water Act and CEQA.[13]

California Endangered Species Act (CESA)

CESA, adopted in 1970, "expresses the state's concern over California's threatened wildlife, defined rare and endangered wildlife," and gave authority to CDFG to "identify, conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat in California."[14] This Act (Fish and Game Code Section 2050, et. seq.) prohibits the "taking" of California listed species unless a permit is obtained from the CDFG.[15] Many of the endangered and/or threatened species are similar to those listed under the federal ESA.

Natural Communities Conservation Planning (NCCP) Program

In 1991, the Natural Community Conservation Planning (NCCP) Act was added to CESA (Fish and Game Code Section 2800-2840). The State of California is the only state to enact a law that closely complements the habitat conservation planning process of ESA. The NCCP

[13] http://ceres.ca.gov/wetlands/permitting/DFG_ summary.html
[14] http://www.energy.ca.gov/glossary/glossary-c.html
[15] http://ceres.ca.gov/wetlands/permitting

Act encourages the development of multi-species, ecosystem-based plans that provide for the conservation and recovery of both listed and unlisted species within the plan area. The NCCP Act requires a plan to provide for the conservation of covered species, and includes independent scientific input and significant public participation. When applied together, the ESA and NCCP Act bring their complementary strengths to conservation planning to provide greater conservation benefits than either Act alone.

Marine Protected Areas

On December 15, 2010, the California Fish and Game Commission adopted regulations to create a suite of marine protected areas (MPAs) in southern California (Point Conception to the California/Mexico border). This network of 50 MPAs and two special closures (including 13 MPAs and two special closures previously established at the northern Channel Islands) covers approximately 354 square miles of state waters and represents approximately 15 percent of the region. There are four designated MPAs in the study region:

- Point Dume State Marine Conservation Area
- Point Dume State Marine Reserve
- Point Vicente State Marine Conservation Area
- Abalone Cove State Marine Conservation Area.

All take is prohibited in the Point Dume State Marine Reserve and the Point Vicente State Marine Conservation Area, except for remediation activities associated with the Palos Verdes Shelf Operable Unit of the Montrose Chemical Superfund Site in Point Vicente. Take is restricted in the other State Marine Conservation Areas, although some fishing for pelagic finfish and coastal pelagic species is allowed.

3.1.7 County of Los Angeles

Significant Ecological Areas

The concept of a 'significant ecological area' (SEA) is unique to Los Angeles County. Los Angeles County developed the concept in the 1970s in conjunction with adopting the original General Plan for the County.

The Significant Ecological Area (SEA) Program is a component of the Los Angeles County Conservation/Open Space Element in their General Plan. This program is a resource

identification tool that indicates the existence of important biological resources. SEAs are not preserves, but are areas where the County deems it important to facilitate a balance between limited development and resource conservation. Limited development activities are reviewed closely in these areas where site design is a key element in conserving fragile resources such as streams, oak woodlands, and threatened or endangered species and their habitat.

Proposed development is governed by SEA regulations. The regulations, currently under review, do not to preclude development, but to allow limited, controlled development that does not jeopardize the unique biotic diversity within the County. The SEA conditional use permit requires development activities be reviewed by the Significant Ecological Area Technical Advisory Committee (SEATAC). Additional information about regulatory requirements is available on the Los Angeles County website.[16]

[16] http://planning.lacounty.gov/sea/faqs

4. OBJECTIVES AND PLANNING TARGETS FOR HABITAT

The following sections describe the 20-year planning targets that were developed for the habitat section of the OSHARP through the collaborative process described in Section 1.4. These targets are intended to serve as a quantitative measure of progress towards the overall IRWMP habitat goals, as well as to guide project proponents in effectively incorporating habitat into proposed IRWMP projects.

4.1 Objectives

Natural open space systems provide habitat and recreation opportunities, as well as other important functions related to water supply and water quality. California and the GLAC Region have lost a great amount of its natural systems and for wetlands systems more than any other state (Dahl 1990). In Los Angeles County, wetland system losses exceed 95 percent.

The objective in this planning process is to help reverse this trend and to have open space for habitat and recreation considered in the planning of water supply and water quality projects. While opportunities for coastal wetland restoration are limited by extensive development, as well as by geologic and topographic constraints, opportunities to preserve and restore stream corridors and riparian habitat are numerous. Upland habitat blocks, buffers, and linkages also are in need of preservation and restoration.

The objective is to increase the number of viable wetlands within the region, to provide adequate buffers along aquatic systems, and to create wildlife linkages using riparian corridors and less densely populated hillsides. In addition, the establishment of wildlife linkages, allowing species to migrate northward as conditions change, will help address the effects of climate change.

4.2 Habitat Planning Targets – Wetlands

4.2.1 Wetlands

Although southern California is a relatively dry region, the greater Los Angeles area historically contained abundant and diverse wetland resources (Rairdan, 1998; Stein et al., 2007; Dark et al., 2011). Much of the original wetland habitat in the region has been destroyed or converted to other habitat (including concrete-lined rivers), and much of the remaining wetlands have been degraded by poor water quality or other human activities.

The goals of the wetland habitat targets are to protect, restore (re-establish or rehabilitate), and/or enhance existing wetland habitat and to create new wetland habitat in the region.

4.2.1.1 Terminology

There are many different ways to categorize or define wetlands, including approaches based on various ecological or regulatory perspectives. For this project, a wetland is considered to be land transitional between terrestrial and aquatic systems where the water table is usually at or near ground surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

This is an ecological definition of wetland, not the regulatory one. Therefore, an area identified as a wetland in this report is not necessarily considered a wetland for regulatory purposes. This may cause some confusion. For example, for the purposes of this report, man-made habitats are considered to be wetlands. However, the wetland regulatory definition considers some man-made habitats developed as stormwater Best Management Practices as a separate category. Man-made detention basins, swales, and depressional areas are generally not considered wetlands for regulatory purposes even though they may provide ecosystem benefits.

To simplify the presentation of wetland planning targets, wetlands were categorized into three general categories: (1) tidal wetlands, (2) freshwater wetlands, and (3) riverine (or riparian) wetlands based on categories defined by the National Wetlands Inventory (NWI). Although incomplete, the NWI is a very important source of information for the present wetland conditions with the GLAC. Larger, regional areas that function as off-system detention and storage would be considered freshwater wetlands. While it is recognized that rivers and stream beds are not always considered wetlands, for the purposes of these categories they are considered to be riverine wetlands. The definition for each of these categories is as follows:

- *Tidal wetlands* include wetland habitats that are inundated by tides, either seasonally or year-round. Marine harbors, a man-made habitat, are also considered tidal wetlands. In the NWI mapping system, the three categories included in tidal wetlands are estuarine and marine deepwater, estuarine and marine wetland, and tidal wetlands.

- *Freshwater wetlands* include wetlands such as depressional marshes, lakes, and ponds. The NWI category "freshwater wetlands" include freshwater emergent wetland, freshwater forested/shrub wetland, freshwater ponds and lakes, and also considers man-made habitats such as flood control basins and ponds which may include areas of freshwater wetlands. It is an important distinction that although spreading grounds and some stormwater Best Management Practices, such as detention basins, swales, and depressional areas, also provide ecosystem benefits, they belong under a separate category and should not be subject to the same protection criteria.
- *Riverine wetlands* include the streambed and wetlands associated with rivers and streams, including upper and lower riverine habitats and dry washes. Man-made habitats considered riverine wetlands include concrete-lined channels and soft-bottomed channels. Note that "riparian" is sometimes used to mean riverine wetlands. Because of its common usage, the terms are used interchangeably here. However, strictly speaking, riparian refers to the vegetated habitat adjacent to streams, rivers, lakes, reservoirs and other inland aquatic systems.

Three distinct types of wetland habitat targets were also developed.

1. Protection of existing wetland habitat
2. Enhancement of existing wetland habitat
3. Restoration or creation of wetland habitat

These activities could occur on public or private lands and include some of the following activities:

- *Protection* entails acquiring existing wetland habitat not previously protected from destruction or degradation or otherwise adding protection measures to prevent an existing wetland from destruction or degradation.
- In *enhancement*, management actions are taken to improve the functions or values of an existing wetland. Enhancement actions could include improving the timing or amount of water source to a wetland, planting native wetland plants, controlling invasive species, and so forth. Improving the quality of water entering a wetland alone would generally not be considered enhancement.

- *Restoration and creation* involve activities of either restoring or creating a wetland in an area that does not currently contain a wetland. The distinction is that if the activity occurs in an area that once contained that type of wetland it is considered to be restoration or re-establishment, whereas creation occurs in an upland area, converting it to a wetland. In both restoration and creation, the focus should be on reintroducing the physical processes and geomorphic form necessary to support a self-sustaining wetland ecosystem.

4.2.1.2 Methodology

Protection, enhancement, and restoration/creation targets were calculated for each wetland type (tidal, freshwater, riverine). Figure 5 summarizes the general approach to calculating wetland habitat targets, with more details about the methodology in Appendix B, Wetland Habitat Methodologies.

For each category, the percentage used to establish numeric targets was chosen after discussion with the Habitat and Open Space Plan Committee. The goal was to develop a numeric target that balanced the benefits of protecting, enhancing or restoring wetland habitats against the practical constraints of undertaking these projects. The general philosophy used to develop these targets was to establish targets that were challenging, yet reasonably attainable, for each subregion.

The restoration/creation habitat targets are based on the area of wetlands lost in each subregion. The historical extent of wetlands in the region (derived from Rairdan 1998; more detail about this data source is provided in Appendix A) is shown in Figure 6 (see Appendices G-K for subregional maps).

Protection and enhancement targets are based on the current extent of wetlands (derived from the National Wetlands Inventory (NWI); more detail about this data source is provided in Appendix A), shown in Figure 7 (Appendices G-K provide information for the subregions).

Protection Target	=	Privately held existing habitat	x	20%		
Enhancement Target	=	Existing habitat	x	25%		
Restoration/Creation Target	=	[Lost habitat	x	10%]	+	[Converted habitat	x	10%]

Figure 5. Summary of Approach to Calculating Wetland Habitat Targets

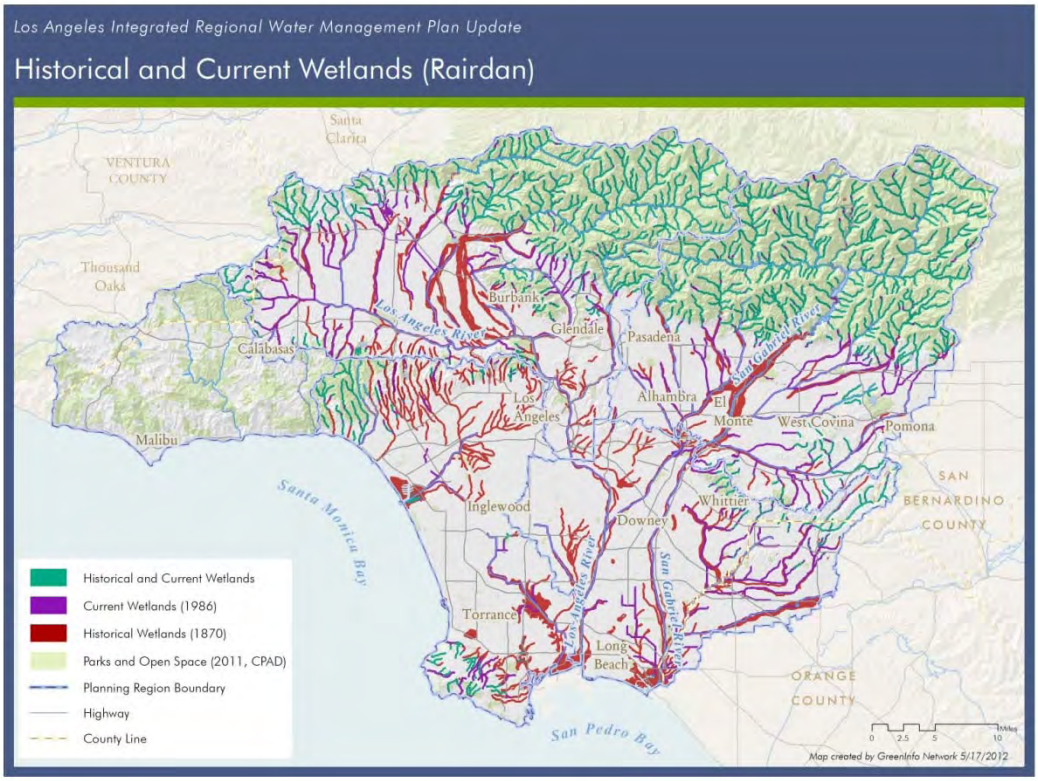

Figure 6. Historical and Current Wetlands (Rairdan) (GLAC Region, except NSMB Subregion)

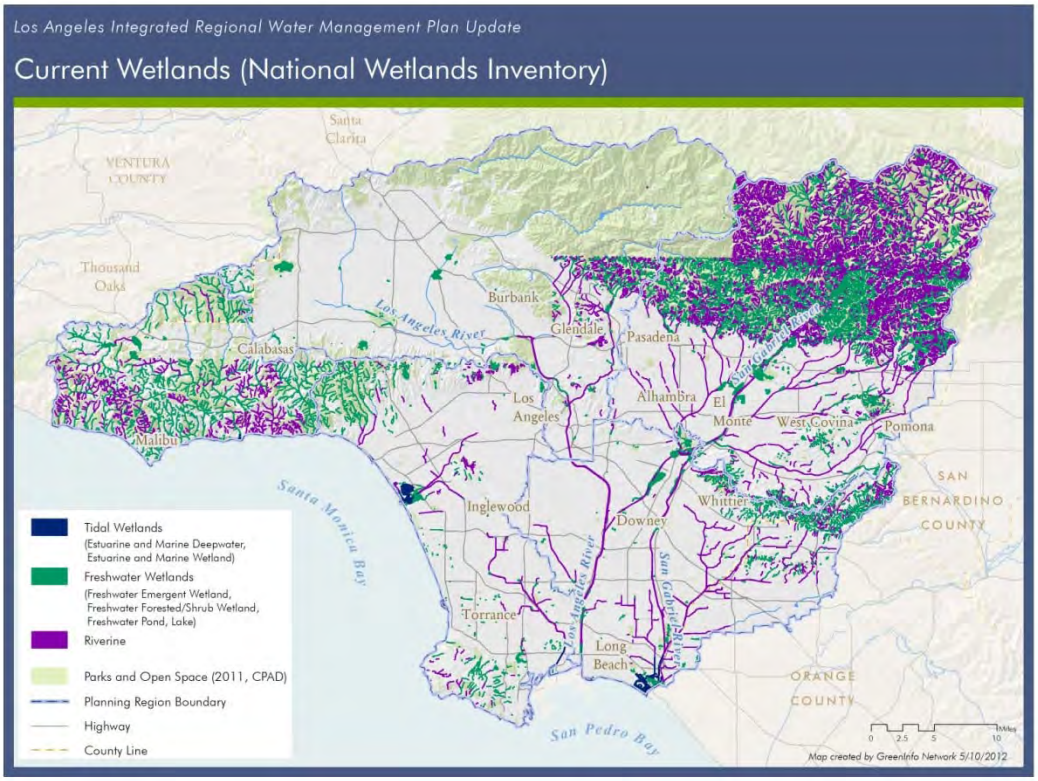

Figure 7. Current Wetlands (NWI) (GLAC Region)

4.2.1.3 Habitat Targets

Table 4 below provides a breakdown of the subregional wetland targets.

Table 4. New Wetland Habitat Targets

	Tidal Wetland	Freshwater Wetland	Riparian (Riverine)	Subtotal for Subregion
Target for Protection or Preservation				
North Santa Monica Bay	0	170	50	**220**
Upper Los Angeles River	0	110	70	**180**
Upper San Gabriel and Rio Hondo Rivers	0	420	280	**700**
Lower San Gabriel and Los Angeles Rivers	110	240	340	**690**
South Santa Monica Bay	100	60	60	**220**
Greater Los Angeles County	210	1,000	800	**2,000**
			Subtotal for Region	**4,000**
Targets for Enhancement				
North Santa Monica Bay	10	290	150	**450**
Upper Los Angeles River	0	820	700	**1,500**
Upper San Gabriel and Rio Hondo Rivers	0	1,300	1,200	**2,400**
Lower San Gabriel and Los Angeles Rivers	160	430	470	**1,100**
South Santa Monica Bay	160	260	140	**560**
Greater Los Angeles County	330	3,000	2,700	**6,000**
			Subtotal for Region	**12,000**
Targets for Restoration or Creation				
North Santa Monica Bay	30	40	20	**90**
Upper Los Angeles River	0	250	830	**1,100**
Upper San Gabriel and Rio Hondo Rivers	0	200	880	**1,000**
Lower San Gabriel and Los Angeles Rivers	330	290	330	**950**
South Santa Monica Bay	400	280	150	**830**
Greater Los Angeles County	760	1,100	2,200	**4,000**
			Subtotal for Region	**8,000**
			TOTAL WETLAND BENEFITS	**24,000**

For the GLAC Region, total wetlands to be benefited by protection, enhancement, restoration, or creation is 12,061 acres.

- The total target acreage for the protection of wetlands is 2,000 acres (200 acres of tidal wetlands, 1,000 acres of freshwater wetlands, and 800 acres of riverine wetlands).
- The total target acreage for enhancement of wetlands is 6,000 acres (300 acres of tidal wetlands, 3,000 acres of freshwater wetlands, and 2,700 acres of riverine wetlands).
- The total target acreage for restoration or creation of wetlands is 4,000 acres (800 acres of tidal wetlands, 1,000 acres of freshwater wetlands, and 2,200 acres of riverine wetlands).

The subregional targets vary across the region due to the differences in the extent of current wetlands and wetland losses. The target for protection was highest for Upper San Gabriel and Rio Hondo Rivers, although the Lower San Gabriel and Los Angeles Rivers target was nearly the same. Both of these subregional targets are around three times higher than targets for the other subregions.

For enhancement, Upper San Gabriel and Rio Hondo Rivers again had the highest target, followed by the Upper Los Angeles River and the Lower San Gabriel and Los Angeles Rivers, with South Bay and North Santa Monica Bay much lower.

For the restoration/creation targets, the Upper San Gabriel and Rio Hondo Rivers, Upper Los Angeles River, Lower San Gabriel and Los Angeles Rivers, and South Bay all have targets of about 1,000 acres. North Santa Monica Bay is dramatically lower, with a target of only 83 acres. The lower target for North Santa Monica Bay could be partially due to the fact that wetland loss for this subregion was not based on the same type of historical analysis as the other subregions, but more likely the lower target is because the region never had extensive tidal wetlands, such as the South Bay or Lower San Gabriel and Los Angeles Rivers, and the mountains are relatively undeveloped.

4.3 Habitiat Planning Targets – Uplands

Urbanization of the Greater Los Angeles County area has caused the loss of wetland and upland communities and the fragmentation of the remaining habitat blocks. The disruption of animal movement by habitat fragmentation presents problems for the region's wildlife ranging from direct mortality on roadways to the genetic isolation of fragmented populations. Protection of water-dependent or wetland resources depends not only on

managing the systems themselves, but also providing buffers to these systems and linkages through the landscape. Therefore, the provision of upland buffers and habitat linkages is important to maintaining habitat diversity.

An abundance of scientific research published since the 1970s documents the value of establishing, maintaining, and enhancing vegetated buffers along wetlands. Wetland buffers provide important benefits including water quality improvement, streambank stabilization, flood control, wildlife habitat, and groundwater recharge (USDA, 2003; Castelle et al., 1992; EOR, 2001; Wenger, 2000; Correll, 1996). Wetland buffers also provide significant social and economic benefits by improving aesthetics and increasing property values (Lovell and Sullivan, 2005; Qui et al., 2006). The effects of habitat fragmentation and mitigation by identifying and protecting areas that wildlife use for movement (i.e. the protection of wildlife linkages or wildlife corridors) has been identified more recently (Beier and Noss, 1998; Bennett, 1999; Haddad et al., 2003; Eggers et al., 2009; Gilbert-Norton, 2010).

A wetland buffer is the vegetated transition zone between an upland area and the aquatic ecosystem, and depending on the definition, the buffer may include portions of both riparian and upland zones. This unique position in the landscape enables buffers to mitigate certain impacts of upland land use on adjacent wetlands. In the absence of wetland buffers, these impacts are typically magnified and become more damaging.

Wetland buffers can vary in size based on factors such as adjacent land use, land ownership, topography, wetland area, and ecological functions. Generally speaking, buffers that are wider, longer, and more densely vegetated with herbaceous, shrub, and tree layers will provide more benefits than buffers that are narrower, shorter, and sparsely vegetated with only herbaceous species. Likewise, wildlife corridors can vary in size. Generally, however, they are larger or wider than buffer zones and provide essential life-support functions for the wildlife using the area.

Ridgelines, canyons, riparian areas, cliffs, swaths of forest or grassland, and other landscape or vegetation features can serve as wildlife linkages. Animals may also move across a relatively broad area rather than through a well-defined corridor, a type of wildlife linkage known as a diffuse movement area. Wildlife linkages are most effective when they connect (or are located within) relatively large and unfragmented areas referred to as habitat blocks (also called wildland blocks).

Areas adjacent to active stream channels can serve as buffers or corridors depending on their design. They can protect the stream and provide lateral connectivity between the streams and adjacent floodplains and uplands, as well as longitudinal connectivity up and down

stream. It is the goal of this plan to provide for the acquisition and/or restoration of these vitally important components of the landscape.

Recommendations on buffer width are provided in Table 5 (Center for Watershed Protection, 2005). Recommendations regarding a minimum width of 1,000 feet for wildlife linkages (corridors) are based on Principles of Wildlife Corridor Design (Bond, 2003). However, it is realized that achieving this recommended width may not be possible and pinch-points and breaks in a linkage may occur.

Table 5. Recommended Habitat Buffers

Function	Special Features	Recommended Minimum Width (feet)
Sediment reduction	Steep slopes (5-15%) and/or functionally valuable wetland	100
	Shallow slopes (<5%) or low quality wetland	50
	Slopes over 15%	Consider buffer width additions with each 1% increase of slope (e.g., 10 feet for each 1% of slope greater than 15%)
Phosphorus reduction	Steep slope	100
	Shallow slope	50
Nitrogen (nitrate) reduction	Focus on shallow groundwater flow	100
Biological contaminant and pesticide reduction	N/A	50
Wildlife habitat and corridor protection	Unthreatened species	100
	Rare, threatened, and endangered species	200-300
	Maintenance of species diversity	50 in rural area 100 in urban area
Flood control	N/A	Variable, depending on elevation of flood waters and potential damages

4.3.1.1 Methodology

For purposes of this plan, the targets for upland habitat acquisition and/or restoration were developed using the following definitions of upland areas:

- *Buffers and Buffer Zones* are 50- to 300-foot wide areas adjoining a wetland, channel, or upland linkage or wildlife corridor that is in a natural or semi-natural state. For wetland and riparian systems, a buffer is to provide a variety of other functions including maintaining or improving water quality by trapping and removing various non-point source pollutants from both overland and shallow subsurface flows, providing erosion control and water temperature control, reducing flood peaks, and serving as groundwater recharge points and habitat. Buffer zones occur in a variety of forms, including herbaceous or grassy areas, grassed waterways, or forested riparian buffer strips. They also may provide for limited passive recreation.
- *Wildlife Linkages or corridors* are wide areas of native vegetation that connect, or have the potential to connect, two or more large patches of habitat on a landscape or regional scale through which a species will likely move over time. The move may be multi-generational; therefore, a linkage should provide both wildlife connectivity and biological diversity. A Wildlife Linkage should be a minimum of 1,000 feet in width, vegetated with native vegetation, and have little or no human intrusion. The goal is to ensure north-south and east-west linkages to mitigate for climate change.

Because of the largely linear nature of buffers and linkages and the major difference being their width, these two areas were combined for the development of the upland target. The target is based on the acquisition and/or restoration of these two features. For the development of upland linkage and corridor targets, regional linkages that have been previously identified or potential linkages between identified habitat blocks (i.e., the County's Significant Ecological Areas and habitat designated as critical by the U.S. Fish and Wildlife Service) were proposed.

Figure 8 shows the general location of the identifies linkages along streams as red arrows and identified and potential upland linkages with black arrows.[17] The red arrows also locate areas where buffers are needed.

Figure 8. Habitat Linkages

For the purpose of developing the upland targets, polygons were drawn along the continuous length of the drainages and upland areas with a width of 1,000 feet. Acreage associated with these polygons was determined. This information is provided in Table 6 below. Existing open space and public and private land ownership was then mapped (Figure 9 and Figure 10)

[17] figure adapted from http://criticalhabitat.fws.gov/crithab

Table 6. Measurement of Potential Linkage Areas within the GLAC Region

Subregion	Linear Feet	Acres
North Santa Monica Bay	31,000	710
Lower San Gabriel and Lower Los Angeles Rivers	330,000	7,500
Upper San Gabriel and Rio Hondo Rivers	580,000	13,000
Upper Los Angeles River	520,000	12,000
South Bay	124,000	2,800
Greater Los Angeles County	**1,585,000**	**36,010**

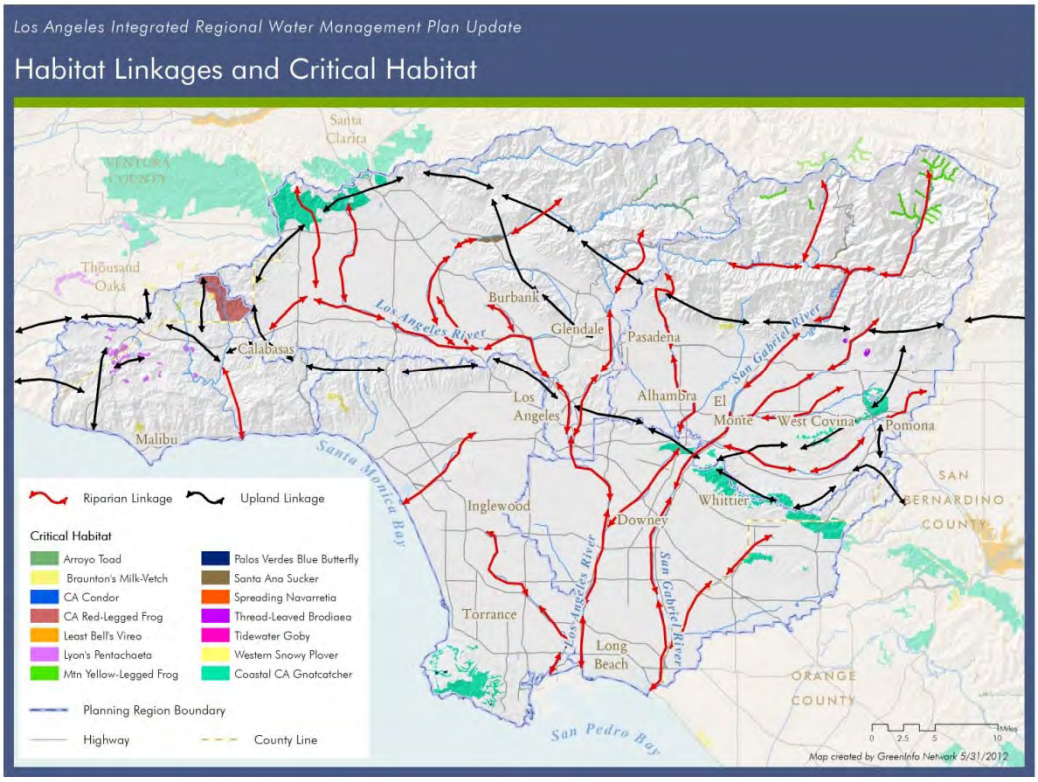

Figure 9. Habitat Linkages with USFWS Designated Critical Habitat Areas

Figure 10. Habitat Linkages with Land Ownership

4.3.1.2 Upland Targets

The target for the acquisition and/or restoration of uplands was then calculated by taking the calculated acreage value from Table 6 and multiplying it by 1.5. This simple formula recognizes that 1,000 feet is a minimum width for a linkage and some of the targeted lands within open space or public ownership. While it is recognized that this may not provide for an accurate measurement of habitat needs, it is a starting point for providing protection to the region's wetland systems.

The subregional targets for Upland Buffers are provided in Table 7. The provision of acquisition and/or restoration of these targets includes the provision of buffer zones.

Table 7. Subregional Upland Targets

Region	Upland Target (acres)
North Santa Monica Bay	1,000
Upper Los Angeles River	18,000
Upper San Gabriel and Rio Hondo Rivers	20,000
Lower San Gabriel and Lower Los Angeles Rivers	11,000
South Bay	4,000
Greater Los Angeles County	**54,000**

5. OPEN SPACE AND RECREATION

The over 9,000,000 people who live within the GLAC Region have access to more than 2,000 park and open space land parcels that offer a variety of public outdoor recreation opportunities. These lands, totaling approximately 101,000 acres, are owned and managed by a myriad of agencies and organizations. In addition, there are almost 300,000 acres of public multiple-use lands of the Angeles National Forest and the 2,249 school district sites that may also have playgrounds and other outdoor recreation amenities.

5.1 Recreation Overview

Recreation occurring in open space areas, whether it is passive or active or a combination of the two, improves physical health, mental health, social function, and youth development and provides environmental and economic benefits to people and communities.

The physical health benefits of open space projects that provide for outdoor recreation are well documented and include:

- Making the individual less prone to obesity
- Improving cardiovascular condition
- Diminishing the risk of chronic diseases
- Boosting the immune system
- Increasing life expectancy

The mental health benefits of outdoor recreation include:

- Alleviating depression
- Increasing positive moods by reducing stress and anxiety
- Increasing productivity
- Improving quality of life through elevated self-esteem, personal and spiritual growth, and overall life satisfaction

While more and more people are migrating to cities, the desire to still feel connected to the natural environment remains strong. From a sociological perspective, when people are connected to nature, it contributes to feeling less isolated and less focused on themselves. As a result, they may become more eager to form connections with their neighbors. A greater

sense of community and social ties emerge, as do increases in generosity, volunteerism, trust, and civic-mindedness. Loneliness, aggression, and crime may consequently decrease.

Recreational activities that include physical activity also help the aging population lead independent and satisfied lives, helping them remain mobile, flexible, and able to maintain their cognitive abilities.

Recreation assists in overall youth development. Recreation activities help develop decision-making skills, cooperative behaviors, positive relationships and empowerment. Young people explore strategies for resolving conflicts while recreating and playing. They learn to act fairly, plan proactively, and develop a moral code of behavior. This play also helps enhance their cognitive and motor skills. Individuals with more highly developed motor skills tend to be more active, popular, calm, resourceful, attentive and cooperative.

The open space resources of the GLAC Region provide exceptional learning opportunities for students. Case studies of educational facilities that adopted environment-based education as the central focus of their academic programs showed: 1) improvement in reading and mathematics scores; 2) better performance in science and social studies; 3) declines in classroom discipline problems; and 4) high level learning opportunities equalized among students.

Conserving resource lands is an investment in future economic development. Community image is enhanced. Businesses frequently relocate where their top talent wants to live, and that is most often in places of natural beauty. New homebuyers value trails and natural areas above any other amenity. When resource land is protected, the adjacent land often increases in value, with homes selling at a faster rate and for 10 to 20 percent return more than comparable homes without access to parks and open areas.

The California Legislature has summarized the need for parks and open space areas that provide outdoor recreation benefits, as presented in the box below:

Summary on the Need for Parks and Open Space Areas

The California Legislature has nicely summarized the need for parks and open space areas that provide outdoor recreation benefits by declaring:

- The demand for parks, beaches, recreation areas and recreational facilities, and historical resources preservation projects in California is far greater than what is presently available, with the number of people who cannot be accommodated at the area of their choice or any comparable area increasing rapidly. Further, the development of parks, beaches, recreation areas and recreational facilities, and historical resources preservation projects has not proceeded rapidly enough to provide for their full utilization by the public.
- The demand for parks, beaches, recreation areas and recreational facilities, and historical resources preservation projects in the urban areas of our state is even greater since over 90 percent of the present population of California reside in urban areas; there continues to be a serious deficiency in open space and recreation areas in the metropolitan areas of the state; less urban land is available, costs are escalating, and competition for land is increasing.
- There is a high concentration of urban social problems in California's major metropolitan areas which can be partially alleviated by increased recreational opportunities.
- California's coast provides a great variety of recreational opportunities not found at inland sites; it is heavily used because the state's major urban areas lie, and 85 percent of the state's population lives, within 30 miles of the Pacific Ocean; a shortage of facilities for almost every popular coastal recreational activity exists; and there will be a continuing high demand for popular coastal activities such as fishing, swimming, sightseeing, general beach use, camping, and day use. Funding for the acquisition of a number of key coastal sites is critical at this time, particularly in metropolitan areas where both the demand for and the deficiency of recreational facilities is greatest. Development pressures in urbanized areas threaten to preclude public acquisition of these key remaining undeveloped coastal parcels unless these sites are acquired in the near future.
- Increasing and often conflicting pressures on limited coastal land and water areas, escalating costs for coastal land, and growing coastal recreational demand require, as soon as possible, funding for, and the acquisition of, land and water areas needed to meet demands for coastal recreational opportunities.
- Cities, counties, and districts must exercise constant vigilance to see that the parks, beaches, recreation areas and recreational facilities, and historical resources they now have are not lost to other uses; they should acquire additional lands as such lands become available; they should take steps to improve the facilities they now have.

Source: CA Public Resource Code 5096.142

The parks and open spaces of the GLAC Region are well used, operating at capacity, and in some cases the recreation demand simply outstrips the supply.

The landscape character of these recreation lands ranges from highly structured parks and recreation sites within urban areas, to regional parks that may offer a combination of developed active and undeveloped passive recreation use, to relatively natural habitat areas and wildlands that contain trail-related recreation with minimal development.

Figure 11 illustrates the following for the GLAC Region:

- Existing developed urban park and recreation areas
- Habitat areas and wildlands
- School sites
- Existing greenways and those subject to sea-level rise
- Planned greenway concepts
- Existing and planned County trail routes
- Existing urban park and recreation areas

Appendices G-K provide this information for the subregions.

Trail routes are illustrated on Figure 11 and were identified in the draft Los Angeles County 2035 General Plan. Most of the identified urban greenways include multiple-use trails that also serve transportation functions. Most of these are inter-city proposals, and thus could be considered regionally significant. In addition, many of the 90 cities within the GLAC Region, such as the cities of Malibu, Monrovia, and Pasadena, have proposed or adopted local trail plans for recreation and transportation access within their jurisdictions. In many cases, these trails tie into and complement the county-wide trail network. As an ongoing process, once adopted, some or all of these local trail routes should be added to the IRWMP data base. Those trail routes that branch from the regional trail system and create loop opportunities for recreation, or local trails that directly connect urban areas with the regional trail system should be specifically identified and included in the regional recreation targets.

Figure 11. Existing and Planned Parks, Recreation Areas, Open Spaces Areas, and Greenways

Appendix E lists individual parcels, by subregion, that are accessible to the public for outdoor recreation and environmental education purposes and categorizes them by developed park and recreation areas, open space lands (including National Forest Lands), greenways, and other public lands such as historic sites, cemeteries, botanic gardens, and other similar spaces. While such inventories of existing local and regional park and recreation lands exist, there is no complementary information for land areas at school sites used for outdoor recreation and environmental education.

Table 8 summarizes the existing acreages of these available recreation lands for each of the five GLAC Subregions. Also provided are existing (2010) and projected (2035) populations within each subregion.

Table 8. Existing Recreation Lands

Subregion	Developed Urban Park and Recreation Area (acres)	Open Space Lands			Greenway (acres)	Other / Misc (acres)	Existing Population Projected Population
		Riparian / Upland / Wetland (acres)	Beach / Estuary (acres)	National Forest (acres)			
North Santa Monica Bay	250	57,000	370	0	0	0	107,000 122,000
Upper Los Angeles River	4,600	29,000	0	120,000	430	560	2,270,000 2,590,000
Upper San Gabriel River and Rio Hondo	3,100	14,000	0	178,000	2,100	1,400	1,520,000 1,740,000
Lower San Gabriel and Lower Los Angeles Rivers	7,000	4,700	390	0	550	50	3,030,000 3,460,000
South Santa Monica Bay	3,900	19,000	1,100	0	70	240	2,690,000 3,080,000
Total Acres in Region	**19,000**	**124,000**	**1,800**	**298,000**	**3,200**	**2,300**	**9,630,000** **10,990,000**

(1) Existing populations based on 2010 census data. Population projections based on SCAG data indicating that for cities within the GLAC area an average population increase of 5.9% between 2008 and 2020, or approximately 5% when scaled from 2010, then 8.7% between 2020 and 2035 could be anticipated.

5.1.1 Types of Open Space and Recreation and Environmental Education Opportunities

A wide range of outdoor recreational and environmental educational opportunities exist. No two park or recreation areas are the same. There is no simple system to classify the variability of development that exists. Open space areas, depending on their proximity to urban populations and their physical characteristics, may be used for a number of active or passive recreational purposes. The following describes some of the major types of recreational open space areas found in the GLAC Region.

Developed Park and Recreation Areas: Developed lands may consist of neighborhood parks, community parks, and sports complexes that are generally less than 20 acres in size. Typically, these parks provide for a combination of active and passive recreation. Golf courses are another type of developed urban recreation area that may range in size from 60 acres to 120 acres with professional courses up to about 250 acres. Though highly developed, golf courses can also include islands of undisturbed open space lands that provide some habitat value as part of their setting.

Greenways: These are linear areas that are generally located around rivers and creeks but sometimes along countywide trail routes, major utility corridors (such as transmission lines), or abandoned rail routes to provide for a wide variety of trail-related recreation.

Table 9 identifies those major rivers, creeks, and channels and other areas within the GLAC Region that have been identified by local communities. These linear recreation lands would typically connect a series of urban park and recreation areas. They also may connect natural landscape components, including wetland, riparian, and upland associations. Countywide trail routes could also be considered in this category as they may connect major parks or open space areas such as the Santa Monica Mountains with the San Gabriel Mountains. Greenways provide opportunities for passive recreation. There are no specific park standards related to greenways, as these are generally opportunities afforded by the landscape setting.

Table 9. Existing and Planned Linear Urban Greenways / Parkways / Bikeways with Class 1 Multiple-use Trails

	Linear Urban Greenways / Parkways / Bikeways	North Santa Monica Bay	Upper Los Angeles River	Upper San Gabriel River and Rio Hondo	Lower San Gabriel and Los Angeles Rivers	South Santa Monica Bay
1	Los Angeles River					
2	Arroyo Seco					
3	Bell Creek Greenway					
4	Tujunga Wash					
6	Burbank Western Channel					
8	San Gabriel River					
9	Compton Creek Regional Garden Park					
10	Rio Hondo and San Gabriel (Emerald Necklace)					
11	Santa Anita Wash					
12	Eaton Wash					
13	Rubio Wash					
14	Alhambra Wash					
15	Coyote Creek					
16	Carbon Creek					
17	Brae Creek					
19	La Canada Verde Creek					
20	Fullerton Creek					
21	Whittier Greenway Trail					
22	Walnut Creek					
23	San Jose Creek					
25	Ballona Creek					
26	Sepulveda Channel					
27	Arroyo la Cienaga					
28	Dominguez Channel					
29	Long Beach Greenbelt					
30	Santa Monica Beach and South Bay Bike Path					
31	Shoreline Pedestrian Bikeway					
32	Duarte Bike Trail					
33	Metro Orange Line Bike Path					
34	Chandler Bikeway					
35	Mission City Bike Trail					

Habitat Areas or Wildlands: The majority of these resource lands are managed by cities, the County, special districts, and joint powers authorities for their natural qualities. Developed facilities generally are limited and focus on safe public access (staging areas, trails, limited visitor support facilities, wildlife sanctuaries, nature centers, and natural areas) for outdoor passive recreation and environmental education. In some cases open space recreation lands may be a component of a city-wide or regional park, a golf course, or greenway.

Schools: Most secondary or primary schools or institutions of higher learning are designed as a park-like setting. Many have playgrounds and athletic fields associated with them. These sites are sometimes not included in park and recreation inventories. School grounds typically provide opportunities for active recreation, such as playgrounds and sports fields.

Angeles National Forest: The mission of the United States Department of Agriculture, Forest Service, the agency that administers the Angeles National Forest, is to achieve quality land management under the sustainable multiple-use management concept to meet the diverse needs of people. To the millions of Los Angeles-area residents within the GLAC Region and to visitors from all over the world, the Angeles National Forest provides a variety of outdoor recreation opportunities.

5.1.2 Open Space, Park, and Recreation Agencies

There are over 140 agencies that provide public outdoor recreation and environmental education opportunities within the region, not including schools. These include federal, state, regional, county, city park departments, special recreation and park districts, open space districts, joint power authorities, water agencies, and land conservation organizations.

5.1.2.1 Regional Agencies

A list of federal, state, private, and special districts and associations that provide regional recreation within the region is found in Table 10.

Table 10. Federal, State, County, Special District, and Private Organizations Providing Public Recreation Opportunities within the Region

Federal Agencies
United States Army Corps of Engineers
United States Bureau of Land Management
United States Coast Guard
United States Forest Service
United States National Park Service
State Agencies
California Department of Fish and Game
California Department of Parks and Recreation
California State Coastal Conservancy
California State Lands Commission
Santa Monica Mountains Conservancy
University of California
Counties
Los Angeles
Orange
Ventura
Special Districts
Conejo Open Space Conservation Agency
Conejo Recreation and Park District
Hawthorne School District
Kinneloa Irrigation District
Las Virgenes Municipal Water District
Los Angeles County Flood Control District
Metropolitan Transportation Authority
Metropolitan Water District of Southern California
Miraleste Recreation and Park District
Mountains Recreation and Conservation Authority
Native Habitat Preservation Authority
Puente Hills Habitat Authority
Rancho Simi Open Space Conservation Agency
Rancho Simi Recreation and Park District
Ridgecrest Ranchos Recreation and Park District
Rose Hills Memorial Park Association

Rossmore Community Services District
San Dimas-La Verne Recreational Facilities Authority
San Gabriel County Water District
San Gabriel River Water Committee
Sanitation Districts of Los Angeles County
South Bay Cities Sanitation District
Watershed Conservation Authority
Westfield Recreation and Park District
Wilmington Public Cemetery District
Other
El Monte Cemetery Association
Fond Land Preservation Foundation
Glendora Community Conservancy
Huntington Library and Botanical Gardens
Mountains Restoration Trust
Palos Verdes Peninsula Land Conservancy
Pasadena Cemetery Association
Roosevelt Memorial Park Association
San Gabriel Cemetery Association
Sierra Madre Cemetery Association
Trust for Public Land
Amerige Heights Community Association

5.1.2.2 Municipal Park and Recreation Departments / Districts

A list of municipal agencies that provide neighborhood and community parks within the region is found in Table 11.

Table 11. Cities Providing Public Recreation Opportunities within the Region

Cities			
Agoura Hills	Cypress	Lawndale	Rolling Hills
Alhambra	Diamond Bar	Lomita	Rosemead
Anaheim	Downey	Long Beach	San Dimas
Arcadia	Duarte	Los Alamitos	San Fernando
Artesia	El Monte	Los Angeles	San Gabriel

Cities			
Azusa	El Segundo	Lynwood	San Marino
Baldwin Park	Fullerton	Malibu	Santa Fe Springs
Bell Gardens	Gardena	Manhattan Beach	Santa Monica
Bell	Glendale	Maywood	Seal Beach
Bellflower	Hawaiian Gardens	Monrovia	Sierra Madre
Beverly Hills	Hawthorne	Montebello	Signal Hill
Brea	Hermosa Beach	Monterey Park	South El Monte
Buena Park	Huntington Park	Norwalk	South Gate
Burbank	Inglewood	Palos Verdes Estates	South Pasadena
Calabasas	Irwindale	Paramount	Temple City
Carson	La Canada Flintridge	Pasadena	Thousand Oaks
Cerritos	La Habra Heights	Pico Rivera	Torrance
Chino Hills	La Habra	Placentia	Walnut
Claremont	La Mirada	Pomona	West Covina
Commerce	La Palma	Rancho Palos Verdes	West Hollywood
Compton	La Puente	Redondo Beach	Westlake Village
Covina	La Verne	Rolling Hills Estates	Whittier
Culver City	Lakewood		

6. OBJECTIVES AND PLANNING TARGETS FOR RECREATION

The following sections describe the 20-year planning targets that were developed for the recreation section of the OSHARP through the collaborative process described in Section 1.4. These targets are intended to serve as a quantitative measure of progress towards the overall IRWMP recreation goals, as well as to guide project proponents in effectively incorporating recreation into proposed IRWMP projects.

6.1 Objectives

General recreation objectives are to:

- Assist in providing urban neighborhood and community park areas that are accessible to underserved populations (and DAC communities) based on average of 4 acres per 1,000 population.
- Enhance existing and planned greenways as shown in Table 11 and regional trails within open space areas with outdoor recreation and environmental educational opportunities.
- Create or assure the preservation of 6 acres of open space lands per 1,000 population that are available for passive public outdoor recreation and education purposes. These lands may incorporate: all or a portion of greenways; county, state, or national parks; US Forest Service lands; regional trails routes; and/or dedicated open space areas or any jurisdiction.

6.2 Recreation Planning Targets

6.2.1 Methodology

The methodology used for establishing recreation targets focuses on defining and identifying underserved communities where the supply of recreation opportunities does not meet demand based on community standards. This methodology is described in detail in Appendix D.

6.2.2 Recreation Targets

Figure 12 presents targets for development of new urban park and recreation areas developed using the methodology described in Appendix D. Included in these targets is

acreage for greenways that, if developed for recreation purposes, provides equivalent recreation benefits to some aspects of neighborhood and community parks. (Appendix F lists existing school sites and developed park and recreation areas).

A number of additional factors need to be considered during the process to implement these targets. These factors are largely based on the type of facility being developed. For neighborhood or community parks that provide active and/or passive recreation, the order of priority should be as follows:

- High Priority: projects within urban areas with less than 1 acre of available park and recreation area per 1,000 population.
- Moderate Priority: projects within urban areas with between 1 to 3.9 acres of available park and recreation area per 1,000 population.
- Low Priority: projects within urban areas with greater than 4 acres of available park and recreation area per 1,000 population.

Recreation targets are for year 2035.

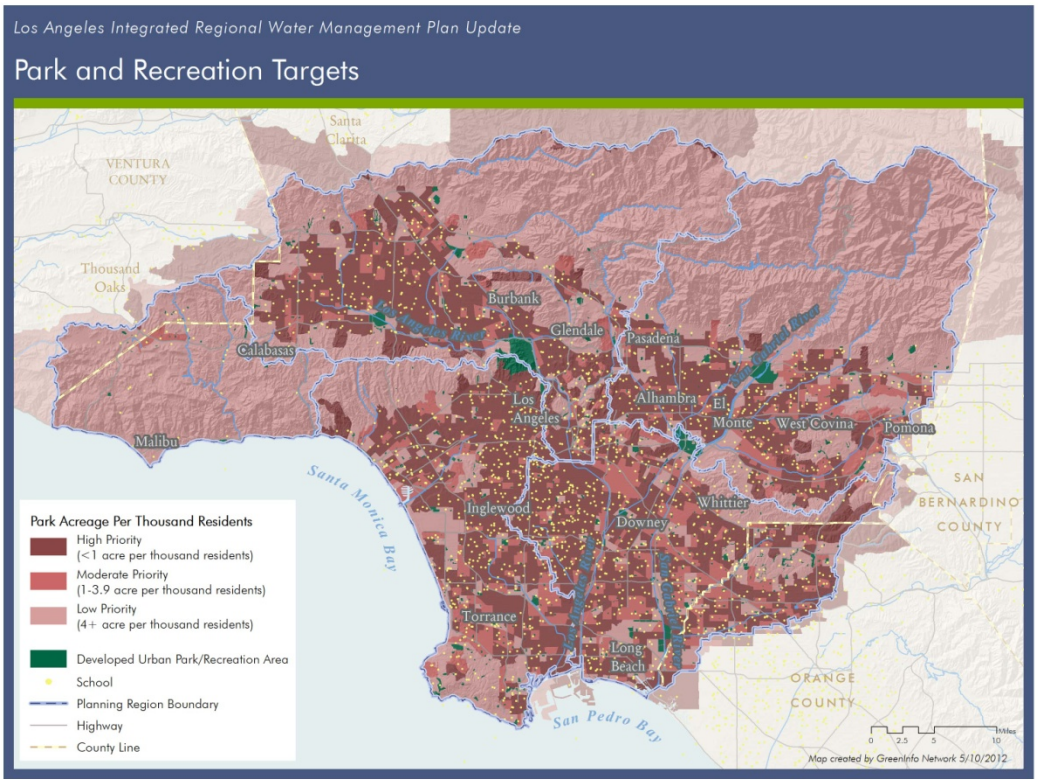

Figure 12. Park and Recreation Targets (GLAC Region)

Table 12 presents targets for the GLAC Region for protecting and developing open space areas for public recreation. These targets provided needed open space areas for public recreation. These targets are based on current and projected (2035) populations.

Table 12. New Recreation Targets for Open Space Areas for Existing Populations

GLAC Region	Existing Open Space Lands Available for Recreation (1) (acres)	Existing Population / Projected Population(2)	Standards (3) (acres)	Targets (acres)
Excluding Angeles National Forest Lands	13,000	**9,630,000** **10,990,000**	58,000 65,926	45,000 53,000
Including Angeles National Forest Lands	27,000	**9,630,000** **10,990,000**	58,000 66,000	30,000 38,000

(1) Open space lands indicated assume that approximately 5% of the total open space land acreage is accessible and developed for recreation access and/or outdoor recreation purposes. This would include staging areas, trailhead enhancements, trails, and associated visitor serving facilities for recreation and outdoor education.

(2) Existing populations based on 2010 census data. Population projections based on SCAG data indicating that for cities within the GLAC area an average population increase of 5.9% between 2008 and 2020, or approximately 5% when scaled from 2010, then 8.7% between 2020 and 2035 could be anticipated.

(3) Based on 6 acres / 1000 population. Open Space is a regional amenity and is not defined by sub-region.

Based on existing standards there is a need for approximately 16,000 acres of additional urban parkland (neighborhood and community parks) within the region. In addition, there is a need for approximately 30,000 to 45,000 acres of additional regional park and open space lands available for recreation. Based on current population projections for the region, this need will rise by the year 2035 to approximately 22,000 acres of urban parkland and between 38,000 and 53,000 acres of regional park and open space lands.

Figure 13 illustrates on the following areas on a regional basis:

- Existing Open Space Areas
- Existing River and Creek Greenways

- Other Greenways
- Greenways planned but not completed
- Planned County trail routes

Figures in Appendices G-K illustrate these areas on a subregional basis.

For resource recreation areas that provide passive recreation or environmental education opportunities, the order of priority should be as follows:

- High Priority: projects more than a 3 miles from an existing open space area or greenway or projects that help complete the County trail system
- Moderate Priority: projects between 1 and 3 miles from an existing open space area or greenway
- Low Priority: projects from between 0 and 1 mile from an existing open space area or greenway

Lands within the County trail system should also be considered as a high priority. This system provides for passive recreation opportunities for both near-to-home recreation and for visitors to southern California from throughout the world. An important justification, from a recreation perspective, for additional open space land acquisition and conservation that will serve the recreation interests of both residents within the GLAC Region and visitors from outside the region is tied to the planned Los Angeles County regional trail system. Completion of this system will require significant land and/or easement acquisition; therefore, the County trail system is also identified as high priority.

There also are other opportunities to accommodate local and area-wide recreation demand for resource lands. These opportunities are found in undeveloped but privately held parcels that, if in public ownership, would provide a direct link between the region's urban populations to existing regional resource lands, including those within the Santa Monica Mountains, the Angeles National Forest, and other regional-serving open space areas such as the Puente or San Jose Hills. No priority is proposed for these resource areas.

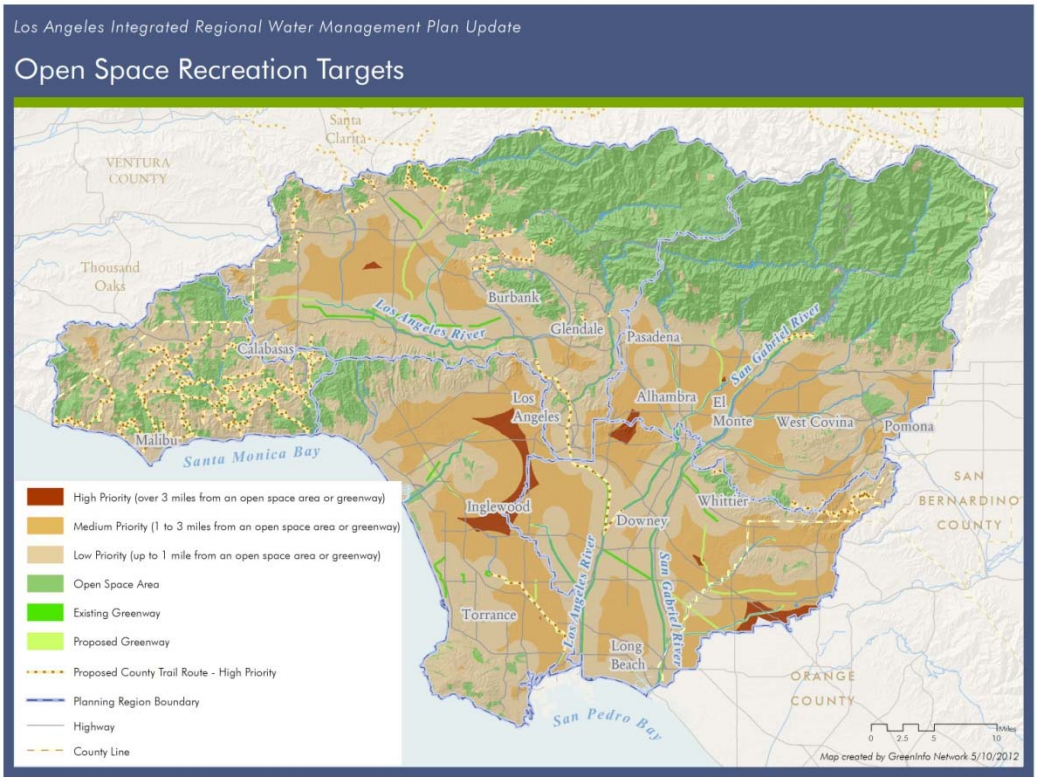

Figure 13. Open Space and Recreation Targets (GLAC Region)

7. OPEN SPACE AND ECOSYSTEM SERVICES

The benefits of open space lands within the region, whether in public or private ownership, are numerous. Evaluation of habitat and recreation benefits only as they are related to water management practices results in an isolated perspective that does not nearly demonstrate the full integration of societal benefits attributable to open space. Additionally, the physical benefits of open space are complemented with economic benefits that open space provides to those who live near open space lands and to entire communities. There are numerous models and studies that have demonstrated the economic values of open space preservation. The justification for the preservation and maintenance of open space lands therefore cannot be solely related to any single benefit but should be viewed as the cumulative effect of many benefits, the management of water resources being only one of them.

Ecosystem services provide one approach for framing the values and benefits of open space. Ecosystem services are the benefits people obtain from ecosystems. The Millennium Ecosystems Assessment (2005) has presented a scheme for classifying ecosystem services using four general categories:

- *Provisioning services* such as food, water, timber, and fiber
- *Regulating services* that affect climate, floods, disease, wastes, and water quality
- *Cultural services* that provide recreational, aesthetic, and spiritual benefits
- *Supporting services* such as soil formation, photosynthesis, and nutrient cycling

Wetlands provide services in all four categories, as is shown in Table 13 (Vymazal, 2011). Wetland ecosystems reduce flood damage to human communities, sequester carbon, and reduce pollutants in runoff entering streams (Brauman et al., 2007). Wetlands support consumptive uses such as hunting and fishing as well as non-consumptive uses such as bird watching. Zedler and Kersher (2008) consider four of the many functions performed by wetlands to have global significance and value as ecosystem services: biodiversity support, water quality improvement, flood abatement, and carbon management.

Table 13. Examples of Services Provided by Wetlands, Organized According to the Millennium Ecosystem Assessment Framework.

Provisioning Services

Food	Production of fish, wild game, fruits, grains
Fresh water	Storage and retention of water for domestic, industrial and agricultural use
Fiber and fuel	Production of logs, fuel-wood, peat, fodder
Biochemical	Extraction of medicines and other materials from biota
Genetic materials	Genes for resistance to plant pathogens, ornamental species, and so on
Regulating Services	
Climate regulation	Source of and sink for greenhouse gases; influence local and regional temperature, precipitation, and other climate processes
Water regulation (hydrological flows)	Groundwater recharge/discharge; flow attenuation
Water purification and waste treatment	Retention, recovery, and removal of excess nutrients and other pollutants
Erosion regulation	Retention of soils and sediments
Natural hazard regulation	Food control; storm protection
Pollination	Habitat for pollination
Cultural Services	
Spiritual and inspirational	Source of inspiration; many religions attach spiritual and religion values to aspects of wetland ecosystems
Recreational	Opportunities for recreational activities
Aesthetic	Many people find beauty or aesthetic value in aspects of wetland ecosystems
Educational	Opportunities for formal and informal education and training
Supporting Services	
Soil formation	Sediment retention and accumulation of organic matter
Nutrient cycling	Storage, recycling, processing, and acquisition of nutrients

Upland habitats also provide a wide range of ecosystem services. As with wetlands, uplands provide biodiversity support and support consumptive uses such as hunting as well as non-consumptive uses such as recreation and education.

The following sections discuss some of the ecosystem services provided by open space lands.

7.1 Providing Fresh Water

The GLAC Region is diverse in its hydrology and geology. As shown in Figure 14, the general flow of water is from north to south; however, geologic conditions can force flows

in an east-west direction and in some areas allow for aquifer recharge. When overlaying existing and future open space projects and programs with the Region's hydrologic and geologic characteristics, some generalized conclusions can be made. For the purposes of the GLAC IRWMP planning process, these conclusions focus on the facts that open space projects, if appropriately designed and sited, have the ability to influence groundwater levels, improve surface water quality, and improve flood management by either attenuating storm flows or by being developed where unmet drainage needs exist, possibly removing the need altogether.

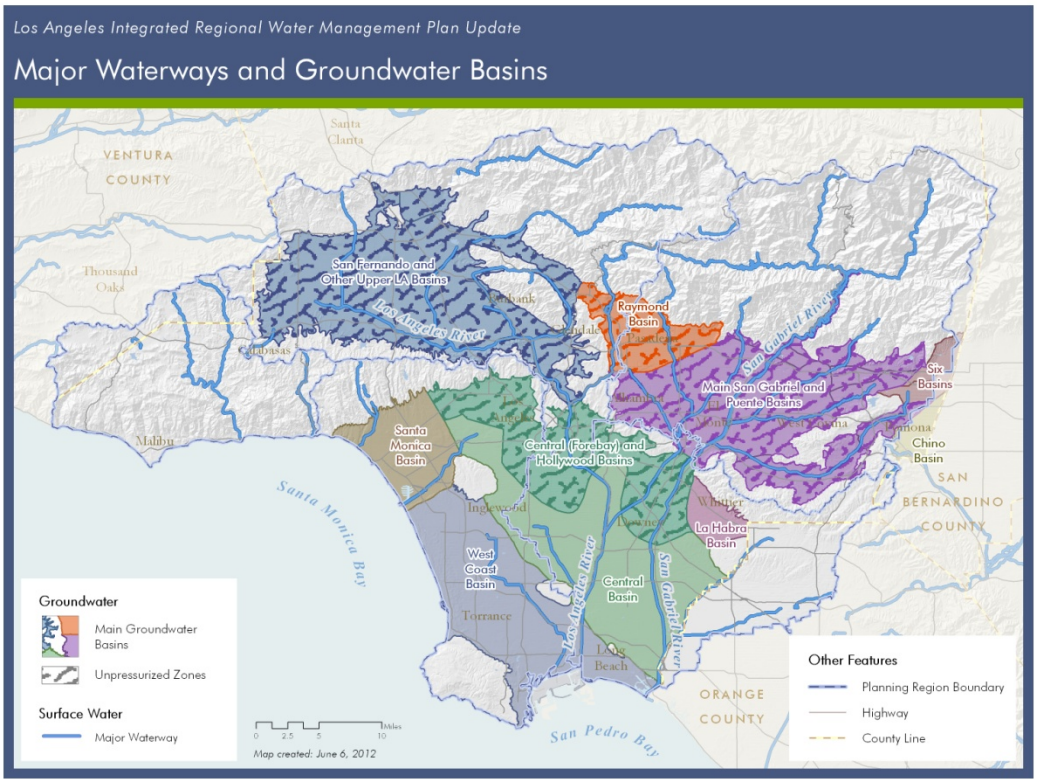

Figure 14. Major Waterways and Groundwater Basins (GLAC Region)

Infiltration and Potential Groundwater Recharge: Preserving or enhancing infiltration for potential groundwater recharge improves water supply reliability and overall water quality. When open space projects are treated as multiple-use, best management practices (BMP) can be incorporated to achieve multiple water management objectives.

Quantifying the water supply benefit that could be achieved by a proposed project will be a necessary component of project prioritization and meeting water supply targets. To assist planners in this effort, a spreadsheet tool was developed that provides an estimate of annual

average infiltration potential of projects using regional climatic data and a generalized hydraulic model. A background for this tool is presented in Appendix L, and the spreadsheet will be made available to planners via the GLAC IRWMP website.

While this tool can provide a rough estimate for planners, it should be understood that it is for planning purposes only. To ensure that the estimated water supply and water quality benefits are realized, professional design assistance should be employed.

Water Conservation: Designing open space projects with water conservation practices, such as appropriate plant palettes, efficient irrigation design, and use of recycled water, can help reduce demands on the region's potable water supplies. Water conservation practices should apply to all designed landscapes within the GLAC Region. For any developed park or outdoor recreation area, demands on water supply are directly affected by planting and irrigation design practices. New parks could be expected to use BMPs to minimize water demand. Additionally, all developed park and recreation areas, like any capital improvement, have a life cycle. Therefore, there remains great opportunity with many older sites that, with rehabilitation and BMPs, further reduction in demands on water supply is possible.

7.2 Improving Water Quality

Natural habitats can improve water quality by capturing and removing pollutants, including nutrients and pathogens. Wetlands are particularly renowned for improving water quality. Some pollutants, particularly metals and many organic compounds, are removed when the suspended particles to which they are adsorbed settle out in wetlands. Some pollutants are transformed by processes occurring within wetlands, such as denitrification for the removal of excess nitrogen. Other pollutants, including bacteria, are deactivated by solar radiation while being retained in wetlands. The water quality improvement services of natural wetlands are often exploited when wetlands are constructed specifically to treat wastewater (including stormwater)

In addition to water quality improvement by natural habitats, designed habitats can also improve water quality. Requiring BMPs to capture wet and dry weather flows from on-site and potentially off-site improves stormwater management and helps to keep pollutants out of receiving water bodies. This would be applicable to both stormwater and irrigation water runoff. BMPs could include use of rain gardens, water quality swales, and/or stormwater retention/detention basins to enhance capture rates, filter and improve water quality and, when appropriately sited, enhance groundwater levels.

These BMPs will contribute to meeting water quality targets for the region. Water quality targets are expressed as an overall capacity (volume) of these systems throughout the region. This capacity is based on systems designed to capture the ¾-inch storm. While additional volume could be provided and may achieve additional water quality benefits, only the volume needed to capture the ¾-inch storm can be counted towards water quality targets. The spreadsheet tool described in Section 7.1 (with additional background provided in Appendix L) also has the capacity to estimate potential to contribute to water quality targets for a proposed BMP. As stated above, this tool is to be used for planning purposes only, and a design professional should be employed to ensure the estimated benefits are achieved.

Also important to note is the consequences to water quality should open spaces be lost to development. While building codes require some level of treatment of the increased pollution generated due to the development, developers are not required to treat existing pollution from tributary areas. When open spaces are maintained with a multiple benefit approach, they not only generate less pollution than developed lands, but are capable of improving water quality from off-site. Thus, increased development on previously open space lands leads to an overall degradation in water quality.

7.3 Flood Risk Reduction

Managing storm events by retaining significant volumes of rainfall before it becomes runoff can assist in reducing demands on the storm drain network. As well, developing open space projects that are able to flood, and potentially placing them in areas that are repeatedly inundated, has the potential to reduce the GLAC Region's overall risk to flooding.

7.4 Preserving Biodiversity

Open space projects provide a wide variety of ecological benefits, including the conservation benefits of providing habitat to native species and the protection and enhancement of biodiversity.

Virtually all developed urban park and recreation areas include some form of green space. Depending on the percentage of vegetated area, vegetative species present, overstory canopy, cover density, and forage opportunity, each of these areas could enhance urban wildlife habitat values and species diversity. The larger the urban park, recreation area, or golf course, the greater the opportunity for hosting a variety of resident species.

The most obvious habitat conservation benefits of open space projects accrue to aquatic and upland habitats and species. Although the Los Angeles area today, especially its urban areas, seems largely devoid of aquatic ecosystems, historically the region supported an abundance

of diverse aquatic habitats (Rairdan 1998, Stein et al. 2007, Dark et al. 2011). From an ecological perspective, riparian areas are critically important in the semi-arid and arid southwest United States, where they provide rare, mesic habitat corridors and contribute disproportionately to regional biodiversity (Knopf et al. 1988). For example, although riparian habitats comprise only one percent of the land area of the Santa Monica Mountains, they are the primary habitat for nearly 20 percent of the native plant flora (Rundel and Sturmer 1998). Management of these vital habitats is especially critical because 95-97 percent of the original riparian habitat in southern California has been lost (Faber et al. 1989).

The conservation value of aquatic ecosystems has increased as the region developed and aquatic habitats were lost and/or degraded. Habitat modification, weedy exotic species introductions, stream channel modification, and heavy recreational use all appear to lead to sharp reductions in plant species diversity (Rundel and Sturmer 1998). These ecosystems provide habitat for a large number of sensitive species including the southwestern willow flycatcher (*Empidonax traillii extimus*), least Bell's vireo (*Vireo bellii pusillus*), arroyo toad (*Bufo californicus*), California red-legged frog (*Rana draytonii*), and western pond turtle (*Emys [Actinemys] marmorata*) among others (Abell 1989, Jennings and Hayes 1994, Thomson et al. 2012).

Besides the obvious effects of habitat destruction and modification, aquatic ecosystems in the region have been influenced by many anthropogenic factors. Hydromodification through changes in the impervious surface of watersheds (Hawley and Bledsoe 2011) or stream bank alteration can have significant ecological effects (White and Greer 2006), often called the "urban stream syndrome" (Walsh et al. 2005). Altered stream flow can influence many taxa, including fish, macroinvertebrates, and amphibians (Poff and Zimmerman 2010). Changes in water quality can also have negative effects on aquatic communities (Paul and Meyer 2001).

7.5 Providing Carbon Management

Wetlands are particularly important in carbon management because they can sequester significant amounts of carbon (Chmura et al. 2003, Bridgham et al. 2006). This is particularly true in saltwater wetlands, whose high productivity results in some of the highest carbon sequestration rates of all habitats. Moreover, salt marshes do not emit methane, which is emitted at relatively high rates by some freshwater wetlands. Because methane is a potent greenhouse gas, the greenhouse gas mitigation potential for salt marshes

is generally higher than for freshwater wetlands. Nonetheless, riparian forests sequester substantial amounts of carbon in their aboveground biomass.

7.6 Providing Aesthetic and Cultural Values

Wetlands provide a variety of aesthetic and cultural values. Wetlands are important tourism destinations because of their aesthetic values and high biodiversity (Millenium Ecosystem Assessment 2005b). The many unique plants and animals, including a disproportionate number of endangered species, make wetlands valued places for viewing birds and other wildlife and plants. Wetlands are also popular for a number of recreational activities, including fishing and boating, although in GLAC these activities are largely restricted to estuaries and lakes or reservoirs. Wetlands provide opportunities for education and scientific research. Wetlands provide aesthetic values to people who appreciate natural features. This value is particularly important in urbanized settings such as much of GLAC, where wetlands provide views and open space that provide a relief from urban environments. Similarly, wetlands provide spiritual and inspirational services, where personal feelings and well-being can be supported (Millenium Ecosystem Assessment 2005b).

Many of these same services are provided by non-wetland habitats. Transitional and upland habitats provide many recreational activities, including hiking and biking. Transitional and upland habitats also provide important aesthetic values and spiritual and inspirational services. Many people value the "sense of place" associated with recognized features of their environment, including aspects of the ecosystem (Millenium Ecosystem Assessment 2005a).

As discussed earlier, open space includes a continuum from natural habitats valued largely for habitat to man-made habitats valued largely for recreation. The aesthetic and cultural services vary similarly along a continuum, spiritual/inspirational and aesthetic services predominating at the natural end of the continuum, and recreational services predominating at the other.

8. POTENTIAL SURFACE WATER AND GROUNDWATER RESOURCES MANAGEMENT BENEFITS OF OPEN SPACE PROJECTS

As described above, the benefits of open space for habitat and recreation are many and include ecosystem and cultural services such as biodiversity and public health, yet these are difficult to accurately quantify. A method was developed for quantifying water quantity and water quality benefits for individual projects; however, applying this to the entire region without specific proposed projects presents obvious challenges. Regardless, estimating and quantifying these benefits on a regional scale have been attempted in recently completed and currently ongoing studies. The methodology is described in detail in Appendix M, and the results a presented below.

8.1 Stormwater Infiltration and Potential Groundwater Recharge Benefits

Results from the methodology described in Appendix M show that there is a potential to recharge 47,000 AF/yr throughout the GLAC Region if the target habitat and recreation lands in areas with high recharge potential are developed and/or enhanced with BMPs (Table 14). Figures 15 and 16 show recreation and habitat targets with potential recharge benefits.

Table 14. Infiltration and Potential Groundwater Recharge Benefits from Open Space Projects

	Potential Groundwater Recharge Capacity (AF/yr)		
	Habitat	**Recreation**	**Total**
North Santa Monica Bay	-	-	-
Upper Los Angeles River	2,000	19,000	21,000
Upper San Gabriel and Rio Hondo	3,000	15,000	18,000
Lower San Gabriel and Los Angeles River	1,000	5,000	6,000
South Santa Monica Bay	-	2,000	2,000
Greater Los Angeles County	**6,000**	**41,000**	**47,000**

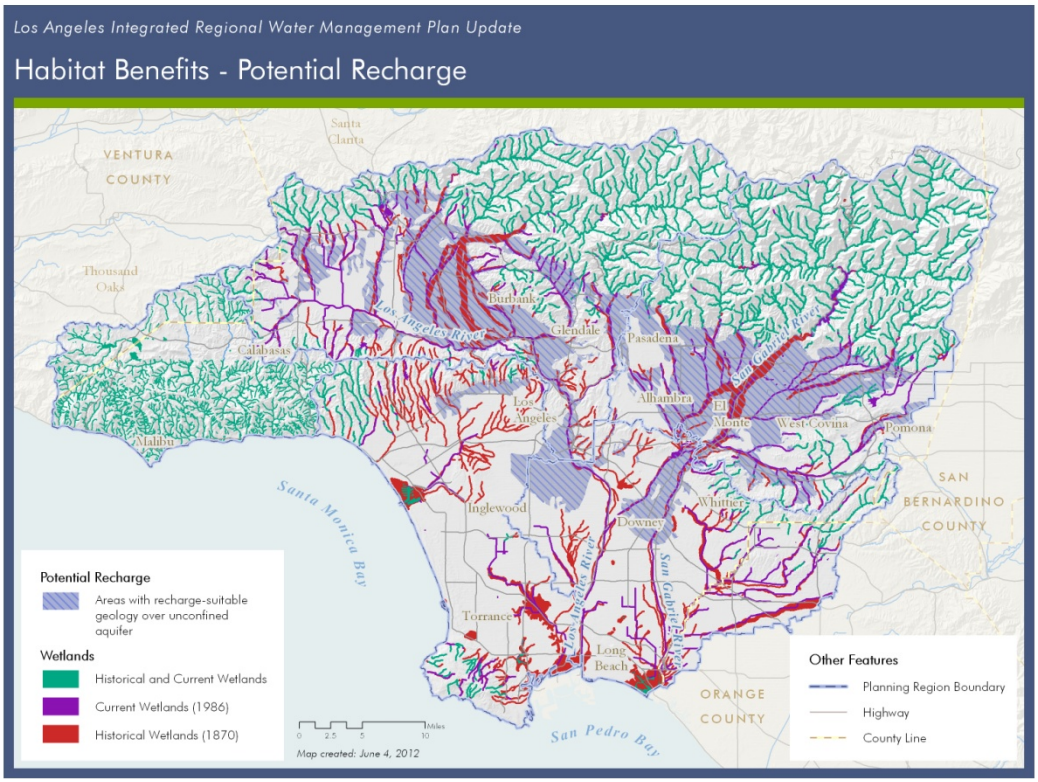

Figure 15. Habitat Targets and Potential Recharge Benefits (GLAC Region)

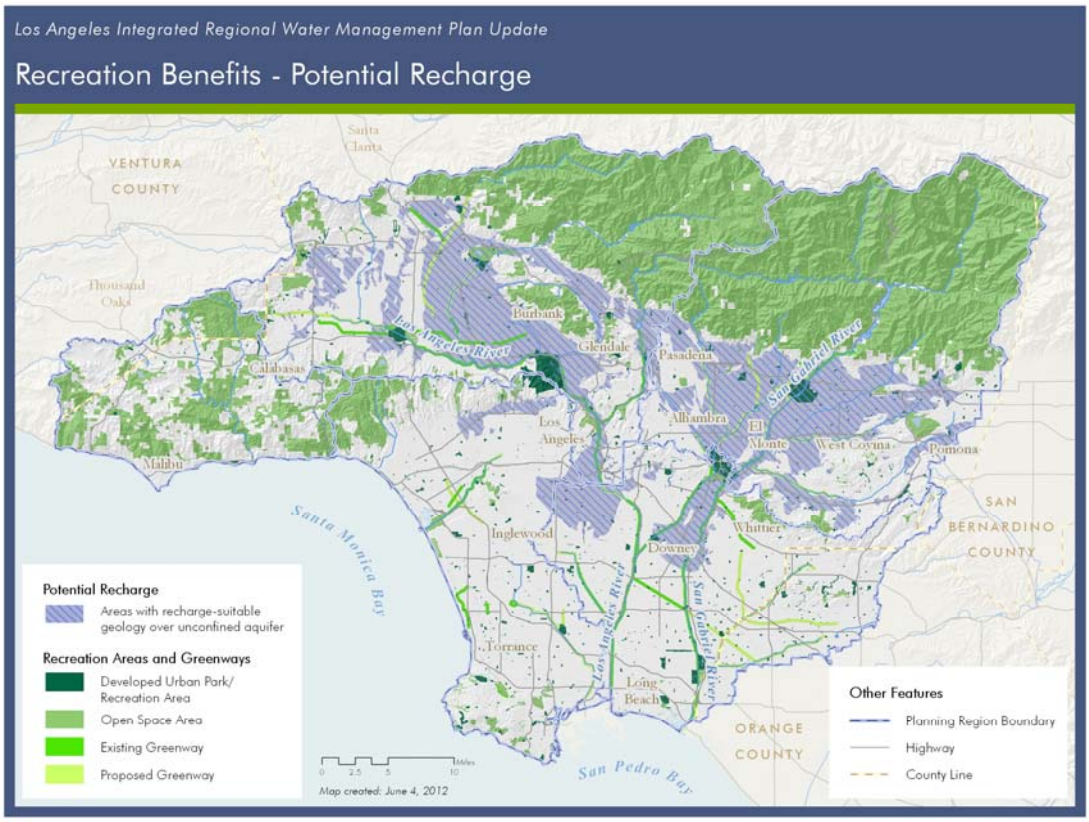

Figure 16. Recreations Targets and Potential Recharge Benefits (GLAC Region)

8.2 Stormwater Quality

Results show that there is a potential to create 21,000 AF of storage for water quality purposes, out of a target of 57,000 AF of storage throughout the GLAC Region if the target habitat and recreation lands are developed and/or enhanced with BMPs (Table 15).

Table 15. Potential Stormwater Quality Benefits from Open Space Projects

	Potential Capture Capacity (AF/yr)		
	Habitat	**Recreation**	**Total**
North Santa Monica Bay	200	200	400
Upper Los Angeles River	600	3,900	4,500
Upper San Gabriel and Rio Hondo	900	2,600	3,500
Lower San Gabriel and Los Angeles River	1,100	4,400	5,500
South Santa Monica Bay	800	6,400	7,200
Greater Los Angeles County	**3,600**	**17,000**	**21,000**

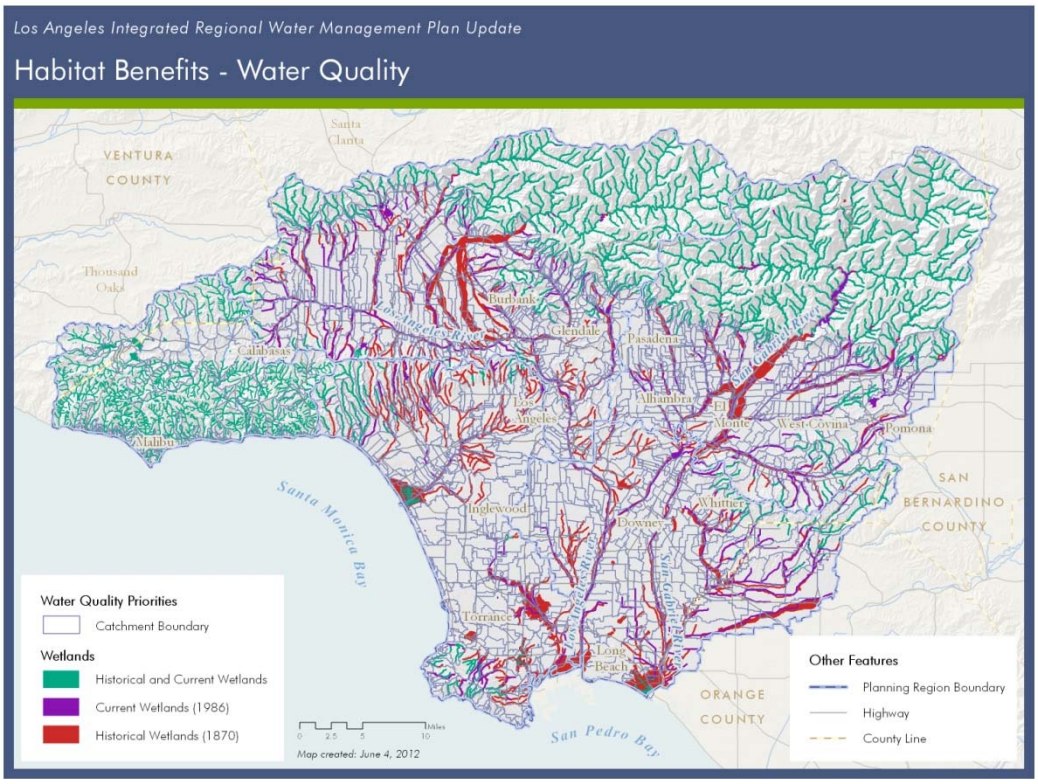

Figure 17. Habitat Targets and Stormwater Quality Benefits (GLAC Region)

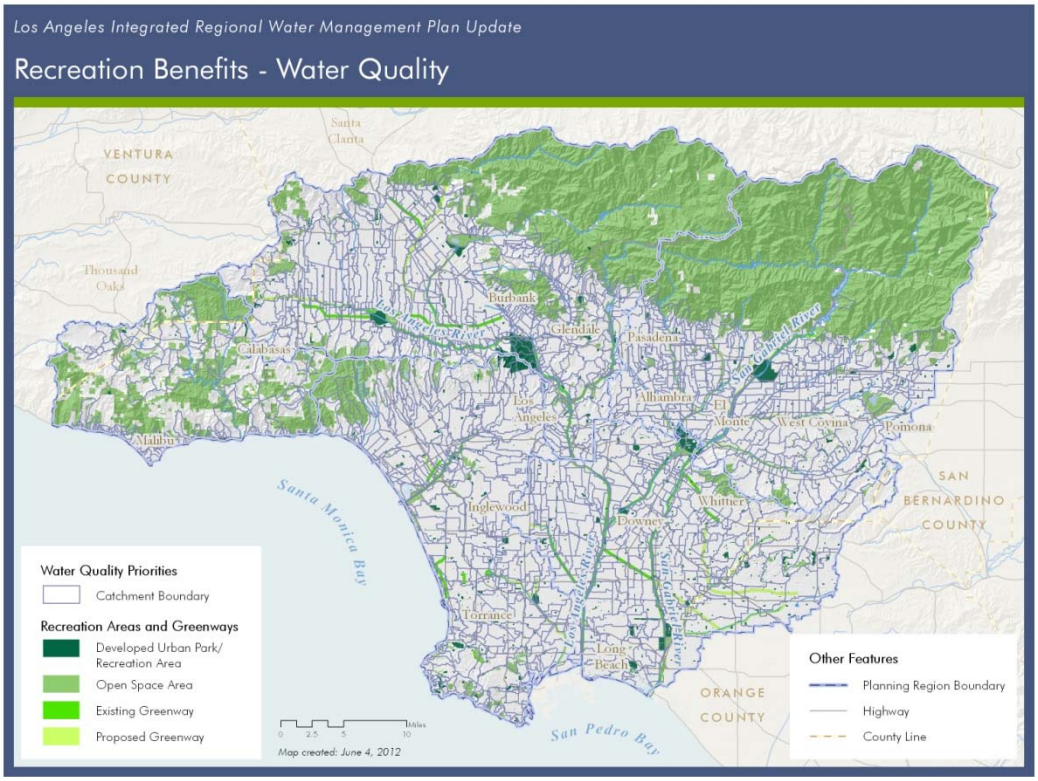

Figure 18. Recreation Targets and Stormwater Quality Benefits (GLAC Region)

9. POTENTIAL CLIMATE BENEFITS OF OPEN SPACE PROJECTS

9.1 Projected Impacts of Climate Change

The effects of climate change are wide-reaching and must be incorporated into long-term planning efforts. According to California Climate Change Center's 2006 Summary Report on California's Changing Climate (Luers et al. 2006) temperatures are expected to rise substantially over the next century. Scientific models, based on the level of greenhouse gas (GHG) emissions, project three different climatic scenarios for California. Under the lower GHG emission scenario, temperature is anticipated to rise between 3 and 5.5°F. The medium GHG emission scenario anticipates a rise in temperature between 5.5 and 8°F. The high GHG emission scenario predicts that temperature may rise between 8 and 10.5°F (Luers et al. 2006).

Unlike temperature projections, there is less of a consensus on the effects that climate change will have on the amount of precipitation in California. Some models predict that there will be little change in the total annual precipitation, while others do not show any consistent trend over the next century. The Mediterranean seasonal precipitation pattern, with most precipitation falling during the winter months and from north pacific storms, is expected to continue. However, some models predict wetter winters while others project a 10 to 20 percent decrease in precipitation (Luers et al 2006). One of the many anticipated effects of climate change is that more precipitation will fall as rain rather than snow. This could lead to a drastic reduction in the annual snow pack (70 to 90 percent), which will pose challenges for water resource managers, winter recreational activities, and the environment.

Another effect of climate change is increased oceanic temperatures and sea level rise. The California Department of Boating and Waterways commissioned an analysis on the economic costs to sea-level rise to California beach communities. The report, released in September 2011, cites various studies projecting the amount California sea-levels may rise. These studies predict that mean sea level in California could rise between 3 feet and 6 feet by 2100 (King et al. 2011). While a rise in sea level of more than 6 feet could mean the inundation of coastal infrastructure and facilities, the most significant coastal damages will most likely occur from extreme storms and episodic events, which are projected to occur more frequently under a changing climate. Coastal erosion is also projected to accelerate in the coming century and will threaten ecosystem services, including shoreline storm buffering capacities and recreational opportunities (King et al. 2011).

Climate change will also have dramatic effects on species and their habitats over the next century. Already, research has linked climate change with observed changes in species

behaviors and species habitat (Parmesan 2006). For example, the migration cycles of migratory songbirds are shifting as birds begin to migrate north earlier in the year. The change in migration cycle has resulted in a decoupling between the birds arrival date at their breeding ground and the availability of food they need for successful reproduction (The birds are arriving prior to the emergence of their food supply.) (USFWS 2010).

The latitudinal and elevational ranges of species will shift as the climate warms (Tingley et al. 2009). Species (both plant and animal) are expected to move to higher elevational gradients as lower elevations become too warm or dry to be habitable (Kelly and Goulden 2008). Warmer temperatures will also increase the risk and size of wildfires, insect outbreaks, pathogens, disease outbreaks, and tree mortality. The IPCC's Fourth Assessment Report estimates that approximately 20 to 30 percent of the world's plant and animal species will have an increased risk for extinction (IPCC 2007).

In aquatic ecosystems, increased water temperatures will negatively impact cold and cool-water fish. Rising sea levels will also inundate critical coastal habitats that serve as nurseries for fish populations as well as other wildlife (USFWS 2010).

Overall climate change is likely to cause abrupt ecosystem changes and species extinctions (Beliard et al. 2012). It will reduce our natural systems' ability to provide valuable ecosystem services—including reducing the availability of clean water—and impact our local and regional economy.

A benefit of greenways with multi-use bicycle paths is that they will be used for transportation purposes and will incrementally slow the pace of global warming. Nationally, the development of trails is seen as one avenue to reduce the nation's obesity epidemic, its dependency on oil, and its contribution to global warming. Fewer autos on the regional highway network means less carbon emissions that are driving global warming. Expanding use of bicycles further reduces emissions and, though marginal, increases the time available for society to respond to major climatic changes.

Within the region, the direct impact of climate change on physical recreation resources is principally related to the potential effects of sea level rise. It could be argued that the greatest open space resource of the GLAC Region is the Pacific Ocean, its public beaches, estuaries, and the public parks and trails along the shoreline. The economic benefits of these fabled southern California resources are significant. The impacts of sea level rise may be nothing short of cataclysmic to some of these beach and coastal estuary resources. These at-risk lands account for approximately 1,600 acres of Developed Urban Parks and Recreation Areas or Open Space Resource Areas. Although climate change adaptation techniques such

as managed retreat have already been adopted at some southern California locations, the ability to clear urbanized lands to accommodate sea level rise is challenging at best, if simply not feasible economically. The ability to manage inland flooding from sea level rise is likely possible with multiple-use design solutions that incorporate levees, sea walls, or other engineered containment facilities with public access to trails and linear habitat corridors. These facilities may be designed to include provisions for particular recreation features such as the coastal trail or retention of piers, but other recreation resources will only be replaced with the acquisition of sufficient existing upland areas that are essentially now fully developed.

9.2 Recommended Criteria and Planning Strategies to Address Climate Change

9.2.1 Climate Change Adaptation

The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as "an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (USFWS 2010, 14). Climate change adaptation seeks to reduce or ameliorate the effects of climate change that may occur.

Historically, California's Mediterranean climate has been known for its naturally variable temperatures and periodically recurring droughts. As a result, many species and ecosystems developed mechanisms to adapt to naturally occurring variations in temperature and water availability. However, with the accelerated warming trends predicted by climate change scientists, there is a high-level of uncertainty as to whether species and ecosystems will be able to adapt adequately enough to survive.

There are a number of adaptation strategies that could be adopted to conserve biodiversity and targeted species. Conservation planning, especially in the design of nature reserves, can be undertaken with a view towards future climate change (Bernazzani et al. 2012). This could include establishing reserves with high diversity of microhabitats (to accommodate on-site shifting of species distributions in response to climate change) to adopting a flexible-boundary approach, perhaps in conjunction with buffers or conservation zoning around a reserve.

The principal adaptation approach being used by the USFWS is the application of landscape-scale approach to conservation. Landscape-scale conservation includes the strategic conservation of terrestrial, freshwater, and marine habitats within sustainable landscapes. With the conservation of strategic habitat areas, it is also equally important to

restore linkages and corridors between large habitat areas to facilitate the movement of fish and wildlife species responding to climate change. The fundamental goal of the USFWS program is to conserve target populations of species, or suites of species, and the ecological functions that sustain them (USFWS 2010).

Although landscape-scale conservation planning, including strategic placement of reserves and corridors, is an essential element of climate change adaptation, in many cases species will not be able to migrate fast enough to keep up with climate change. A more active adaptation strategy is "assisted migration" (or assisted colonization) where target species are actively moved to a new location outside of their current distribution to anticipate the loss of suitable habitat where they currently occur (Vitt et al. 2010). Although there is some evidence of limited success with assisted migration, this strategy is controversial because of the many conservation issues it creates.

One of the most serious threats to coastal communities, both ecological and human, is sea level rise (Herberger et al 2011). To improve the GLAC Region's understanding of the threat of climate change, a multi-sectoral, multi-jurisdictional assessment of shoreline vulnerability and risk is needed. This assessment of the shoreline and estuarine areas would be conducted on a subregion basis. Local community and stakeholder interest and capacity for participation, the diversity of shoreline features, and presence of regionally significant infrastructure and resources would be considered.

The vulnerability and risk of asset categories would include, but not be limited to: river estuaries, community land use including parks and recreation resources, shoreline protection, and stormwater and wastewater infrastructure. To address assessment frames, a social vulnerability analysis, a broad socio-economic analysis using FEMA's HAZUS methodology, and an analysis of environmental and economic costs due to potential disruption and loss of services could be completed. The goal would be to identify regional and local adaptation strategies to improve resilience features that address the vulnerabilities present. The assessment should also consider the social inequities likely to be reinforced or increased with future climate change (Shonkoff et al. 2011).

Because of the uncertainties associated with predicting future climate change, it is critical that adaptive management strategies be built into long-term planning initiatives. The US Department of Interior defines adaptive management as:

> *A decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific*

> *understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contribution to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent and end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders.* (US DOI 2009)

Implementation of effective adaptive management strategies provides resource managers, recreation planners, and site planners with a mechanism to address the uncertainties of our changing climate.

9.2.2 Climate Change Mitigation

Climate change mitigation refers to reducing GHG concentrations by either reducing the source of GHG emissions or increasing GHG sinks. Mitigation measures include carbon storage and sequestration, fossil fuel and material substitution, food production, and providing additional local recreation areas and green travel routes to encourage walking and cycling.[18] Reducing the production of greenhouse gases will result in immediate improvements to the regional environment while contributing to better health and economic efficiencies in households and businesses.[19]

The most obvious mitigation measure is to reduce GHG emissions by reducing fossil fuel combustion, since that is the largest source of GHGs. Alternative energy sources and energy conservation are often mentioned as obvious means of reducing fossil fuel consumption. More fuel-efficient transportation, including bicycling and walking, can contribute to that goal. There are important opportunities to encourage these activities in GLAC.

One important class of GHG mitigation strategies is geoengineering. Geoengineering encompasses a wide range of activities, from reducing the level of solar radiation by introducing chemicals or objects in the atmosphere or into space, to sequestering carbon by industrial activities, enhancing ocean productivity, or enhancing carbon sequestration in natural habitats by reforestation (Scheilnhuber 2011). Many of these activities are extremely

[18] http://www.opengreenspace.com/
[19] http://ccir.ciesin.columbia.edu/nyc/ccir-ny_q4a.html

controversial, partially because of doubts about their effectiveness and partially because of concerns about potentially large unintended and undesirable consequences.

Besides strategies to reduce fossil fuel consumption, there are a number of climate mitigation strategies that would be implemented in GLAC. One of the most effective would be carbon sequestration by natural habitats. Wetlands can be excellent habitats for carbon sequestration, especially coastal wetlands (Chmura et al. 2003, Vymazal 2011), so the GLAC wetlands could be managed to maximize carbon sequestration whenever feasible; this would include both wetland protection, which would preserve existing carbon stores, and wetland creation, which could increase carbon sequestration.

10. INTEGRATING HABITAT AND RECREATION TARGETS

As discussed earlier, open space encompasses a continuum of uses from natural resource lands to urban parks. Although habitat and recreation targets were calculated separately using different methodological approaches, in fact they are related. However, they are not additive.

A particular project may be useful for both habitat and recreation, in which case the uses would be completely complementary, or on the other extreme it could be useful for one or the other only (i.e., exclusive). Projects that focus on habitat or recreation, even to the exclusion of the other use, are valuable, but of course it is ideal if a project can accommodate both uses.

The total Open Space target for the region will be some combination of the habitat targets and the recreation targets. If habitat and recreation were exclusive, then the total Open Space target would be the sum of the habitat and recreation targets.

While it is recognized there is a potential that at least some of the habitat and recreation targets may overlap because of the open space continuum, for the purpose of this plan, the total Open Space target is the sum of the habitat and recreation target values. No analysis has been done to determine if the total target number can be reduced because of the continuum.

Table 16. Summary of Target Tables – Wetlands, Uplands, and Recreation

North Santa Monica Bay	Upper Los Angeles River	Upper San Gabriel and Rio Hondo Rivers	Lower San Gabriel and Los Angeles Rivers	South Santa Monica Bay	Greater Los Angeles County
Targets for Wetland Protection or Preservation (Tidal Wetland, Freshwater Wetland, and Riparian) (in acres)					
220	180	700	690	220	2,000
Targets for Wetland Enhancement (Tidal Wetland, Freshwater Wetland, and Riparian (in acres)					
440	1,500	2,400	1,100	560	6,000
Targets for Wetland Restoration or Creation (Tidal Wetland, Freshwater Wetland, and Riparian (in acres)					
90	1,100	1,000	950	830	4,000
Targets for Upland Habitat (Buffers and Linkages) (in acres)					
1,100	18,000	20,000	11,000	4,000	54,000
Target for Recreational Park Lands (in acres)					
170	4,500	3,000	5,100	6,900	20,000
Target for Natural Recreational Lands (in acres, range for entire region)					
					30,000 - 53,000
Total Open Space Target (in acres)					
2,000	**25,000**	**27,000**	**19,000**	**13,000**	**115,000 – 138,000**

11. EVALUATING OPEN SPACE PROJECTS

An important component of the IRWMP is the application of scoring metrics to determine the suitability of proposed projects in meeting overall goals and objectives. Recommended criteria to evaluate proposed uplands, wetlands and recreation projects are included in the appendices and are based on the expertise of the Open Space Team, although the GLAC IRWMP Steering Committees will be guiding the scoring process as the final IRWMP is developed.

Because proposed open space project proponents will be required to describe specific project benefits, methods for transparently and scientifically evaluating those benefits for comparison is vital to ensuring the best projects are recognized.

11.1 Habitat Project Evaluation

Numerous methodologies for measuring biological or ecological integrity/ecosystem services were evaluated as part of the process for developing evaluation criteria for open space projects as they relate to habitat. The methodologies reviewed included, but were not limited to, the following: Wetlands Evaluation Technique (WET), Rosgen (for stream hydrology), USACE's Functional – Based Performance Standards for Evaluating the Success of Riparian and Depressional/Emergent Marsh Restoration Sites, Habitat Evaluation Procedures (HEP), California Rapid Assessment Methodology (CRAM), Index of Biological Integrity (IBI), Instream Flow Models (for animals and biological communities), Wetland Replacement Evaluation Procedures, Hydrogeomorphic Wetland Assessment Model (HGM), and the Synoptic Approach.

After analyzing these methods for their applicability to IRWMP, design evaluation criteria for the creation, enhancement, and/or restoration of riverine, palustrine, and estuarine systems were developed using the USACE Functional – Based Performance Standards for Evaluating the Success of Riparian and Depressional/Emergent Marsh Restoration Sites and California's CRAM standards to score for habitat benefits provided by open space projects (See Appendix N).

Although CRAM is generally applied to wetland areas, it was adapted with the USACE method to include uplands also as part of the GLAC IRWMP project evaluation methodology. CRAM is preferred because it provides consistent and comparable assessments of wetland conditions for all wetlands and regions in California, yet accommodates special characteristics of different regions and wetland types. While it assesses the overall condition of wetlands, the results of a CRAM condition assessment can

be used to infer a wetland's ability to provide various functions or services for which it is most suited. CRAM assessments have four attributes: landscape context, hydrology, physical structure, and biotic structure. It also identifies key stressors that may be affecting wetland condition.

However, CRAM, and all other assessment methodologies reviewed, only deals with evaluating the condition and/or function of a project area; CRAM does not evaluate the proposed design of a wetland habitat creation, restoration, and/or enhancement project. The proposed IRWMP project evaluation criteria was developed using criteria from CRAM and other assessment methodologies that described the physical characteristics of the systems with the highest value. At this time, the suggested scoring numbers provide an indication of relative importance (note: the scoring system for this and other functions is currently under development).

11.2 Recreation Project Evaluation

Recreation criteria may be applied on an individual project design basis, or on a broader general planning basis for land acquisition or comparative project evaluations.

The methodology for determining recreation benefits and differentiating between projects is essentially one of measured need for recreation opportunities. The evaluation procedures used to characterize recreation need are based on three variables:

- Supply and demand: the availability of existing developed parks and recreation areas, greenways, or open space areas based on accepted community standards
- Accessibility: the usability of developed parks and recreation areas, greenways, or open space areas in terms of their distance from population centers, particularly underserved populations
- Planning Consistency: whether or not linear features such as greenways or regional trails are actively being planned and/or have been adopted in County and City General Plans.

The proposed IRWMP project evaluation criteria directly correlates to these variables. A supply ratio of 4 acres per 1,000 population serves as a baseline to consider the need for new recreation areas. Distance zones were used to identify priority areas vis-a-vis accessibility. Subregion maps (see Appendices G-K) were produced to illustrate these variables.

In some cases, the challenge for providing outdoor recreation and educational opportunities is land acquisition. The methodology for identifying these areas was limited to:

- Regional trail routes identified in the Draft Los Angeles County General Plan.
- An internet survey of greenway opportunities that have been identified and or formally adopted within the GLAC Region.

It should be noted that with 90 cities within the GLAC Region, and Los Angeles County, the identification of those trails and greenways called is a dynamic process, could be amended as new information is presented (such as City trail plans), and should be updated as necessary over time. (See also Appendix O).

Supply and demand criteria were based on the availability of parklands per thousand residents. Thresholds identified include:

- Less than 1 acre
- 1 to 3.9 acres
- Over 4 acres

Accessibility criteria focus on distances between residents and an open space or trail opportunity. These are:

- More than 3 miles from a greenway or trail
- Between 1 and 3 miles away from a greenway or trail
- Less than 1 mile away from a greenway or trail that is extremely accessible from both pedestrians and bicyclists

Criteria identified for the acquisition of new parklands and trail routes included:

- Consistency with the appropriated governing agency plans
- The opportunity to expand an existing public park, open space area, greenway, or trail
- The size of the parcel relative to its intended recreation use
- Immediacy in terms of the threat of development and a lost opportunity
- Consistency with resource conservation priorities

12. IMPLEMENTING THE OPEN SPACE FOR HABITAT AND RECREATION PLAN

The IRWMP serves as a blueprint that guides a regional approach to developing, protecting, and preserving water resources within the GLAC region. The blueprint seeks to integrate targets, methodologies, and criteria for assessing water resource projects. One goal of this integration is to generate well-designed water resource projects that meet multiple water resource management needs and objectives, including the provision of open space for habitat and recreation. Another goal is to optimize successful grant-funding opportunities within the state's IRWMP program.

12.1 Opportunities and Challenges

Opportunities

The benefits of considering habitat and open space in the IRWMP are numerous. Investing in the preservation, enhancement, and restoration/creation of open space features creates a vision for a more connected region, protecting biodiversity from the uncertain effects of climate change, and maintaining the region's recreational opportunities. The wildlife buffers, linkages, corridors and ample recreation opportunities recommended by the plan will help ensure that people, plants, and animals can move across the landscape to adapt to warming temperatures. It also will allow people to understand the connection between open space and improved environmental management.

The protection, enhancement, and restoration/creation of wetlands systems and their associated buffer zones throughout the region will protect valuable watershed functions. These activities will provide not only critical habitat to species as they move across the landscape, but will also help preserve water quality and quantity. In coastal areas, the preservation, enhancement, and/or restoration/creation of tidal wetlands will help mitigate the effects of rising sea levels.

The IRWMP serves as roadmap for the region's cities, water resource agencies, and other stakeholders to use as they work together. The establishment of subregional goals and objectives, as well as collective regional goals and objectives, allows for these entities to build upon each other's visions and projects. In addition, the mandated process for plan updates provides a means for goals and objectives to be measured and adjusted as progress is made.

In addition to meeting the goals and objectives of the state's IRWMP program, criteria developed in the OSHARP were developed in a manner that is consistent with current regulatory standards of other state and federal permitting agencies. This was done to ensure efficient use of project funds by agencies competing for grant funding.

Challenges

There are many challenges in developing and implementing the goals, objectives, and targets of the OSHARP. Some issues to consider in the future include the following:

- There is currently insufficient research on evaluating and assigning value to ecosystem services. Evaluation of ecosystem services is a relatively new area of study that has yet to achieve consensus on assessment methodologies. As research in this area advances, the OSHARP will be able to more precisely assess the benefits of open space.
- Inequitable access to existing open space resources for outdoor recreation and environmental education purposes needs to be addressed. Access is chiefly dependent on proximity and transportation factors that are outside the scope of the IRWMP. While there may be ways of transporting people to open space, there are limited opportunities to bring open space to people within many urban areas of the GLAC Region. The urban areas are essentially built out and the opportunities for land acquisitions and redevelopment and/or restoration are considered to be limited. The cost of land also may be considered too prohibitive if the justification for acquisition is only related to recreation values. Multipurpose projects may aid in addressing this issue.
- The high level of urbanization and land values within the GLAC Region presents a significant challenge in implementing open space conservation. Open space conservation is needed for the region to protect its biodiversity and mitigate the effects of climate change. By implementing environmental solutions that address water resource management needs such as flood attenuation and water quality improvement, society will receive multiple benefits. It is recognized that these solutions tend to be more complex than "traditional" engineered approaches and should be encouraged.
- There is a concern that project proponents fail to consult property owners, including public agency landowners, prior to developing project concepts and adding these projects into the IRWMP project database. The project addresses this criticism by providing a framework for partnering and collaboration throughout the GLAC region.

- Oftentimes the development of open space decreases local government revenue by taking properties "off the tax rolls", while increasing costs through increased enforcement/oversight for recreational users and/or requiring funds for natural resource management and maintenance. Such funding is typically not readily available. New resource management tools need to be assessed to address this issue. For example, public agency mitigation or conservation banking could not only provide compensatory mitigation for important public infrastructure projects, but also protect/restore habitat and provide adequate funding for the long-term management.
- The acquisition of open space or creation/enhancement/restoration of habitat adjacent to existing neighborhoods may increase potential of fire or flood hazards. These environmental activities also may negate the benefits of existing infrastructure, impact water rights, and/or significantly alter long-established operations and maintenance procedures. If any of these are identified as an issue during the project review process, they should be addressed at that time.
- Implementation of the IRWMP relies, to some extent, on political decision-making. Political consensus, participation by key public organizations, program staffing, and available funding are important for full implementing the IRWMP.

Strategies to Work with Agencies to Ensure Consistency with the IRWMP

The development of the IRWMP has served as a mechanism for discussions between agencies and other stakeholders regarding ways to increase integrated water resource management planning within the GLAC Region. Some of these discussions led to the identification of issues and needs that must be further explored. This exploration should take place during future revisions of this IRWMP. This 2012 IRWMP should serve as a catalyst for further evaluation of regional issues and the means to resolve those issues through a collaborative process. Case studies on the Santa Barabara County and the Santa Ana Watershed approach may be useful in further refining a collaborative process.

Stakeholder and agency partnerships have been created during the development of the IRWMP. By establishing these relationships, these entities can effectively coordinate planning with each other, exchange innovative ideas and methods, and increase coordination to undertake studies and projects. Agencies and non-governmental organizations might even collaborate to work on issues of common interest and identify consensus on broad goals, as exemplified by the working arrangement between the Los Angeles Department of Water and

Power and TreePeople. By partnering, both the individual strengths of each organization, and the benefits from implemented projects, will expand.

Given the large number of agencies with jurisdiction in the GLAC Region, there are a broad range of interests and issues. Many of the interests and issues extend beyond water resource management. Ongoing planning between agencies should increase opportunities to focus on common themes to protect water supply and water quality as well as to address other environmental issues and to provide more parks and open space. Through ongoing planning, agencies can work together to plan and develop multi-purpose projects and programs that fulfill their mandates and meet larger regional needs while also helping to enhance water supplies and improve water supply reliability (GLAC IRWMP Acceptance Process Application, April 28 2009).

12.2 Gaps in Knowledge

The revised IRWMP is based on the best available science to date. However, information updates (i.e., research, science, and public policies) is needed and these updates must be disseminated. Obtaining, assessing, and disseminating high-quality data often is difficult. Without an agreement as to the basic information, it can be difficult to determine accurate baselines, make projections, and set targets in implementing water-related projects (Bliss and Bowe 2011). The effectiveness of the knowledge itself may pose another gap because it often takes several years of implementation, practice, and monitoring to determine an outcome.

While regional inventories of park and recreation lands exist, the complementary information for outdoor areas at school sites used for outdoor recreation and environmental education throughout the entire region does not. Many elementary, middle, and high schools in the urban areas of Los Angeles County are not park-like; instead, they have minimal recreational amenities and contain asphalt rather than vegetated surfaces. Information that should be inventoried includes: condition of outdoor recreation / physical education areas, accessibility to neighborhood areas (open or closed to public use after school hours), and existence of joint use agreements with public recreation providers.

Trail routes illustrated on the recreation and open space target maps are proposed regional trails as identified in the draft Los Angeles General Plan 2035, as well greenways identified by stakeholders during the outreach efforts for the development of the OSHARP. Many of the 90 cities within the GLAC region, such as the Cities of Malibu, Monrovia, and Pasadena, as well as other agencies and joint power authorities that provide outdoor recreation opportunities have adopted or proposed local trail plans that complement the county-wide

trail network. As an ongoing process, once adopted, these trail routes may be added, as appropriate, to the IRWMP database. Those trail routes that create loops stemming from the regional trail system, connect regional trail routes within lands that are outside of existing public lands, or directly connect urban areas with the regional trail system should be specifically identified.

Inventories are also needed to characterize and evaluate the region's wildlands. Besides potential buffer and identified linkage areas, additional habitat core areas may be identified.

Standardized statistics about the use, appeal, and value of the open spaces of the GLAC Region, and the passive recreation that take places in them, do not exist. The GLAC Region hosts industries, climate, and landscapes that are known locally, statewide, nationally, and internationally. However, the open spaces of the region are not all the same. Beaches, river greenways, and a variety of mountain settings offer a myriad of open space opportunities. Added to that variety, there is a great disparity in the way the different agencies that own or manage open space areas maintain statistics about visitors and use within those resources. Conducting a comprehensive open space inventory and use analysis that employs a standardized approach applied evenly over the region, and that identifies the economic value of open space to the region would greatly benefit the OSHARP because of the sensitivity of the metrics applied to open space.

12.3 Recommendations

The IRWMP is a living document. It is not intended to be filed away on a shelf, but rather to serve as the catalyst for solutions that can be implemented throughout the GLAC subregions. The OSHARP is also intended to be reviewed regularly and updated as new information, technologies, and data become available. The following recommendations for the OSHARP will assist in:

- Incorporating new open space data and information in the IRWMP
- Identifying and prioritizing important habitat and recreation needs
- Refining targets, methodologies and project evaluation
- Fostering regional partnerships.

It is recommended that stakeholders conduct an inventory of planned or existing projects within the GLAC region that meet the intent of the IRWMP. The information sources currently available are disjointed and in many different formats, including specific plans, periodicals, newsletters, and occasionally contained within usable GIS databases.

While in the process of finalizing the updated Significant Ecological Area Program, Los Angeles County could amend it to identify linkages and give them the same priority as protection of large habitat blocks.

The wetland habitat targets are based on data about historical and current extent of wetlands and ownership of parcels with wetlands. The best available data were used for calculating the targets, but additional work could be done to improve all of these databases. Recommendations include:

- **Wetland loss**. Rairdan (1998) was used to determine the loss of wetlands in the region. Rairdan's historical wetland analysis has been supplanted by historical ecology studies in two sections of GLAC (Stein et al. 2007 for the San Gabriel River and Dark et al. 2011 for the Ballona Creek watershed). The recent historical ecology studies use more modern, detailed methods than Rairdan used, but their limited geographic scope precluded their use for establishing GLAC targets. The creation/restoration targets would be improved if a historical ecology study was completed for the entire GLAC region.
- **Current wetland extent**. The National Wetlands Inventory (NWI) was used to indicate the current extent of wetlands in GLAC. Unfortunately, the current NWI maps do not cover the entire GLAC region. The protection and enhancement targets would be improved if there were NWI maps for the entire region. Moreover, the NWI mapping should be done at a level that includes as many local wetland types as possible, including ephemeral wetlands and streams.
- **Ownership**. Wetland ownership was determined using the California Protected Area Database (CPAD). However, not all publicly owned lands are included in the CPAD. It would be possible to develop a more accurate estimate of private ownership by searching ownership on a parcel-by-parcel basis; however, an effort such as this was beyond the scope of this project. The protection targets could be refined by determining ownership using a parcel-by-parcel analysis.

The habitat targets could be improved by considering ecosystem services as well as wetland extent. It was originally planned to incorporate ecosystem services more thoroughly into the

targets. However, there is no readily applicable method for quantifying ecosystem services at present, and there is an almost complete lack of information on the ecosystem services being provided by existing wetlands. The importance of assessing ecosystem services has only recently been recognized, and this is an area of active research. The development of methods to assess ecosystem services should be monitored and applied to GLAC wetlands when a suitable method has been developed. A detailed understanding of the ecosystem services provided by existing wetlands is critical for developing improved wetland targets.

As an ongoing process, once adopted, some or all of these local trail routes should be added to the IRWMP data base. Those trail routes that branch from the regional trail system and create loop opportunities for recreation, or local trails that directly connect urban areas with the regional trail system should be specifically identified and included in the regional recreation targets.

And finally, essential to any truly integrated effort, as part of the IRWMP, the GLAC Region should develop and publicize its strategic focus and willingness to invest in feasible, multi-beneficial, collaboratively developed projects.

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GEOTECHNICAL REPORT UPDATE
PROPOSED MARSH PARK
LOS ANGELES, CALIFORNIA

1.0 INTRODUCTION

Geo**L**ogic **A**ssociates (**GLA**) is pleased to submit this Geotechnical Update Report to the Mountains Recreation and Conservation Authority (MRCA) for supplemental geotechnical design services pertinent to the planned Marsh Park improvements located at the northern terminus of Rosanna Street in Los Angeles, CA (see Vicinity Map, Figure 1).

GLA has previously prepared a geotechnical design report for the Marsh Park Project in 2006 titled:

GeoLogic Associates, 2006, Geotechnical Design Report, Proposed Phase III Marsh Street Park, Northeast of Rosanna Street, Los Angeles, California: consultant report prepared for Mountains Recreation and Conservation Authority, 16 p., attachments (Job No. 2006-177; dated December 4, 2006).

The current plan for the park is referenced below:

Melendrez, 2011, Marsh Park, dated 12/16/2011

Based on review of the current plan for the Park (above), we understand that the current concept is generally similar to the concept proposed in 2006. However, changes to the building/structure locations are planned, as are revisions to the parking lot location and ingress/egress routes. The currently planned location for restroom is in the location of our boring B-1 but the proposed location of the Picnic Shelter is in the footprint of an existing building, west of the area investigated in our 2006 report. Changes in hardscape and landscaping locations are also planned.

Based on review of the current improvement plan (dated 12/16/2011) for the site, it is our opinion that the conclusions and recommendations contained in GLA's referenced 2006 geotechnical report (above) remains pertinent and applicable to the proposed construction except as updated below in the following sections which supersede the recommendations presented in our earlier 2006 report for the site. The following contain the updated sections.

2.0 SEISMICITY

This discussion of faults on the site is prefaced with a discussion of California legislation and policies concerning the classification and land-use criteria associated with faults. By definition of the California Geological Survey, an active fault is a fault that has had surface displacement within Holocene time (about the last 11,000 years).

The state geologist has defined a potentially active fault as any fault considered to have been active during Quaternary time (last 1,600,000 years). This definition is used in delineating Earthquake Fault Zones as mandated by the Alquist-Priolo Geologic Hazards Zones Act of 1972 and as subsequently revised in 1975, 1985, 1990, 1992, and 1994. The intent of this act is to assure that unwise urban development and certain habitable structures do not occur across the traces of active faults.

The subject site is not included within any Earthquake Fault Zones as created by the Alquist-Priolo Act, however, our review of available geologic literature (Section 8.0) indicates that there are two known active thrust faults below the site and several known major active faults in the immediate vicinity of the site.

2.1 Historic Seismicity

Reasonably well-established historic records of earthquakes in southern California have been kept for the past two-hundred years. More accurate instrument measurements have been available since 1933. Based on recorded earthquake magnitudes and locations, the subject site appears to have experienced seismic exposure typical of the southern California area during historic time.

The project site is not located within a currently established Earthquake Fault Zone (formerly known as Alquist-Priolo Special Studies Zone). Neither the field observations nor literature review disclosed an active fault trace crossing the project site, however several blind thrust faults underlie the site. In **GLA**'s opinion, the potential is low to moderate for ground or fault rupture to occur at the site during the design life of the proposed structures. In addition, the site is located within close proximity to the Hollywood and Raymond faults which are capable of generating significant ground shaking.

2.2 Regional Seismicity

The site can be considered to lie within a seismically active region, as can all of Southern California. From a deterministic standpoint, Table 1 identifies potential seismic events that could be produced by the maximum credible earthquake event.

The maximum credible earthquake is defined by the State of California as the maximum earthquake that appears capable of occurring under the presently understood tectonic framework. Site-specific seismic parameters included in Table 1 are the distances to the causative faults, earthquake magnitudes (Mw), and expected ground accelerations, which were determined with

EQFAULT software (Blake, 2000a) from attenuation relationships for underlying geologic conditions that are similar to the subject site.

Table 1
Seismic Parameters for Active Faults

Fault Zone (Seismic Source)	Distance to Site (miles)	Maximum Credible Earthquake Event		2010 CBC Maximum Considered Earthquake Event
		Moment Magnitude	Peak Horizontal Ground Acceleration (g)	Peak Horizontal Ground Acceleration (g)
Puente Hills Blind Thrust	0.0	7.1	0.79	0.94
Upper Elysian Park Blind Thrust	0.0	6.4	0.55	
Hollywood	0.7	6.4	0.54	
Raymond	1.7	6.5	0.53	
Verdugo	3.5	6.9	0.54	
Sierra Madre	7.9	7.2	0.41	
Newport-Inglewood	9.3	7.1	0.29	
Santa Monica	10.0	6.6	0.25	

As indicated in Table 1, the Puente Hills Blind Thrust Fault is the active fault considered to have the most significant effect at the site from a design standpoint. The maximum earthquake from the fault has a 7.1 moment magnitude, generating a peak horizontal ground acceleration of 0.79g at the project site. Secondary effects associated with severe ground shaking following a relatively large earthquake on a regional fault that may affect the site include ground lurching and shallow ground rupture, soil liquefaction, seiches and tsunamis. These secondary effects of seismic shaking are discussed in the following sections.

From a probabilistic standpoint (considering all the faults in the vicinity of the site and their respective return periods), the Maximum Considered Earthquake or the design ground motion (in accordance with the 2010 California Building Code, (CBC)) is defined as the ground motion having a 2 percent probability of being exceeded in 50 years (2,475-year return period). This ground motion is referred to as the design earthquake. The design earthquake ground motion at the site is predicted to be 0.94g (Blake, 2000b). The results of our seismic analyses are presented in Appendix A.

The effect of seismic shaking may be mitigated by adhering to the CBC and state-of-the-art seismic design parameters of the Structural Engineers Association of California.

2.3 2010 CBC Seismic Criteria

The soil parameters in accordance with the 2010 CBC are as follows:

Table 2
2010 CBC Seismic Design Parameters

IBC Section	Factor/Class	Value
Table 1613.5.2	Site Classification	D
Section 1613.5.1	S_S, Short Period Spectral Acceleration*	2.142g
Section 1613.5.1	S_1, 1-Second Period Spectral Acceleration*	0.792g
Table 1613.5.3(1)	F_a	1.0
Table 1613.5.3(2)	F_v	1.5
Section 1613.5.3	S_{MS}	2.142g
Section 1613.5.3	S_{M1}	1.188g
Section 1613.5.4	S_{DS}	1.428g
Section 1613.5.4	S_{D1}	0.792

* From USGS, Earthquake Ground Motion Parameters, Version 5.1.0, for CBC (2010), IBC (2009).

2.4 Lurching and Shallow Ground Rupture

Soil lurching refers to the rolling motion on the ground surface by the passage of seismic surface waves. Effects of this nature are likely to be significant where the thickness of soft sediments vary appreciably under structures and at the interface of sediments of varying densities. Damage to the proposed development should not be significant since a relatively large differential fill/alluvium thickness is not known to exist below the site. Since there are known buried thrust faults underlying the site, the possibility of the ground rupture on-site during the design earthquake event is low to moderate.

2.5 Liquefaction Potential

Liquefaction is likely to occur when loose sandy soils are saturated and subjected to seismic forces. During a seismic event, excess pore water pressures can increase and result in a loss of shear strength of the foundation soils. The project site is located within a currently established Seismic Hazard Zone for liquefaction (CDMG, 1999). Although groundwater was noted in the borings at a depth of about 38.5 feet below the ground surface at the time of drilling, CDMG (1998) has designated the historic highest (near-surface) groundwater level at about 25 feet below the existing ground surface.

The Standard Penetration Test and dynamic cone blow counts indicate that the soils below a depth of 25 feet generally consist of dense sands with minor intervals of clayey deposits. Such soils are not typically known to be subject to significant liquefaction effects under seismic shaking of the design earthquake event, and as a result, the potential for liquefaction at this site to effect the proposed at-grade, lightly-loaded site improvements is considered to be low.

2.6 Tsunamis and Seiches

A tsunami is a sea wave generated by submarine earthquakes, landslides or volcanic activity which displaces a relatively large volume of water in a very short period of time. Seiches are defined as oscillations in a semi-confined body of water due to earthquake shaking or fault rupture. Due to the elevation of the site (approximately 360 feet mean sea level) and the distance from the Pacific Ocean or other large bodies of water, the potential for tsunamis and seiches at the site is considered very low.

3.0 EARTHWORK RECOMMENDATIONS

3.1 Site Demolition

Pre-grading activities at the site will include demolition of existing structures and pavement. In addition, any existing utility lines, foundations, floor slabs, underground storage tanks, or other subsurface structures which are not to be utilized should be removed, destroyed or abandoned in compliance with current governmental regulations and with approval from the geotechnical engineer.

3.2 Deleterious Materials

Prior to any grading, all trash, surface structures, debris and vegetation should be removed and disposed off-site. The site should be adequately cleared to allow for unrestricted earthwork to commence. Existing fill that has been dumped in the northwest part of the site should be evaluated for suitability.

3.3 Soil Removal and Replacement

In order to enhance the uniformity of surficial conditions, it is recommended that removals be performed so that a minimum of 12 inches of compacted fill is placed for the support of footings, floor slabs, pavement, and hardscape. These depths of removal and subgrade treatment should occur beneath the bottom of slabs and footings. The removal and recompaction should extend a minimum horizontal distance of 10 feet beyond the building perimeter and 2 feet beyond the limits of pavement and hardscape. After removal, the exposed surface should then be moisture conditioned to a minimum of 110 percent of maximum dry density and be compacted to not less than 90 percent of maximum dry density (ASTM D1557). Minor fill that may be necessary to establish final grade should be placed to the same standard.

3.4 Use of On-site Soils

In general, on-site soils (if evaluated to be free of organics, contamination, expansive soils, trash, or other deleterious materials) can be used for grading at this site. The results of laboratory tests on selected samples suggest that the existing surficial fills have moisture contents that are considerably below optimum moisture content. Therefore, moisture addition may be necessary (during certain times of the year) to achieve and the recommended soil moisture content of 110 percent of optimum moisture content. The dumped fill in the northwesterly part of the site

should be evaluated for suitability prior to placement as compacted fill. All fill soils used below structures and pavement areas should have an expansion index less than or equal to 20 (as tested in accordance with ASTM D4829).

3.5 Import Soils

If import soil material is necessary to reach design grades, the fill should have the following characteristics:

- free of organics, contamination, trash, or other deleterious materials
- granular material
- a maximum particle size of 1 inch
- low corrosion potential
- low soluble sulfate content
- expansion index less than or equal to 20 (as tested in accordance with ASTM D4829).

All soils that are planned to be used as an import source for the site should be tested for suitability, and approved by the geotechnical engineer, prior to hauling to the site. The contractor should provide ample time (at least one week) for a sample of the planned import soils to be tested for soluble sulfate potential, metallic corrosion potential, expansion potential, and other engineering properties pertinent to site conditions.

3.6 Moisture Conditions

The site should be protected from softening due to ponding resulting from rainfall, and from desiccation due to exposure during warm weather. Sprinkling or provision of a protective cover should be provided as necessary to maintain recommended moisture conditions. Specific provisions should be made for confirmatory testing for moisture content just before any slabs or foundations are constructed.

4.0 FOUNDATION DESIGN RECOMMENDATIONS

4.1 Bearing Capacity and Settlement

Conventional spread or continuous footings should be founded on recompacted soils, which are prepared as recommended within this report. Spread footings should have a minimum width of 18 inches (minimum width of 24 inches for isolated spread footings) and minimum embedment of 18 inches below the lowest adjacent soil grade. It is recommended that continuous footings be reinforced (as a minimum) with four No. 5 bars (two near the top and two near the base of the footing).

For loads of up to 20 kips for columns and 5 kips/foot for walls, footings constructed in accordance with the foregoing recommendations may be sized to support a maximum net allowable bearing pressure of 2,000 pounds per square foot (psf). The allowable value may be increased by one-third for short-term loading including dead plus live seismic or wind loading.

Total and differential settlement under static loading for these conditions and where provisions are made to control changes in soil moisture content, are expected to less than 1 inch and 1/2-inch, respectively.

4.2 Resistance to Lateral Loads

Lateral loads may be resisted by friction between the supporting soils and the bottom of footings and/or by lateral passive resistance acting against the sides of footings. An allowable coefficient of friction of 0.38 is considered applicable for concrete against compacted on-site soils. The recommended lateral passive resistance for compacted fills is 180 psf per foot of depth of embedment. The values for the coefficient of friction and passive resistance include factors of safety of 1.5 and 2.0, respectively.

If the allowable frictional resistance and allowable passive resistance are combined, the allowable passive resistance should be reduced by an additional 50 percent. For purposes of design, the total allowable static lateral resistance may be increased by one-third for transient loading including dead plus live, seismic or wind loading.

4.3 Site Drainage

Drainage at the site should be directed away from foundations, collected and tightlined to appropriate discharge points. We recommend collecting roof drainage by eave gutters and directing accumulated precipitation away from foundations to the storm drain or street via non-erosive devices. Water, either natural or from irrigation, should not be permitted to pond and saturate the subsurface soils. Landscape requiring a heavy irrigation schedule should not be planted adjacent to foundations or paved areas.

5.0 CONSTRUCTION OBSERVATION

The conclusions and recommendations in this report are based in part upon data that were obtained from a limited number of observations, site visits, excavations, samples, and tests. The nature of many sites is such that differing geotechnical or geological conditions can occur within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, the findings, conclusions, and recommendations presented in this report can be relied upon only if further evaluation is conducted in the field during construction by a representative of the geotechnical engineer, in order to confirm that our preliminary findings are representative for the site.

6.0 LIMITATIONS

This report has not been prepared for use by parties or projects other than those named or described above. It may not contain sufficient information for other parties or other purposes. This report has been prepared in accordance with generally accepted geotechnical practices and makes no other warranties, either express or implied, as to the professional advice or data contained herein.

This report is valid for a period of two years from the date of publication. A review of the findings and recommendations contained in this report is required if construction is delayed beyond the two-year period.

We recommend that this office have an opportunity to review the final grading and foundation plans in order to provide additional site-specific recommendations, as necessary.

7.0 CLOSING

We appreciate this opportunity to be of service. If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Geo-**L**ogic **A**ssociates

Joseph G. Franzone, GE 2189
Supervising Geotechnical Engineer

Distribution: Laura Saltzman, Addressee (1 via e-mail: laura.Saltzman@mrca.ca.gov)

Attachments: References
Figure 1 – Vicinity Map
Appendix A – Seismic Analysis

8.0 REFERENCES

Blake, Thomas F., 2000a, EQFAULT, Version 3.00b, Deterministic Estimation of Peak Acceleration from Digitized Faults, updated 2004.

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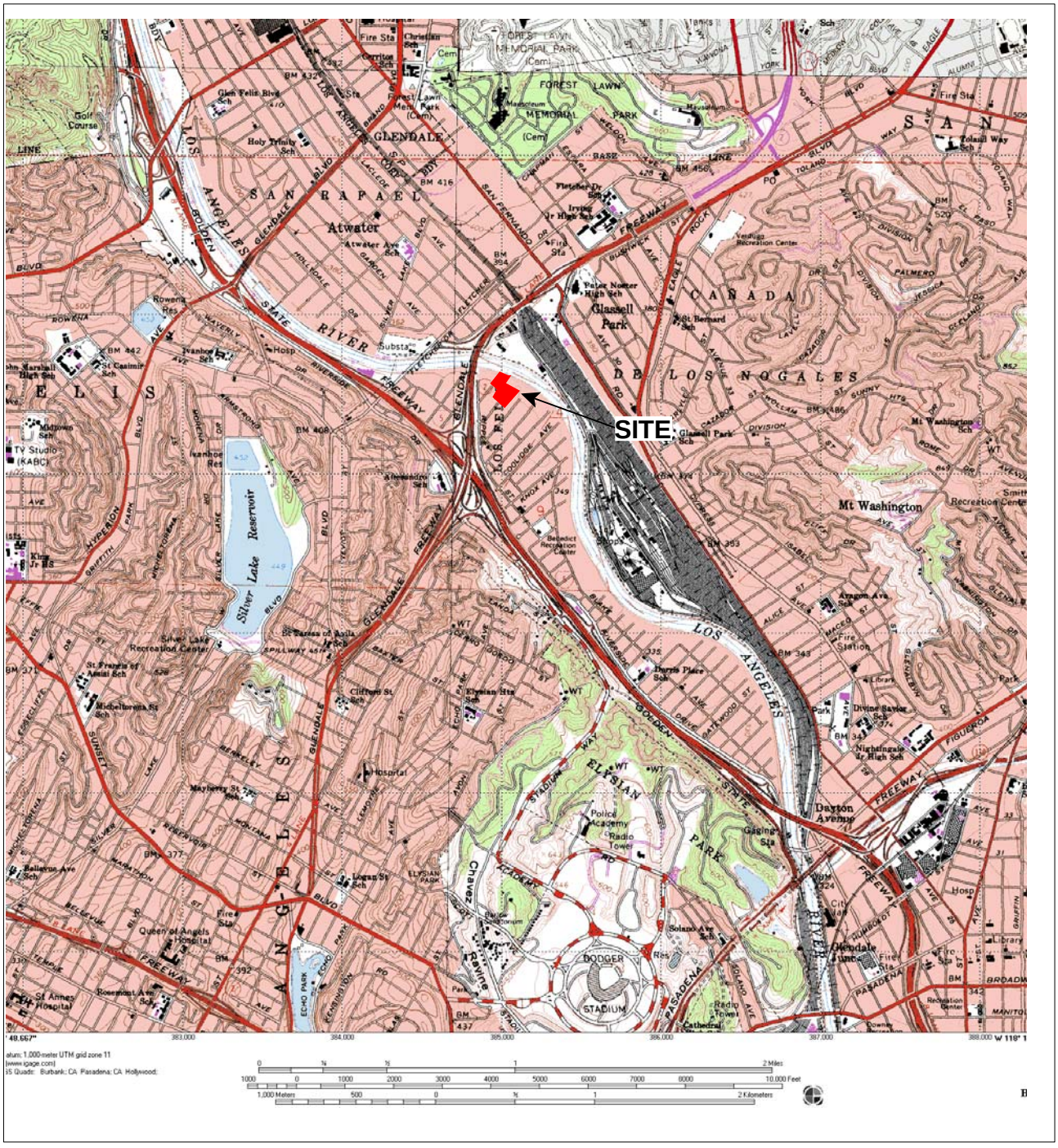


REFERENCE: U.S.G.S.,1966, 7.5 Minute Topographic Series, Los Angeles, revised 1994.

N

FIGURE 1

GEOTECHNICAL UPDATE REPORT
MARSH PARK
LOS ANGELES, CALIFORNIA

VICINITY MAP

Geo-Logic ASSOCIATES

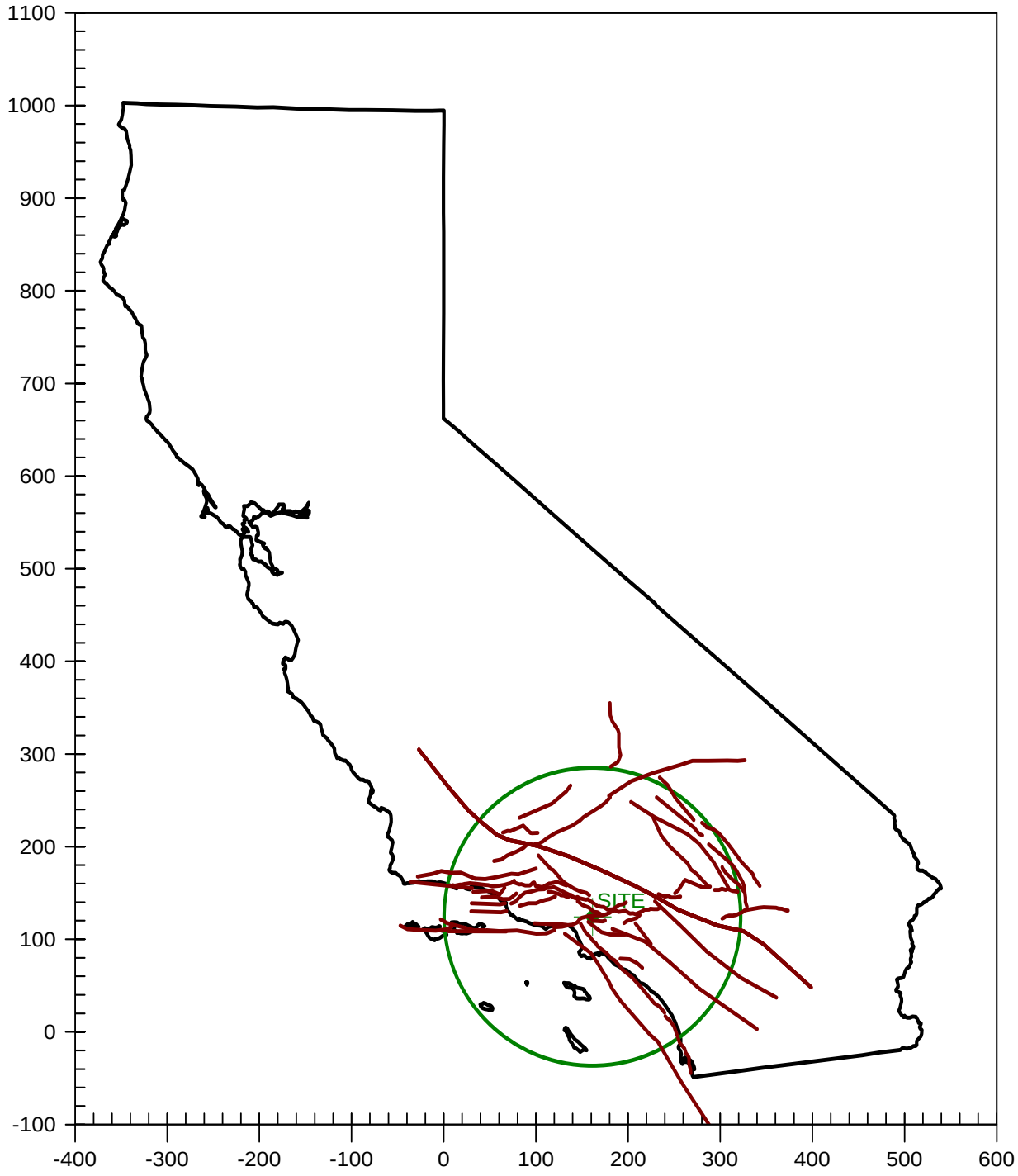
Draft: JGF	Date: 03-12	Project No. 2012-0040

APPENDIX A

SEISMIC ANALYSIS

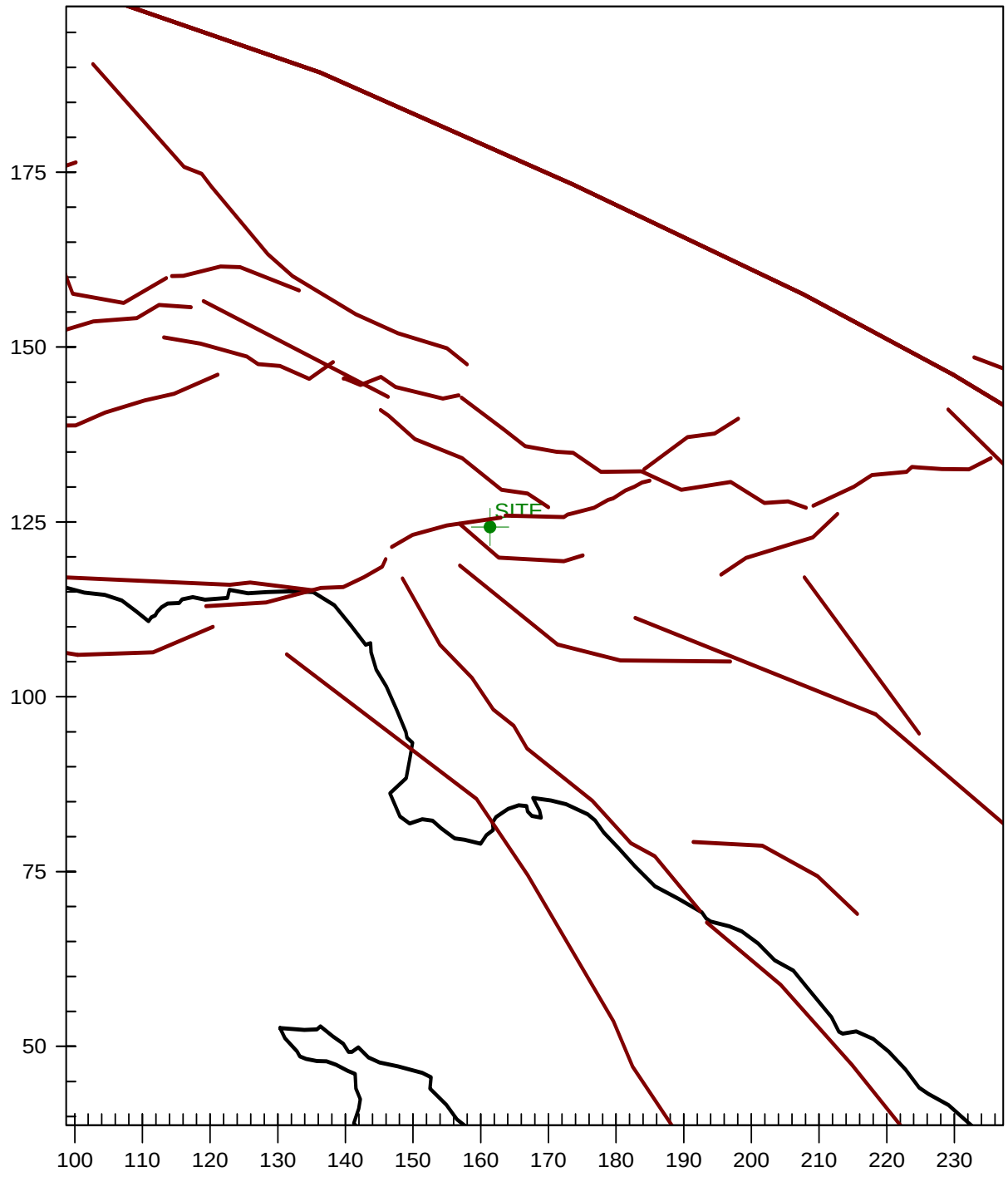
CALIFORNIA FAULT MAP

Marsh Street Park



CALIFORNIA FAULT MAP

Marsh Street Park



****
*   *
* E Q F A U L T *
*   *
* Version 3.00 *
*   *
****

DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: 2012-0040

DATE: 03-07-2012

JOB NAME: Marsh Street Park

CALCULATION NAME: MCE Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE_MCE_new.DAT

SITE COORDINATES:
SITE LATITUDE: 34.1073
SITE LONGITUDE: 118.2477

SEARCH RADIUS: 100 mi

ATTENUATION RELATION: 3) Boore et al. (1997) Horiz. - NEHRP D (250)
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: cd_2drp
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CGSFLTE_MCE_new.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

Page 1

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
PUENTE HILLS BLIND THRUST	0.0(0.0)	7.1	0.790	XI
UPPER ELYSIAN PARK BLIND THRUST	0.0(0.0)	6.4	0.547	X
HOLLYWOOD	0.7(1.1)	6.4	0.538	X
RAYMOND	1.7(2.8)	6.5	0.528	X
VERDUGO	3.5(5.6)	6.9	0.542	X
SIERRA MADRE	7.9(12.7)	7.2	0.410	X
NEWPORT-INGLEWOOD (L.A.Basin)	9.3(14.9)	7.1	0.287	IX
SANTA MONICA	10.0(16.1)	6.6	0.254	IX
SIERRA MADRE (San Fernando)	12.1(19.5)	6.7	0.234	IX
NORTHRIDGE (E. Oak Ridge)	13.6(21.9)	7.0	0.252	IX
CLAMSHELL-SAWPIT	14.5(23.3)	6.5	0.185	VIII
SAN GABRIEL	14.7(23.6)	7.2	0.218	IX
WHITTIER	15.3(24.7)	6.8	0.171	VIII
MALIBU COAST	16.3(26.3)	6.7	0.188	VIII
SAN JOSE	20.1(32.4)	6.4	0.137	VIII
PALOS VERDES	20.3(32.6)	7.3	0.181	VIII
SANTA SUSANA	20.6(33.2)	6.7	0.158	VIII
HOLSER	25.8(41.6)	6.5	0.120	VII
CHINO-CENTRAL AVE. (Elsinore)	26.3(42.4)	6.7	0.131	VIII
ANACAPA-DUME	26.9(43.3)	7.5	0.197	VIII
CUCAMONGA	27.9(44.9)	6.9	0.139	VIII
SIMI-SANTA ROSA	28.5(45.9)	7.0	0.144	VIII
SAN ANDREAS - Whole M-1a	30.9(49.8)	8.0	0.189	VIII
SAN ANDREAS - Mojave M-1c-3	30.9(49.8)	7.4	0.138	VIII
SAN ANDREAS - 1857 Rupture M-2a	30.9(49.8)	7.8	0.170	VIII
SAN ANDREAS - Cho-Moj M-1b-1	30.9(49.8)	7.8	0.170	VIII
OAK RIDGE (Onshore)	31.9(51.4)	7.0	0.132	VIII
SAN JOAQUIN HILLS	33.7(54.2)	6.6	0.103	VII
SAN CAYETANO	37.2(59.8)	7.0	0.118	VII
ELSINORE (GLEN IVY)	39.1(62.9)	6.8	0.084	VII
NEWPORT-INGLEWOOD (Offshore)	40.5(65.1)	7.1	0.096	VII
SAN JACINTO-SAN BERNARDINO	43.4(69.8)	6.7	0.073	VII
SAN ANDREAS - Carrizo M-1c-2	43.5(70.0)	7.4	0.106	VII
SAN ANDREAS - SB-Coach. M-2b	44.7(71.9)	7.7	0.122	VII
SAN ANDREAS - San Bernardino M-1	44.7(71.9)	7.5	0.109	VII
SAN ANDREAS - SB-Coach. M-1b-2	44.7(71.9)	7.7	0.122	VII
CLEGHORN	47.0(75.6)	6.5	0.062	VI
SANTA YNEZ (East)	49.0(78.8)	7.1	0.083	VII
VENTURA - PITAS POINT	53.7(86.4)	6.9	0.084	VII
OAK RIDGE(Blind Thrust Offshore)	56.1(90.3)	7.1	0.090	VII

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
NORTH FRONTAL FAULT ZONE (West)	57.8(93.1)	7.2	0.093	VII
CHANNEL IS. THRUST (Eastern)	58.2(93.6)	7.5	0.108	VII
M.RIDGE-ARROYO PARIDA-SANTA ANA	58.2(93.7)	7.2	0.093	VII
SAN JACINTO-SAN JACINTO VALLEY	58.3(93.9)	6.9	0.065	VI
OAK RIDGE MID-CHANNEL STRUCTURE	59.7(96.0)	6.6	0.066	VI
ELSINORE (TEMECULA)	60.6(97.6)	6.8	0.060	VI
CORONADO BANK	60.8(97.8)	7.6	0.091	VII
GARLOCK (West)	60.9(98.0)	7.3	0.077	VII
PLEITO THRUST	61.8(99.4)	7.0	0.080	VII
RED MOUNTAIN	62.4(100.5)	7.0	0.079	VII
BIG PINE	65.7(105.8)	6.9	0.059	VI
HELENDALE - S. LOCKHARDT	70.6(113.6)	7.3	0.069	VI
SANTA CRUZ ISLAND	72.9(117.4)	7.0	0.070	VI
WHITE WOLF	74.4(119.8)	7.3	0.081	VII
LENWOOD-LOCKHART-OLD WOMAN SPRGS	79.3(127.7)	7.5	0.070	VI
SAN JACINTO-ANZA	80.2(129.1)	7.2	0.059	VI
GARLOCK (East)	82.3(132.4)	7.5	0.068	VI
NORTH FRONTAL FAULT ZONE (East)	82.6(132.9)	6.7	0.054	VI
ROSE CANYON	82.8(133.2)	7.2	0.058	VI
NORTH CHANNEL SLOPE	83.4(134.2)	7.4	0.078	VII
SANTA YNEZ (West)	83.4(134.2)	7.1	0.055	VI
ELSINORE (JULIAN)	86.8(139.7)	7.1	0.053	VI
PINTO MOUNTAIN	87.4(140.7)	7.2	0.055	VI
GRAVEL HILLS - HARPER LAKE	89.9(144.7)	7.1	0.052	VI
LANDERS	92.6(149.0)	7.3	0.056	VI
JOHNSON VALLEY (Northern)	93.8(151.0)	6.7	0.040	V
BLACKWATER	94.7(152.4)	7.1	0.049	VI
SANTA ROSA ISLAND	95.1(153.0)	7.1	0.060	VI
CALICO - HIDALGO	97.6(157.0)	7.3	0.054	VI
So. SIERRA NEVADA	98.4(158.4)	7.3	0.065	VI

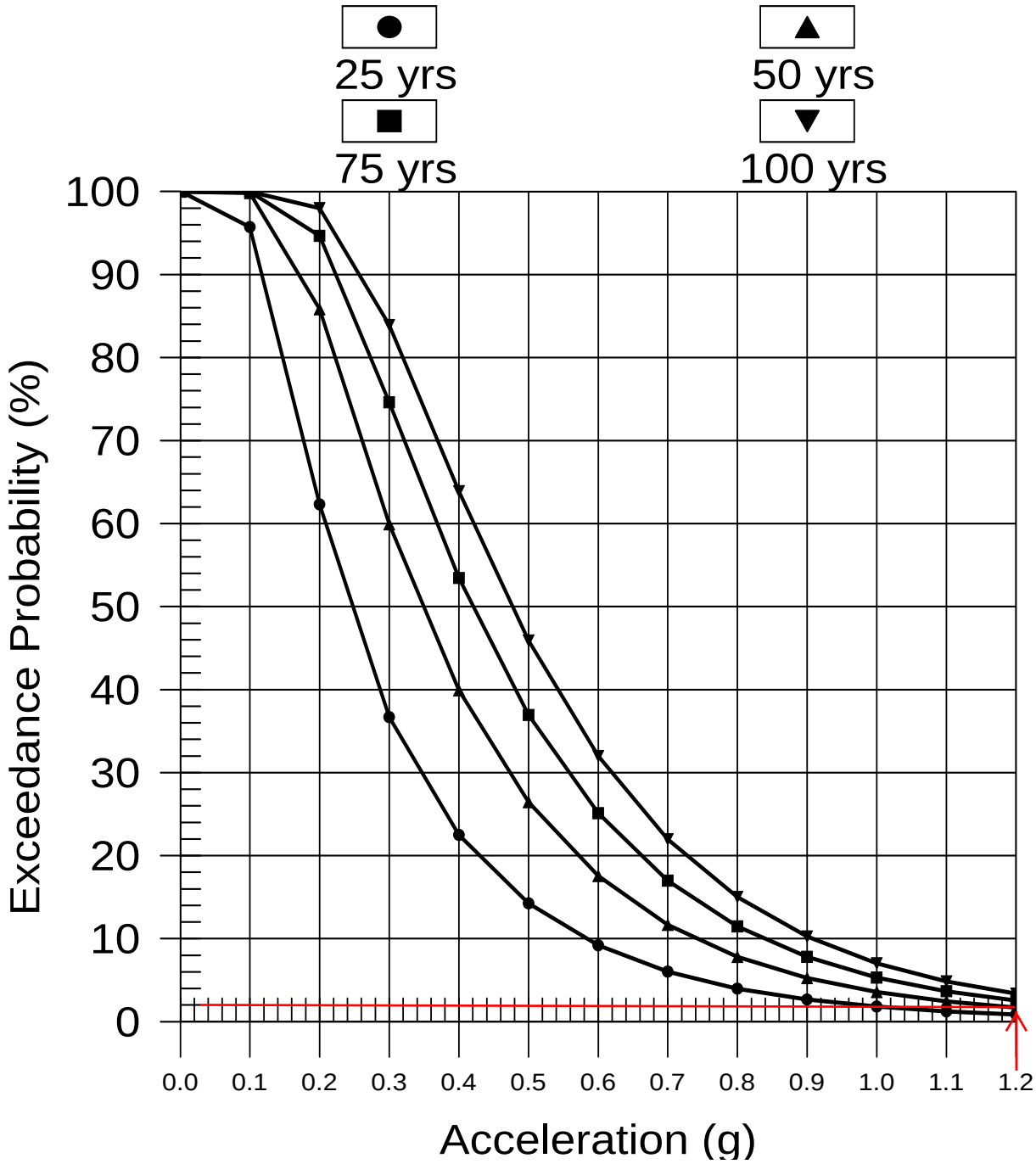
-END OF SEARCH- 70 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE UPPER ELYSIAN PARK BLIND THRUST FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 0.0 MILES (0.0 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.7903 g

PROBABILITY OF EXCEEDANCE_Marsh Street Park

BOORE ET AL(1997) NEHRP D (250)1



PROBABILITY OF EXCEEDANCE_Marsh Street Park

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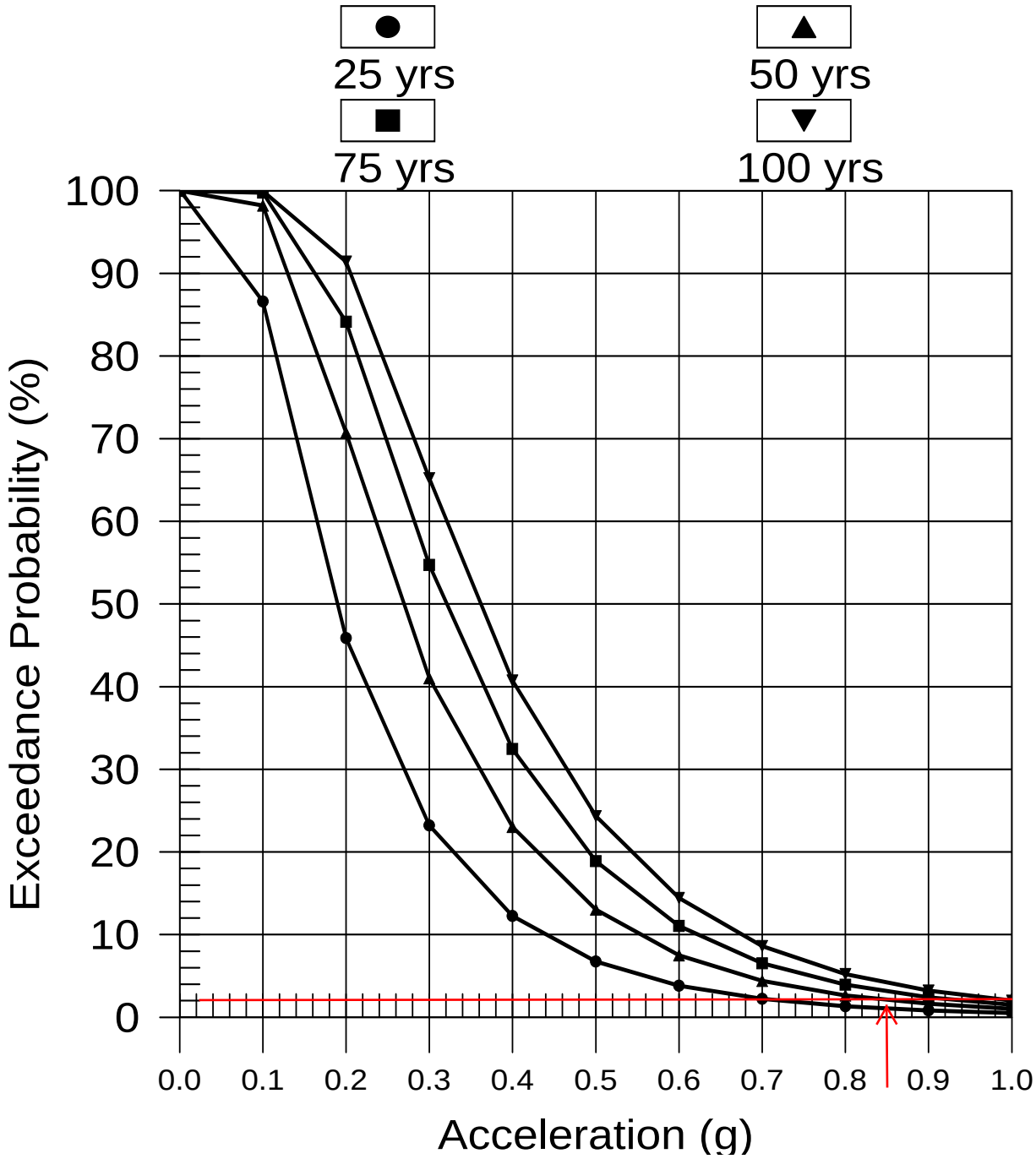
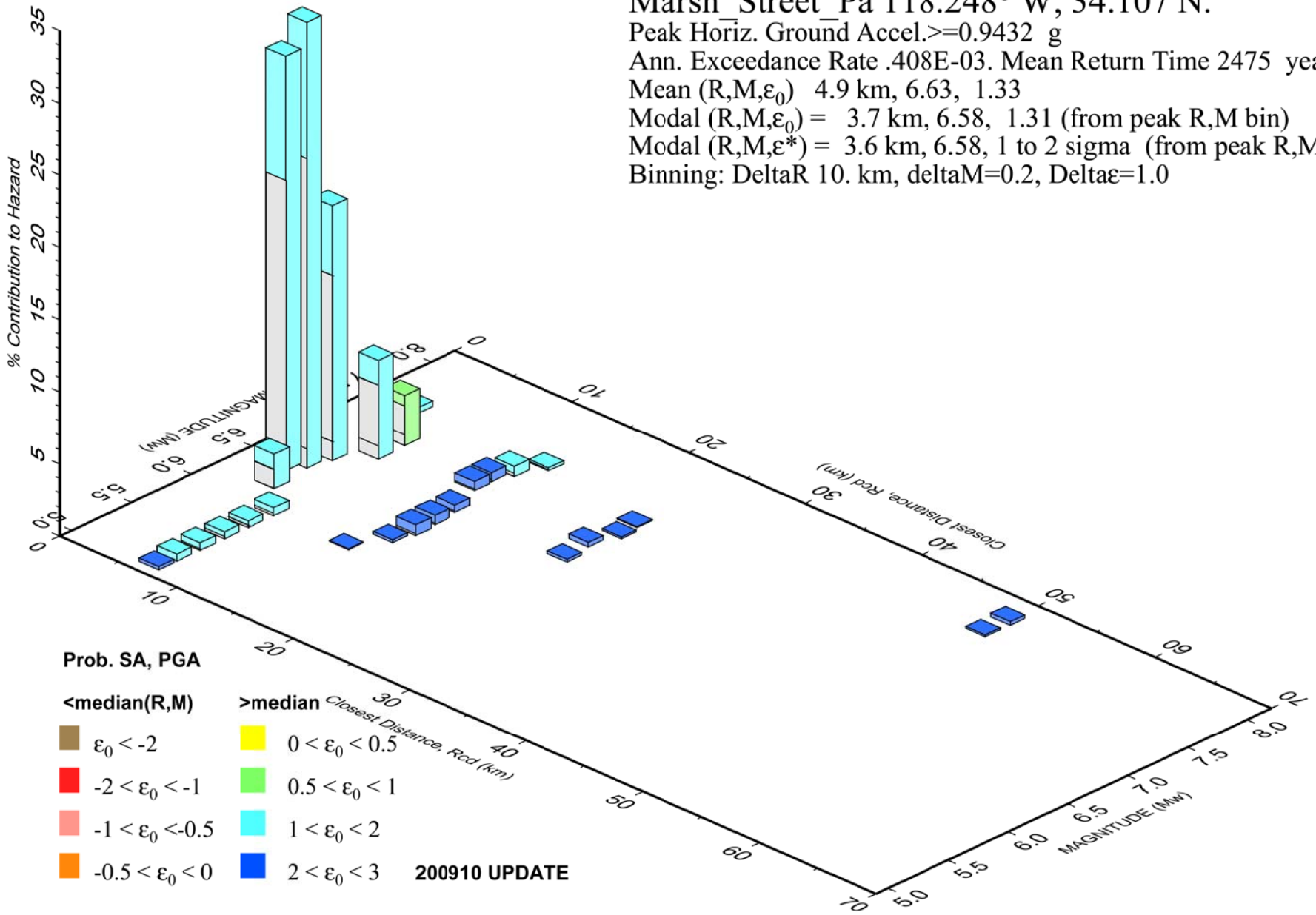
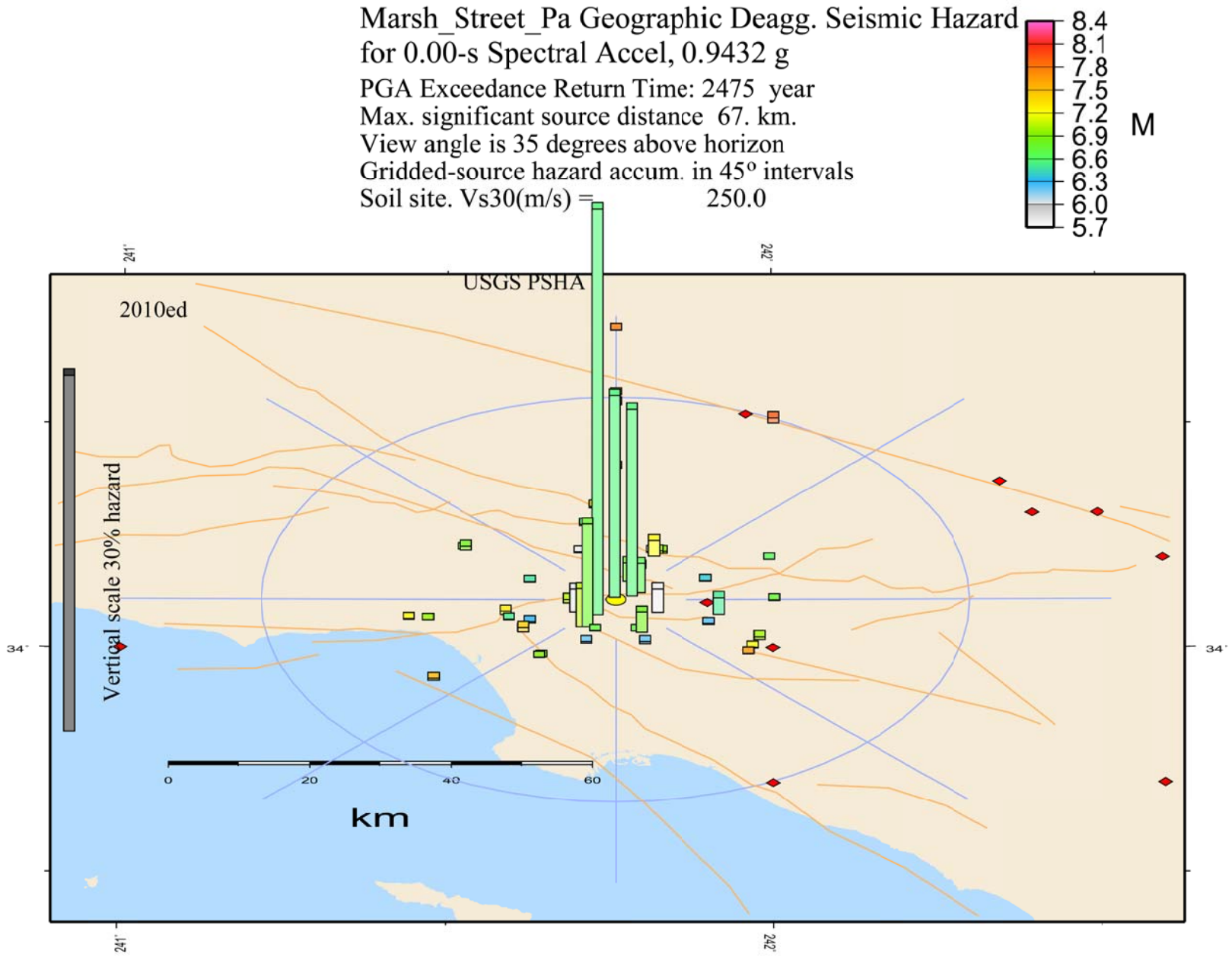


PSH Deaggregation on NEHRP D soil
Marsh_Street_Pa 118.248° W, 34.107 N.

Peak Horiz. Ground Accel.>=0.9432 g
Ann. Exceedance Rate .408E-03. Mean Return Time 2475 years
Mean (R,M,ε_0) 4.9 km, 6.63, 1.33
Modal (R,M,ε_0) = 3.7 km, 6.58, 1.31 (from peak R,M bin)
Modal (R,M,ε^*) = 3.6 km, 6.58, 1 to 2 sigma (from peak R,M,ε bin)
Binning: DeltaR 10. km, deltaM=0.2, Deltaε=1.0





GMT 2012 Mar 8 01:57:40 Site Coords:-118.247 34.1073 (yellow disk) Vs30= 250.0. Max annual ExcdRate .1395E-03 (column height prop. to ExRate). Red diamonds: historical earthquakes, M>6

HYDROLOGY AND HYDRAULICS REPORT

MARSH PARK
KPFF Job # 108247

January 8, 2013

OWNER:

Mountains Recreation & Conservation Authority
LA River Center and Gardens
570 West Avenue 26, Suite 100
Los Angeles, CA 90065
(323) 221-9944

PREPARED BY:

KPFF Consulting Engineers
6080 Center Drive, Suite 700
Los Angeles, CA 90045
(310) 665-2800

TABLE OF CONTENTS

Page No.

LIST OF EXHIBITS

APPENDICES

The Los Angeles County of Department Public Works has developed a time of concentration calculator (TC Calculator) as a tool for calculating the time of concentration and peak runoff rates and volumes. The TC Calculator uses the modified rational method as outlined in the Hydrology Manual. The input requirements for the TC Calculator include the watershed area, soil type, percent imperviousness, length of flow path, slope of flow path, and rainfall isohyets. The TC Calculator can provide results for a range of storm events. Information such as soil type and rainfall isohyets was taken from the Hydrology Manual. Please refer to Appendix A for the Soil Classification Map for the project site.

The hydrologic cycle and proposed storm drain system for the project site has been designed for a 50 year – 24 hour storm event.

The runoff from the picnic pavilion roof was calculated using the Uniform Plumbing Code. The roof runoff was calculated for the 60 minute duration, 100 year return rainfall rate for Los Angeles as listed in Appendix D, and table D-1 of the Uniform Plumbing Code, 2003 edition.

Input parameters and calculations specific to the project site are shown in Appendix C. These calculations can be referenced with Exhibit 1.

IV. HYDRAULICS CALCULATIONS DESIGN CRITERIA

A. Onsite Storm Drain Pipe Sizing

The onsite storm drain system is designed to capture the runoff from the 19 subareas as well as site run-on from Gleneden Street. Runoff from the 19 subareas is essentially the runoff from the hardscaped and landscaped areas of the park. This runoff is captured by area drains (or roof drains, for the picnic pavilion) and connected to a storm drain pipe network. Surface run-on from Gleneden Street is intercepted by a trench drain and also connected to the storm drain pipe network.

Runoff collected from the various subareas discharges into the Los Angeles River. The net runoff from the proposed onsite subareas is 6.78 cfs. With the addition of 6.89 cfs of run-on, a total of 13.67 cfs is anticipated to be discharged through the existing outlet. A 50 year isohyet of 6.30 inch is used for the hydrograph calculation per the *Los Angeles County Public Works Department Hydrology Manual, January 2006.*

The computer software *Flow Master* (Haestad Methods) is used to calculate the pipe size for the drainage system.

As noted in the Hydrology Manual, section 4.3 Urban Flood Protection, the storm drain system should have enough capacity to convey runoff from at least the 10-year storm event. The computer software *Flow Master* was used to size the onsite storm drain pipe network for the runoff quantities calculated in Appendix C. The results of the analyses indicate that the proposed pipe sizes are designed to convey the runoff from the project site without flooding the site. Worksheets for the onsite storm drain system sizing from

Flow Master can be found in Appendix D. These calculations can be referenced with Exhibit 1.

V. RESULTS

The proposed 3.3-acre public park land development at the terminals of Gleneden Street and Rosanna Street has been shown to reduce the overall discharge from the project site. The overall drainage direction and discharge point will remain unchanged. Due to an increase in vegetative/pervious cover and the addition of vegetated swales, the proposed site has been shown to discharge approximately 13.67 cubic feet per second (cfs) during a 50-year storm. This is a 0.77 cfs flow reduction compared to the outlet discharge expected for a 50-year storm in existing conditions (14.44 cfs). Furthermore, the proposed storm drain pipe network has been shown to adequately convey the flows produced by the design storm (see Appendix D).

VI. REFERENCES

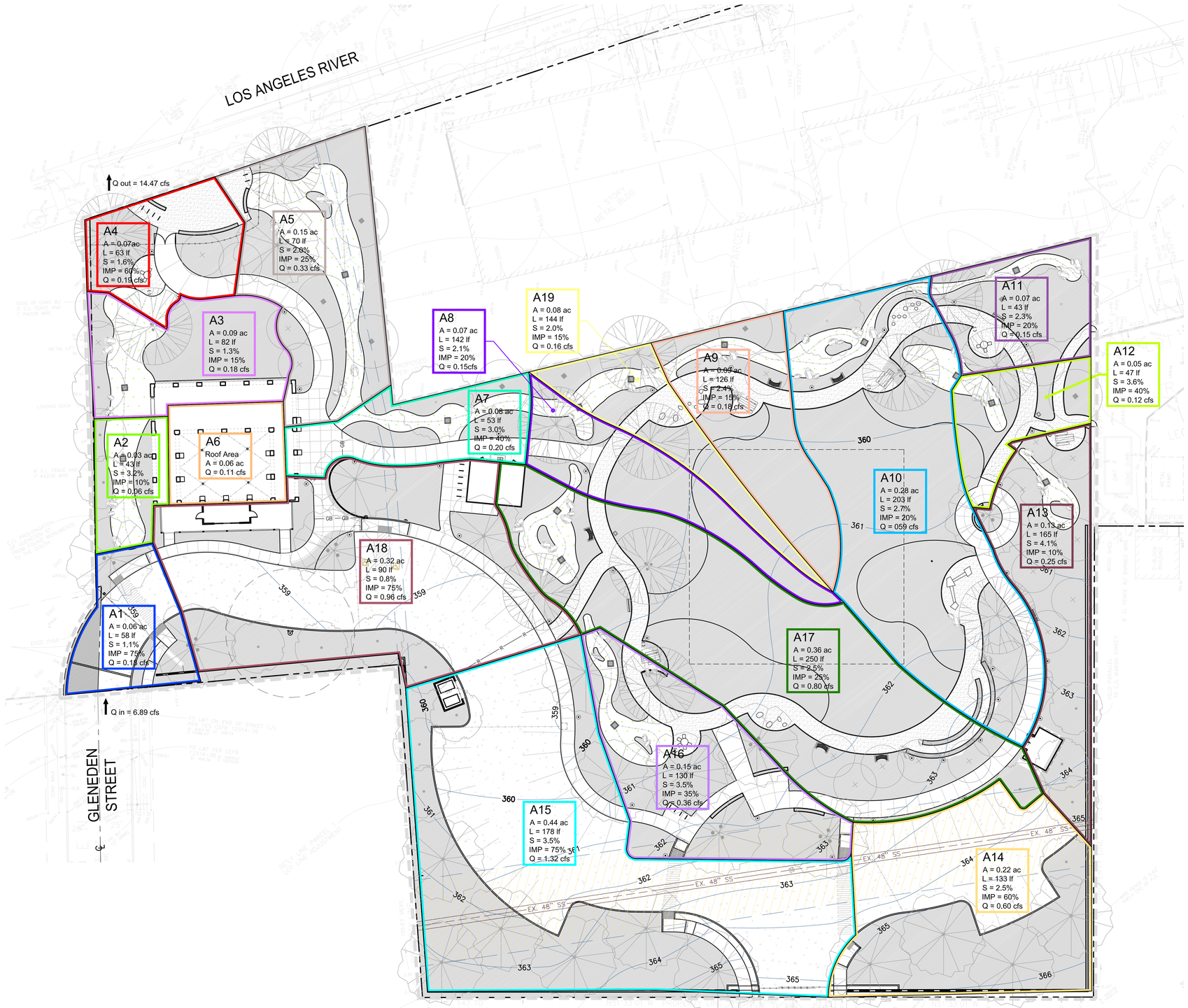
Los Angeles County Public Works Department Hydrology Manual, January 2006

Uniform Plumbing Code, 2003 edition

LEED Reference Guide, version 2.0, published by United States Green Building Council

EXHIBIT 1

Proposed Drainage Area Map



TOTAL DRAINAGE AREA = 3.05 AC
Q GLENEDEN STREET = 6.89 cfs
Q ONSITE (PRE) = 7.55 cfs
Q ONSITE (POST)= 6.78 cfs
Q OUT (PRE) = 14.44 cfs
Q OUT (POST) = 13.67 cfs

PLAN
SCALE: 1" = 20'-0"
0 10' 20' 40'
GRAPHIC SCALE

MARSH PARK
Phase II

OWNER
MOUNTAINS RECREATION & CONSERVATION AUTHORITY
LA RIVER CENTER AND GARDENS
570 WEST AVENUE 26, SUITE 100
LOS ANGELES, CA 90065
T: (323) 221-9944
F: (323) 221-9934

LANDSCAPE ARCHITECT
MELENDREZ
617 S. OLIVE STREET, 11TH FLOOR
LOS ANGELES, CA 90014
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CIVIL / STRUCTURAL ENGINEERS
KPFF
6080 CENTER DRIVE, SUITE 700
LOS ANGELES, CA 90045
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F: (310) 665-9075

ARCHITECT
ERW DESIGN
6624 DUME DRIVE
MALIBU, CA 90265
T: (310) 457-1809

ELECTRICAL ENGINEER
MDC ENGINEERS INC.
200 N. BERRY STREET, BLDG. 'B'
BREA, CA 92821
T: (213) 746-2844
F: (213) 746-6463

PLUMBING ENGINEER
SOUTH COAST ENGINEERING GROUP, INC.
5000 N. PARKWAY CALABASAS, SUITE 307
CALABASAS, CA 91302
T: (818) 224-2700
F: (818) 224-2711

MELÉNDREZ

REGISTERED PROFESSIONAL ENGINEER
THOMAS GISELL
No. C34734
Exp. 9/30/13
CIVIL
STATE OF CALIFORNIA

REV	DATE	ISSUE
	05.25.12	50% CONST DOCS.
	08.28.12	PERMIT SUBMITTAL

kpff Consulting Engineers
6080 Center Dr. Suite 700
Los Angeles, California 90045
(310) 665-2800 Fax (310) 665-9075

MARSH PARK
2944 GLENEDEN STREET
LOS ANGELES,
CALIFORNIA 90039

DWG TITLE:
DRAINAGE AREA MAP

DATE:

SCALE: AS NOTED ON PLAN

DRAWN: GW

JOB NO.: 108247

SHEET:
EXBT-1

__ OF __ SHEETS

APPENDIX A

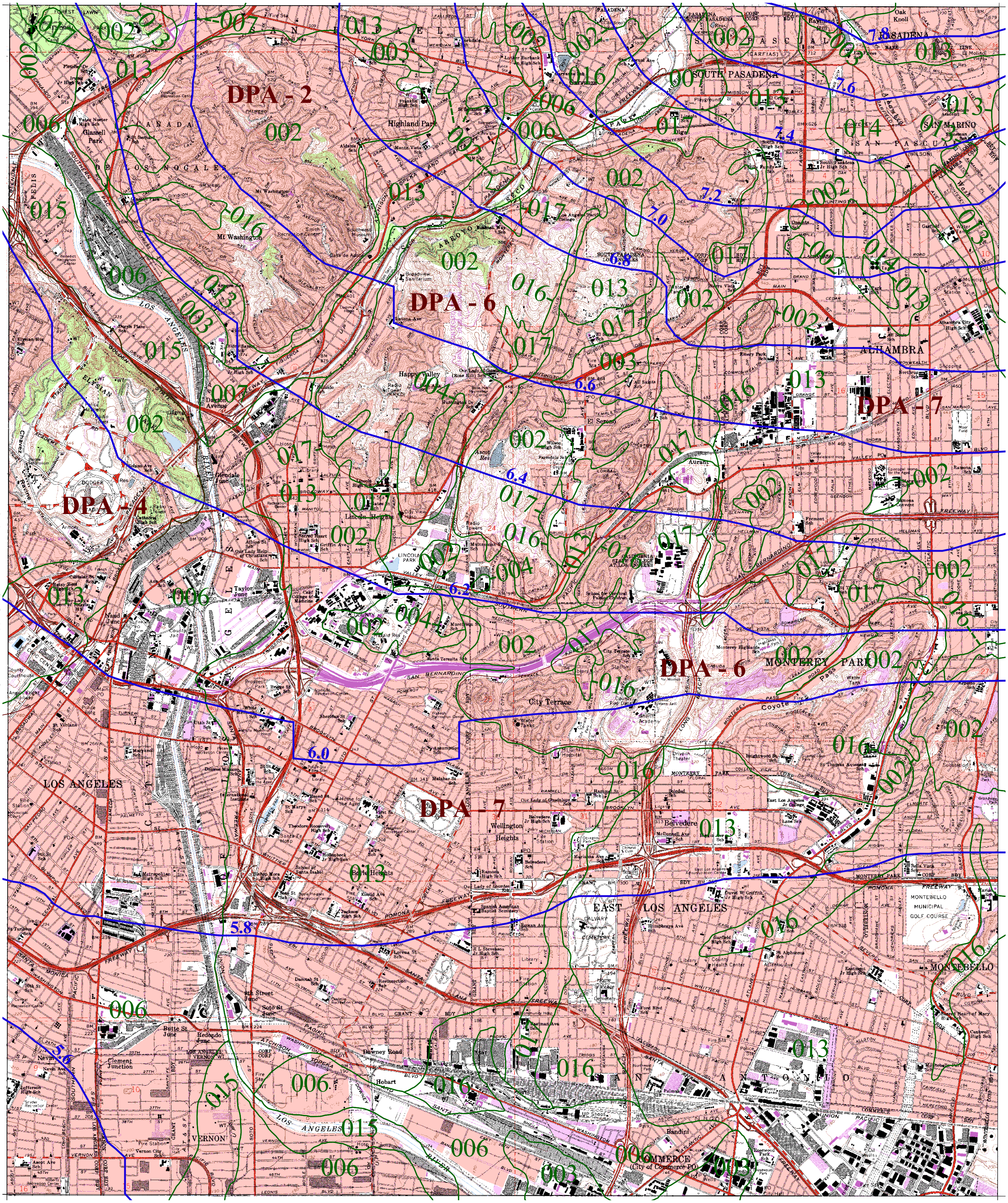
Soil Classification Map

34º 07' 30''

PASADENA 1-H1.29

-118º 15' 00''

HOLLYWOOD 1-H1.18



EL MONTE 1-H1.20

-118º 07' 30''

SOUTH GATE 1-H1.9

34º 00' 00''

016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N W E S

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878

10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

LOS ANGELES
50-YEAR 24-HOUR ISOHYET

1-H1.19

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

APPENDIX B

Project Soils Percolation Test Report

1080247 10d130

1.7

GeoLogic Associates
Geologists, Hydrogeologists and Engineers

GEOTECHNICAL DESIGN REPORT
PROPOSED PHASE III MARSH STREET PARK
NORTHEAST OF ROSANNA STREET
LOS ANGELES, CALIFORNIA

Prepared For:

Mountains Recreation and Conservation Authority
570 West Avenue 26
Los Angeles, California

Prepared By:

GeoLogic Associates
3921-A East La Palma Avenue
Anaheim, California 92807

December 4, 2006

Job No. 2006-177

The alluvial soils consisted mainly of fine to medium grained silty sand with lesser amounts of interbedded sandy silt, clayey sand and sandy clay. Some gravel and coarser sand was also present locally. The sands tended to be medium dense to a depth of about 25 feet and became denser at greater depths. Most of the soils found above groundwater at a depth of 38.5 feet were in a damp condition, however, it appeared that clayey intervals were restricting infiltration at some locations resulting in a moist condition.

3.3 GROUNDWATER

Groundwater was observed at a depth of 38.5 feet in Boring, B-1. Historically high groundwater in the vicinity, as reported by the State of California Seismic Hazards Zone Report 29 (Open File Report 98-20) for the Los Angeles Quadrangle, is about 25 feet below the ground surface.

Fluctuation of the groundwater level may occur due to seasonal rainfall, changes with irrigation, construction activities on this or adjacent portions of the site, and other factors not evident at the time of this evaluation.

4.0 EVALUATIONS AND DESIGN RECOMMENDATIONS

4.1 GENERAL

From a geotechnical perspective, the proposed improvements are considered feasible. The available data suggest favorable foundation conditions and a limited need for removals for site preparation. The majority of the on-site soils have a very low to low expansion potential, and although clayey zones with higher swelling potential may be present, no special measures are required to deal with expansive soils. Permeability testing suggests relatively slow seepage rates which may impact the design of the detention basins. In addition, the soils at the site are highly erodible and protection will be necessary during construction and over the long term.

4.2 ENGINEERING SEISMOLOGY

4.2.1 Historic Seismicity

Reasonably well-established historic records of earthquakes in southern California have been kept for the past two-hundred years. More accurate instrument measurements have been available since 1933. Based on recorded earthquake magnitudes and locations, the subject site appears to have experienced seismic exposure typical of the southern California area during historic time.

The project site is not located within a currently established Earthquake Fault Zone (formerly known as Alquist-Priolo Special Studies Zone). Neither the field observations nor literature review disclosed an active fault trace on the project site. In **GLA**'s opinion, it is unlikely that ground or fault rupture will occur at the site during the design life of the proposed structures. The site is, however, located within close proximity to the Hollywood fault (approximately 1.2 km per CBC), which is capable of generating significant ground shaking.

TABLE 3

GRADING REQUIREMENTS FOR JOINT SAND FOR INTERLOCKING CONCRETE PAVEMENT

Sieve Size	Percent Passing
No. 4	100
No. 8	95 to 100
No. 16	70 to 100
No. 30	40 to 100
No. 50	20 to 40
No. 100	10 to 25
No. 200	0 to 10

4.8 DETENTION BASINS

Grading for the proposed detention basins in the northeast and northwest parts of the site will involve cuts of up to about 4 feet. The boring logs suggest that the exposed native soils will be predominantly fine silty sand. Constructed slopes for the proposed detention basins should not be steeper than 3:1 (horizontal:vertical). Once final grades are achieved the exposed surface should be scarified to a minimum of 6 inches and be compacted to not less than 90 percent of maximum dry density, at or near optimum moisture content. Due to the lack of cohesion of the on-site soils they will be easily eroded. Appropriate protection should be provided with particular attention at inlets and outlets.

Constant head permeability testing was performed on two remolded samples of on-site soils compacted to 90 percent of maximum dry density (ASTM D1557). The resulting coefficients of permeability of 5.6×10^{-6} cm/sec and 9.9×10^{-6} cm/sec suggest relatively slow infiltration rates. Without allowances for evaporation and absorption, it is estimated that percolation for a pond area of 2,500 square feet with a 4-foot initial head would take place at a rate of about 100 to 150 cubic feet per day. Actual percolation rates may differ due to variations in the composition and conditions of the pond soils.

4.9 SURFACE DRAINAGE

The long term performance of the building will be significantly enhanced by attention to the provision and maintenance of proper surface drainage. In addition, the soils at the site are prone to erosion. The intent of the following recommendations is to provide general information regarding the control of surface water around the perimeter of the structures.

1. Ponding and areas of low flow gradients should be avoided.

EXPANSION INDEX (UBC 18-2 & ASTM D4829)
PERCENT PASSING THE NUMBER 200 SIEVE (ASTM D1140)

Boring No. / Sample No.	Sample Depth (feet)	% Passing No. 200	Expansion Index	UBC Table 18-I-B
B-1/4	0 – 5	15	--	--
B-1/8*	20 – 21.5	57	--	--
B-1/11*	35 – 36.5	14	--	--
B-2/3	0 – 5	28	--	--
B-3/4	0 – 5	25	--	--
B-4/3	0 – 5	49	20	Very Low Potential
B-5/3	0 – 5	39	--	--

* From Grain-size distribution ASTM D422

SOLUBLE SULFATE CONTENT (CA STM 417)
METALLIC CORROSION (CA STM 643)

Boring No. / Sample No.	Sample Depth (feet)	Concrete	Metallic	
		Soluble Sulfates ppm (percent)	pH	Electrical Resistivity (ohm-cm)
B-1/4	0 – 5	53 (0.0053)	--	--
B-3/4	0 – 5	49 (0.0049)	7.5	2,475

R-VALUE (CA STM 301)

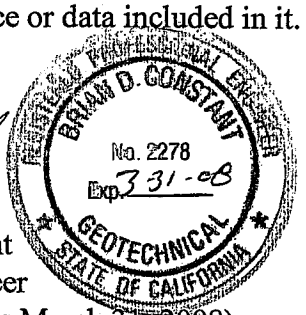
Boring No. / Sample No.	Sample Depth (feet)	R-Value
B-4/3	0 – 5	49

CONSTANT-HEAD PERMEABILITY TEST (ASTM 2434)

Boring No. / Sample No.	Sample Depth (feet)	Coefficient of Permeability (cm/sec)
B-2/3	0 – 5	5.6×10^{-6}
B-4/3	0 – 5	9.9×10^{-6}

This report has not been prepared for use by parties or projects other than those named or described above. It may not contain sufficient information for other parties or other purposes. It has been prepared in accordance with generally accepted geotechnical practices and makes no other warranties either express or implied, as to the professional advice or data included in it.

GeoLogic Associates



for Caroline D. Steele
Project Engineer
RCE 67016 (Expires September 30, 2008)

Brian D. Constant
Principal Engineer
GE 2278 (Expires March 31, 2008)

CDS/DM;/BDC/cds/ljo

Distribution: Ms. Elizabeth Jordan, Addressee (4)

APPENDIX C

Hydrology Calculations

Marsh Park
KPFF Project No: 108247

Pre-Construction Conditions Hydrology Summary

Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Fire Factor	Volume (acre-ft)
1	0.76	0.95	50	15	240	0.014	6.3	5	3.76	0.48	0.88	2.51	1	0.34
2	2.32	0.4	50	15	320	0.02	6.3	6	3.45	0.45	0.63	5.04	1	0.52
												7.55	**cfs**	
									(Run-on from Gleneden St.) ->		+	6.89		
												14.44	**cfs**	

Marsh Park
KPFF Project No: 108247

Post-Construction Conditions Hydrology Summary

Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flow rate (cfs)	Fire Factor	Volume (acre-ft)
1	0.06	0.75	50	15	58	0.011	6.3	5	3.76	0.48	0.8	0.18	1	0.02
2	0.03	0.1	50	15	43	0.032	6.3	5	3.76	0.48	0.52	0.06	1	0
3	0.09	0.15	50	15	82	0.013	6.3	5	3.76	0.48	0.54	0.18	1	0.01
4	0.07	0.6	50	15	63	0.011	6.3	5	3.76	0.48	0.73	0.19	1	0.02
5	0.15	0.25	50	15	70	0.02	6.3	5	3.76	0.48	0.59	0.33	1	0.02
7	0.08	0.4	50	15	53	0.03	6.3	5	3.76	0.48	0.65	0.2	1	0.02
8	0.07	0.2	50	15	142	0.021	6.3	5	3.76	0.48	0.56	0.15	1	0.01
9	0.09	0.15	50	15	126	0.024	6.3	5	3.76	0.48	0.54	0.18	1	0.01
10	0.28	0.2	50	15	203	0.027	6.3	5	3.76	0.48	0.56	0.59	1	0.04
11	0.07	0.2	50	15	43	0.023	6.3	5	3.76	0.48	0.56	0.15	1	0.01
12	0.05	0.4	50	15	47	0.036	6.3	5	3.76	0.48	0.65	0.12	1	0.01
13	0.13	0.1	50	15	165	0.041	6.3	5	3.76	0.48	0.52	0.25	1	0.01
14	0.22	0.6	50	15	133	0.025	6.3	5	3.76	0.48	0.73	0.6	1	0.07
15	0.44	0.75	50	15	178	0.035	6.3	5	3.76	0.48	0.8	1.32	1	0.16
16	0.15	0.35	50	15	130	0.035	6.3	5	3.76	0.48	0.63	0.36	1	0.03
17	0.36	0.25	50	15	250	0.025	6.3	5	3.76	0.48	0.59	0.8	1	0.06
18	0.32	0.75	50	15	90	0.008	6.3	5	3.76	0.48	0.8	0.96	1	0.12
19	0.08	0.15	50	15	144	0.02	6.3	5	3.76	0.48	0.54	0.16	1	0.01
												6.78	**cfs**	
									(Run-on from Gleneden St.) ->		+	6.89		
												13.67	**cfs**	

SIZING STORM WATER DRAINAGE SYSTEMS

D 1 Roof Drainage.

The rainfall rates in Table D-1 should be used for design unless higher values are established locally.

D 2 Sizing by Flow Rate.

Storm drainage systems can be sized by storm water flow rates, using the appropriate GPM/square foot of rainfall listed in Table D-1 for the local area. Multiplying the listed GPM/square foot by the roof area being drained by each inlet (in square feet) produces the gallons per minute (GPM) of required flow for sizing each drain inlet. The flow rates (GPM) can then be added to determine the flows in each section of the drainage system. Required pipe sizes for various flow rates (GPM) are listed in Table 11-1 and Table 11-2.

D 3 Sizing by Roof Area.

Storm drainage systems can be sized using the roof area served by each section of the drainage system. Maximum allowable roof areas with various rainfall rates are listed in Table 11-1 and Table 11-2, along with the required pipe sizes. Using this method, it may be necessary to interpolate between two listed rainfall rate columns (inches per hour). To determine the allowable roof area for a listed pipe size at a listed slope, divide the allowable square feet of roof for a one (1) inch (25.4 mm/h) rainfall rate by the listed rainfall rate for the local area. For example, the allowable roof area for a six (6) inch (152 mm) drain at one-eighth (1/8) inch (3.2 mm) slope with a rainfall rate of 3.2 inches (81 mm/h) is 21,400/3.2 = 6688 square feet (621.3 m^2).

D 4 Capacity of Rectangular Scuppers.

Table D-2 lists the discharge capacity of rectangular roof scuppers of various widths with various heads of water. The maximum allowable level of water on the roof should be obtained from the structural engineer, based on the design of the roof.

TABLE D-1
Maximum Rates of Rainfall for Various Cities

The rainfall rates in this table are based on U.S. Weather Bureau Technical Paper No. 40, Chart 14: 100-Year 60-Minute Rainfall (inches).

States and Cities	Storm Drainage 60-Minute Duration, 100-Year Return	
	Inches/Hour	GPM/Square Foot
ALABAMA		
Birmingham	3.7	0.038
Huntsville	3.3	0.034
Mobile	4.5	0.047
Montgomery	3.8	0.039
ALASKA		
Aleutian Islands	1.0	0.010
Anchorage	0.6	0.006
Bethel	0.8	0.008
Fairbanks	1.0	0.010
Juneau	0.6	0.006
ARIZONA		
Flagstaff	2.3	0.024
Phoenix	2.2	0.023
Tucson	3.0	0.031

TABLE D-1 Continued

States and Cities	Storm Drainage 60-Minute Duration, 100-Year Return	
	Inches/Hour	GPM/Square Foot
ARKANSAS		
Eudora	3.8	0.039
Ft. Smith	3.9	0.041
Jonesboro	3.5	0.036
Little Rock	3.7	0.038
CALIFORNIA		
Eureka	1.5	0.016
Lake Tahoe	1.3	0.014
Los Angeles	2.0	0.021
Lucerne Valley	2.5	0.026
Needles	1.5	0.016
Palmdale	3.0	0.031
Redding	1.5	0.016
San Diego	1.5	0.016
San Francisco	1.5	0.016
San Luis Obispo	1.5	0.016
COLORADO		
Craig	1.5	0.016
Denver	2.2	0.023
Durango	1.8	0.019
Stratton	3.0	0.031
CONNECTICUT		
Hartford	2.8	0.029
New Haven	3.0	0.031
DELAWARE		
Dover	3.5	0.036
Rehobeth Beach	3.6	0.037
DISTRICT OF COLUMBIA		
Washington	4.0	0.042
FLORIDA		
Daytona Beach	4.0	0.042
Ft. Myers	4.0	0.042
Jacksonville	4.3	0.045
Melbourne	4.0	0.042
Miami	4.5	0.047
Palm Beach	5.0	0.052
Tampa	4.2	0.044
Tallahassee	4.1	0.043
GEORGIA		
Atlanta	3.5	0.036
Brunswick	4.0	0.042
Macon	3.7	0.038
Savannah	4.0	0.042
Thomasville	4.0	0.042

APPENDIX D

Onsite Pipe Network Sizing

Marsh Park

KPFF Project No.: 108247

Pipe #	Friction Method	Roughness Coefficient	Channel Slope (ft/ft)	Normal Depth (ft)	Diameter (ft)	Discharge (ft^3/s)	Flow Area (ft^2)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Top Width (ft)	Critical Depth (ft)
P1	Manning Formula	0.01	0.01	0.21	0.5	0.26	0.08	0.7	0.11	0.49	0.26
P2	Manning Formula	0.01	0.01	0.15	0.5	0.15	0.05	0.59	0.09	0.46	0.19
P3	Manning Formula	0.01	0.01	0.17	0.5	0.18	0.06	0.62	0.09	0.47	0.21
P4	Manning Formula	0.01	0.01	0.35	0.67	0.87	0.19	1.09	0.17	0.67	0.44
P5	Manning Formula	0.01	0.01	0.27	0.5	0.41	0.11	0.82	0.13	0.5	0.33
P6	Manning Formula	0.01	0.01	0.19	0.5	0.22	0.07	0.66	0.1	0.48	0.24
P7	Manning Formula	0.01	0.01	0.33	0.67	0.76	0.17	1.03	0.16	0.67	0.41
P8	Manning Formula	0.01	0.01	0.16	0.5	0.16	0.05	0.6	0.09	0.47	0.2
P9	Manning Formula	0.01	0.01	0.18	0.5	0.2	0.06	0.64	0.1	0.48	0.22
P10	Manning Formula	0.01	0.01	0.18	0.5	0.21	0.07	0.65	0.1	0.48	0.23
P11	Manning Formula	0.01	0.01	0.13	0.5	0.11	0.04	0.54	0.08	0.44	0.16
P12	Manning Formula	0.01	0.01	0.12	0.5	0.09	0.04	0.51	0.07	0.43	0.15
P13	Manning Formula	0.01	0.01	0.39	0.67	1.03	0.21	1.17	0.18	0.66	0.48
P14	Manning Formula	0.01	0.01	0.42	0.83	1.46	0.28	1.32	0.21	0.83	0.54
P15	Manning Formula	0.01	0.01	0.29	0.67	0.63	0.15	0.97	0.15	0.66	0.37
P16	Manning Formula	0.01	0.01	0.52	1	2.49	0.41	1.61	0.26	1	0.68
P17	Manning Formula	0.01	0.01	0.63	1	3.32	0.52	1.83	0.28	0.97	0.78
P18	Manning Formula	0.01	0.01	0.39	0.83	1.28	0.25	1.26	0.2	0.83	0.51
P19	Manning Formula	0.01	0.01	0.46	1	2.04	0.36	1.5	0.24	1	0.61
P20	Manning Formula	0.01	0.01	0.49	1	2.2	0.38	1.54	0.25	1	0.63
P21	Manning Formula	0.01	0.01	0.74	1.25	5.52	0.76	2.19	0.34	1.23	0.95
P22	Manning Formula	0.01	0.01	0.76	1.25	5.72	0.78	2.23	0.35	1.22	0.97
P23	Manning Formula	0.01	0.01	0.74	1.5	6.75	0.88	2.35	0.37	1.5	1.01
P24	Manning Formula	0.01	0.01	0.77	1.5	7.12	0.91	2.39	0.38	1.5	1.03
P25	Manning Formula	0.01	0.01	1	2	14.62	1.56	3.14	0.5	2	1.38
P26	Manning Formula	0.01	0.01	0.77	1.5	7.09	0.91	2.39	0.38	1.5	1.03
P27	Manning Formula	0.01	0.01	0.77	1.5	7.18	0.92	2.4	0.38	1.5	1.04
P28	Manning Formula	0.01	0.01	0.78	1.5	7.29	0.93	2.42	0.38	1.5	1.05
P29	Manning Formula	0.01	0.01	0.79	1.5	7.5	0.95	2.44	0.39	1.5	1.06

Percent Full (%)	Critical Slope (ft/ft)	Velocity (ft/s)	Velocity Head (ft)	Specific Energy (ft)	Froude Number	Maximum Discharge (ft^3/s)	Discharge Full (ft^3/s)	Slope Full (ft/ft)	Flow Type
41.2	0.00463	3.41	0.18	0.39	1.52	0.78	0.73	0.00127	SuperCritical
30.8	0.00427	2.92	0.13	0.29	1.54	0.78	0.73	0.00042	SuperCritical
33.8	0.00433	3.08	0.15	0.32	1.55	0.78	0.73	0.00061	SuperCritical
52.7	0.00503	4.62	0.33	0.68	1.53	1.71	1.59	0.00299	SuperCritical
53.6	0.00548	3.82	0.23	0.5	1.45	0.78	0.73	0.00316	SuperCritical
37.7	0.00446	3.25	0.16	0.35	1.53	0.78	0.73	0.00091	SuperCritical
48.6	0.0047	4.46	0.31	0.64	1.56	1.71	1.59	0.00228	SuperCritical
31.8	0.00428	2.98	0.14	0.3	1.55	0.78	0.73	0.00048	SuperCritical
35.7	0.00439	3.17	0.16	0.34	1.54	0.78	0.73	0.00075	SuperCritical
36.7	0.00444	3.21	0.16	0.34	1.54	0.78	0.73	0.00083	SuperCritical
26.3	0.00418	2.67	0.11	0.24	1.54	0.78	0.73	0.00023	SuperCritical
23.7	0.0042	2.53	0.1	0.22	1.54	0.78	0.73	0.00015	SuperCritical
58.6	0.0056	4.8	0.36	0.75	1.48	1.71	1.59	0.00419	SuperCritical
51.1	0.00463	5.26	0.43	0.85	1.6	3.03	2.82	0.00268	SuperCritical
43.7	0.00439	4.25	0.28	0.57	1.59	1.71	1.59	0.00157	SuperCritical
52.2	0.00453	6	0.56	1.08	1.64	4.98	4.63	0.00289	SuperCritical
62.7	0.00566	6.41	0.64	1.27	1.54	4.98	4.63	0.00514	SuperCritical
47.3	0.00435	5.08	0.4	0.79	1.63	3.03	2.82	0.00206	SuperCritical
46.4	0.00409	5.71	0.51	0.97	1.68	4.98	4.63	0.00194	SuperCritical
48.5	0.00423	5.82	0.53	1.01	1.67	4.98	4.63	0.00226	SuperCritical
59.2	0.00502	7.3	0.83	1.57	1.64	9.03	8.4	0.00432	SuperCritical
60.5	0.00519	7.36	0.84	1.6	1.63	9.03	8.4	0.00464	SuperCritical
49.7	0.00392	7.71	0.92	1.67	1.78	14.69	13.65	0.00244	SuperCritical
51.3	0.00404	7.81	0.95	1.72	1.77	14.69	13.65	0.00272	SuperCritical
49.8	0.00368	9.34	1.36	2.35	1.86	31.63	29.41	0.00247	SuperCritical
51.1	0.00403	7.8	0.95	1.71	1.77	14.69	13.65	0.0027	SuperCritical
51.5	0.00407	7.82	0.95	1.72	1.76	14.69	13.65	0.00276	SuperCritical
52	0.00411	7.85	0.96	1.74	1.76	14.69	13.65	0.00285	SuperCritical
52.9	0.00419	7.91	0.97	1.77	1.75	14.69	13.65	0.00302	SuperCritical

Office of Grants and Local Services
Statewide Park Program
Round Two

Location Finder:

Enter project address or zoom to location and click on map

90039 Go

Community Fact Finder

Restricted - Permit needed

Protected Lands Updates

Park added or revised

Park deleted

Interactive mapping by GreenInfo Network

ARCHITECTURAL DESIGN SURVEY OF:
MARSH STREET PARK (PHASE 1)
FOR:
MOUNTAINS RECREATION & CONSERVATION AUTHORITY
IN THE CITY OF LOS ANGELES, COUNTY OF LOS ANGELES,
STATE OF CALIFORNIA

HENNON
Surveying & Mapping, Inc.
601 E. GLENOAKS BLVD., SUITE 208
GLENDALE, CALIFORNIA 91207
(818)243-0640
FAX: (818)243-0650

DATE: MAY 31, 2001
SCALE: ONE INCH=TWENTY FT
CONTOUR INTERVAL: 1.0 FT
PROJECT NO: 1958
SHEET ONE OF ONE SHEETS

LEGEND:

A/C = ASPHALT	L&T&G = LEAD & TAG MONUMENT
AC = AIR CONDITIONING UNIT	MH = UTILITY MANHOLE
BW = BACK OF WALK	MW = MONITORING WELL
CATV = CABLE T.V. VAULT	N&TAG = NAIL & TAG MONUMENT
CATVB = CABLE T.V. BOX	PK = PK NAIL MONUMENT
CB = CATCH BASIN	P/L = PROPERTY LINE
CE = CITY ENGINEER	PMT = PARKING METER
CEFB = CITY ENGINEER FIELD BOOK	PP = POWER POLE
C/L = CENTERLINE	PRO = PRORATED
CNC = CONCRETE NAIL	ROW = RIGHT-OF-WAY LINE
CONC = CONCRETE	SDMH = STORM DRAIN MANHOLE
CS MON = COUNTY SURVEYOR MONUMENT	ST = STREET LIGHT
DWY = DRIVEWAY	SLB = STREET LIGHT PULL BOX
EMH = ELECTRIC MANHOLE	SP = SPRINKLER
EPB = ELECTRIC PULL-BOX	SPK&T = SPIKE & TIN MONUMENT
EV = ELECTRIC VAULT	SPK&W = SPIKE & WASHER MONUMENT
FB = FIELD BOOK	SSCO = SANITARY SEWER CLEAN OUT
FDC = FIRE DEPT. CONNECTION	SSM = STANDARD SURVEY MONUMENT
FF = FINISHED FLOOR	SSMH = SANITARY SEWER MANHOLE
FG = FINISHED GRADE	SW = SAW CUT LINE
FS = FINISHED SURFACE	TELCO = TELEPHONE CABINET
FH = FIRE HYDRANT	TMH = TELEPHONE MANHOLE
FL = FLOWLINE	TOA = TOP OF ASPHALT
GM = GAS METER	TOC = TOP OF CONCRETE
GP = GUARDPOST	TP = TELEPHONE POLE
GV = GAS VALVE	TS = TRAFFIC SIGNAL
GVLT = GAS VAULT	TSB = TRAFFIC SIGNAL PULL BOX
HB = HOSE BIBB	TV = TELEVISION VAULT
IC = IRRIGATION CONTROL VALVE	TW = TOP OF WALL
IP = IRON PIPE MONUMENT	VLT = UNKNOWN VAULT
LACFCD = LOS ANGELES COUNTY FLOOD CONTROL DIST.	W.I. = WROUGHT IRON FENCE
LAT = SANITARY SEWER LATERAL	WM = WATER METER
LL = LANDSCAPE LIGHT	WMH = WATER METER MANHOLE
LP = LIGHT POLE	WV = WATER VALVE
L&SPK = LEAD & SPIKE MONUMENT	WVLT = WATER VAULT
L&T = LEAD & TACK MONUMENT	YL = YARDLIGHT

2 —— = OVERHEAD WIRES

ALL BEARINGS AND DISTANCES SHOWN HEREON ARE FIELD MEASURED OR DERIVED FROM FIELD MEASUREMENTS UNLESS DENOTED AS THE FOLLOWING:

(XX.XX' TR) = RECORD DATA PER TRACT MAP NO. 3657 MB 47-51
(XX.XX' CE) = RECORD DATA PER CITY OF LOS ANGELES ENGINEER'S FIELD BOOK
(XX.XX' DEED) = RECORD DATA PER DEED OF RECORD

VICINITY MAP – NOT TO SCALE

GRAPHIC SCALE
0' 10' 20' 40'
SCALE: 1" = 20'

TENTATIVE CONDO TRACT NO. 64085
2944 GLENEDEN STREET
APN 5442-031-043

2944 GLENEDEN STREET
APN 5442-031-901

APN 5442-031-902

PARCEL 3
PARCEL 4
PARCEL 5
(ALSO EXCEPTION TO PARCEL 2)
PARCEL 6
PARCEL 7
PARCEL 2

1 STORY METAL BLDG
ONE STORY BUILDING

LOS ANGELES RIVER
(400 FT WIDE R/W OF L.A. C.F.C.D.)

GLENEDEN ST
RIPPLE PLACE
ROSANNA ST
MARSH ST

PROPERTY LINE

PROPOSED 5' EASEMENT PER LOT LINE ADJUSTMENT

APPROXIMATE LOCATION OF 40' GLENDALE SANITARY SEWER EASEMENT

INGRESS/EGRESS EASEMENT

POB PARCEL 3

TPOB PARCEL 6

TPOB PARCELS 7

POB PARCELS 2 & 6

SE'LY LINE PARCEL 1 LOT LINE ADJUSTMENT

SW'LY LINE LOT A, TR 3498

NW'LY CORNER LOT 36 ELYSIAN GARDEN

LOT 38 TR 3657 MB 47-51

LOT 37

LEGAL DESCRIPTION PARCEL 1

AREA = 2712 SQ. FT.

LEGAL DESCRIPTION:

PARCEL 5:

THAT PORTION OF THE EDWARD PARTRIDGE 34.859 ACRE TRACT, IN THE RANCHO LOS FELIX, AS PER MAP RECORDED IN BOOK 70 PAGE 73 OF MISCELLANEOUS RECORDS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, INCLUDED WITHIN THE FOLLOWING DESCRIBED COUNDARIES:

BEGINNING AT THE MOST NORTHERLY CORNER OF LOT 34 OF TRACT NO. 4574, AS PER MAP RECORDED IN BOOK 52 PAGE 30 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY; THENCE ALONG THE PROLONGATION OF THE NORTHEASTERLY PORTION OF THE NORTHWESTERLY LINE OF SAID LOT 34, NORTH 34°27'50" EAST 225.40 FEET, MORE OR LESS TO A POINT IN THE SOUTHWESTERLY LINE OF LOT "A" OF TRACT NO. 3498, AS PER MAP RECORDED IN BOOK 38 PAGE 5 OF MAPS, RECORDS OF SAID COUNTY; THENCE ALONG SAID SOUTHWESTERLY LINE, SOUTH 65°25'25" EAST 162.30 FEET; THENCE SOUTH 35°29'45" WEST, 264.98 FEET TO A POINT IN THE NORTHEASTERLY LINE OF ROSANNA STREET, AS SHOWN ON SAID MAP OF TRACT NO. 4574, DISTANT SOUTH 51°25'55" EAST, 10 FEET FROM THE MOST EASTERLY CORNER OF SAID LOT 34; THENCE NORTHWESTERLY ALONG SAID NORTHEASTERLY LINE TO AND ALONG THE NORTHEASTERLY LINE OF SAID LOT 34, A DISTANCE OF 157.70 FEET, MORE OR LESS, TO THE POINT OF BEGINNING.

PARCEL 6:

THAT PART OF LOT 5 OF THE SOUTHERN PACIFIC CLASSIFICATION YARD TRACT, AS PER MAP RECORDED IN BOOK 147 PAGES 22 TO 26 INCLUSIVE OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, AND THAT PART OF LOT "A" OF TRACT NO. 3498, AS PER MAP RECORDED IN BOOK 38 PAGE 5 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWESTERLY CORNER OF LOT 36 OF ELYSIAN GARDEN TRACT, AS PER MAP RECORDED IN BOOK 12 PAGES 190 AND 191 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY; THENCE NORTH 65°30' WEST, A DISTANCE OF 421.61 FEET, MEASURED ALONG THE SOUTHWESTERLY LINE OF SAID LOT "A" OF TRACT NO. 3498 TO THE TRUE POINT OF BEGINNING; THENCE CONTINUING NORTH 65°30' WEST, ALONG SAID SOUTHWESTERLY LINE, A DISTANCE OF 80 FEET; THENCE NORTH 24°30' EAST, A DISTANCE OF 187.14 FEET, MORE OR LESS, TO A POINT IN THE SOUTHWESTERLY LINE OF THE LOS ANGELES COUNTY FLOOD CONTROL CHANNEL, 400 FEET WIDE, AS DESCRIBED IN DEED RECORDED JUNE 24, 1941 IN BOOK 18506 PAGE 271 OFFICIAL RECORDS; THENCE SOUTH 69°46'20" EAST, A DISTANCE OF 6.98 FEET TO THE BEGINNING OF A TANGENT CURVE, CONCAVE TO THE SOUTHWEST, HAVING A RADIUS OF 2000 FEET, A RADIAL LINE OF SAID CURVE THROUGH SAID POINT BEARING NORTH 20°13'40" EAST; THENCE SOUTHEASTERLY ALONG SAID CURVE, 53.16 FEET, MORE OR LESS; THENCE SOUTH 24°30' WEST, A DISTANCE OF 190 FEET, MORE OR LESS, TO THE POINT OF BEGINNING.

EXCEPT FROM THAT PORTION OF LOT 5 OF SOUTHERN PACIFIC CLASSIFICATION YARD TRACT, ALL PETROLEUM, OIL, NATURAL GAS, AND PRODUCTS DERIVED THEREFROM WITHIN OR UNDERLYING SAID LAND, OR THAT MAY BE PRODUCED THEREFROM, AND ALL RIGHTS THERETO, AS RESERVED BY SOUTHERN PACIFIC RAILROAD COMPANY AND SOUTHERN PACIFIC COMPANY, IN DEED RECORDED JANUARY 3, 1946 IN BOOK 22661 PAGE 74, OFFICIAL RECORDS.

ALSO EXCEPT FROM THAT PORTION OF LOT "A" OF TRACT NO. 3498, ALL OIL, GAS AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER SAID LAND.

LEGAL DESCRIPTION:

PARCEL 1:

LOTS 37 AND 38 OF TRACT NO. 3657, IN THE CITY OF LOS ANGELES, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 47 PAGE(S) 51 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

PARCEL 2:

ALL THAT PART OF THE EDWARD PARTRIDGE 34.855 ACRES AS PER MAP RECORDED IN BOOK 70 PAGE 73 OF MISCELLANEOUS RECORDS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWESTERLY CORNER OF LOT 34 OF TRACT NO. 4574, AS PER MAP RECORDED IN BOOK 52 PAGE 30 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY; THENCE NORTH 34°27'50" EAST 225.16 FEET; THENCE SOUTH 65°30' EAST 339.40 FEET TO THE MOST NORTHERLY CORNER OF LOT 38 OF TRACT NO. 3657, AS PER MAP RECORDED IN BOOK 47 PAGE 51 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY; THENCE SOUTHWESTERLY ALONG THE WESTERLY LINE OF SAID TRACT SOUTH 38°36'35" WEST 306.91 FEET TO THE CORNER OF LOT 46 OF TRACT NO. 4574; THENCE NORTH 51°23'25" WEST 312.89 FEET TO THE PLACE OF BEGINNING.

EXCEPT THAT PORTION OF SAID PARCEL 2, DESCRIBED AS FOLLOWS:

BEGINNING AT THE MOST NORTHERLY CORNER OF LOT 34 TRACT 4574, RECORDED IN BOOK 52 PAGE 30 OF MAPS; THENCE ALONG THE PROLONGATION OF THE NORTHEASTERLY PORTION OF THE NORTHWESTERLY LINE OF SAID LOT 34 NORTH 34° 27'50" EAST 225.40 FEET, MORE OR LESS, TO A POINT IN THE SOUTHWESTERLY LINE OF LOT "A" TRACT 3498, RECORDED IN BOOK 38 PAGE 5 OF MAPS; THENCE ALONG SAID SOUTHWESTERLY LINE SOUTH 65°25'25" EAST 162.30 FEET; THENCE SOUTH 35° 29'45" WEST 264.98 FEET TO A POINT IN THE NORTHEASTERLY LINE OF ROSANNA STREET, AS SHOWN ON SAID MAP OF TRACT 4574, DISTANT SOUTH 51°25'55" EAST 10 FEET FROM THE MOST EASTERLY CORNER OF SAID LOT 34; THENCE NORTHWESTERLY ALONG SAID NORTHEASTERLY LINE TO AND ALONG THE NORTHEASTERLY LINE OF SAID LOT 34, A DISTANCE OF 157.70 FEET, MORE OR LESS, TO THE POINT OF BEGINNING.

PARCEL 3:

THAT PORTION OF LOT 5 OF THE SOUTHERN PACIFIC CLASSIFICATION YARD TRACT, AS PER MAP RECORDED IN BOOK 147 PAGES 22 TO 26 INCLUSIVE, OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, AND THAT PORTION OF LOT "A," OF TRACT NO. 3498, AS PER MAP RECORDED IN BOOK 38 PAGE 5 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS A WHOLE AS FOLLOWS:

BEGINNING AT A POINT IN THE SOUTHERLY LINE OF SAID LOT "A", DISTANT NORTH 65° 30' WEST 481.61 FEET ALONG SAID SOUTHWESTERLY LINE FROM THE NORTHWEST CORNER OF THE ELYSIAN GARDEN TRACT, AS PER MAP RECORDED IN BOOK 12 PAGE 190 OF MAPS; THENCE NORTH 24°30'10" EAST 187.14 FEET, MORE OR LESS, TO THE SOUTHWESTERLY LINE OF THE LOS ANGELES COUNTY FLOOD CONTROL CHANNEL, 400 FEET WIDE, AS DESCRIBED IN DEED RECORDED JUNE 24, 1941 IN BOOK 18506 PAGE 271, OFFICIAL RECORDS; THENCE NORTHWESTERLY, ALONG SAID SOUTHWESTERLY LINE, 267.08 FEET, MORE OR LESS, TO THE NORTHWESTERLY PROLONGATION OF THE CENTER LINE OF GLENEDEN STREET, 50 FEET WIDE, AS SHOWN ON MAP OF TRACT NO. 2199, RECORDED IN BOOK 23 PAGE 15 OF MAPS; THENCE ALONG SAID PROLONGATION SOUTH 37°31'10" WEST, 171.65 FEET, MORE OR LESS, TO THE SOUTHWESTERLY LINE OF SAID LOT "A"; THENCE SOUTHEASTERLY ALONG SAID SOUTHWESTERLY LINE TO THE POINT OF BEGINNING.

EXCEPT FROM THAT PORTION OF SAID PARCEL WHICH IS INCLUDED WITHIN THE LINES OF SAID LOT 5 OF SOUTHERN PACIFIC CLASSIFICATION YARD TRACT, ALL PETROLEUM, OIL, NATURAL GAS, AND PRODUCTS DERIVED THEREFROM, AND ALL RIGHTS THERETO, AS RESERVED BY SOUTHERN PACIFIC RAILROAD COMPANY, AND SOUTHERN PACIFIC COMPANY, IN DEED RECORDED JANUARY 3, 1946 IN BOOK 22661 PAGE 74, OFFICIAL RECORDS.

ALSO EXCEPT FROM THAT PORTION OF SAID PARCEL WHICH IS INCLUDED WITHIN THE LINES OF LOT "A" OF TRACT NO. 3498, ALL OIL, GAS, AND OTHER HYDROCARBON SUBSTANCES IN AND UNDER SAID LAND.

PARCEL 4:

THAT PORTION OF RANCHO LOS FELIX, AS PER MAP RECORDED IN BOOK 1 PAGE 164 OF PATENTS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING AT THE MOST EASTERLY CORNER OF TRACT NO. 2199, AS SHOWN ON MAP RECORDED IN BOOK 23 PAGE 15 OF MAPS; THENCE ALONG THE NORTHEASTERLY LINE OF SAID TRACT, NORTH 56°43' WEST 142.09 FEET; THENCE NORTH 42°33'45" EAST 49.36 FEET TO A POINT IN THE SOUTHWESTERLY LINE OF LOT "A" OF TRACT NO. 3498, AS SHOWN ON MAP RECORDED IN BOOK 38 PAGE 5 OF MAPS, DISTANT THEREON NORTH 65°30' EAST 151.23 FEET FROM THE NORTHEASTERLY PROLONGATION OF THE NORTHWESTERLY LINE OF SAID TRACT NO. 2199; THENCE ALONG SAID SOUTHWESTERLY LINE, SOUTH 65°30' EAST 140.17 FEET TO THE NORTHEASTERLY PROLONGATION OF THE SOUTHEASTERLY LINE OF SAID TRACT NO. 2199; THENCE SOUTH 34°57' WEST 70.42 FEET TO THE POINT OF BEGINNING.

BASIS OF BEARINGS:

THE CENTER LINE OF MARSH ST. HAVING A BEARING OF N38°36'35"E PER TRACT NO. 3657 MB 47-51 HAS HELD AS THE BASIS OF BEARINGS FOR THIS SURVEY.

BENCHMARKS:

ELEVATIONS SHOWN HEREON ARE BASED ON THE CITY OF LA 1985 ADJUSTMENT OF THE SEA LEVEL DATUM OF 1929 (LA CITY ORDINANCE NO. 52,222.)

LA CITY BM 12-31010 1985 ADJ. EL=362.056' WIRE SPIKE IN EAST CURB RIPPLE ST., 45 FT NORTH OF B.C. CURB RETURN NORTH OF PARTRIDGE AVE.

LA CITY BM 12-31025 1985 ADJ. EL=364.428 WIRE SPIKE EAST CURB RIPPLE ST., 3 FT SOUTH OF B.C. CURB RETURN SOUTH OF ROSANNA ST.

ANY USER OF ELEVATIONS AND/OR COORDINATES SHOWN HEREON FOR THE CONTROL OF CONSTRUCTION, SHALL VERIFY AT LEAST 3 POINTS SHOWN HEREON, FOR MATHEMATICAL CONSISTENCY PRIOR TO SUCH USE.

IMPORTANT NOTE:

WARNING! – THERE IS NO ASSURANCE THAT THE LOCATION OF SUBSTRUCTURES SHOWN ON THIS DRAWING ARE ACCURATE, OR THAT ALL EXISTING SUBSTRUCTURES ARE SHOWN ON THIS DRAWING. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL SUBSTRUCTURES WHETHER SHOWN OR NOT. ANY DAMAGE TO THE EXISTING SUBSTRUCTURES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. PRIOR TO EXCAVATIONS USA ALERT MUST BE CONTACTED AT 1-800-422-4133 FOR FIELD LOCATION MARKINGS OF SUBSTRUCTURES.

SURVEYOR'S STATEMENT:

THIS MAP CORRECTLY REPRESENTS A FIELD SURVEY MADE BY ME OR UNDER MY DIRECTION FOR THE EXCLUSIVE USE OF MRCA DURING MAY, 2001 & JUNE, 2008.

ROBERT DAVID HENNON, PLS 5573 (LIC. EXPIRES 9-30-13)

PROFESSIONAL LAND SURVEYOR ROBERT DAVID HENNON L.S. NO. 5573 9-30-13 STATE OF CALIFORNIA

THOMAS GUIDE:	594 F-3	
LA CITY DIST:	MAP-150B209	
ASS. PARCEL NO.:	VARIES	
FILE:	1958-1.DWG	
SURVEYED BY:	R HENNON	

NO.	DATE	DESCRIPTION	BY
6	OCT. 6, '12	PARCEL 6	RDH
5	AUG 8, '12	POWER POLE NUMBERS	RDH
4	MAR 21, '12	INGRESS/EGRESS EASEMENT LOCATION	RDH
3	MAR 20, '12	GLENEDEN ST. TOPO & BDRY ADJ.	RDH
2	06-25-08	ADDED PARCEL 7	RDH
1	06-17-08	ADDED NEW TOPO	RDH

ARCHITECTURAL DESIGN SURVEY OF MARSH STREET PARK (PHASE 1)
MOUNTAINS RECREATION & CONSERVATION AUTHORITY
IN THE CITY OF LOS ANGELES, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA

Community Facts - Find popular facts (population, income, etc.) and frequently requested data about your community.

Enter a state, county, city, town, or zip code: 90039 GO

- Population
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- Education
- Housing
- Income
- Origins and Language
- Poverty
- Veterans

90039

Total Population

28,514 *Source: 2010 Demographic Profile*

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- Population, Age, Sex, Race, Households and Housing ...

American Community Survey
- Education, Marital Status, Relationships, Fertility, Grandparents ...
- Income, Employment, Occupation, Commuting to Work ...
- Occupancy and Structure, Housing Value and Costs, Utilities ...
- Sex and Age, Race, Hispanic Origin, Housing Units ...

Population Estimates Program
- Annual Population Estimates ...

Economic Census
- Number of Establishments, Annual Payroll, Number of Employees ...

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January 23, 2013

Mountains Recreation & Conservations Authority
Laura Saltzman, laura.saltzman@mrca.ca.gov
570 West Avenue Twenty six, Suite 100
Los Angeles, CA 90065

RE: Marsh Park, received January 22, 2013

Dear Laura,

Attached are individual soil reports and a database. The samples vary by location more than by depth but S1 and S5 have some significant differences by depth.

S1, S2 and S3 have moderately high alkalinity. The pH values range from 7.63 to 8.35. The average pH is 8.05. The average pH of S4 and S5 is 7.21. The pH values range from 7.11 to 7.37.

Salinity is low in all 10 samples. The average salinity in the 0.5' samples is 0.17 millimho/cm. The average salinity in the 1.5' samples is 0.32 millimho/cm.

Nitrogen is sufficient for sample S2 1.5' and is low for the others.

Phosphorus is low for S1 0.5' and is modest for S2 1.5', S3 0.5' and S4 0.5' & 1.5'.

Potassium is low or modest except for samples S5 0.5' & 1.5' where potassium is high.

Iron is sufficient. Manganese is high in S2 0.5' and is low or modest in the other samples. Zinc is low in S4 1.5' Zinc is excessively high in S1, 1.5' at 37 parts per million and S5, 0.5' at 93 parts per million. The optimum level of zinc is several parts per million. Woody plants generally do not grow well if zinc is over about 30 parts per million. Herbaceous plants generally need zinc below about 50 parts per million. Grasses are fairly tolerant of high zinc. Boron is modest on average.

Sulfur is low. Magnesium is moderate on average. Sodium is low. Chromium is moderate in sample S1, 1.5'. Lead is high at 57 parts per million in sample S1, 1.5'.

The samples appear be mostly loamy sands. Sandy soils have low binding ability to retain nutrients and to sequester heavy metals. They also have low moisture holding capacity. Increases soil organic matter will increase the water and nutrient holding capacity.

Recommendations

Limit the use of samples S1, 1.5' and S5, 0.5' to grasses such as Muhlenbergia regens and turf due the high metal content.

General soil preparation on a square foot basis for a 6 inch lift. Broadcast the following materials uniformly. The rates are per 1,000 square feet. Incorporate them homogeneously 6 inches deep:

Ureaformaldehyde (38-0-0) – 8 pounds except S2, 1.5'
Potassium sulfate (0-0-50) – 6 pounds except S5
Triple superphosphate (0-45-0) – 3 pounds except S2, 0.5'; S3, 1.5' and S5 0.5'
agricultural gypsum - 10 pounds for all
Organic soil amendment – about 3 cubic yards, sufficient for 3% to 5% soil organic matter on a dry weight basis

For the preparation on a volume basis, homogeneously blend the following materials into clean soil. Rates are expressed per cubic yard:

Ureaformaldehyde (38-0-0) – 1/3 pound except S2, 1.5'
Potassium sulfate (0-0-50) – 1/4 pound except S5
Triple superphosphate (0-45-0) – 1/4 pound except S1, 1.5'; S2, 0.5'; S3, 1.5' and S5
agricultural gypsum – 1/2 pound for all
Organic soil amendment – about 15% by volume, sufficient for 3% to 5% soil organic matter on a dry weight basis

Organic soil amendment suggestions:

1. Humus material shall have an acid-soluble ash content of no less than 6% and no more than 20%. Organic matter shall be at least 50% on a dry weight basis.
2. The pH of the material shall be between 6 and 7.5.
3. The salt content shall be less than 10 millimho/cm @ 25° C. in a saturated paste extract.
4. Boron content of the saturated extract shall be less than 1.0 part per million.
5. Silicon content (acid-insoluble ash) shall be less than 50%.
6. Calcium carbonate shall not be present if to be applied on alkaline soils.
7. Types of acceptable products are composts, manures, mushroom composts, straw, alfalfa, peat mosses etc. low in salts, low in heavy metals, free from weed seeds, free of pathogens and other deleterious materials.
8. Composted wood products are conditionally acceptable [stable humus must be present]. Wood based products are not acceptable which are based on red wood or cedar.
9. Sludge-based materials are not acceptable.
10. Carbon:nitrogen ratio is less than 25:1.
11. The compost shall be aerobic without malodorous presence of decomposition products.

12. The maximum particle size shall be 0.5 inch, 80% or more shall pass a No. 4 screen for soil amending.

    Maximum total permissible pollutant concentrations in amendment in parts per million on a dry weight basis:

arsenic	20	copper	150	selenium	50
cadmium	15	lead	200	silver	10
chromium	300	mercury	10	vanadium	500
cobalt	50	molybdenum	20	zinc	300
		nickel	100		

Irrigate the soils with pH values over 8.0 deeply initially and reduce the pH to less than 8.0. Then irrigate normally. Target the rootball soils initially and as the plants become established, irrigate the new roots in the site soil.

Monitor the soils during preparation and amending for suitability.

For site maintenance, apply ureaformaldehyde (38-0-0) at 8 pounds per 1,000 square feet about twice per year. Monitor the site with periodic testing. If nitrogen, phosphorus and potassium are needed, apply Yara's Turf Royale (21-7-14) pounds per 1,000 square feet. Species of faster growth need higher rates of fertilization than species of slower growth rates. Additionally, nutrient recycling from leaf litter accumulation decreases the need to apply nutrients.

Sincerely,

Garn A. Wallace, Ph. D.
GAW:n

BLS
BUREAU OF LABOR STATISTICS
U.S. DEPARTMENT OF LABOR

NEWS RELEASE

WEST INFORMATION OFFICE
San Francisco, Calif.

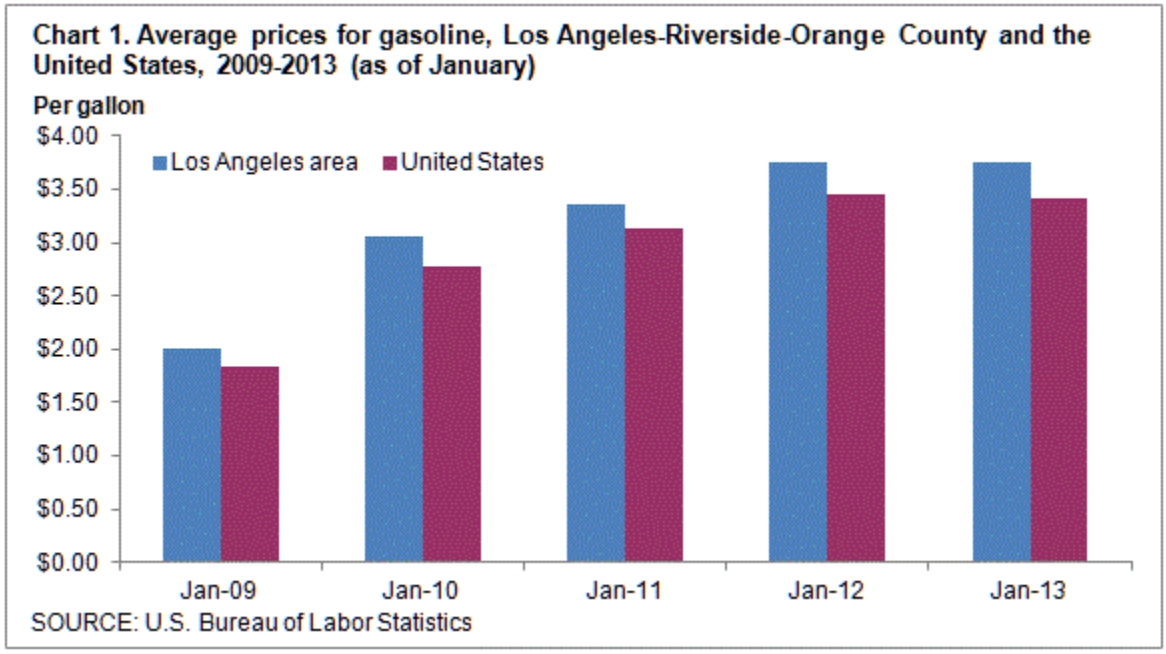
For release Friday, March 1, 2013 **13-396-SAN**

Technical information: (415) 625-2282 • BLSinfoSF@bls.gov • www.bls.gov/ro9
Media contact: (415) 625-2270

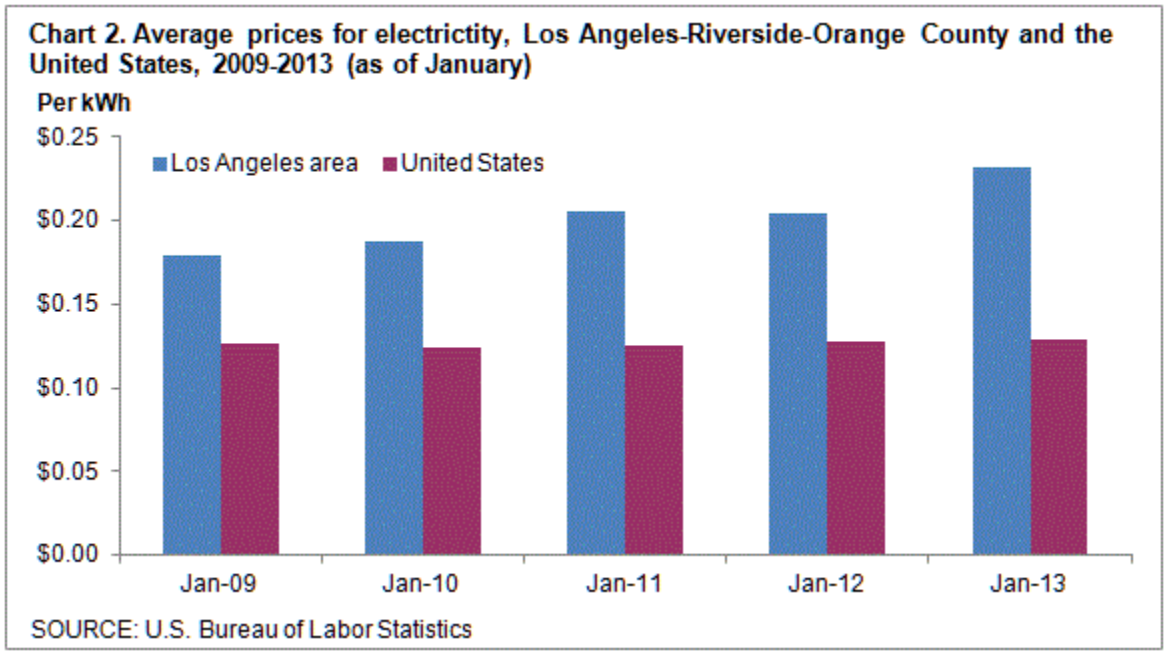
AVERAGE ENERGY PRICES, LOS ANGELES AREA–JANUARY 2013

Gasoline prices averaged $3.749 a gallon in the Los Angeles area in January 2013, the U.S. Bureau of Labor Statistics reported today. Regional Commissioner Richard J. Holden noted that area gasoline prices were similar to last January when they averaged $3.747 per gallon. Los Angeles area households paid an average of 23.2 cents per kilowatt hour (kWh) of electricity in January 2013, up from 20.4 cents per kWh in January 2012. The average cost of utility (piped) gas at $1.013 per therm in January was similar to the $0.996 per therm spent last year. (Data in this release are not seasonally adjusted; accordingly, over-the-year-analysis is used throughout.)

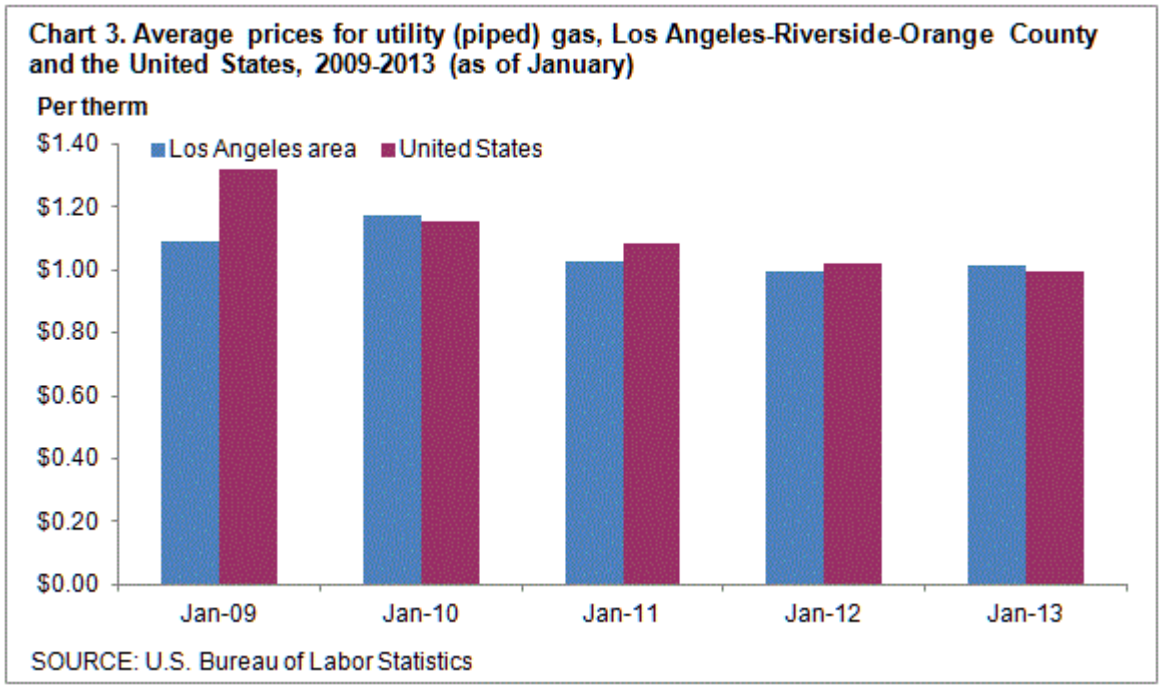
At $3.749 a gallon, Los Angeles area consumers paid 10.0 percent more than the $3.407 national average in January 2013. A year earlier, consumers in the Los Angeles area paid 8.7 percent more than the national average for a gallon of gasoline. The local price of a gallon of gasoline has exceeded the national average by more than six percent in the month of January in each of the past five years. (See chart 1.)



The 23.2 cents per kWh Los Angeles households paid for electricity in January 2013 was 79.8 percent more than the nationwide average of 12.9 cents per kWh. Last January, electricity costs were 59.4 percent higher in Los Angeles compared to the nation. In the past five years, prices paid by Los Angeles area consumers for electricity exceeded the U.S. average by more than 42 percent in the month of January. (See chart 2.)



Prices paid by Los Angeles area consumers for utility (piped) gas, commonly referred to as natural gas, were $1.013 per therm, similar to the national average in January 2013 ($0.996 per therm). A year earlier, area consumers also paid close to the same price per therm for natural gas compared to the nation. In three of the past five years, the per therm cost for natural gas in January in the Los Angeles area has been within three percent of the U.S. average. (See chart 3.)



The Los Angeles-Riverside-Orange County, Calif. metropolitan area consists of Los Angeles, Orange, Riverside, San Bernardino and Ventura Counties in California.

Technical Note

Average prices are estimated from Consumer Price Index (CPI) data for selected commodity series to support the research and analytic needs of CPI data users. Average prices for electricity, utility (piped) gas, and gasoline are published monthly for the U.S. city average, the 4 regions, the 3 population size classes, 10 region/size-class cross-classifications, and the 14 largest local index areas. For electricity, average prices per kilowatt-hour (kWh) and per 500 kWh are published. For utility (piped) gas, average prices per therm, per 40 therms, and per 100 therms are published. For gasoline, the average price per gallon is published. Average prices for commonly available grades of gasoline are published as well as the average price across all grades.

Price quotes for 40 therms and 100 therms of utility (piped) gas and for 500 kWh of electricity are collected in sample outlets for use in the average price programs only. Since they are for specified consumption amounts, they are not used in the CPI. All other price quotes used for average price estimation are regular CPI data.

With the exception of the 40 therms, 100 therms, and 500 kWh price quotes, all eligible prices are converted to a price per normalized quantity. These prices are then used to estimate a price for a defined fixed quantity.

The average price per kilowatt-hour represents the total bill divided by the kilowatt-hour usage. The total bill is the sum of all items applicable to all consumers appearing on an electricity bill including, but not limited to, variable rates per kWh, fixed costs, taxes, surcharges, and credits. This calculation also applies to the average price per therm for utility (piped) gas.

Information from this release will be made available to sensory impaired individuals upon request. Voice phone: 202-691-5200, Federal Relay Services: 800-877-8339.

Table 1. Average prices for gasoline, electricty, and utility (piped) gas, Los Angeles-Riverside-Orange County and the United States, January 2012-January 2013, not seasonally adjusted

Year and month	Gasoline per gallon		Electricity per kWh		Utillity (piped) gas per therm	
	Los Angeles area	United States	Los Angeles area	United States	Los Angeles area	United States
2012						
January	$3.747	$3.447	$0.204	$0.128	$0.996	$1.021
February	4.013	3.622	0.204	0.128	0.931	0.986
March	4.394	3.918	0.204	0.127	0.931	0.978
April	4.257	3.976	0.204	0.127	0.883	0.951
May	4.333	3.839	0.204	0.129	0.978	0.907
June	4.037	3.602	0.193	0.135	1.054	0.927
July	3.800	3.502	0.193	0.133	1.053	0.943
August	4.073	3.759	0.193	0.133	1.072	0.960
September	4.175	3.908	0.193	0.133	1.027	0.953
October	4.499	3.839	0.211	0.128	1.052	0.962
November	3.924	3.542	0.211	0.127	0.995	0.994
December	3.677	3.386	0.211	0.127	1.042	1.004
2013						
January	3.749	3.407	0.232	0.129	1.013	0.996

Analysis of the Energy Intensity of Water Supplies for West Basin Municipal Water District

March, 2007

Robert C. Wilkinson, Ph.D.

Note to Readers

This report for West Basin Municipal Water District is an update and revision of an analysis and report by Robert Wilkinson, Fawzi Karajeh, and Julie Mottin (Hannah) conducted in April 2005. The earlier report, *Water Sources "Powering" Southern California: Imported Water, Recycled Water, Ground Water, and Desalinated Water*, was undertaken with support from the California Department of Water Resources, and it examined the energy intensity of water supply sources for both West Basin and Central Basin Municipal Water Districts. This analysis focuses exclusively on West Basin, and it includes new data for ocean desalination based on new engineering developments that have occurred over the past year and a half.

Principal Investigator: Robert C. Wilkinson, Ph.D.

Dr. Wilkinson is Director of the Water Policy Program at the Donald Bren School of Environmental Science and Management, and Lecturer in the Environmental Studies Program, at the University of California, Santa Barbara. His teaching, research, and consulting focuses on water policy, climate change, and environmental policy issues. Dr. Wilkinson advises private sector entities and government agencies in the U.S. and internationally. He currently served on the public advisory committee for California's 2005 State Water Plan, and he represented the University of California on the Governor's Task Force on Desalination.
Contact: wilkinson@es.ucsb.edu

West Basin Municipal Water District

Contact: Richard Nagel, General Manager
West Basin Municipal Water District
17140 South Avalon Boulevard, Suite 210
Carson, CA 90746
(310) 217 2411 phone, (310) 217-2414 fax
richn@westbasin.org

West Basin Municipal Water District www.westbasin.org

Overview

Southern California relies on imported and local water supplies for both potable and non-potable uses. Imported water travels great distances and over significant elevation gains through both the California State Water Project (SWP) and Colorado River Aqueduct (CRA) before arriving in Southern California, consuming a large amount of energy in the process. Local sources of water often require less energy to provide a sustainable supply of water. Three water source alternatives which are found or produced locally and could reduce the amount of imported water are desalinated ocean water, groundwater, and recycled water. Groundwater and recycled water are significantly less energy intensive than imports, while ocean desalination is getting close to the energy intensity of imports.

Energy requirements vary considerably between these four water sources. All water sources require pumping, treatment, and distribution. Differences in energy requirements arise from the varying processes needed to produce water to meet appropriate standards. This study examines the energy needed to complete each process for the waters supplied by West Basin Municipal Water District (West Basin).

Specific elements of energy inputs examined in this study for each water source are as follows:

- Energy required to **import water** includes three processes: pumping California SWP and CRA supplies to water providers; treating water to applicable standards; and distributing it to customers.
- **Desalination of ocean water** includes three basic processes: 1) pumping water from the ocean or intermediate source (e.g. a powerplant) to the desalination plant; 2) pre-treating and then desalting water including discharge of concentrate; and 3) distributing water from the desalination plant to customers.
- **Groundwater** usage requires energy for three processes: pumping groundwater from local aquifers to treatment facilities; treating water to applicable standards; and distributing water from the treatment plant to customers. Additional injection energy is sometimes needed for groundwater replenishment.
- Energy required to **recycle water** includes three processes: pumping water from secondary treatment plants to tertiary treatment plants; tertiary treatment of the water, and distributing water from the treatment plant to customers.

The energy intensity results of this study are summarized in the table on the following page. They indicate that recycled water is among the least energy-intensive supply options available, followed by groundwater that is naturally recharged and recharged with recycled water. Imported water and ocean desalination are the most energy intensive water supply options in California. East Branch State Water Project water is close in energy intensity to desalination figures based on current technology, and at some points along the system, SWP supplies exceed estimated ocean desalination energy intensity. The following table identifies energy inputs to each of the water supplies including estimated energy requirements for desalination. Details describing the West Basin system operations are included in the water source sections. Note that the Title 22 recycled water energy figure reflects only the *marginal* energy required to treat secondary effluent wastewater which has been processed to meet legal discharge requirements, along with the energy to convey it to user

Energy Intensity of Water Supplies for West Basin Municipal Water District

	af/yr	Percentage of Total Source Type	kWh/af Conveyance Pumping	kWh/af MWD Treatment	kWh/af Recycled Treatment	kWh/af Groundwater Pumping	kWh/af Groundwater Treatment	kWh/af Desalination	kWh/af WBMWD Distribution	Total kWh/af	Total kWh/year
Imported Deliveries											
State Water Project (SWP) [1]	57,559	43%	3,000	44	NA	NA	NA	NA	0	3,044	175,209,596
Colorado River Aqueduct (CRA) [1]	76,300	57%	2,000	44	NA	NA	NA	NA	0	2,044	155,957,200
(other that replenishment water)											
Groundwater[2]											
natural recharge	19,720	40%	NA	NA	NA	350	0	NA	0	350	6,902,030
replenished with (injected) SWP water [1]	9,367	19%	3,000	44	NA	350	0	NA	0	3,394	31,791,598
replenished with (injected) CRA water [1]	11,831	24%	2,000	44	NA	350	0	NA	0	2,394	28,323,432
replenished with (injected) recycled water	8,381	17%	205	0	790	350	0	NA	220	1,565	13,116,278
Recycled Water											
West Basin Treatment, Title 22	21,506	60%	205	NA	0	NA	NA	NA	285	490	10,537,940
West Basin Treatment, RO	14,337	40%	205	NA	790	NA	NA	NA	285	1,280	18,351,360
Ocean Desalination	20,000	100%	200	NA	NA	NA	NA	3,027	460	3,687	82,588,800

Notes:

NA Not applicable

[1] Imported water based on percentage of CRA and SWP water MWD received, averaged over an 11-year period. Note that the figures for imports do not include an accounting for system losses due to evaporation and other factors. These losses clearly exist, and an estimate of 5% or more may be reasonable. The figures for imports above should therefore be understood to be conservative (that is, the actual energy intensity is in fact higher for imported supplies than indicated by the figures).

[2] Groundwater values include entire basin, West Basin service area covers approximately 86% of the basin. Groundwater values are specific to aquifer characteristics, including depth, within the basin.

Energy Intensity of Water

Water treatment and delivery systems in California, including extraction of "raw water" supplies from natural sources, conveyance, treatment and distribution, end-use, and wastewater collection and treatment, account for one of the largest energy uses in the state.[1] The California Energy Commission estimated in its 2005 Integrated Energy Policy Report that approximately 19% of California's electricity is used for water related purposes including delivery, end-uses, and wastewater treatment.[2] The total energy embodied in a unit of water (that is, the amount of energy required to transport, treat, and process a given amount of water) varies with location, source, and use within the state. In many areas, the energy intensity may increase in the future due to limits on water resource extraction, and regulatory requirements for water quality, and other factors.[3] Technology improvements may offset this trend to some extent.

> ***Energy intensity*** is the total amount of energy, calculated on a whole-system basis, required for the use of a given amount of water in a specific location.

The Water-Energy Nexus

Water and energy systems are interconnected in several important ways in California. Water systems both provide energy – through hydropower – and consume large amounts of energy, mainly through pumping. Critical elements of California's water infrastructure are highly energy-intensive. Moving large quantities of water long distances and over significant elevation gains, treating and distributing it within the state's communities and rural areas, using it for various purposes, and treating the resulting wastewater, accounts for one of the largest uses of electrical energy in the state.[4]

Improving the efficiency with which water is used provides an important opportunity to increase related energy efficiency. ("*Efficiency*" as used here describes the useful work or service provided by a given amount of water.) Significant potential economic as well as environmental benefits can be cost-effectively achieved in the energy sector through efficiency improvements in the state's water systems and through shifting to less energy intensive local sources. The California Public Utilities Commission is currently planning to include water efficiency improvements as a means of achieving energy efficiency benefits for the state.[5]

Overview of Energy Inputs to Water Systems

There are four principle energy elements in water systems:

1. primary water extraction and supply delivery (imported and local)
2. treatment and distribution within service areas
3. on-site water pumping, treatment, and thermal inputs (heating and cooling)

4. wastewater collection, treatment, and discharge

Pumping water in each of these four stages is energy-intensive. Other important components of embedded energy in water include groundwater pumping, treatment and pressurization of water supply systems, treatment and thermal energy (heating and cooling) applications at the point of end-use, and wastewater pumping and treatment.[6]

1. Primary water extraction and supply delivery
Moving water from near sea-level in the Sacramento-San Joaquin Delta to the San Joaquin-Tulare Lake Basin, the Central Coast, and Southern California, and from the Colorado River to metropolitan Southern California, is highly energy intensive. Approximately 3,236 kWh is required to pump one acre-foot of SWP water to the end of the East Branch in Southern California, and 2,580 kWh for the West Branch. About 2,000 kWh is required to pump one acre foot of water through the CRA to southern California.[7] Groundwater pumping also requires significant amounts of energy depending on the depth of the source. (Data on groundwater is incomplete and difficult to obtain because California does not systematically manage groundwater resources.)

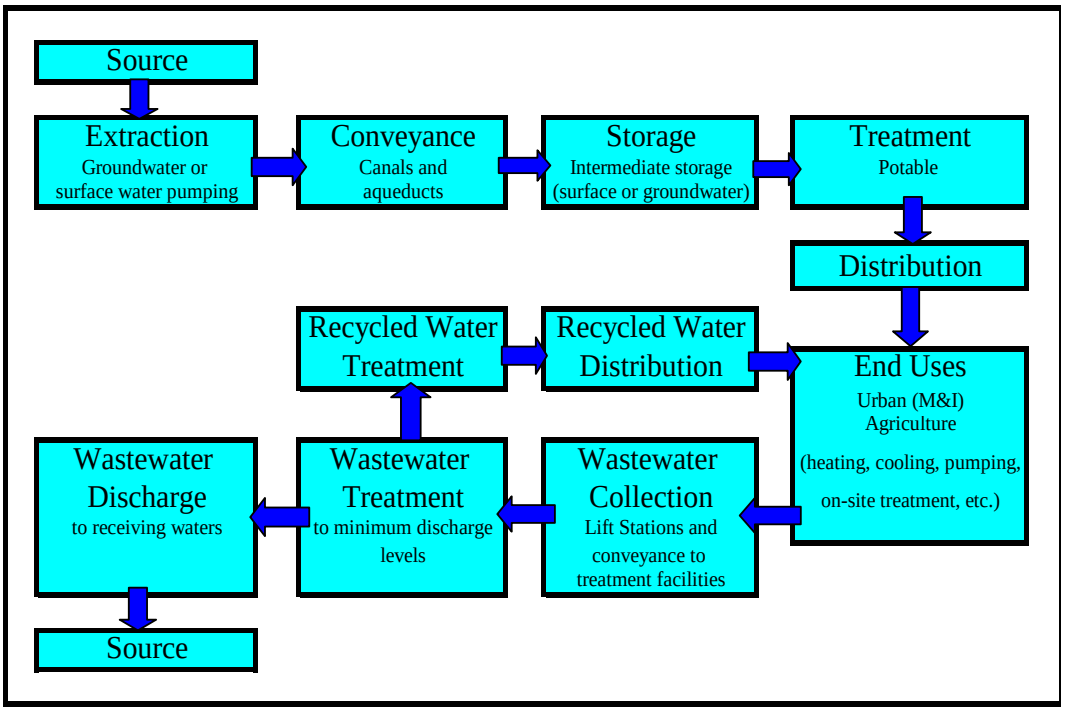
2. Treatment and distribution within service areas
Within local service areas, water is treated, pumped, and pressurized for distribution. Local conditions and sources determine both the treatment requirements and the energy required for pumping and pressurization.

3. On-site water pumping, treatment, and thermal inputs
Individual water users use energy to further treat water supplies (e.g. softeners, filters, etc.), circulate and pressurize water supplies (e.g. building circulation pumps), and heat and cool water for various purposes.

4. Wastewater collection, treatment, and discharge
Finally, wastewater is collected and treated by a wastewater authority (unless a septic system or other alternative is being used). Wastewater is often pumped to treatment facilities where gravity flow is not possible, and standard treatment processes require energy for pumping, aeration, and other processes. (In cases where water is reclaimed and re-used, the calculation of total energy intensity is adjusted to account for wastewater as a *source* of water supply. The energy intensity generally includes the additional energy for treatment processes beyond the level required for wastewater discharge, plus distribution.)

The simplified flow chart below illustrates the steps in the water system process. A spreadsheet computer model is available to allow cumulative calculations of the energy inputs embedded at each stage of the process. This methodology is consistent with that applied by the California Energy Commission in its analysis of the energy intensity of water.

Simplified Flow Diagram of Energy Inputs to Water Systems



Source: Robert Wilkinson, UCSB[8]

Calculating Energy Intensity

Total energy intensity, or the amount of energy required to facilitate the use of a given amount of water in a specific location, may be calculated by accounting for the summing the energy requirements for the following factors:

- imported supplies
- local supplies
- regional distribution
- treatment
- local distribution
- on-site thermal (heating or cooling)
- on-site pumping
- wastewater collection
- wastewater treatment

Water pumping, and specifically the long-distance transport of water in conveyance systems, is a major element of California's total demand for electricity as noted above. Water use (based on embedded energy) is the next largest consumer of electricity in a typical Southern California home after refrigerators and air conditioners. Electricity required to support water service in the typical home in Southern California is estimated at between 14% to 19% of total residential energy demand.[9] If air conditioning is not a factor the figure is even higher. Nearly three quarters of this energy demand is for pumping imported water.

Interbasin Transfers

Some of California's water systems are uniquely energy-intensive, relative to national averages, due to the pumping requirements of major conveyance systems which move large volumes of water long distances and over thousands of feet in elevation lift. Some of the interbasin transfer systems (systems that move water from one watershed to another) are net energy producers, such as the San Francisco and Los Angeles aqueducts. Others, such as the SWP and the CRA require large amounts of electrical energy to convey water. On *average*, approximately 3,000 kWh is necessary to pump one AF of SWP water to southern California,[10] and 2,000 kWh is required to pump one AF of water through the CRA to southern California.[11]

Total energy savings for reducing the full embedded energy of *marginal* (e.g. imported) supplies of water used indoors in Southern California is estimated at about 3,500 kWh/af.[12] Conveyance over long distances and over mountain ranges accounts for this high marginal energy intensity. In addition to avoiding the energy and other costs of pumping additional water supplies, there are environmental benefits through reduced extractions from stressed ecosystems such as the delta.

Imported Water:
The State Water Project and the Colorado River Aqueduct

Water diversion, conveyance, and storage systems developed in California in the 20th century are remarkable engineering accomplishments. These water works move millions of AF of water around the state annually. The state's 1,200-plus reservoirs have a total storage capacity of more than 42.7 million acre feet (maf).[13] West Basin receives imported water from Northern California through the State Water Project and Colorado River water via the Colorado River Aqueduct. The Metropolitan Water District of Southern California delivers both of these imported water supplies to the West Basin.

California's Major Interbasin Water Projects

The State Water Project

The State Water Project (SWP) is a state-owned system. It was built and is managed by the California Department of Water Resources (DWR). The SWP provides supplemental water for agricultural and urban uses.[14] SWP facilities include 28 dams and reservoirs, 22 pumping and generating plants, and nearly 660 miles of aqueducts.[15] Lake Oroville on the Feather River, the project's largest storage facility, has a total capacity of about 3.5 maf.[16] Oroville Dam is the tallest and one of the largest earth-fill dams in the United States.[17]

Water is pumped out of the delta for the SWP at two locations. In the northern Delta, Barker Slough Pumping Plant diverts water for delivery to Napa and Solano counties through the North Bay

Aqueduct.[18] Further south at the Clifton Court Forebay, water is pumped into Bethany Reservoir by the Banks Pumping Plant. From Bethany Reservoir, the majority of the water is conveyed south in the 444-mile-long Governor Edmund G. Brown California Aqueduct to agricultural users in the San Joaquin Valley and to urban users in Southern California. The South Bay Pumping Plant also lifts water from the Bethany Reservoir into the South Bay Aqueduct. [19]

The State Water Project is the largest consumer of electrical energy in the state, requiring an average of 5,000 GWh per year.[20] The energy required to operate the SWP is provided by a combination of DWR's own hydroelectric and other generation plants and power purchased from other utilities. The project's eight hydroelectric power plants, including three pumping-generating plants, and a coal-fired plant produce enough electricity in a normal year to supply about two-thirds of the project's necessary power.

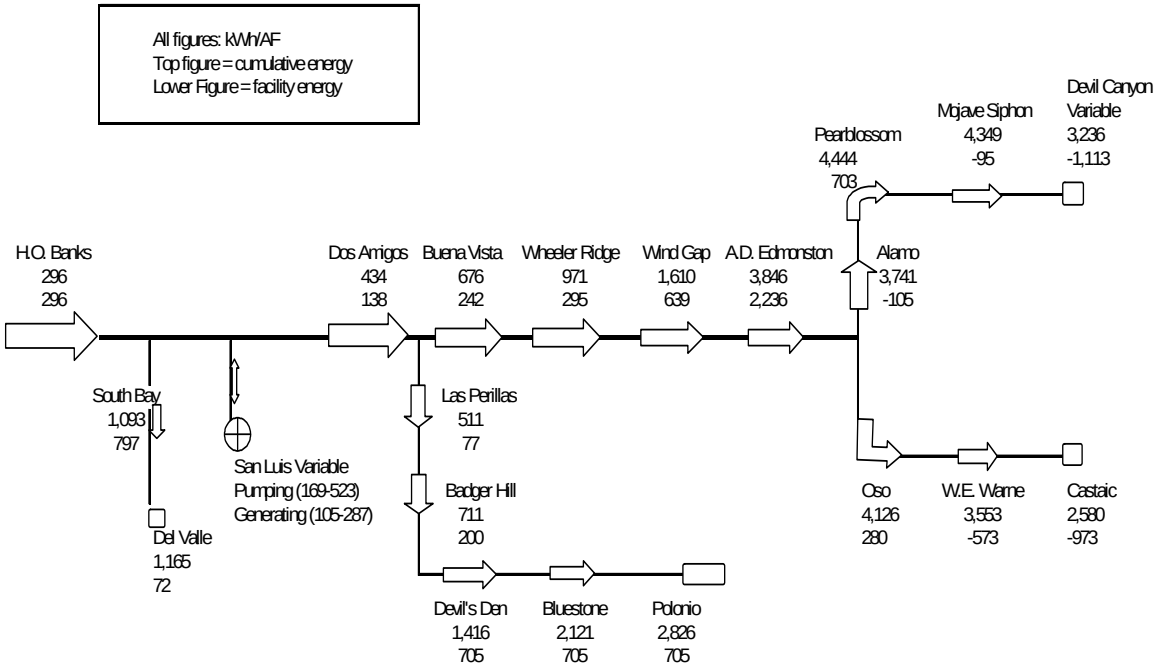
Energy requirements would be considerably higher if the SWP was delivering full contract volumes of water. The project delivered an average of approximately 2.0 mafy, or half its contracted volumes, throughout the 1980s and 1990s.[21] Since 2000 the volumes of imported water have generally increased.

The following map indicates the location of the pumping and power generation facilities on the SWP.

Names and Locations of Primary State Water Delivery Facilities

The following schematic shows each individual pumping unit on the State Water Project, along with data for both the individual and cumulative energy required to deliver an AF of water to that point in the system. Note that the figures include energy recovery in the system, but they do not account for losses due to evaporation and other factors. These losses may be in the range of 5% or more. While more study of this issue is in order, it is important to observe that the energy intensity numbers are conservative (e.g. low) in that they assume that all of the water originally pumped from the delta reaches the ends of the system without loss.

State Water Project
Kilowatt-Hours per Acre Foot Pumped
(Includes Transmission Losses)



Source: Wilkinson, based on data from: California Department of Water Resources, State Water Project Analysis Office, Division of Operations and Maintenance, *Bulletin 132-97*, 4/25/97.

The State Water Project

Final Delivery Reliability Report 2011

June 2012

State of California
Natural Resources Agency
Department of Water Resources

DEPARTMENT OF WATER RESOURCES
STATE OF CALIFORNIA





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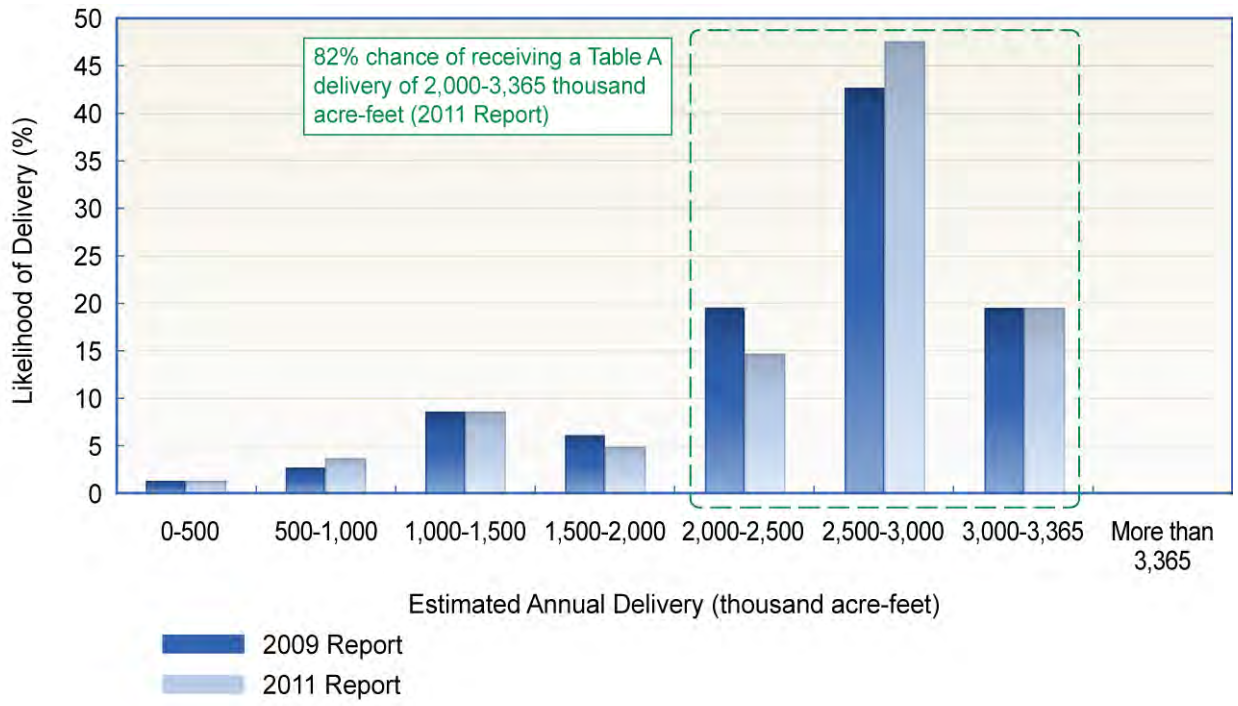


Figure 6-4. Estimated Likelihood of SWP Table A Water Deliveries (Existing Conditions)

Table 6-3. Estimated Average and Dry-Period Deliveries of SWP Table A Water (Existing Conditions), in Thousand Acre-Feet (Percent of Maximum SWP Table A Amount, 4,133 taf/year)

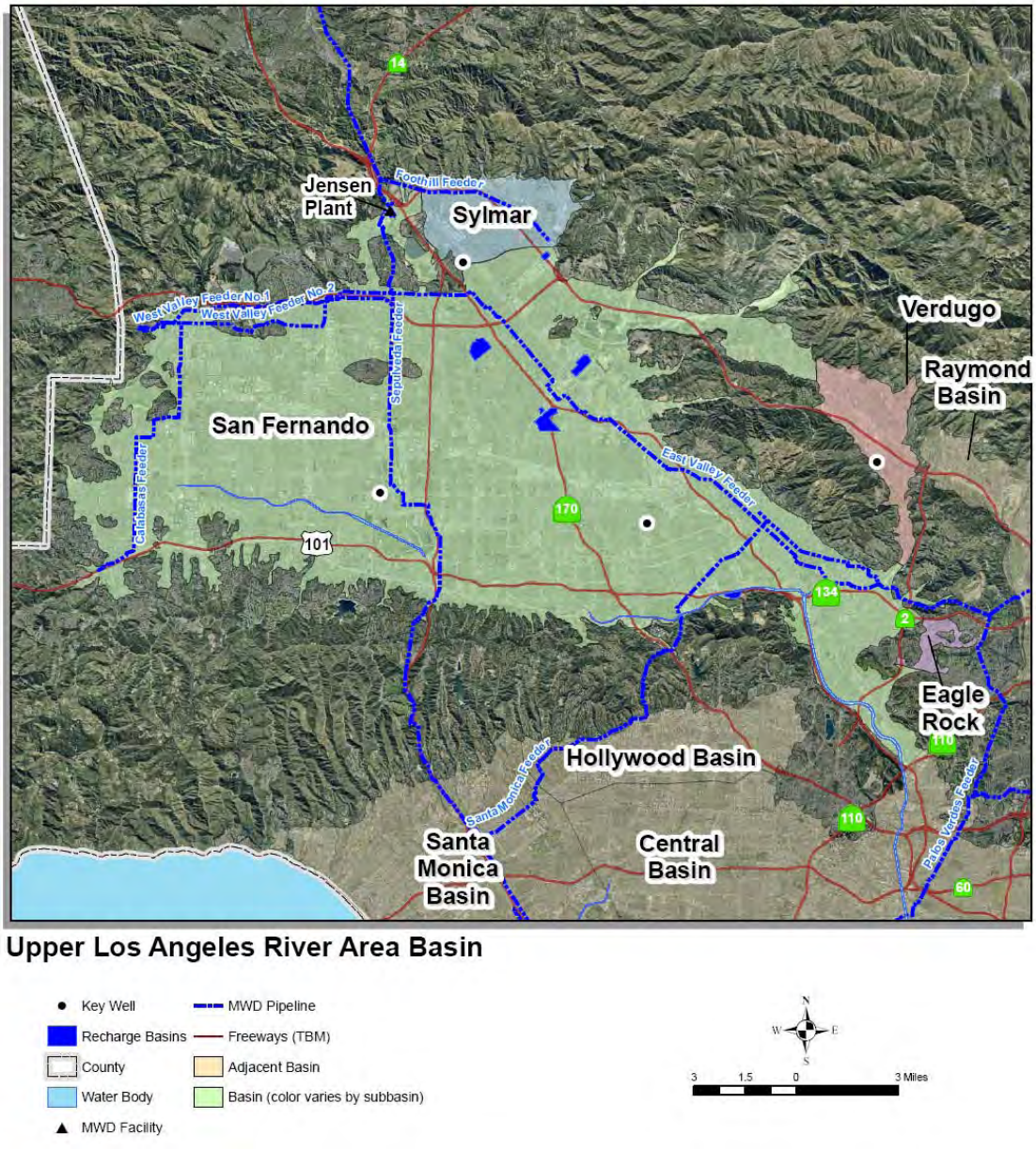
	Long-term Average	Single Dry Year (1977)	2-Year Drought (1976–1977)	4- Year Drought (1931–1934)	6-Year Drought (1987–1992)	6-Year Drought (1929–1934)
2009 Report	2,483 (60%)	302 (7%)	1,496 (36%)	1,402 (34%)	1,444 (35%)	1,398 (34%)
2011 Report	2,524 (61%)	380 (9%)	1,573 (38%)	1,454 (35%)	1,462 (35%)	1,433 (35%)

Table 6-4. Estimated Average and Wet-Period Deliveries of SWP Table A Water (Existing Conditions), in Thousand Acre-Feet (Percent of Maximum SWP Table A Amount, 4,133 taf/year)

	Long-term Average	Single Wet Year (1983)	2-Year Wet (1982–1983)	4-Year Wet (1980–1983)	6-Year Wet (1978–1983)	10-Year Wet (1978–1987)
2009 Report	2,483 (60%)	2,813 (68%)	2,935 (71%)	2,817 (68%)	2,817 (68%)	2,872 (67%)
2011 Report	2,524 (61%)	2,886 (70%)	2,958 (72%)	2,872 (69%)	2,873 (70%)	2,833 (69%)

The Upper Los Angeles River Area (ULARA) Basins are located within Los Angeles River Watershed in Los Angeles County. The ULARA Basins include the San Fernando, Sylmar, Verdugo and Eagle Rock Basins and underlie the Metropolitan member agencies of the cities of Los Angeles, San Fernando, Burbank, and Glendale and Foothill Municipal Water District (Foothill MWD). A map of the basins with the ULARA is provided in **Figure 2-1**.

Figure 2-1
Map of the ULARA Basins



about 300 to 400 AF of underflow passes into the Raymond Basin from the Verdugo Basin (DWR, 2004 and Geomatrix, 2005). These flows are accounted for in each basin's adjudication so there are no separate agreements regarding these flows.

WATER SUPPLY FACILITIES AND OPERATIONS

The following section describes the existing water supply facilities in the ULARA Basins. These include 146 groundwater production wells and 314 acres of recharge ponds for groundwater recharge.

Active Production Wells

There are 146 active production wells within the ULARA Basins. A total of 77,995 AF were pumped from the ULARA groundwater basins during the 2004/05 water year. Approximately 94 percent or 73,500 AF of the total volume was pumped from municipal production with the remaining production from private wells. A summary of production from these wells is provided in **Table 2-3**. Historical production is also summarized on **Figure 2-4**.

Table 2-3
Summary of Production Wells in the ULARA Basins

Basin	Number of Wells	Estimated Production Capacity (AFY) [1]	Average Production 1985-2004 (AFY)	Well Operation Cost [2] ($/AF)
San Fernando	122	220,000	88,370	$24 to $165 Average $63 (2004)
Sylmar	6	8,700	5,770	
Verdugo	17	7,400	5,090	Data not available
Eagle Rock	3	230	224	Data not available
Total	**146**	**236,330**	**99,454**	--

Source: Watermaster, 2006a and 2006b; LA, 2006c
1. Based on maximum annual basin production over the past 5 years for Eagle Rock Basin; Other Basins Watermaster, 2006c, LA, 2006c based upon 10 month per year operation.
2. LA, 2006a

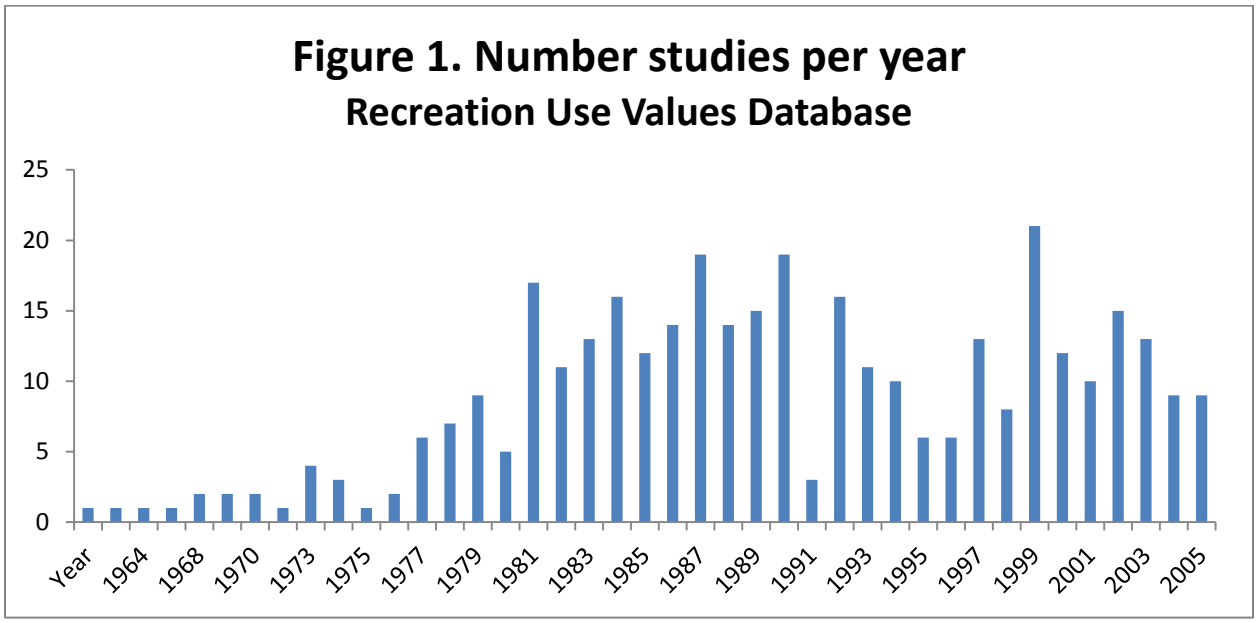
RECREATION USE VALUES DATABASE

Welcome to the Recreation Use Values Database for North America. What you will find here are links to the database, bibliography, and background information. If you have questions, comments and/or suggestions about the database, would like assistance in using this database for benefit transfer, or would like to submit documentation on North American studies not currently in the database, please contact Dr. Randall Rosenberger (R.Rosenberger@oregonstate.edu). We also are interested in how you apply benefit transfer for recreation valuation, so please submit documentation about your applications.

The database currently contains 352 documents of economic valuation studies that estimated the use value of recreation activities in the U.S. and Canada from 1958 to 2006, totaling 2,703 estimates in per person per activity day, adjusted to 2010 USD. Twenty-one primary activity types are provided, with several more available if segregated by activity mode, resource type, primary species sought, or little studied activities (i.e., 'other recreation' has an additional 22 activities identified). These recreation use value estimates are measures of net willingness-to-pay or consumer surplus for recreational access to specific sites, or for certain activities at broader geographic scales (e.g., state or province, national) in per person per activity day units—this database does not contain information on marginal values for changes in site quality or condition. The database is currently offered as an Excel workbook containing the database and coding protocols. It is currently sorted by primary activity by region—of course, you may download and sort it however you wish. The bibliography cross-references the database via the document code.

An overview of the database is provided below, including distributions of estimates and studies, and mean values by activity type by region.

Figures 1 and 2 display the distribution of the number of studies and number of estimates per year, respectively. The spikes in the number of estimates correspond with the estimates provided from U.S. Fish and Wildlife's National Surveys on fishing, hunting and wildlife viewing.



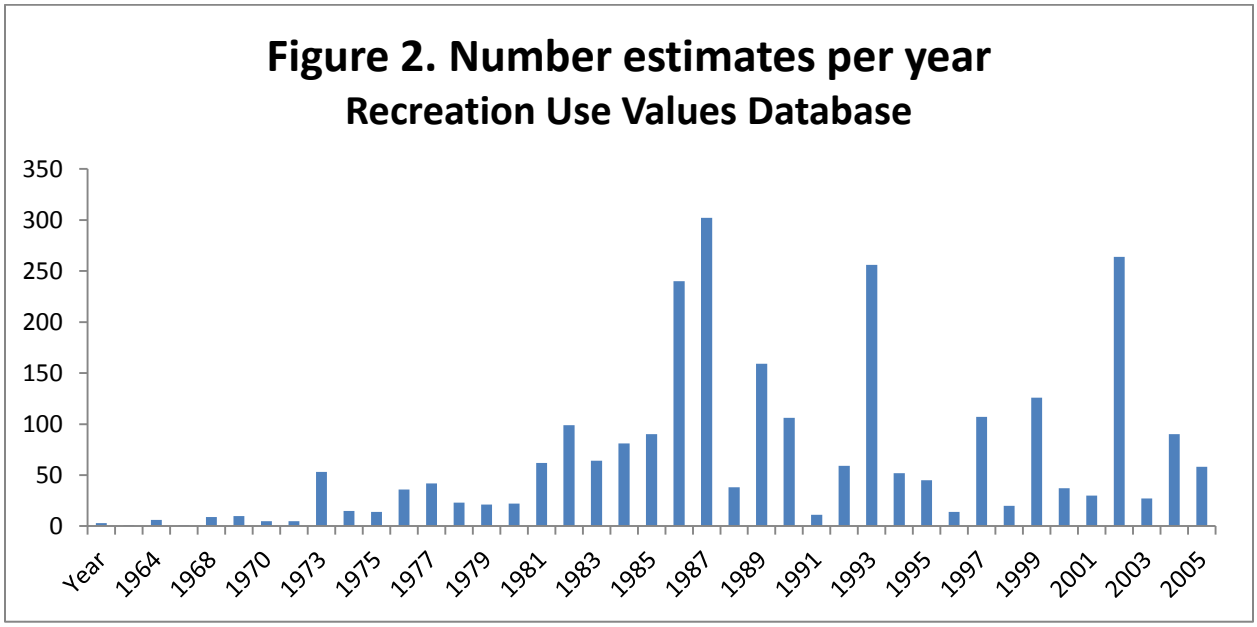


Figure 3 segregates the number of estimates by primary activity type. The spikes in number of estimates for freshwater fishing, big game hunting, and wildlife viewing coincide with the U.S. Fish and Wildlife's National Survey.

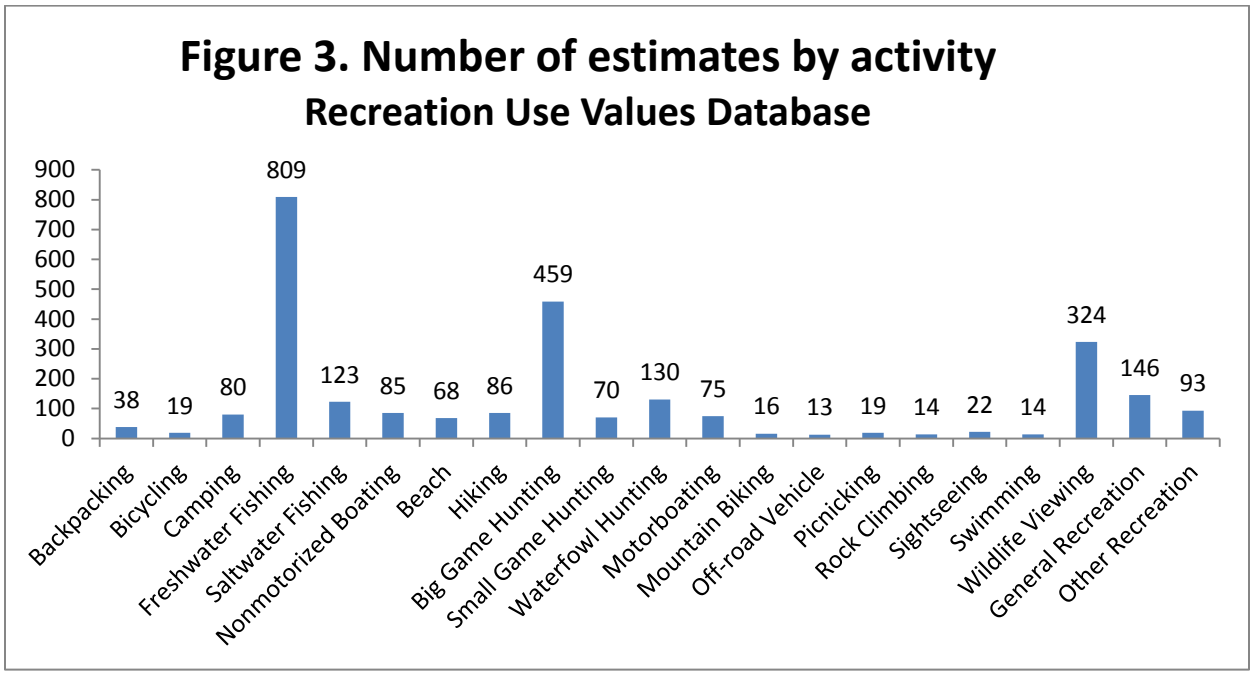


Figure 4 shows the distribution of consumer surplus estimates ($CS per person per activity day in 2010 USD) (mean = $59.60 per person per day; se = 1.3; n = 2703).

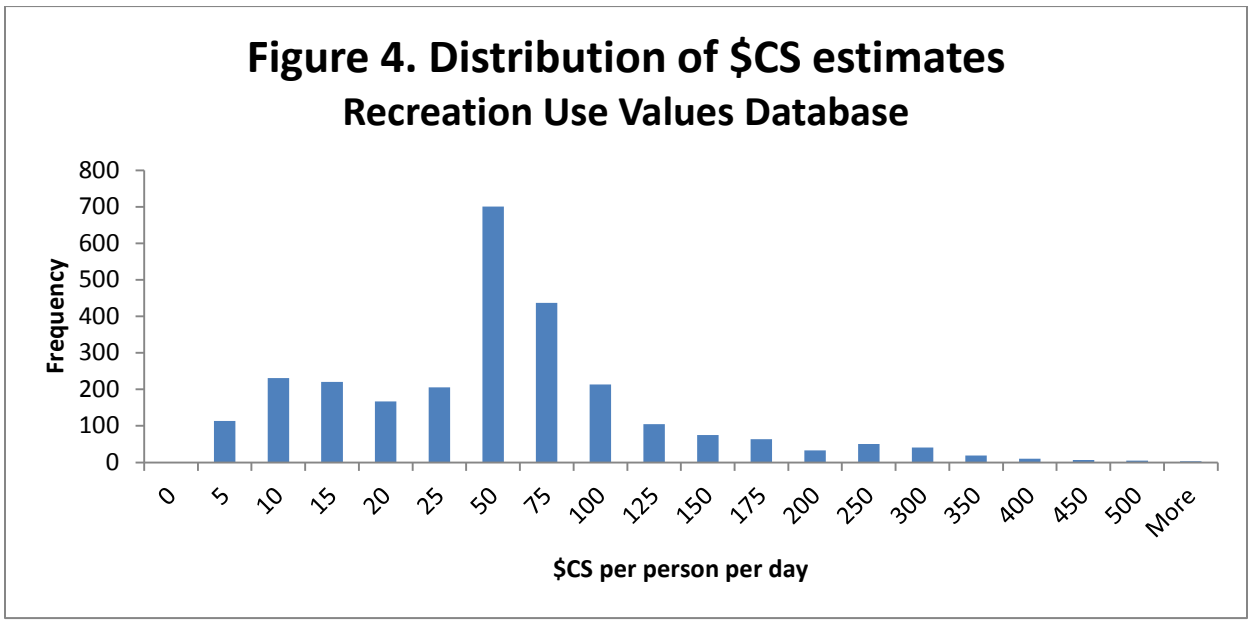


Figure 5 shows the mean consumer surplus ($CS) per person per day by primary activity type (aggregate mean = $59.60 per person per day, 2010 USD). The high mean value for mountain biking may be due to limited research on high profile mountain biking sites, along with the largest standard error among activity types reported (see Table 1). Saltwater fishing and nonmotorized boating have higher mean estimates than other activities; although with relatively larger standard errors (see Table 1). Backpacking and camping have lower mean estimates per person per day, but are similar when aggregated up to multiple day trips typical of overnight recreation activities.

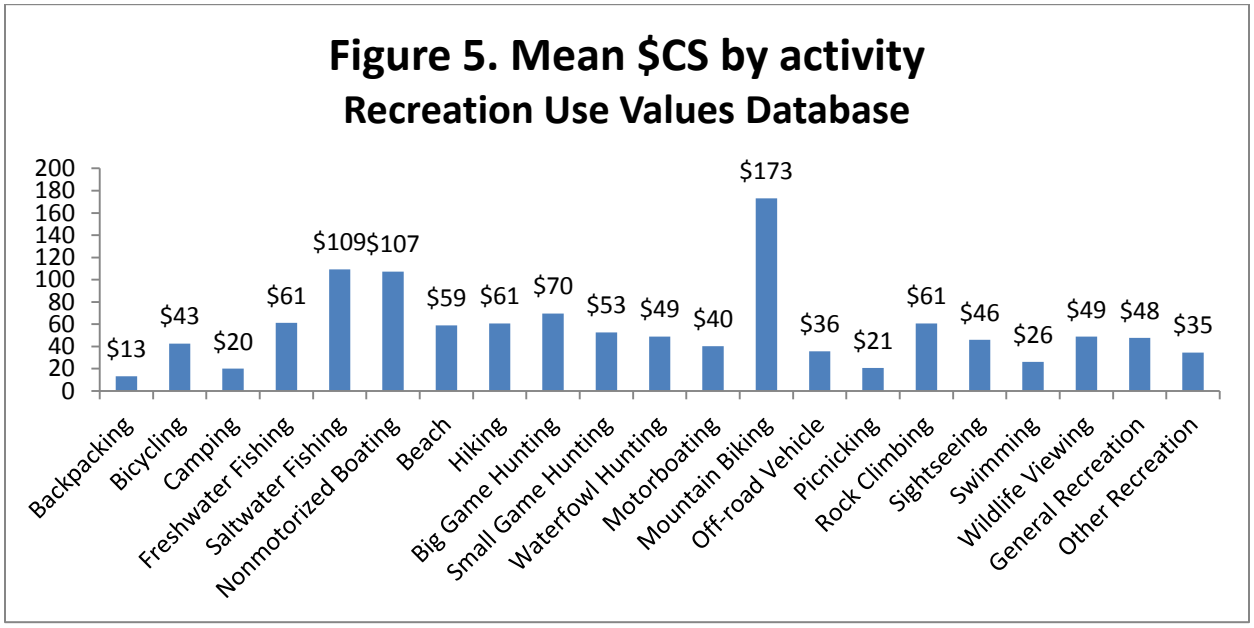


Table 1 reports mean consumer surplus ($CS) per person per day by primary activity type and region. Reported are the number of estimates, mean $CS, and standard error by cell. The bottom row aggregates by region whereas the last column aggregates by activity type. The overall aggregation for the database is reported in the lower right cell.

We hope you find this database useful in your work on recreation valuation in North America.

Sincerely,

Randall S. Rosenberger
Department of Forest Ecosystems & Society
Oregon State University
15 August, 2011

TABLE 1. Recreation Use Values per Person per Day by Activity and Region, in 2010 USD[a].

Activity	Northeastern U.S.[b]			Midwestern U.S.[b]			Southern U.S.[b]			Western U.S.[b]			Multiple Regions, U.S.[b]			Canada			Total		
	n	Mean	se[c]	n	Mean	se	n	Mean	se	n	Mean	se	n	Mean	se	n	Mean	se	n	Mean	se
Backpacking	31	$8.07	0.5	---	---	---	4	$31.70	9.1	2	$39.85	15.1	1	$49.67	---	---	---	---	**38**	**13.33**	**2.2**
Bicycling	---	---	---	6	$36.64	5.5	12	47.12	8.4	---	---	---	1	25.53	---	---	---	---	**19**	**42.67**	**5.6**
Camping	7	25.17	8.7	3	9.85	3.6	10	10.19	1.5	58	21.68	3.0	2	16.69	0.9	---	---	---	**80**	**19.98**	**2.4**
Freshwater Fishing[d]	126	61.59	3.8	188	39.30	4.0	152	54.07	4.0	302	81.81	4.4	20	55.10	10.2	21	$16.36	5.1	**809**	**61.21**	**2.2**
Saltwater Fishing[d]	19	62.75	13.0	---	---	---	54	106.63	16.7	40	143.46	18.4	10	76.62	26.0	---	---	---	**123**	**109.39**	**10.2**
Nonmotorized Boating[e]	4	39.55	3.4	4	18.09	7.1	26	134.84	26.0	45	112.12	18.0	3	41.08	8.6	3	73.42	0.5	**85**	**107.36**	**12.8**
Beach	12	52.22	13.8	10	13.08	4.4	26	80.66	15.0	20	57.81	15.7	---	---	---	---	---	---	**68**	**58.98**	**8.1**
Hiking	2	66.25	51.2	2	33.26	27.2	11	100.35	37.0	70	55.54	7.5	1	23.63	---	---	---	---	**86**	**60.63**	**7.9**
Big Game Hunting[f]	57	73.11	7.4	90	55.81	3.5	77	66.47	5.2	171	78.91	5.0	7	184.98	42.3	57	50.70	8.4	**459**	**69.69**	**2.8**
Small Game Hunting[f]	9	31.09	10.5	3	48.71	27.2	1	179.39	---	34	72.94	14.8	6	74.08	11.1	17	8.58	0.9	**70**	**52.51**	**8.3**
Waterfowl Hunting[f]	17	39.45	6.0	26	31.76	3.3	30	60.95	8.8	31	58.10	10.4	7	131.20	6.6	19	16.33	0.8	**130**	**48.88**	**4.0**
Motorized Boating	7	95.20	19.5	32	30.84	6.3	15	24.3	4.6	20	48.55	20.3	1	31.32	---	---	---	---	**75**	**40.27**	**6.7**
Mountain Biking	---	---	---	---	---	---	1	57.05	---	15	180.67	36.2	---	---	---	---	---	---	**16**	**172.95**	**34.7**
Off-road Vehicle	---	---	---	---	---	---	6	30.39	6.0	6	42.02	5.7	1	28.91	---	---	---	---	**13**	**35.64**	**4.0**
Picnicking	5	5.79	0.9	1	10.86	---	4	44.55	12.6	8	19.06	1.9	1	22.74	---	---	---	---	**19**	**20.70**	**4.1**
Rock Climbing	1	60.36	---	---	---	---	3	177.70	33.8	6	34.63	4.0	4	11.50	0.8	---	---	---	**14**	**60.52**	**18.5**
Sightseeing	---	---	---	2	30.88	9.3	6	61.94	27.6	12	44.28	11.9	2	22.92	4.4	---	---	---	**22**	**45.94**	**9.8**
Swimming	2	30.16	17.9	1	20.09	---	2	13.75	3.4	8	28.88	7.2	1	28.45	---	---	---	---	**14**	**26.24**	**4.7**

Activity	Northeastern U.S.[b]			Midwestern U.S.[b]			Southern U.S.[b]			Western U.S.[b]			Multiple Regions, U.S.[b]			Canada			Total		
	n	Mean	se[c]	n	Mean	se	n	Mean	se	n	Mean	se	n	Mean	se	n	Mean	se	n	Mean	se
Wildlife Viewing[g]	47	54.12	6.4	50	39.06	2.6	80	55.26	6.4	91	63.99	6.3	14	38.30	8.1	42	12.15	2.4	**324**	**48.72**	**2.8**
General Recreation[h]	---	---	---	14	154.26	25.7	36	56.96	12.6	83	31.97	4.2	---	---	---	13	8.05	0.5	**146**	**47.73**	**5.5**
Other Recreation[i]	4	34.62	10.8	4	25.85	5.0	8	59.73	19.2	64	33.25	6.5	13	27.82	4.3	---	---	---	**93**	**34.51**	**4.9**
Total	**350**	**54.04**	**2.5**	**436**	**44.03**	**2.4**	**564**	**66.08**	**3.1**	**1086**	**69.34**	**2.3**	**95**	**61.92**	**6.6**	**172**	**26.30**	**3.2**	**2703**	**59.60**	**1.3**

[a]Use value estimates are standardized to per person per day and adjusted to 2010 USD using U.S. consumer price index; Canadian estimates are adjusted to U.S. dollars using the current exchange rate at time of study. Use estimates measure access value and not marginal changes in site quality or condition. Estimates >$500 per person per day or identified as bad estimates by the authors of primary studies were removed from the database.

[b]Regions are defined as U.S. Census regions. Multiple regions or U.S. are studies with scope of multiple Census regions or national.

[c]Standard errors may be used to calculate 95% confidence intervals about the mean values as approximately: mean +/- 2* se.

[d]Freshwater and saltwater fishing values are not distinguished by resource type or primary species. See the database and study documents for more details regarding freshwater and saltwater fishing studies and values. See the database and study documents for more details regarding nonmotorized boating.

[e]Nonmotorized boating includes whitewater rafting/kayaking, canoeing, and rowing.

[f]Hunting values are not distinguished by resource type or primary species. See the database and study documents for more details regarding hunting values.

[g]Wildlife viewing values are not distinguished by resource type or primary species. See the database and study documents for more details regarding wildlife viewing values.

[h]General recreation is defined as primary studies that do not identify a primary activity.

[i]Other recreation is defined as activities with few primary studies, including cross-country skiing, downhill skiing, snowmobiling, snowboarding, shellfishing, jet skiing, scuba diving, snorkeling, water skiing, windsurfing, family gathering, horseback riding, jogging/running, walking, nature study, photography, gathering forest products, visiting nature centers, visiting arboretums, visiting historic sites, visiting prehistoric sites, and visiting aquariums. See the database and study documents for more details regarding other recreation values.

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SCA
ENVIRONMENTAL, INC.

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■ 5777 West Century Blvd., Suite 1055
Los Angeles, CA 90045
Tel: (310) 258-0460 **FAX: (415) 962-0736**

To	**Ms. Leslie Chan, Project Manager** Mountains Recreation & Conservation Authority (MRCA) Los Angeles River Center & Gardens 570 West Avenue 26, Suite 100 Los Angeles, CA 90065
FAX	**N/A**
cc:	
From	Mark Osborn
Date	~~September 30, 2010~~ Revised 12/08/10
RE	**SCA Hazardous Materials Specifications – Gleneden Property**
Proj. #	L-9985

Dear Ms Chan:

Attached are SCA's specifications documents for the MRCA's Gleneden property, ~~dated 9/30/10~~ revised 12/08/10. Included are the following sections:

1. **Section 00235 - Existing Conditions: Hazardous Materials**, which summarizes the survey document and identifies the hazardous materials in the buildings on the site;

2. **Section 01110 - Hazardous Materials Procedures**, which describes the requirements and procedures for impacting hazardous materials in the buildings. This document is for non-abatement personnel, such as renovators, electricians, plumbers, etc.;

3. **Section 02090 - Hazardous Materials Abatement**. This section is for the abatement/demolition contractor, and identifies requirements and procedures for the hazardous materials abatement to be performed in conjunction with the demolition of the Warehouse and the renovation of the "Factory."

4. **Section 01010 - Abatement Work Plan: Summary of Work**. This is a project and site-specific work plan for the abatement and demolition work at the Gleneden property, and also includes abatement diagrams.

Please feel free to contact me at (310) 258-0460, if you have any questions regarding these documents or you can e-mail me at mosborn@sca-enviro.com. Thank you very much.

Sincerely,
SCA ENVIRONMENTAL, INC.

Mark Osborn

Mark Osborn, AIA, CAC, CHMM
Project Consultant

☐ FAX ___ PGS TOTAL (Includes Cover Sheet) ☐ FAX WILL BE FOLLOWED BY HARD COPY

■ HARDCOPY ☐ HAND-CARRIED ☐OVERNIGHT ☐ 2ND DAY ☐ UPS GROUND ■ US MAIL

DOCUMENT 00235

EXISTING CONDITIONS: HAZARDOUS MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

A. This Document describes Reference Documents covering investigations of existing hazardous materials, including data identified in a survey report prepared for the Mountains Recreation and Conservation Authority (MRCA), and the use of data resulting from various investigations.

1.2 HAZARDOUS MATERIALS REPORT(S)

A. The Bidder's attention is directed to the fact that a survey report was prepared for the site by the MRCA's Environmental Consultant: SCA Environmental, Inc., entitled "Summary Report: Pre-Demolition Bulk Asbestos and Lead-Based Paint Survey – Mountains Recreation and Conservation Authority – Gleneden Property," revised December 2010, which was utilized by the MRCA and its Consultants in preparing the Contract Documents.

B. Copies of the above referenced report(s) may be obtained from the MRCA at the Los Angeles River Center and Gardens, 570 West Avenue 26, Suite 100, Los Angeles, CA 90065.

1.3 HAZARDOUS MATERIALS REPORT(S) - SUMMARY INFORMATION

A. Asbestos Hazards: Certain existing building components or materials that may be impacted by the Work of this Project are known or presumed to contain asbestos.

1. The following materials were tested and found to contain asbestos at concentrations greater than one percent (>1%):

"Factory" Building:

a. Black roof penetration mastic.

b. Silver/gray roof penetration mastic.

c. Gray HVAC duct tape (canvas type) and resilient compound on the roof.

d. Black mastic on HVAC duct joints and seams on the roof.

e. Black, tarry wrap and coating on 1" and 2" pipes on the roof.

f. Sliver textured coating (paint) on round HVAC ducts on the roof.

g. White, painted HVAC duct seam tape on the round sheet metal duct in the Heater Closet (Women's Restroom).

h. Sprayed-on acoustical ceiling plaster (with plaster substrate), where present throughout (primarily above laid-in ceiling tiles).

i. Black "hockey puck" mirror mastic on an interior wall in the Men's Restroom (mirror not present).

j. 9" x 9" black vinyl floor tiles with tan streaks, and associated black mastic throughout (concealed beneath carpeting).

k. Black mastic, associated with white leveling compound and residual yellow glue (where floor tiles are missing in the Office/Storage area).

l. Residual brown wall mastic observed in a Storage Room, Sewing Room and Men's Restroom, and potentially concealed elsewhere (throughout), including behind wood wall paneling and cork walls.

<u>"Panama Moving and Storage" Warehouse</u>

a. Roof penetration mastic associated with the restroom vent.

2. The following materials were not tested, but the Contractor, for purposes of this Contract, shall assume that these materials contain asbestos at greater than one tenth of one percent (>0.1%), and manage these materials as asbestos-containing:

a. Concealed wall mastic (assumed present behind wood and cork wall panels) in the Factory Building.

3. The following materials were tested and found to contain "trace amounts" (greater than 0.1 percent [>0.1%]) of asbestos:

a. None identified.

4. The following suspect asbestos-containing materials were tested and found not to contain asbestos:

a. Gypsum wallboard and associated joint compound, where present both in the Warehouse and in the "Factory."

b. Grout associated with ceramic wall and floor tiles in the restrooms of the Warehouse, and the restrooms and kitchen of the "Factory."

c. Composite rolled roofing, tar and felt on the main roof field of the "Factory."

d. Gray mastic on joints and seams of the HVAC units on the roof of the "Factory." (This material, however, is associated with ACM silver coating/paint, typically.)

e. Exterior stucco on the "Factory," painted red.

f. White interior and exterior window putty in the "Factory."

g. Smooth wall and ceiling plaster and associated "button board" substrate in the restrooms and kitchen of the "Factory."

h. 12" x 12" nailed-on ceiling tiles, with straight hole pattern (above non-ACM laid-in ceiling tiles) in the "Factory."

i. 2' x 4' laid-in ceiling tiles, with pinholes and fissures, where present throughout the "Factory."

j. 2' x 2' laid-in ceiling tiles, with deep fissures, where present throughout the "Factory."

k. Yellow textured mastic on interior HVAC seams (observed in the Sewing Room) in the "Factory."

l. Clear baseboard mastic associated with non-suspect vinyl cove base throughout the "Factory."

B. Lead Hazards: Certain existing painted or coated surfaces to be impacted by the Work of this Project are known or suspected to contain lead.

1. The following paints, coatings, or materials were tested and found to contain lead at concentrations at or above the U.S. Department of Housing and Urban Development (HUD) definition of a lead-containing material (either $\geq$1.0 mg/cm^2 or $\geq$0.5 percent ($\geq$0.5%) lead by weight):

a. Chipped red paint on an exterior steel bollard adjacent to the Warehouse.

b. Intact red paint on metal HVAC equipment housings and ductwork on the roof of the "Factory" building.

c. Severely chipped and peeling red paint on the exterior wood window frames and roof fascia of the "Factory."

d. Chipped and peeling brown paint on the wood support column of the overhang of the "Factory."

e. Intact brown paint on the exterior fiberglass awning of the "Factory."

2. The following materials were not tested but, the Contractor, for the purposes of this Contract, assume, and manage, them as lead containing.

a) Plumbing components, such as pipes, fittings and solders.

b) Roof flashings.

c) Mastics and adhesives.

d) Ceramic materials.

e) Porcelain fixtures.

3. The following materials were tested and the concentrations of lead were found to be below the HUD definition of lead a containing material (<1.0 mg/cm^2 or <0.5 percent lead by weight). For OSHA compliance, therefore, the Contractor shall assume that, at a minimum, some lead is "present" in all these materials and that they have the potential, until proven otherwise, to create a lead hazard.

   a. Intact red paint/primer on wide flange steel beams of the Warehouse.

   b. Intact yellow paint on exterior door frames of the Warehouse.

   c. Chipped red paint on the steel angle "ramp guards" on the edge of the concrete loading dock of the Warehouse.

   d. Intact green paint on the steel roll-up doors of the Warehouse.

   e. Chipped and peeling gray paint on the exterior steel guardrail of the Warehouse.

   f. Chipped gray paint on the exterior window frames of the Warehouse.

   g. Peeling silver paint on the metal HVAC ducts on the roof of the "Factory."

   h. Chipped and peeling red paint on the exterior stucco walls of the "Factory."

   i. Intact red paint on the exterior metal door frames of the "Factory."

   j. Intact red paint on the exterior metal security bars of the "Factory."

   k. Intact purple paint on an exterior metal door of the "Factory."

   l. Severely peeling white paint on the plaster ceiling in the Women's Restroom of the "Factory."

   m. Severely chipped and peeling red paint on the metal roof flashing of the "Factory."

4. The MRCA has not verified that any paints, coatings, dusts, or materials are "lead free," or below 90 ppm.

C. PCB-containing Fluorescent Light Ballasts:

1. Approximately 50 light ballasts, which are assumed to contain PCBs, were observed in the Warehouse and "Factory" buildings.

D. Mercury, Cadmium, and/or Sodium-Containing Fluorescent Light Tubes/Bulbs, Thermostats and Controls:

1. Approximately 100 light tubes, which are assumed to contain mercury, were observed in the Warehouse and "Factory" buildings.

2. One (1) mercury-containing thermostat was observed in the "Factory" building.

3. Six (6) exterior halogen lights and nine (9) interior mercury vapor lights were observed on the site.

E. Sewage, Sludge, and Bacterial Hazards Associated From Untreated Sewage:

1. Not observed.

F. Bio-Hazards:

1. Extensive water infiltration and substrate damage was observed in the "Factory" building, indicative of potential mold growth.

1.4 USE OF DATA

A. Environmental consultation was obtained only for the use of the MRCA and its Consultants for planning and design stages of this Project. The above mentioned report(s) are not, as a whole, part of the Contract Documents, but the survey data contained therein can be relied upon by the Contractor to characterize general site conditions, although quantities, friability and other factors may have changed or been altered since the published report date(s).

B. All statements, findings, and interpretations in the above-mentioned reports are those of the Environmental Consultant. The MRCA makes no representations, either expressed or implied, as to the completeness or adequacy of the above-mentioned reports. Bidders are advised that the limited testing of components allow for generalizations in describing the extent of hazardous materials. Specific components or materials, should be checked against the referenced survey report(s) and the Contract Documents, or be tested at affected locations, prior to disturbance of such components.

C. Bidders shall visit the site and acquaint themselves with the existing conditions.

1.5 PRE-BID VISIT TO WORK SITE

A. Prior to bidding, Bidders may make their own investigations to satisfy themselves as to the Site and subsurface conditions, but such investigations shall be performed only under the provisions set by the MRCA during the Bid Walk Phase.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF DOCUMENT

DOCUMENT 00235

EXISTING CONDITIONS: HAZARDOUS MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

A. This Document describes Reference Documents covering investigations of existing hazardous materials, including data identified in a survey report prepared for the Mountains Recreation and Conservation Authority (MRCA), and the use of data resulting from various investigations.

1.2 HAZARDOUS MATERIALS REPORT(S)

A. The Bidder's attention is directed to the fact that a survey report was prepared for the site by the MRCA's Environmental Consultant: SCA Environmental, Inc., entitled "Summary Report: Bulk Asbestos and Lead-Based Paint Survey – Mountains Recreation and Conservation Authority – Gleneden Property," dated September 2010, which was utilized by the MRCA and its Consultants in preparing the Contract Documents.

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j) 9" x 9" black vinyl floor tiles with tan streaks, and associated black mastic throughout (concealed beneath carpeting).

k) Black mastic, associated with white leveling compound and residual yellow glue (where floor tiles are missing in the Office/Storage area).

l) Residual brown wall mastic observed in a Storage Room , Sewing Room and Men's Restroom, and potentially concealed elsewhere (throughout), including behind wood wall paneling and cork walls.

"Panama Moving and

m) Concealed wall mastic (assumed present behind wood & cork wall panels) where present throughout

m) Roof penetrat om vent (<3 square feet).

2. The following material , for purposes of this Contract, shall assume that these r than one tenth of one percent (>0.1%), and manage t g:

a) None identifie

3. The following materials were tested and found to contain "trace amounts" (greater than 0.1 percent [>0.1%]) of asbestos:

a) None identified.

4. The following suspect asbestos-containing materials were tested and found not to contain asbestos:

a) Gypsum wallboard and associated joint compound, where present both in the Warehouse and in the "Factory."

b) Grout associated with ceramic wall and floor tiles in the restrooms of the Warehouse, and the restrooms and kitchen of the "Factory."

c) Composite rolled roofing, tar and felt on the main roof field of the "Factory."

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i) 2' x 4' laid-in ceiling tiles, with pinholes and fissures, where present throughout the "Factory."

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k) Yellow textured mastic on interior HVAC seams (observed in the Sewing Room) in the "Factory."

l) Clear baseboard mastic associated with non-suspect vinyl cove base throughout the "Factory."

B. Lead Hazards: Certain existing painted or coated surfaces to be impacted by the Work of this Project are known or suspected to contain lead.

1. The following paints, coatings, or materials were tested and found to contain lead at concentrations at or above the U.S. Department of Housing and Urban Development (HUD) definition of a lead-containing material (either $\geq$1.0 mg/cm^2 or $\geq$0.5 percent ($\geq$0.5%) lead by weight):

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b. Intact red paint on metal HVAC equipment housings and ductwork on the roof of the "Factory" building.

c. Severely chipped and peeling red paint on the exterior wood window frames and roof fascia of the "Factory."

d. Chipped and peeling brown paint on the wood support column of the overhang of the "Factory."

e. Intact brown paint on the exterior fiberglass awning of the "Factory."

2. The following materials were not tested but, the Contractor, for the purposes of this Contract, assume, and manage, them as lead containing.

a) Plumbing components, such as pipes, fittings and solders.

b) Roof flashings.

c) Mastics and adhesives.

d) Ceramic materials.

e) Porcelain fixtures.

3. The following materials were tested and the concentrations of lead were found to be below the HUD definition of lead a containing material (<1.0 mg/cm^2 or <0.5 percent lead by weight). For OSHA compliance, therefore, the Contractor shall assume that, at a minimum, some lead is "present" in all these materials and that they have the potential, until proven otherwise, to create a lead hazard.

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   l) Severely peeling white paint on the plaster ceiling in the Women's Restroom of the "Factory."

   m) Severely chipped and peeling red paint on the metal roof flashing of the "Factory."

4. The MRCA has not verified that any paints, coatings, dusts, or materials are "lead free," or below 90 ppm.

C. PCB-containing Fluorescent Light Ballasts:

1. Approximately 50 light ballasts, which are assumed to contain PCBs, were observed in the Warehouse and "Factory" buildings.

D. Mercury, Cadmium, and/or Sodium-Containing Fluorescent Light Tubes/Bulbs, Thermostats and Controls:

1. Approximately 100 light tubes, which are assumed to contain mercury, were observed in the Warehouse and "Factory" buildings.

2. One (1) mercury-containing thermostat was observed in the "Factory" building.

3. Six (6) exterior halogen lights and nine (9) interior mercury vapor lights were observed on the site.

E. Sewage, Sludge, and Bacterial Hazards Associated From Untreated Sewage:

1. Not observed.

F. Bio-Hazards:

1. Extensive water infiltration and substrate damage was observed in the "Factory" building, indicative of potential mold growth.

1.4 USE OF DATA

A. Environmental consultation was obtained only for the use of the MRCA and its Consultants for planning and design stages of this Project. The above mentioned report(s) are not, as a whole, part of the Contract Documents, but the survey data contained therein can be relied upon by the Contractor to characterize general site conditions, although quantities, friability and other factors may have changed or been altered since the published report date(s).

B. All statements, findings, and interpretations in the above-mentioned reports are those of the Environmental Consultant. The MRCA makes no representations, either expressed or implied, as to the completeness or adequacy of the above-mentioned reports. Bidders are advised that the limited testing of components allow for generalizations in describing the extent of hazardous materials. Specific components or materials, should be checked against the referenced survey report(s) and the Contract Documents, or be tested at affected locations, prior to disturbance of such components.

C. Bidders shall visit the site and acquaint themselves with the existing conditions.

1.5 PRE-BID VISIT TO WORK SITE

A. Prior to bidding, Bidders may make their own investigations to satisfy themselves as to the Site and subsurface conditions, but such investigations shall be performed only under the provisions set by the MRCA during the Bid Walk Phase.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF DOCUMENT

SECTION 01010

ABATEMENT WORK PLAN – SUMMARY OF WORK

The work covered by this work plan includes the removal, handling and disposal of various hazardous materials in accordance with the Mountains Recreation and Conservation Authority's (MRCA) Master Specification Sections 01110 and 02090 and applicable federal, state and local regulations at the above designated site.

A copy of this Abatement Work Plan is to be posted on-site during the abatement work.

I. Summary of Work (as designated)

X	Removal and disposal of asbestos-containing materials (ACM) as part of the MRCA's Restoration Program for the Gleneden site, 2944 Gleneden Street, in Los Angeles.
X	Scraping and stabilization of loose and peeling paints as required for disposal of intact painted elements as [potentially] non-hazardous waste, including associated dust controls and personal protective procedures in compliance with Cal/OSHA's Construction Lead Standard, 8 CCR 1532.1 and CDPH regulation 17 CCR, Sections 35001 through 36100.
	Spot abatement and disposal of waste for primers and lead-containing paints on structural steel elements prior to torching, cutting, etc., including dust controls and personal protective procedures in compliance with Cal/OSHA's Construction Lead Standard, 8 CCR 1532.1 and CDPH regulation 17 CCR Sections 35001 through 36100.
	Preparation and disposal of waste for repainting, including dust controls and personal protective procedures for manual scraping or sanding and other "Trigger 1" work activities in compliance with Cal/OSHA's Construction Lead Standard, 8 CCR 1532.1 and CDPH regulation 17 CCR Sections 35001 through 36100.
X	Demolition, removal and disposal of painted surfaces with lead ceramic glazing or lead-based paints (LBPs) whereby airborne exposures may exceed the permissible exposure level, requiring such work to be completed by CDPH Certified Lead Workers and Supervisors in compliance with Cal/OSHA's Construction Lead Standard, 8 CCR 1532.1 and CDPH regulation 17 CCR Sections 35001 through 36100.
	Clean-up of metals contamination.
X	Removal and disposal of PCB-containing ballasts, as designated.
X	Removal and recycling of mercury-containing lamps and/or mercury-containing thermostats.
	Removal, characterizing, and disposal of lab or other chemicals as potential hazardous waste.
	For Controlled Renovation Projects: Use of controlled renovation procedures for drilling, coring and anchoring through asbestos-containing materials as required under the MRCA's Renovation Program, in accordance with 8 CCR 1529.
	For Controlled Renovation Projects: Use of dust controls during drilling, coring and anchoring through materials containing lead as required per 8 CCR 1532.1.
	For Controlled Renovation Projects: Clean-up of building dust and contamination for clearance dust sampling.

II. Submittals:

Pre-job Submittals (as designated):

X	SCAQMD Notification (10 working days in advance);
X	Cal/OSHA Notification per 8 CCR 1529 AND 8 CCR 1532.1 (24-hours in advance);
	CDPH Notification Form CDPH 8551 (12/97) for Abatement of Lead Hazards
X	Copy of current Contractors' State Licensing Board (CSLB) License;
X	Copy of Cal/OSHA Asbestos Registration Certificate;
X	Proof of all required permits or variances;
X	Abatement work schedule;
X	Abatement work plan(s);
X	Copies of workers' asbestos training certificates, including the Competent Person;
X	Copies of CDPH Certified Lead Workers' and Supervisor's training certificates, as applicable;
X	Copies of workers' lead awareness training certificates;
X	Copies of workers' annual medical exam and respirator approval;
X	Copies of workers' 12-month respirator fit testing records;
X	Copies of workers' blood lead test within past 90 days;
X	Material Safety Data Sheets (MSDS) for chemicals used;
X	Emergency phone listing;
X	SCAQMD annual registration of all negative pressure units and vacuums;
X	Proposed location of locked dumpster; and
X	Rotameter calibrations within past 6 months.

Periodic Submittals (as designated):

X	Personal air monitoring (daily);
X	Updated worker documentation (as needed);
X	Boundary access logs (daily);
X	Negative pressure records for applicable containments (daily); and
X	Copies of updated notification to regulatory agencies (as needed).

Project Close-out Submittals (as designated within 2 weeks of completion):

X	Certificate of Completion;
X	Receipt and weight tickets from landfill operator or recycler (as applicable);
X	Copies of completed uniform waste manifests, including hazardous and non-hazardous waste;
X	Waste profiling data (TCLP, WET and SW846, as applicable);
X	Filter change logs for all filtration units, water filtration units (as applicable) and respirators;
X	Foreman's daily job reports;
X	Employee and visitor entry/exit logs for all containments;
X	Manometer printouts for all applicable containments; and
X	Air sample results for all personnel, work areas and air filtration units.

III. Schedule

Start Date:	*To be determined.*
End Date:	*To be determined.*
Maximum Abatement Shifts:	(10) concurrent asbestos and lead hazard/abatement shifts.
Time frame:	7:00 a.m. to 3:30 p.m., Monday thru Friday, unless otherwise indicated in the Contract Documents.

IV. Contacts:

Contact	*Individual*	*Phone #*	*e-mail*	*Mobile #*
MRCA Project Manager:	Leslie Chan	323/221-9944 ext. 183	leslie.chan@ mrca.gov	323/829-3503
SCA Environmental Project Manager	Mark Osborn	310/258-0460	mosborn@ sca-enviro.com	310/701-4044
Abatement Contractor's Project Manager	*To be determined.*			
Demolition Contractor's Project Manager	*To be determined.*			

Note: Contact the MRCA's Project Manager only in an emergency.

V. Security

Arrange site security with the MRCA at the beginning of the job.

Provide temporary security at building penetrations created by the demolition and abatement.

VI. Special Conditions

Design:

1. Asbestos Abatement and Lead Hazard Abatement Project Designs shall be completed by the MRCA's designated Environmental Consultant only. Designers shall be EPA-accredited Asbestos Project Designers and California Department of Public Health lead-certified only.

Air Sampling:

1. PCM Analysis: Analysis of PCM samples shall follow the procedures outlined in NIOSH method 7400 and within these Contract Documents.

2. TEM Analysis: The U. S. Environmental Protection Agency passed regulations for schools under the Asbestos Hazard Emergency Response Act (AHERA), which are found in 40 CFR Part 763 "Asbestos Containing Materials in Schools." This regulation states that all abatement work shall be evaluated upon completion by collecting air samples using aggressive sampling techniques and that all such samples shall be analyzed using Transmission Electron Microscopy (TEM). The TEM protocol for large projects/zones calls for the collection of a minimum of 5 inside samples, 5 outside samples, and 3 blank samples and each should be analyzed by TEM. The regulation strictly defines the criteria that must be met to determine that a building is acceptably clean after removal. TEM analysis turnaround times shall be 24 hours, unless otherwise indicated.

3. The sampling and analytical criteria in the AHERA regulation for schools shall be viewed as the preferred method for determining that any asbestos abatement project in any building has achieved a satisfactory level of cleanliness. The MRCA shall clear any work areas that may need to be re-occupied prior to demolition, using aggressive sampling and TEM analysis, unless otherwise noted. The MRCA reserves the right to determine the quantity of clearance air samples to be collected for each subzone.

4. The MRCA shall pay the Environmental Consultant's costs of the final round of visual inspections, aggressive air sampling, and PCM and/or TEM analyses that will meet the asbestos abatement specification. All rounds of visual inspections, aggressive air sampling, and PCM and/or TEM analyses that fail to meet the contract criteria shall be borne by the Contractor. For the purpose of this paragraph, visual inspection includes the area isolation inspection, pre-encapsulation inspection, and final area clean-up inspection.

5. During all asbestos-related work, perimeter sample results will be collected by the MRCA and/or their Environmental Consultant (Industrial Hygienist). These samples will be analyzed by Phase Contrast Microscopy (PCM). Sample results that are in excess of the background level or 0.01 fibers per cubic centimeter (f/cc) Project Action Level may be forwarded for analysis by Transmission Electron Microscopy (TEM) with a 12-hour turnaround specified. Handling, shipping, and analysis charges (including the Environmental Consultant's time and expenses) will be paid for by the Contractor. Any sample results in excess of 70 asbestos structures per square millimeter of filter area (corrected for a 1,200 - 1,800 liter sample volume as appropriate) will require cleaning, inspection, and re-sampling of the affected area at the Contractor's expense.

6. During all lead hazard-related work, such as demolition, torching and welding activities, etc., as applicable, perimeter air sample and/or lead wipe sample results will be collected by the MRCA's Environmental Consultant (Industrial Hygienist). These samples will be analyzed by flame atomic absorption. Wipe sample results which are in excess of the construction dust control standard of 800 micrograms per square foot for adjoining construction zones on two consecutive samplings (or two consecutive days) on any occasion will require isolation and clean-up of the affected areas. Air sampling results in excess of the Cal/OSHA "Project Action Level" of 30 micrograms per cubic meter will require isolation of the work area and amendment of work procedures and/or clean-up of the affected areas. Re-sampling of the affected areas and handling, shipping, and analysis charges (including the Environmental Consultant's time and expenses) for additional sampling required to show background levels below these construction lead standards shall be borne by the Contractor.

Submittals:

1. All pre-construction submittals shall be forwarded to the MRCA's Project Manager and the MRCA's designated Environmental Consultant prior to the start of abatement as designated in the Contract Documents and herein.

2. Failure by the Contractor to fulfill the submittal requirements as specified in the Contract Documents and herein shall be the basis for withholding final payment until such submittal requirements are satisfied.

Additional Liquidated Damages:

1. The Contractor shall pay for all Environmental Consultant costs for delays in completion of work beyond the authorized schedule established by the MRCA. Such charges shall include Consultant's observations and inspections, daily air monitoring, equipment, transportation and analysis charges. Such costs are estimated at $1,000 per day, exclusive of any costs associated with final clearance air testing. See the Liquidated Damages Section in the General Conditions for further requirements.

Waste Manifests:

1. The Contractor shall coordinate the inspection and signing of all waste manifests with the MRCA and its Environmental Consultant, while on-site. Failure to complete the manifests or callbacks after completion of the project will be backcharged to the Contractor.

VII. Summary of Sampling Results:

Non-asbestos materials identified, which may be impacted by the demolition include:

- See Document 00235 or the Contract Documents, as applicable.

Note: All ACM or ACCM identified for abatement in this work plan is in the "Factory" building, unless specifically noted otherwise.

Lead-based paints tested on-site, requiring protection from disturbances causing airborne lead dusts during the abatement phase include:

- See Document 00235 or the Contract Documents, as applicable.

Treat all similar paints and substrates in kind. Note that most building paints contain some lead content, and require demolition dust control procedures for compliance with Cal/OSHA's Construction Lead Standard under 8 CCR 1532.1.

Scrape and stabilize all loose and peeling paints on-site and characterize for possible disposal as hazardous waste. Intact painted elements may be disposed as non-hazardous waste complying with dust controls and personal protective procedures per Cal/OSHA regulation 8 CCR 1532.1 and CDPH regulation 17 CCR Sections 35001 through 36100.

VIII. Standard Procedures

Asbestos Abatement:

Abatement Material Group A-1	**Vinyl Floor Tiles with Related Mastics**			
Method:	X Full Isolation or Mini-Containment	___ Glovebag	___ Glovebag-Cutout	
Material	***Activity Class***	***Sample I.D.***	***% Asbestos***	***Est. Quantity****
Vinyl floor tiles with related mastics	2	FLVCT-23-01, -02 & -03	>1% CH (tiles); 2% CH (mastic).	2,400 square feet
Leveling compound with related mastics	2	MISC-024-01, -02, -03	3% CH (mastic)	10 square feet

**Quantity estimate is for project planning purposes only. All quantities are to be verified in the field by the Contractor, prior to abatement.*

Asbestos Abatement Procedures for Material Group A-1 (Applicable Indicated):

Decon System:	X Shower if >250 SF	___ Central	___ Hudson sprayer or bucket decon if <250 SF
Floor:	# Layers Poly	___ Drop Cloths	___ Scaffold
Walls:	1 # of Polyethylene Layers	X 6-ft. high Splash Guards	
Criticals:	1 # of Polyethylene Layers	__ Plywood Barriers	

Other Comments: **For Vinyl Floor Tiles & Mastic Abatement:**

Abate the vinyl floor tiles and mastics and leveling compounds, as applicable, using full isolation or mini-containment abatement methods per Cal/OSHA 8 CCR 1529 Work Class II procedures, minimum, with negative pressurization of all zones. Demolish interior partitions and counters to access and abate concealed materials. Remove the mastics using an approved "low odor" mastic remover with greater than 140°F flash point. *Products containing methylene chloride are specifically prohibited.* Dispose of tile waste as Category 1 non-friable asbestos waste. Characterize and dispose of rags and solvent residues as a separate, [potentially] hazardous waste stream. Coordinate with the abatement of sprayed-on acoustical materials.

For Disposal & Cleanup: Double gooseneck bag all asbestos floor tiles as dispose as Category 1 non-friable asbestos waste. Dispose of mastics, rags and associated waste as specified by the mastic remover manufacturer, potentially as hazardous waste. HEPA vacuum the surrounding area, prior to visual inspection and clearance by the Environmental Consultant.

If a mobile containment is used, clean-up and reseal the phone booth-type containment and airlock entry between uses.

Abatement Material Group A-2:	**Roofing Materials (and HVAC Materials on the Roof)**			
Method:	X Cordon Area	___ Glovebag	___ Glovebag-Cutout	
Material	***Activity Class***	***Sample I.D.***	***% Asbestos***	***Est. Quantity****
Black roof patching & penetration mastic	2	RFMAS-05-01, -02, -03	4% CH	50 square feet (on "Factory" roof)
		RFMAS-AAA	*Assumed ACM >1% CH*	3 square feet (on Warehouse roof)
Sliver/gray roof penetration mastic	2	RFMAS-06-01, -02, -03	3% CH	100 square feet
HVAC duct tape and mastic	2	HDUTP-07-01, -02, -03	5% CH	75 square feet
HVAC black mastic on joints & seams	2	HMAS-09-01, -02, -03	2% CH	20 square feet
Black tarry wrap and coating on 1" and 2" pipes	2	MISC-10-01, -02, -03	3% CH	30 square feet
Silver textured coating on round HVAC ducts	2	MISC-11-01, -02, -03	3% CH	400 square feet

**Quantity estimate is for project planning purposes only. All quantities are to be verified in the field by the Contractor, prior to abatement.*

Asbestos Abatement Procedures for Material Group A-2 (Applicable Indicated):

Decon System:	X Shower if >2,500 SF	___ Central	X Hudson sprayer or bucket decon if <2,500 SF
Floor:	___ # Layers Poly	X Drop Cloths	___ Scaffold
Walls:	___ # of Polyethylene Layers	__ Splash Guards	
Criticals:	1 # of Polyethylene Layers	__ Plywood Barriers	

Other Comments: **For Roofing Abatement:**

Set-up drop cloths on the ground under roofing removal area and abate the roof patching and penetration compounds, and HVAC mastics, as applicable, using wet methods. Seal all rooftop vents, windows, etc. with one layer of 6-mil polyethylene sheeting, as a critical barrier. Bag or wrap waste in 2 layers of 6-mil polyethylene sheeting and gently lowered to ground. *(Bags shall not be thrown off the roof under any circumstances.)* Debris chutes must be pre-authorized by MRCA before use. If used, they shall be sealed and negatively pressurized.

Coordinate abatement work with stabilization of loose and peeling exterior lead-based/lead containing paints.

For Disposal & Cleanup: HEPA vacuum the surrounding area following the abatement for final visual clearance. Dispose of all roofing debris as Category 1 non-friable asbestos waste.

Allow for a 20 ft. minimum buffer zone between the roof removal activities and other demolition work.

Abatement Material Group A-3:	**Wall and Ceiling Mastics**			
Method:	X Full Isolation or Mini-Containments	___ Glovebag	___ Glovebag-Cutout	
Material	***Activity Class***	***Sample I.D.***	***% Asbestos***	***Est. Quantity****
Black mirror mastic on restroom wall	2	MASTIC-19-01	10% CH	1 square foot
Residual brown wall mastic	2	MASTIC-27-01, -02, -03	1-2% CH	25 square feet
Mastic assumed present behind wood wall panels and cork walls	2	MASTIC-AAA	*Assumed ACM >1% CH*	500 square feet

**Quantity estimate is for project planning purposes only. All quantities are to be verified in the field by the Contractor, prior to abatement.*

Asbestos Abatement Procedures for Material Group A-3 (Applicable Indicated):

Decon System:	___ Shower	___ Central	X Hudson sprayer or bucket decon
Floor:	1 # Layers Poly	___ Drop Cloths	___ Scaffold
Walls:	1 # of Polyethylene Layers	X Splash Guards	
Criticals:	1 # of Polyethylene Layers	__ Plywood Barriers	

Other Comments: **For Mastics on non-Asbestos Substrates:**

Remove mastic intact with the substrate and double bag for disposal as Category 1 non-friable asbestos waste. Where substrate removal is not required, remove the cork or wood wall panels and scrape any 3-dimensional mastic (also including mirror and other wall mastics) using a razor blade or sharp knife. Dispose of mastic as Category 1 non-friable asbestos waste.

Abatement Material Group A-4:	**Interior Sprayed-On Acoustical Plasters and HVAC Duct Seam Tape**		
Method:	X Full Isolation or Mini-Containments	___ Glovebag	___ Glovebag-Cutout

Material	***Activity Class***	***Sample I.D.***	***% Asbestos***	***Est. Quantity****
Sprayed-on acoustical plaster ceilings and plaster substrate	1	CLTX-17-01, -02, -03	5% CH	1,000 square feet
White, painted interior HVAC duct seam tape	2	HDUCTP-16-01	70% CH	3 square feet

**Quantity estimate is for project planning purposes only. All quantities are to be verified in the field by the Contractor, prior to abatement.*

Asbestos Abatement Procedures for Material Group A-4 (Applicable Indicated):

Decon System:	X Shower if >25 SF	___ Central	___ Hudson sprayer or bucket decon if <25 SF
Floor:	___ # Layers Poly	___ Drop Cloths	___ Scaffold
Walls:	1 # of Polyethylene Layers	X Splash Guards	
Criticals:	2 # of Polyethylene Layers	___ Plywood Barriers	

Other Comments:

For ACM Sprayed-On Acoustical Materials and Friable Duct Seam Tape:

Remove materials (including overspray) with hand tools, using full isolation or mini-containment procedures, satisfying the requirements of Cal/OSHA 8 CCR 1529 Work Class 1 procedures. Use wet methods for dust controls. Dispose of materials as friable asbestos waste. Remove substrates as required to access materials and overspray. Treat all enclosing substrates or materials, such as laid-in ceiling tiles, as potentially asbestos-contaminated and dispose of in double goosenecked, labeled bags, as friable asbestos waste.

Removal of larger wall or ceiling segments, particularly demolition of elements that may impact friable plaster finishes, shall be completed under full isolation or mini/mobile-containment procedures, by a licensed Abatement Contractor. The Asbestos Contractor, using glovebag and mobile mini-containment methods or full isolation methods (depending on the quantities impacted) shall complete corings greater than 2" in diameter, which cannot be properly controlled using a wetted sponge.

Remove the interior HVAC duct seam tape in conjunction with the acoustical plaster abatement, within a contiguous negative pressure containment set up for that purpose. Dispose of material as in double goosenecked, labeled bags, as friable asbestos waste.

If a mobile containment is used, clean up and re-seal the phone booth-type containment and airlock entry between uses.

Lead Hazards Construction and Demolition Work:

Zone L-1: Interior & Exterior Paints				
Sample I.D.	***Color***	***Area***	***Lead Content***	***Activity Class***
HUD-defined Lead-Based Paints or Glazing	Varies	Varies	≥5,000 ppm	1
Majority of painted substrates	Varies	Varies	>600 ppm	1

Lead Hazard Procedures for Zone L-1 (Applicable Indicated):

Decon System:	___	Shower	___	Central	X Hudson sprayer
Required Methods:	___	Full Containment	X	Manual Methods w/Drop Cloths	X Loose & Peeling Paints Only

Other Comments:

For Stabilization of Loose & Peeling Paints:

Manually scrape and stabilize loose and peeling paints prior to demolition of painted substrates using drop cloths, wet methods, and HEPA vacuums for dust control, in compliance with Cal/OSHA regulation 8 CCR 1532.1. Avoid dry sweeping. Coordinate exterior paint stabilization with the asbestos abatement activities.

For Mechanical Sanding: Work areas requiring mechanical sanding or stripping of painted surfaces with any lead content shall be fully contained with polyethylene dust barriers, establishing negative pressure of the zone, and using HEPA-filtered tools and other dust control procedures as outlined under 8 CCR 1532.1.

For Demolition of Painted Substrates & Ceramic Tile Glazing: Demolition of painted concrete or plaster substrates or glazed ceramic tiles shall be completed under full isolation containments with negative air pressurization. Loose paints, HEPA vacuum canister wastes, and fine dust shall be characterized and disposed as [potentially] hazardous waste. Respiratory protection shall be upgraded per 8 CCR 1532.1 requirements for mechanical sanding or mechanical equipment without HEPA vacuum or water misting attachments.

For Disposal & Cleanup: Demolish and dispose of intact painted substrates as [potentially] non-hazardous waste, pending characterization of the waste. Characterize and dispose of loose and peeling paint debris, chemical strippers, rags, etc. as [potentially] hazardous waste. Clean-up drop cloths and HEPA vacuum loose and peeling chips and debris daily for all work areas, before leaving the site. Metallic lead flashing may be recycled.

Complete abatement work exceeding the permissible exposure limit using CDPH Certified Lead Workers and Supervisors, including but not necessarily limited to demolition of lead-glazed ceramic tiles, extensive manual or mechanical scraping or sanding of loose and peeling paints, demolition of concrete-encased primed steel, and spot abatement of primed structural steel prior to torching or cutting, as applicable.

IX. Monitoring and Clearance

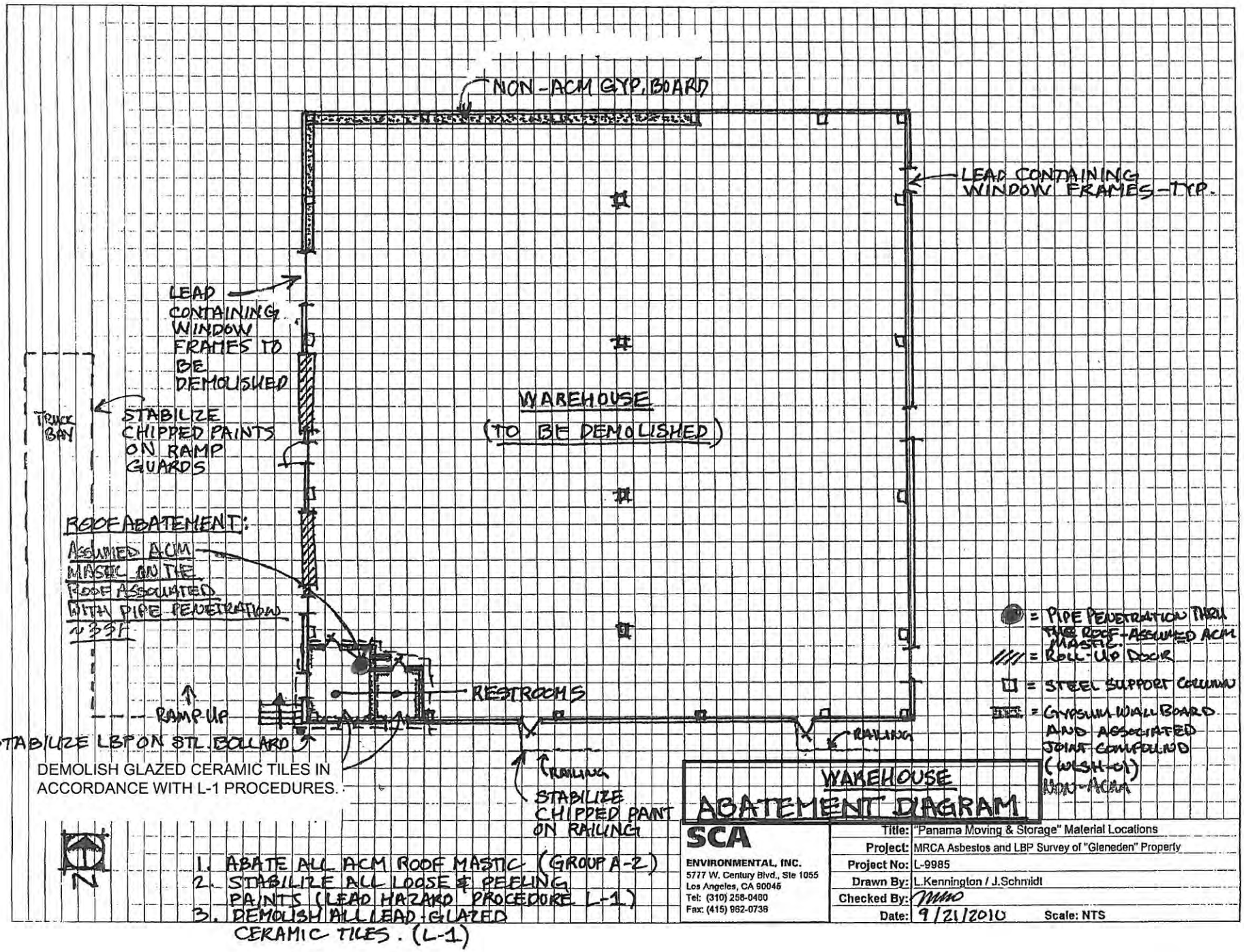
Asbestos Clearance Requirements (includes budgeted # of samples):

VAT & Mastic Abatement	Visual Only	___ PCM/zone	1-2 TEM/500 SF (typ.)
Roofing and Exterior HVAC Mastic Abatement	X Visual Only	___ PCM/zone	TEM/subzone
Sprayed-On Acoustical Plaster Abatement	Visual Only	___ PCM/zone (if <100 SF or <260 LF)	5 TEM/subzone (if ≥160 SF or ≥260 LF

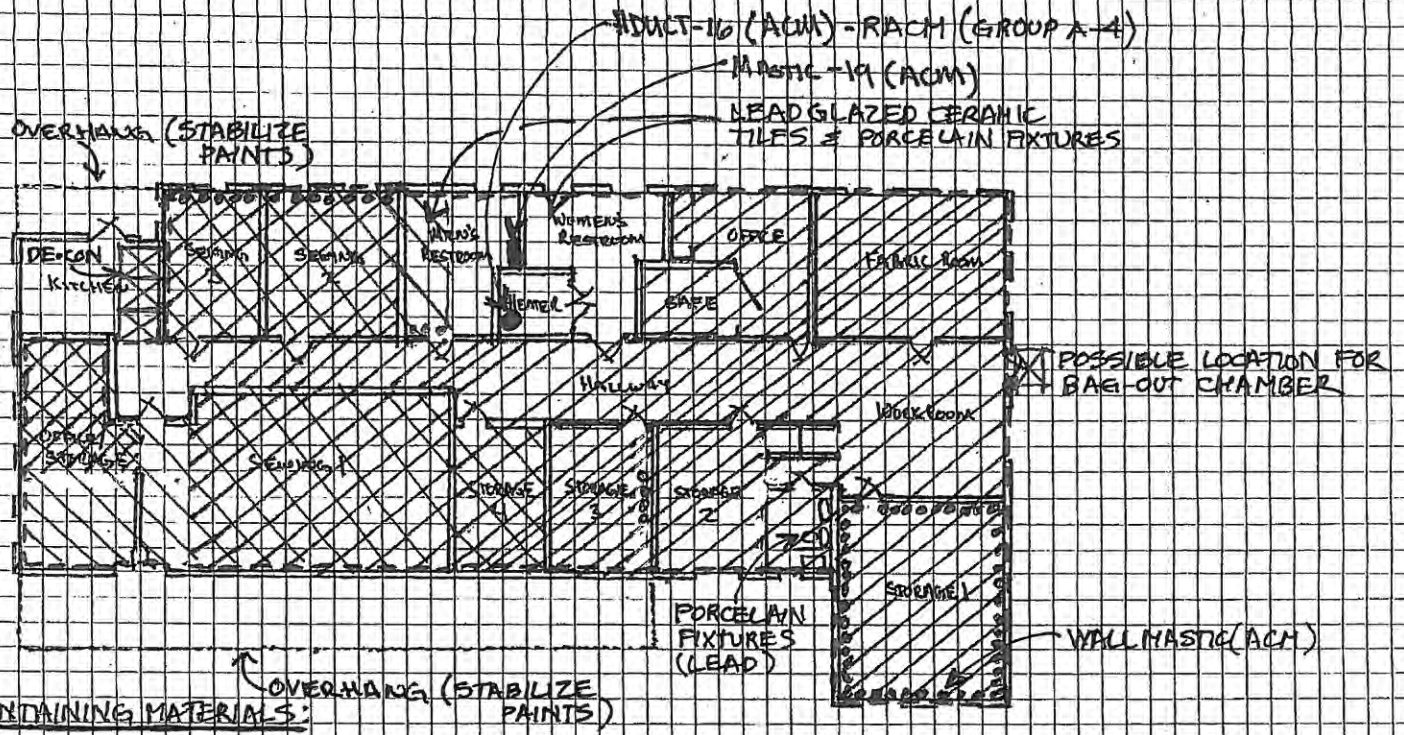
X. Diagrams

See the attached plans for areas of impact.

Consultant's Signature:  Mark Osborn, AIA, CAC, CHMM Project Consultant	Date: December 8, 2010
Contractor's Signature	Date:


NON-ACM GYP. BOARD
LEAD CONTAINING WINDOW FRAMES-TYP.
LEAD CONTAINING WINDOW FRAMES TO BE DEMOLISHED
TRUCK BAY
STABILIZE CHIPPED PAINTS ON RAMP GUARDS
WAREHOUSE
(TO BE DEMOLISHED)
ROOF ABATEMENT:
ASSUMED ACM MASTIC ON THE ROOF ASSOCIATED WITH PIPE PENETRATION
± 33 SF
RESTROOMS
RAMP UP
STABILIZE LBP ON STL. BOLLARD
DEMOLISH GLAZED CERAMIC TILES IN ACCORDANCE WITH L-1 PROCEDURES.
RAILING
STABILIZE CHIPPED PAINT ON RAILING
= PIPE PENETRATION THRU FLAT ROOF-ASSUMED ACM MASTIC.
= ROLL-UP DOOR
= STEEL SUPPORT COLUMN
= GYPSUM WALL BOARD AND ASSOCIATED JOINT COMPOUND (WSH-01) NON-ACM
N
1. ABATE ALL ACM ROOF MASTIC (GROUP A-2)
2. STABILIZE ALL LOOSE & PEELING PAINTS (LEAD HAZARD PROCEDURE L-1)
3. DEMOLISH ALL LEAD GLAZED CERAMIC TILES. (L-1)
WAREHOUSE
ABATEMENT DIAGRAM
SCA
ENVIRONMENTAL, INC.
5777 W. Century Blvd., Ste 1055
Los Angeles, CA 90045
Tel: (310) 258-0460
Fax: (415) 962-0736
Title: "Panama Moving & Storage" Material Locations
Project: MRCA Asbestos and LBP Survey of "Gleneden" Property
Project No: L-9985
Drawn By: L.Kennington / J.Schmidt
Checked By: MMO
Date: 9/21/2010
Scale: NTS

"FACTORY"



ASBESTOS CONTAINING MATERIALS:

- = FLOOR-23: BLACK WITH TAN STREAKS VINYL FLOOR TILES AND ASSOCIATED BLACK MASTIC (PRIMARILY CONCEALED BENEATH CARPET). - ACM FLOOR TILE AND MASTIC. (ABATEMENT GROUP A-1)
- = DUCT-16: WHITE, PAINTED FIBROUS DUCT SEAM TAPE ON HEATER IN THE CLOSET - ACM
- = MASTIC-19: BLACK "MOCKEN PUCK" MIRROR MASTIC (MIRROR ABSENT) (GROUP A-3)
- = MASTIC-27: RESIDUAL BROWN WALL MASTIC AGDA AND ASSUMED-ACM POTENTIALLY CONCEALED
- MASTIC-AAA: MASTIC BEHIND CORK AND WOOD WALL PANELS - ACM MASTIC SAMPLED (GROUP A-3)
- CLTX-17: ACM SPRAYED-ON ACOUSTICAL CEILING MATERIAL (RACM). (GROUP A-4)
- DENOTES AREA OF CONTAINMENT UNDER NEGATIVE PRESSURE

N

LEAD: (GROUP L-1)

- STABILIZE ALL LOOSE, PEELING AND/OR FLAKING PAINTS.
- DEMOLISH LEAD-GLAZED CERAMIC TILES & PORCELAIN FIXTURES

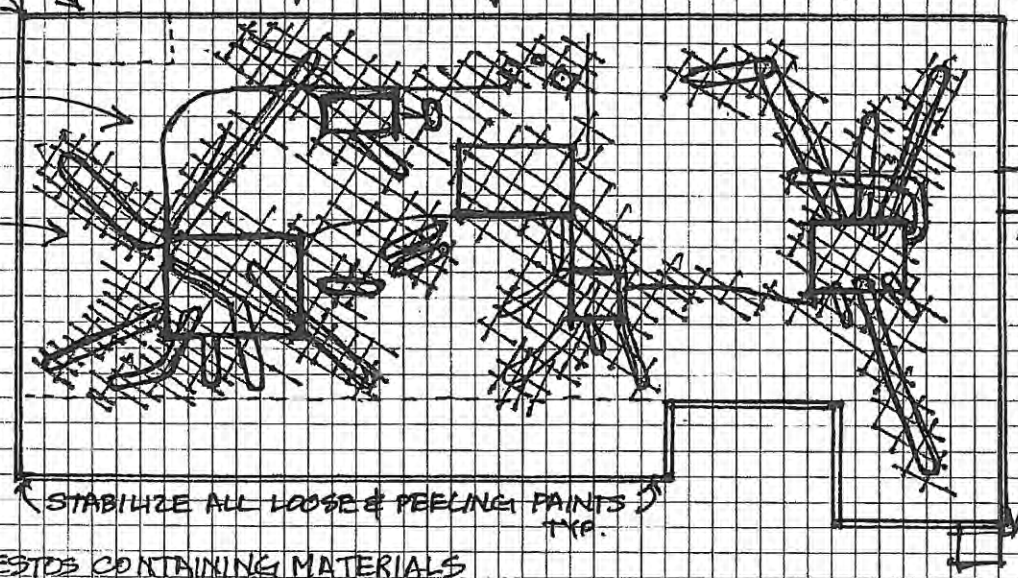
FACTORY BUILDING - INTERIOR

ABATEMENT DIAGRAM

SCA
ENVIRONMENTAL, INC.
5777 W. Century Blvd., Ste 1055
Los Angeles, CA 90045
Tel: (310) 258-0450
Fax: (415) 962-0736

Title:	"Factory" 2944 Gleneden Street Material Locations
Project:	MRCA Asbestos and LBP Survey of "Gleneden" Property
Project No:	L-9985
Drawn By:	L.Kennington / J.Schmidt
Checked By:	MMM
Date:	9/21/10 Scale: NTS

ROOF



ASBESTOS CONTAINING MATERIALS

= ACM Roofing Mastics Associated with HVAC Ducts, Joints, Seams & Penetrations:

- RFMAS-05: Black mastic associated with roof penetrations
- RFMAS-06: Silver/gray mastic associated with roof penetrations
- HDUTP-07: HVAC duct tape and mastic (canvas type with gray coating)
- HMAS-09: Black mastic on HVAC joints and seams
- MISC-10: Black, tarry wrap/coating on 1" and 2" pipes on the roof
- MISC-11: Silver texture coating on "round" HVAC ductwork (Abatement Group A-2)

LEAD

- STABILIZE ALL LOOSE, PEELING AND/OR FLAKING PAINTS THROUGHOUT (L-1)

N

"FACTORY" BUILDING ROOF & EXTERIOR

ABATEMENT DIAGRAM

SCA
ENVIRONMENTAL, INC.
5777 W. Century Blvd., Ste 1055
Los Angeles, CA 90045
Tel: (310) 258-0460
Fax: (415) 982-0736

Title:	"Factory" 2944 Gleneden Street Material Locations
Project:	MRCA Asbestos and LBP Survey of "Gleneden" Property
Project No:	L-9985
Drawn By:	L.Kennington / J.Schmidt
Checked By:	
Date:	9/21/2010 Scale: NTS

SECTION 01110

HAZARDOUS MATERIALS PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements and procedures for hazardous materials related work activities, as applicable, to the Work and the existing conditions at the project site.

1. Work includes Hazardous Materials Precautions and Handling Procedures for non-abatement trades.

B. Related Documents:

1. Document 00235 - Existing Conditions: Hazardous Materials.

C. Related Sections:

1. Section 01300 - Submittals.
2. Section 02060 - Building Demolition.
3. Section 02090 - Hazardous Materials Abatement and Control.
4. Section 01010 - Abatement Work Plan/Related Sections Drawing/Plans.

1.2 DEFINITIONS

A. Abatement: Primary work involving the removal, containment, control or treatment of hazardous materials.

B. Asbestos: A generic name given to a number of naturally occurring hydrated mineral silicates that possess a unique crystalline structure, are incombustible in air, and are separate into fibers. Asbestos includes any material that contains greater than 0.1 percent by weight in the asbestiform varieties of chrysotile (serpentine); crocidolite (riebecklite); amosite (cummingtonite-grunerite); anthophyllite; tremolite; and actinolite. For the purposes of determining respiratory protection and worker protection both the asbestiform and non-asbestiform varieties of the above materials and any of these materials that have been chemically treated or altered shall be considered asbestos.

C. Asbestos-Containing Material (ACM): Any material which contains more than one percent (>1%) asbestos by weight for the purposes of abatement, waste disposal and fiber controls specified under this Contract.

D. Asbestos Containing Construction Material (ACCM): Any material which contains more than one tenth of one percent (>0.1%) asbestos by weight requiring personal protection, dust controls, Contractor registration, and worker training in compliance with Cal/OSHA regulation 8 CCR 1529. For waste disposal purposes, ACCM greater than 0.1% by weight and less than 1% by weight is classified as non-hazardous waste, although it is a regulated material under Cal/OSHA.

E. Hazardous Materials Control: Incidental work procedures for control of releases of project-related hazardous materials, including containment, enclosure, wetting, controlled demolition procedures, and removal and disposal.

F. Hazardous Waste:

1. Waste material, including asbestos, loose and peeling lead-based paints, PCB ballasts, and any other material which requires management, handling transport, treatment, storage or disposal according to the requirements of the Federal Resource, Conservation and Recovery Act (RCRA) and associated regulation 42 U.S.C. 6901 et seq. and 40 CFR Part 260 et seq.) or the California Hazardous Waste Control Law and associated regulations (Health and Safety Code 25000 et seq. and 22 CCR 66260 et seq.).

2. References to hazardous material or contaminated material incorporate definitions of hazardous pollutants, hazardous contaminants, hazardous material, hazardous substance, hazardous waste, toxic pollutants and toxic substance applicable in accordance with Federal, State, regional and local statutes, laws, regulations and policies.

G. Lead: Metallic lead, all inorganic lead compounds and organic lead soaps, and excluding all other organic lead compounds.

H. Lead-Based Paints: Paints or coated surfaces that contain an amount of lead equal to, or in excess of, one milligram per square centimeter or more than half of one percent (0.5%) lead by weight.

I. Lead-Containing: Any material, coating, substrate or product that contains metallic lead, all inorganic lead compounds and organic lead soaps, and excluding all other organic lead compounds.

J. Lead-Contaminated Dust: Dusts that contain an amount of lead equal to, or in excess of, forty micrograms per square foot for floor surfaces and two hundred and fifty micrograms per square foot for horizontal window surfaces.

K. Lead-Contaminated Soil: Bare soil that contains lead equal to, or in excess of, four hundred parts per million (400 ppm) in children's play areas and one thousand parts per million (1,000 ppm) in all other areas.

L. Lead-Related Construction Work: Means any construction, alteration, painting, demolition, salvage, renovation, repair or maintenance of any residential or public building, including preparation and clean-up, that, by using or disturbing lead-containing material or soil, may result in significant exposure of adults or children to lead.

M. Presumed Lead-Based Paint: Means paint or surface coating affixed to a component in or on a structure, excluding paint or surface coating affixed to a component in or on a residential dwelling constructed on or after January 1, 1978.

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01300 - Submittals.

1. Site-Specific Hazardous Materials Management Plan (HMMP): Submit Contractor's HMMP for the Mountains Recreation and Conservation Authority's (MRCA's) approval within ten (10) days after the Notice to Proceed, including the following items.

a) Overall scope and schedule of all hazardous materials management including but not limited to:

(1) Description of all hazardous materials work to be performed or managed, and intended control procedures.

(2) Schedule of all hazardous materials work.

(3) Description of personal protective equipment and methods as well as intended compliance monitoring.

b) Name, phone number, pager number of Contractor's designated Hazardous Materials Supervisor as required in this section's "Quality Control."

c) Name, address and phone number of the Contractor's landfill;

2. Excavated Material Disposal Method: Submit for the MRCA's acceptance prior to removing excavated material from the Project Site the Contractor's lawful, safe, and cost effective methods for transportation and disposal of excavated materials meeting the acceptance criteria of the Contractor's off-site disposal facility.

3. Imported Material: Prior to hauling imported material to the Project Site, submit environmental analytical data as required by the MRCA. Provide as a minimum, one 4-point composite test for each 500 cubic yards analyzed for RCI, TRPH, and CAM 17 metals.

4. Close-out Submittals: Provide copy of final trucking log for all imported fills deposited at the Project Site. Logs shall include information on the origin of the import (street address and city), location of the deposit (coordinates and elevation), quantity (cubic yards), a description of the material environmental analytical results, and trucking invoices.

B. Submit Worker Documentation in accordance with the requirements outlined in the Contractor's HMMP, including but not limited to:

1. Certification of the worker's awareness or hazards training by a Certified trainer or as stated on the Contractor's letterhead by the Contractor's Health & Safety Officer or Superintendent.

2. Medical examination and approval for use of respiratory protection, as applicable, including current respirator fit test records.

1.4 PROJECT CONDITIONS

A. Contractor shall pay all costs associated with the compliance with applicable hazardous materials regulations or requirements incurred by the Contractor or its subcontractors for this Project.

B. Take precautions necessary to protect the health and safety of construction workers, site visitors, MRCA personnel, outside consultants, public and others from exposure to hazardous materials.

C. Take precautions necessary to insure all surrounding properties or adjacent occupied areas are protected from any contamination from all hazardous materials from this Project Site.

D. Review the information in the environmental and hazardous material investigation reports and make such information available to appropriate subcontractors and building occupants.

E. Obtain and pay for all sampling and profiling analyses required for waste disposal. California CDPH-accredited laboratories shall perform analyses.

F. Minimize generation and migration of hazardous and contaminated materials, waste, dust, fumes and debris.

G. Prevent contamination or further contamination of any material or area by hazardous or contaminated material, waste, dust, fumes or debris.

H. Avoid mixing or concentrating removed, or demolished materials so as to increase the cost of disposing of such materials required to be disposed as hazardous or contaminated wastes.

I. Contractor shall retain, and the MRCA will not indemnify against, any liability of Contractor resulting from the activities or duties which are the responsibility of Contractor under the terms of the Contract, including but not limited to present or future liability arising from the arrangement of transportation or disposal of any hazardous or contaminated material, whether on or off-site.

K. Pursuant to 29 CFR 1926.1101, the Contractor shall be deemed to exercise general supervisory authority over the work covered by the standard, even though the General Contractor is not qualified to serve as the asbestos "Competent Person," as defined by the standard. As supervisor of the entire Project, the General Contractor shall ascertain whether any subcontractor is in compliance with the standard and shall require such contractor to come into compliance with the standard when necessary.

L. Contractors shall schedule and coordinate abatement activities to time limitations indicated in the Contract Documents, allowing 10 work shifts for asbestos, lead-based paint, PCB ballast, and other abatement.

1.5 QUALIFICATIONS

A. Hazardous Materials Supervisor: Assign a qualified person directly responsible under the Contractor's Superintendent having the necessary training to be knowledgeable in the identification, control, and management of the hazardous materials on-site. The Hazardous Materials Supervisor is responsible for the following:

1. Enforcing safe work and hygiene practices in compliance with the Site-Specific Hazardous Materials Management Plan (HMMP).

2. Advising subcontractors of potential hazards and minimum general requirements of the HMMP.

3. Coordinating subcontractor's work regarding hazardous material procedures and controls.

4. Establishing and maintaining restricted work areas.

5. Requiring proper use of personal protective equipment.

6. Communicating approved modified safety requirements to site personnel.

7. Notification and coordinating signing of waste manifests with the MRCA.

B. Hazardous Materials Handlers: Only qualified persons shall engage in hazardous material- related work. Contractor and subcontractor personnel who come into contact with, are exposed to, disturb, operate equipment or otherwise handle hazardous or contaminated material, or debris shall have appropriate hazard communication and required training, personal and medical monitoring, and shall be certified to wear appropriate personal protective equipment as required by the applicable laws and regulations. Special qualifications which may be required depending on the Contractor's means and methods include, but are not limited to, the following:

1. Asbestos-Related Work Involving Asbestos-Containing Materials exceeding 100 square feet:

   a) Valid asbestos handling license issued by the California State Contractors Licensing Board and a valid current Certificate of Registration for Asbestos-Related Work as issued by the California Department of Industrial Relations - Division of Occupational Safety and Health (Cal/OSHA).

   b) Work shall be completed under the on-site supervision of a Competent Person as defined by OSHA Regulation 29 CFR Part 1926.1101 (8 CCR 1529 in California).

   c) All abatement workers shall have AHERA training with annual 8-hour refresher training, current medical exams for the use of respiratory protection, and current fit tests of appropriate respirators.

2. Lead-Hazard Work: All affected workers shall have lead awareness training, current medical examinations and approval for the use of respiratory protection, and current fit testing of respirators complying with Cal/OSHA regulation 8 CCR 1532.1 when affecting lead paints and lead construction hazards including, but not limited to:

   a) Demolishing or salvaging structural items where lead or material containing lead are present.

   b) Removing or encapsulating materials containing lead.

   c) Constructing, altering, repairing or renovating structures, substrates, or portions thereof that contain lead or materials containing lead.

   d) Installing of products containing lead.

   e) Cleaning-up of lead contamination.

   f) Transporting, disposing, storing, or containing lead or lead-containing materials on the site or other locations where construction and demolition activities are performed.

3. Lead Abatement Work: Only qualified persons with California Department of Public Health' (CDPH)-approved Lead Workers training, annual medical examinations and approval for the use of respiratory protection, and current fit testing of respirators under the direct supervision of a CDPH approved Lead Abatement Supervisor shall engage in work defined under Cal/OSHA regulation 8 CCR 1532.1 affecting lead-based paints and lead construction hazards, including but not limited to:

a) Working in an environment where lead exposures exceed 30 micrograms/m^3.

b) Abating lead-based paints, including but not limited to abatement of loose and peeling lead-based paints, demolition and disposal of concrete-encased primed structural steel and/or stripping of lead coatings from structural steel prior to torching or welding.

c) As defined under Title 17, California Code of Regulations (CCR), Division 1, Chapter 8 "Accreditation, Certification and Work Practices in Lead-Related Construction," Article 1, Sections 35001 et al, and Article 16, Section 36000 and 36100.

4. PCB Ballast-Related Work: Removal of non-leaking PCB ballasts may be completed by workers with PCB hazard awareness training as verified by the Contractor's Health and Safety Officer or Superintendent. Removal of leaking or damaged PCB ballasts from lighting fixtures shall be completed by a trained worker, wearing protective gloves and following safety procedures as outlined in the HMMP. Hazardous waste shall be handled according to the U. S. Environmental Protection Agency's Standards 40 CFR 761.60 and 761.65 (22 CCR Section 66699(b) in California).

5. Contaminated Soils-Related Work including Underground Storage Tanks: workers shall have current 40-hour HAZWOPER training and 8-hour annual refresher training per OSHA Regulation 29 CFR 1910.120 (8 CCR 5192 in California) and shall comply with other health and safety requirements as approved in a Site-Specific Hazardous Materials Management Plan.

6. Bio-hazard Work: Work areas contaminated with fecal matter and human excretions, along with needles and syringes and other materials potentially contaminated with infectious bloodborne pathogens or other bio-hazards shall comply with the health and safety requirements as approved in a Site-Specific Hazardous Materials Management Plan.

C. Hazardous Materials Haulers:

1. Possess during the hauling of hazardous material, applicable federal, state, and local vehicle insurance requirements, valid driver's license, vehicle registration and licenses, and a current Class 1 Certification of Compliance from the California Highway Patrol affixed to each vehicle.

2. Possess a Hazardous Substance Removal Certification granted by the State of California Department of Toxic Substances Control (510-540-3802) and other required certifications and insurance.

3. Contractor shall be responsible for informing drivers of hauling vehicles about:

a) The nature of the material hauled.

b) Any recommended or required routes to and from the site.

c) Applicable city street use regulations and requirements, and State of California Department of Transportation (Caltrans) codes, regulations and requirements.

d) The MRCA's requirements for proper handling and transportation of hazardous waste.

e) The legal maximum loads for each vehicle.

1.6 REGULATORY REQUIREMENTS

A. Hazardous and contaminated materials and hazardous waste shall be handled according to applicable laws and regulations in effect at the time of disturbance, transport or disposal of said hazardous materials or waste and requirements of the Contract Documents. In the event of conflict, the more stringent requirement shall apply.

B. The MRCA is the generator, as defined in 22 CCR Section 66260.10 and 40 CFR Part 261, of any hazardous waste, and will be responsible for that hazardous waste to the extent required by law.

C. Contractor is alerted to and shall familiarize itself to the following laws and regulations regarding the generation, management, characterization and disposal of hazardous waste:

1. Resources Conservation and Recovery Act, 42 U.S.C. Section 6901 et seq. and regulations 40 CFR Part 260 et seq.

2. California Health and Safety Code, Division 20 and regulations, and 22 CCR Section 66000 et seq.

3. For asbestos hazards: Comply with the applicable requirements of the Cal/OSHA Construction Asbestos Standard, 8 CCR Section 1529 and South Coast Air Quality Management District Rule 1403.

4. For lead hazards and abatement: Comply with the applicable requirements of the Cal/OSHA Lead in Construction Standard, 8 CCR Section 1532.1; Cal/EPA Regulation 22 CCR Section 66000, et seq.; California Department of Public Health (CDPH) Regulation 17 CCR 35001, et seq.

1.7 HAZARDOUS MATERIALS USED TO PERFORM THE WORK

A. General: Minimize the use of hazardous materials to perform the work. Where materials that contain hazardous substances or mixtures are used to perform the work, material usage shall be in strict adherence to Cal/OSHA's safety requirements and the manufacturer's warnings and application instructions listed on the Material Safety Data Sheet provided by the product manufacturer and on the product container label.

1. Contractor will be responsible for coordinating the exchange of MSDS or other hazard communication information between subcontractors at the site.

2. Contractor will notify the MRCA when a specific product or equipment, or their intended usage, may be unsafe prior to ordering the product or equipment or prior to the product or equipment being incorporated in the Work.

B. Prohibited Material: The following materials and chemicals are specifically prohibited from use on this project unless otherwise accepted in writing by the MRCA.

1. Material with a stated ACGIH threshold limit value of less than 25 parts per million.

2. Ethylene glycol monomethyl ether.

3. Dipropylene glycol methyl ether.

4. Ethylene glycol.

5. Formaldehyde.

6. Methylene chloride.

7. Isocyanates.

8. Chemicals with a flash point of less than 140 degrees Fahrenheit.

PART 2 - PRODUCTS

2.1 HAZARDOUS MATERIAL CONTROLS AND EQUIPMENT

A. Protective Devices: Temporary wash stations or showers, disposable clothing, respirators, gloves, hard hats, and other required items. Respirators shall protect against appropriate dusts, fumes and mists as approved by the National Institute for Occupational Safety and Health (NIOSH) under provisions of 30 CFR Part 11.

B. Waste Receptacles: Conform to federal and State regulations, with 6-mil minimum thickness waste bags.

C. Polyethylene Sheeting and Dust Barriers:

1. Polyethylene sheeting shall be flame-retardant and approved and listed by the State Fire Marshal in accordance with Section 13121 and/or 13144.1 of the California Health and Safety Code.

a) Thickness and Size: 6-mil thick minimum, unless otherwise specified, sized to minimize the frequency of joints.

b) Flammability: Comply with NFPA Standard 701 with a flame spread rating of no greater than 5 and a smoke development rating of no more than 70 when tested in accordance with ASTM procedures.

D. HEPA Vacuums and Negative Pressure Units (NPUs) used for clean-up of materials and detail cleaning shall be HEPA-filtered.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Notify the Contractor's Hazardous Material Supervisor of suspect conditions for testing by the MRCA.

B. Promptly notify the MRCA of differing conditions. Please note that the Contract Documents may restrict access to some ceiling spaces and plenums were known asbestos-containing damaged, friable surfacing materials exist. Access to these restricted areas will require the use of respiratory protection, full coveralls and decontamination procedures if accessed by non-abatement trades unless a negative exposure assessment is submitted to show that lower standards of protection are acceptable.

3.2 ASBESTOS HAZARD CONTROL PROCEDURES

A. Prohibited Activities Not Specified in this Section:

1. A qualified Asbestos Abatement Contractor per Cal/OSHA regulation 8 CCR 1529 shall complete Work exceeding 100 sq. ft. or 100 linear feet of asbestos-containing materials. All work affecting friable asbestos-containing materials shall be completed in compliance with Cal/OSHA Work Class I or III procedures, as applicable. Class III work may be completed by workers with EPA Asbestos Operations and Maintenance training and annual refresher training, minimum. Refer to Section 02090 - Hazardous Materials Abatement and Control.

B. Demolition of non-ACM obstructing known intact ACM.

1. Remove non-contaminated and non-asbestos materials for access using standard dust control procedures as required for painted assemblies, etc.

2. Minimize disturbances to substrates concealing friable or damaged asbestos-containing materials, such as laid-in ceiling tiles concealing asbestos-containing acoustical plasters, demolition of non-ACM partitions which may destabilize sprayed-on asbestos-containing acoustical finishes, etc. Work impacting asbestos-containing materials shall be completed by qualified workers only.

3. Remove and dispose of non-contaminated waste, where feasible. Alert the Contractor's Hazardous Material Supervisor of contaminated conditions for proper removal and disposal and cordon off the affected areas where contamination is encountered. Do not dry sweep affected wastes and debris.

C. Unexpected exposure to known or suspect intact ACM.

1. Where asbestos materials are intact, such as intact ceiling plasters, proceed to remove the affected substrate and immediately label the asbestos material with a "caution" sign to prevent unintentional disturbances.

2. Where asbestos materials uncovered are damaged or unknown asbestos contaminated conditions are encountered, discontinue work in the immediate contaminated area, shutdown the areas HVAC system, if not already disengaged, and alert the Contractor's Hazardous Materials Supervisor of the conditions for proper removal and disposal.

D. Unexpected release of asbestos into the environment.

1. Cordon off the immediate area (10 to 20 ft. radius average minimum), and shutdown the area's HVAC system (if applicable). Stop work and immediately notify the MRCA of the disturbance. (Abatement work and clean-up may need to be performed under "Procedure 5" of SCAQMD's Rule 1403.)

2. Notify the Contractor's Hazardous Materials Supervisor for proper removal and disposal using wet methods and HEPA-filtered vacuums. Clean-up work shall be completed under the directions of a Competent Person with 16-hour minimum EPA Operations and Maintenance asbestos training and by workers with 2-hours asbestos awareness training minimum unless exposures exceed the permissible exposure limit of 0.1 fibers/cc.

3. Decontaminate or dispose of friable waste in double 6-mil thick goosenecked labeled waste bags for manifesting and disposal.

E. Procedures for reporting Suspect Asbestos Containing Materials.

1. Advise the Contractor's Hazardous Materials Supervisor (HMS) of suspect conditions for testing by the MRCA. Do not remove or disturb suspect materials until tested and approved.

F. Perimeter Action Level: Failure of the Contractor to follow wet methods, immediate clean up, and fiber control procedures as outlined herein resulting in exceedances to the Perimeter Action Level of 0.01 fibers/cc by Phase Contrast Microscopy at the perimeter of the regulated area, or within adjoining occupied zones (as measured by the MRCA or its consultants) shall result in clean-up and analysis of the samples by Transmission Electron Microscopy (TEM) at the Contractor's expense.

3.3 LEAD HAZARD CONTROL PROCEDURES

A. Prohibited Activities Not Specified in this Section.

Lead-related construction work affecting lead-based paints or lead-contaminated soils as defined under CDPH. Refer to Section 02090 - Hazardous Materials Abatement and Control.

B. Prohibited Activities:

1. Open flame burning or torching of lead-based paints or presumed lead-based paints, including use of propane-fueled heat grids.

2. Scraping, sanding, or grinding of lead-based paints or presumed lead-based paints without proper containment or a HEPA local vacuum exhaust tool.

3. Uncontained hydro-blasting or high pressure washing of lead-based paints or presumed lead-based paints.

4. Abrasive blasting or sandblasting or lead-based paints or presumed lead-based paints without proper containment or a HEPA local vacuum exhaust or dust collector.

5. Heat guns operating above 1,100 degrees Fahrenheit.

6. Dry sweeping of debris and removal of surface coatings by torch or flame.

7. Disturbance of lead-painted or lead-coated surfaces scheduled to remain within the structure(s) by cutting, sawing, grinding, or other construction operations without adequate dust controls.

8. Eating, smoking and drinking in or in the proximity of lead hazard operations.

9. Removal of lead-containing coatings with a torch or flame, except as a result of unavoidable welding or torching of back-to-back structural elements that cannot be adequately previously abated without affecting the integrity of the structure.

10. Steam cleaning and compressed air removal for lead-based paints or presumed lead-based paints.

11. Lead hazard contamination beyond the containment barriers.

C. Handling:

1. For existing lead-painted or lead-coated surfaces that are indicated to remain, advise workers of the potential hazards.

2. For areas where handling or disturbance of loose or peeling paints are required, verify that the paint that remains on interior walls, ceilings, and other surfaces in areas of active work, as applicable, is adhered to the substrate sufficiently to support eventual repainting. Paints that peel or loosen during wetting shall be handled and removed as specified in this Section.

3. Clean debris and surfaces with HEPA-filtered vacuums and wet methods. Dry sweeping is not permitted.

4. Show where existing lead-painted or lead-coated surfaces are scheduled to remain, workers shall be advised of the potential hazard of these materials with all work completed by qualified workers.

5. Shoveling, wet sweeping, and brushing may be used only where vacuuming or other equally effective methods have been tried and are found to be ineffective.

6. Loose debris and scraped materials with a lead content greater than 1.0 mg/m3 or 0.5% by weight shall be treated as hazardous waste. Construction waste coated with intact lead paints or glazing may be disposed as construction debris in accordance with Cal/EPA requirements.

7. Workers shall decontaminate themselves and appropriate equipment prior to eating, drinking and smoking.

D. Recycling: Items to be recycled, such as but not limited to lead roof flashings or lead sheeting, shall be accompanied with a bill of lading and a memorandum from the recycler acknowledging that lead may be present and work activities and disposal will comply with applicable regulations. Submit in accordance with procedures of Section 01300 - Submittals.

E. Cleaning: Provide daily "housekeeping" on the project site including, but limited to:

1. Clean-up of loose debris and contamination daily prior to leaving the job site, or covering with tarpaulins to prevent unwanted disturbances.

2. Daily clean-up of traffic areas, using a HEPA vacuum or wet methods.

3. Repair of torn or damaged protective barriers.

F. Field Quality Control:

1. Maintain airborne dust levels within the regulated construction zone and throughout the construction site below the Cal/OSHA Project Action Level of 30 micrograms per cubic meter. Levels above the Project Action Level may require an upgrade in respiratory protection for all affected workers, as well as amended work practices and clean-up of affected areas at no additional cost to the MRCA.

2. Maintain airborne lead dust levels at the site's property line or adjoining occupied non-construction areas below the National Ambient Air Quality Standard (NAAQS) of 1.5 micrograms per cubic meter. Exceeding this level may require further isolation of the work areas, amended work practices, and clean-up of affected areas at no additional cost to the MRCA.

3. All costs for additional sampling of contaminated areas, including the MRCA's time and expenses for handling, shipping, and analysis charges, required to show background levels below the lead standards in Subparagraphs F.1 and F.2 shall be at the Contractor's expense.

4. Failure by the Contractor to contain construction dust and debris and exceedances of the NAAQS standard of 1.5 micrograms/cubic meter outside the construction boundaries within adjoining occupied areas of the school as measured by MRCA will require detailed clean-up and additional clearance wipe sampling at the Contractor's expense.

G. Project Hygiene Facilities: Provide project hygiene wash-up facilities including:

1. A 2-stage decontamination assembly, minimum, including an equipment and contiguous clean room with a bucket wash-up facility positioned outside all regulated work areas. The Equipment Room shall contain labeled bags for storing contaminated protective clothing and equipment. The Clean Room shall contain lockers and containers for storing employee street clothes and personal items, including a suitable supply of potable water to permit each employee to wash their hair, hands, forearms, face and neck. Provide 1 wash station minimum for every 10 workers.

2. Sufficient sets of protective full-body clothing to be worn in the designated work areas and whenever a potential airborne lead hazard exists. Clothing shall include, but not be limited to, full-body coveralls, headgear, eye protection, and gloves. Disposable-type protective clothing is acceptable.

H. General Dust Controls: Provide general dust control including:

1. Hudson or airless sprayers for wetting-down construction materials and debris throughout demolition or scraping phases.

2. Fire-retardant polyethylene dust barriers.

3. HEPA-filtered vacuum for clean-up of loose debris and suspect contamination.

4. Polyethylene drop cloths for protection of floors, furnishings, landscaping, etc., as applicable, to prevent contamination or damage to building surfaces, equipment or finishes.

I. Warnings and Signs: Provide the following minimum signs and posting requirements:

1. Cordon off the proximity (within approximately 20 ft.) of regulated work areas using "Caution" tape, polyethylene dust barriers, or other appropriate means. Persons entering the regulated "cordoned" work areas shall wear appropriate respiratory protection and full-body coveralls.

2. Affix warning signs at the entry and approaches to the regulated areas.

3. Lockout electrical and HVAC equipment within the regulated area, as necessary.

3.4 PCB BALLAST PROCEDURES

A. Identifying PCB ballasts: All ballasts not specifically labeled "non-PCB" or "PCB free" shall be considered PCB-containing.

B. Prohibited Activities Not Specified in this Section: Removal of ballasts from fixtures with hazard awareness training as indicated by the Contractor's Hazardous Materials Supervisor.

C. Procedures for Removal of Non-Leaking Ballasts: Non-leaking ballasts shall be removed from their fixtures and packed in kitty litter-lined steel drums for hazardous waste disposal. Workers removing ballasts may require protective gloves as a precaution against unforeseen leaks or damage.

D. Procedure for Handling Leaking PCB Ballasts:

1. Workers removing ballasts from fixtures shall wear protective clothing and nitrile or neoprene gloves.

2. Leaking ballasts pose a health and safety hazard and shall therefore be removed by trained workers only (Cal/OSHA 40-hour Hazwoper training is recommended).

3. Wipe down the fixture showing signs of overheated or leaking ballasts with paper towels after the unit has been cooled to room temperature.

4. Follow with additional wiping with an organic solvent, e.g., mineral spirits or isopropyl alcohol.

5. Place leaking ballasts and rags into a plastic bag, which is tied-off and secured.

6. Pack the ballasts in steel drums for hazardous waste disposal.

E. Procedure for Disposal of PCB ballasts:

1. Pack PCB ballasts and bagged leaking ballasts and rags into a steel drum, sealed, labeled, and transported to an approved incinerator following required manifest procedures as specified in this Section.

2. Absorbent material, such as kitty litter, shall be used as a cushion and absorbent within the drums.

3. Do not exceed the incinerator's drum loading requirements, typically 350 to 500 lbs. per drum.

4. Transport hazardous waste for disposal per the requirements under 22 CCR Section 66268.110.

5. Dispose as a hazardous waste per EPA Regulation 40 CFR 761.00 and 761.65 and Cal/EPA Regulation 22 CCR Section 66508.

3.5 MERCURY-CONTAINING LAMP REMOVAL PROCEDURES

A. Prohibited Activities Not Specified in this Section: Disposal of quantities over 25 lamps per day as non-hazardous waste.

B. Handling and Disposal of Lamps:

1. Spent fluorescent and other mercury-containing lamps shall be considered a hazardous waste by the California Department of Public Health (CDPH; 22 CCR Section 66699(b)).

2. Ship lamps exceeding 25 units per site per day to a commercial recycler where they are to be crushed and the mercury reclaimed.

3. Comply with DOT requirements for manifests, with evidence of proper disposal provided to the MRCA, including a log of shipping dates and quantities.

4. Load into secured cardboard boxes for shipment to prevent unnecessary breakage.

5. In the event of lamp breakage, clean-up broken glass and debris immediately, using a HEPA-filtered vacuum for final clean-up.

3.6 HAZARDOUS EXCAVATED MATERIAL HANDLING PROCEDURES

A. Properly evaluate, excavate, segregate, handle, and haul the excavated materials to an appropriate disposal site approved by the MRCA. Segregate each type of material to minimize mixing with demolished pavement, sub-base, and other hazardous materials.

B. Place all contaminated materials and hazardous materials directly into the vehicle or container for transport to the disposal facility. Contaminated materials and hazardous materials shall be transported separately, with no mixing of the different types of materials.

C. Enforce dust control requirements at the site as specified in the contract documents.

D. Prevent spillage of excavated or hauled materials. Contractors shall be liable for the costs of spillage and necessary clean-up, whether on or off the site.

E. Haul trucks carrying soils shall be loaded so that soils do not extend above the walls of the truck bed and shall be covered so as to prevent soils from spilling over the sides and back of the vehicles.

F. Bill of Lading: Prepare a bill of lading in a form approved by the MRCA for each shipment of excavated material from the site.

1. The bill of lading shall describe the contents of each truck carrying materials to the waste disposal site, including the address of the ultimate disposal site, the weight and yardage of the waste (as applicable), and an emergency phone number.

2. Contractor's hauler(s) shall sign and date the bill of lading, indicating that the hauler has accepted the load described on the manifest for that particular day.

3. The MRCA will sign the bill of lading and keep the appropriate number of copies and give the remaining copies to the hauler.

4. Copies of bill of lading accepted by the treatment/disposal sites shall be provided to the MRCA.

G. Weighing of Excavated Materials: Measure weights of all excavated materials produced.

1. Weight measurements shall be correlated to either the vehicle's bill of lading number or the hazardous waste manifest number.

2. The information shall show the date of lading, net weight of soils loaded to the appropriate vehicle, and an identification of the vehicle that has been loaded.

3.7 EXCAVATED MATERIAL DISPOSAL PROCEDURES

A. Notify the MRCA in writing and obtain the MRCA's approval prior to sale, supply, off- site reuse, or offer to sell excavated material.

B. Site Tests: Perform engineering and chemical testing required by the MRCA and applicable federal, state, and local laws and regulations at no additional cost to the MRCA.

3.8 IMPORTED MATERIALS

A. Maximize the use of excavated materials for backfill.

B. Except for contaminated soils or hazardous wastes, soils removed from the Project excavation may be used for backfill provided it conforms to the requirements of the Contract Documents.

C. Imported materials for backfill shall conform to the requirements of the Contract Documents and shall be approved by the MRCA prior to being hauled to the site.

D. Asphalt, crushed concrete aggregate, mud, clay, bricks, cobblestones, rocks, and debris will not be accepted as imported fill material.

3.9 UNDERGROUND STORAGE TANK HAZARD CONTROL PROCEDURES

A. Not applicable.

3.10 OTHER HAZARDOUS MATERIALS HAZARD CONTROL PROCEDURES

A. Not applicable.

3.11 WASTE DISPOSAL AND MANIFESTING PROCEDURES

A. Hazardous Waste Disposal:

1. Packing, labeling, transporting, and disposing of hazardous waste shall comply with Cal/EPA regulations under 22 CCR, including completion of the Uniform Hazardous Waste Manifest Form (DTSC 8022A and EPA 8700-22).

2. A "Waste Manifest" shall be completed for disposal of hazardous waste. The transporter shall possess a valid EPA Transporter I.D. number. The Contractor's Hazardous Materials Supervisor shall notify the Project Manager at least 48 hours prior to the time that the Manifest is required to be signed by the MRCA.

3. Applicable information to be included in the "Waste Manifest" includes the following:

a) EPA Generator I.D. Number: Verify with MRCA Project Manager.

b) Generator's Name and Address:
Mountains Recreation and Conservation Authority, Los Angeles River Center and Gardens, 570 West Avenue 26, Suite 100, Los Angeles, CA 90065

c) Generator Tax I.D. Number: _____.

B. Disposal of Contaminated and Other Materials:

1. Disposal of intact lead-coated architectural or structural elements may occur as non-hazardous waste in accordance with Cal/EPA's and the Department of Toxic Substances Control's (DTSC) requirements.

2. Loose and peeling lead-based paints and miscellaneous lead debris shall be treated as hazardous waste, unless otherwise indicated. Lead wastes shall be profiled by the Contractor by means of standard digestion and extraction tests (TCLP, WET and SW846), as appropriate, and shall be manifested and properly disposed.

3.12 FINAL PROJECT CLEAN-UP AND REOCCUPANCY CLEARANCE CRITERIA PROCEDURES

A. Asbestos: Asbestos-containing materials will be abated with clearance by visual inspection and Phase Contrast Microscopy (PCM) or Transmission Electron Microscopy (TEM), as applicable, as outlined under the "Hazardous Materials Abatement and Control" Section, as applicable.

B. Lead Hazards:

1. Visual Inspection: Final clean-up prior to re-occupancy or Substantial Completion shall include wet wiping using a mild detergent solution and HEPA vacuuming all suspect

dust and debris for final visual inspection, or wipe dust sampling as outlined under the "Hazardous Materials Abatement and Control" Section, as applicable.

2. Final Cleaning:

a) Final clean-up prior to demolition shall include wet wiping using a mild detergent solution and HEPA vacuuming all suspect dust and debris areas.

END OF SECTION

SECTION 02090

HAZARDOUS MATERIALS ABATEMENT AND CONTROL

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes: Minimum requirements for hazardous materials handling, control, and abatement activities, as applicable, including, but not necessarily limited to:

1. Hazardous materials controls.
2. Handling and disposal of asbestos-containing building materials (ACBM).
3. Handling and disposal of lead-based paints and lead-containing materials.
4. Removal and disposal of existing ballasts containing polychlorinated biphenyl (PCB).
5. Disposal of mercury-containing lamps.
6. Handling and disposal of contaminated soils.
7. Demolition associated with access to hazardous materials.
8. Criteria for abatement zone clearance testing.
9. Criteria for re-occupancy clearance.

B. Related Documents:

1. Document 00235 - Existing Conditions: Hazardous Materials.

C. Related Sections:

1. Section 01010 - Abatement Work Plan: Summary of Work.
2. Section 01110 - Hazardous Material Procedures and Controls
3. Section 01300 - Submittals.
4. Section 01500 - Construction Facilities and Temporary Controls
5. Section 01545 - Health and Safety.
6. Section 02060 - Building Demolition.
7. Section 02072 - Mechanical and Electrical Selective Demolition.

D. Related Work to be performed by the Mountains Recreation and Conservation Authority (MRCA) under Separate Contract:

1. Hazardous materials removal as specified in Section 01010 - Abatement Work Plan: Summary of Work.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. E84: "Test Method for Surface Burning Characteristics of Building Materials."

2. E119: "Standard Method for Fire Tests of Building Construction and Materials."

3. E849: "Safety and Health Requirements Relating to Occupational Exposure to Asbestos."

B. American National Standards Institute (ANSI):

1. Z9.2: "Fundamentals Governing the Design and Operation of Local Exhaust Systems."

2. Z41.1: "Men's Safety Toe Footwear."

3. Z86.1: "Commodity Specification for Air."

4. Z87.1: "Practice for Occupational and Educational Eye and Face Protection."

5. Z88.2: "Practices for Respiratory Protection."

6. Z88.6: "Respiratory Protection - Respiratory Use Physical Qualifications for Personnel."

7. Z89.1: "Requirements for Industrial Head Protection."

C. National Fire Protection Association (NFPA):

1. Standard 10: "Fire Extinguishers".

2. Standard 70: "National Electric Code."

3. Standard 90A: "Fire Rating of Sprayed-On Fireproofing."

4. Standard 701: "Small Scale Fire Test for Flame Resistant Textiles and Films."

D. California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA):

1. Title 8 California Code of Regulations (8 CCR) Section 5144 - Respiratory Protection.

2. Title 8 California Code of Regulations (8 CCR) Section 1532.1 - Construction Lead Standard.

3. Title 8 California Code of Regulations (8 CCR), Article 4, Section 1529 - Asbestos Standard for the Construction Industry.

4. Title 8 California Code of Regulations (8CCR) Sections 3203 and 1509 - Injury and Illness Prevention Program.

5. Title 8 California Code of Regulations (8 CCR), Article 110, Section 5208 - Asbestos Standard for General Industry.

6. Title 8 California Code of Regulations (8 CCR), Article 2.5, Section 341.6 for employer registration when disturbing more than 100 sq. ft. of ACCM.

E. U. S. Department of Housing and Urban Development (HUD): Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing," referred to as the "HUD Guidelines."

F. State of California Regional Water Quality Control Board (RWQCB):

1. Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Storage Tank Sites.

G. State of California State Water Resources Control Board:

1. Leaking Underground Fuel Tank (LUFT) Manual.

H. American Petroleum Institute (API):

1. API Recommended Practice 1604: "Removal and Disposal of Used Underground Storage Tanks."

1.3 DEFINITIONS

A. Abatement: as defined by the Department of Public Health for lead hazards work, includes any set of measures designed to reduce or eliminate lead hazards.

B. Activity Class/Category - Lead: Lead hazard designations assigned to work activities that involve lead-containing materials. Activities that fall into Classes I through III, including as examples the operations defined below, are required to assume the following personal airborne exposure levels, unless otherwise demonstrated.

1. Activity Class I; Exposure <500 micrograms/m^3

a) Surface clean-up of lead-containing dust or debris <15,000 micrograms/ft^2;

b) Spray painting with lead-based paints; Manual demolition of structures (e.g. drywall, plaster, etc.);

c) Manual sanding, grinding, needle gunning, chiseling, hammering, wire brushing, milling or scraping of lead-based coatings;

d) Heat gun removal of any surface coating; and power tool cleaning with dust collection systems.

2. Activity Class II; Exposure >500 micrograms/m^3 and <2,500 micrograms/m^3

a) Using lead mortar;

b) Lead burning;

c) Rivet busting;

d) Power tool cleaning without dust collection systems;

e) Clean-up of dry abrasive; and

f) Abrasive blasting enclosure movement and removal.

3. Activity Class III; Exposure >2,500 micrograms/m^3

a) Abrasive blasting of any coated surfaces;

b) Welding on any coated surfaces;

c) Torching or cutting or any coated surfaces; and

d) Torch burning of any coated surfaces.

C. Asbestos Work Class: Activities for removing asbestos materials by categories are as follows:

1. Work Class I:

a) Activity involving removal of TSI and surfacing asbestos-containing materials (ACM) or friable presumed asbestos-containing materials (PACM).

2. Work Class II:

a) Activity involving removal miscellaneous materials excluding TSI and surfacing asbestos-containing materials (ACM) or friable presumed asbestos-containing materials (PACM), including but not limited to wallboard, floor tiles and sheeting, roofing and siding shingles, and construction mastics.

3. Work Class III:

a) Repair and maintenance operations where TSI or surfacing is likely to be disturbed, which fits within one standard glovebag or waste container under 60 inches.

4. Work Class IV:

a) Maintenance and custodial activities during which employees contact but do not disturb PACM or ACM and activities to clean-up dust, waste and debris resulting from Work Class I, II, and III activities.

D. Certified Lead Worker: includes those who do lead-related construction work activities on a work site under the directions of a Certified Lead Supervisor, including:

1. Removal, disposal or abatement of loose and peeling lead-based paints as defined by HUD, including scraping, demolition or other Cal/OSHA Activity 1 through 3 work as defined above lasting over 20 years.

2. Removal or repair of lead plumbing.

3. Repainting or general construction on surfaces painted with lead-based paints.

4. Removal, enclosing or covering of lead-contaminated soils.

5. Note that renovations, remodeling, painting, operations and maintenance work or other activities listed above that are considered to be interim controls, or lasting under 20 years, may be completed by workers satisfying Cal/OSHA's asbestos awareness training requirements only.

E. Certified Lead Supervisor: includes those who supervise daily work activities on a lead-related construction site, as well as supervision of repainting or general construction performed on surfaces with lead-based paints where abatement is designed to permanently reduce or eliminate lead hazards for public (non-industrial) buildings or to last more than 20 years. The Certified Lead Supervisor shall oversee the Certified Lead Workers, enforce safe work practices, and schedule and coordinate work site activities with the building occupants and other contractors and consultants.

F. Containment: as defined by the California Department of Public Health includes any system, process or barrier used to contain lead hazards in a work area, including plastic sheeting, wet scraping, and other lead-safe work practices as described in the HUD Guidelines, Chapter 8.

1.4 SUBMITTALS

A. Asbestos:

1. Submit the following, in accordance with Section 01300 - Submittals, prior to Commencement of the Abatement Work:

a) Proof of current Asbestos Contractor's license (CSLB).

b) Proof of current California Department of Public Health (CDPH) Asbestos Contractor's registration certification.

c) Valid and current SCAQMD notification for the Project.

d) Cal/OSHA 24-hour Temporary Worksite Notification for Asbestos and Methylenedianiline-Related Work per 8 CCR 1529 for disturbances exceeding 100 sq. ft.

e) Worker documentation, including:

1) Current AHERA training certifications - Supervisor/Competent Persons.

2) Current AHERA training certifications - Workers.

3) Respiratory fit test records in compliance with 8 CCR 5144.

4) Medical examination approvals for respirator use in compliance with 8 CCR 5144.

f) Written asbestos abatement work plan and schedule as part of the Contractor's Hazardous Materials Management Plan (HMMP) to be submitted in accordance with Section 01110 - Hazardous Materials Procedures.

g) Material Safety Data Sheets (MSDS) for chemicals used.

h) Emergency phone number and pager listing.

i) SCAQMD annual registration of negative pressure units and vacuums.

j) Rotameter calibration data within past 6 months.

k) Negative Exposure Assessment, as warranted, where personal protective equipment differs from minimal requirements established by Cal/OSHA's Construction Industry Standards.

2. Submit the following, in accordance with Section 01300 - Submittals, within 5 calendar days of the request by the MRCA or within 5 calendar days of completion of the abatement or hazard control work.

a) Contractor daily personal air-monitoring data.

b) Updated worker documentation, as needed.

c) Daily boundary access logs.

d) Daily negative pressure records, as applicable.

e) Copies of updated schedules and notices to regulatory agencies, as needed.

f) Receipt and weight tickets from landfill operator or incinerator, as applicable.

g) Copies of completed uniform waste manifests.

h) Certification of Completion.

B. Lead-Related Work:

1. Submittals the following, in accordance with Section 01300 - Submittals, prior to commencement of the lead-related work:

a) Worker documentation, including:

1) Abatement Plan prepared by a Certified Lead Supervisor, Certified Lead Project Monitor, or Certified Lead Project Designer including:

(a) detailed lead hazards control and management measures.

(b) a detailed description of abatement methods, locations and components where abatement is planned.

(c) a recommended schedule for inspection.

(d) instructions to maintain potential lead hazards in safe condition.

2) Current CDPH Certified Lead Worker and Certified Lead Supervisor training certificates.

3) Completed CDPH Form 8551 (12/97) prior to lead-based paint or lead-contaminated soils abatement work.

4) Respiratory fit test records within past 12 months.

5) Current Medical Examination approvals for all workers wearing half facepiece negative air respirators or greater.

6) Blood lead test for Certified Lead Workers within the past 90 days.

b) Material safety data sheets for chemicals used.

c) Lead Hazard Control Plan pursuant to 8 CCR 1532.1: Procedures for minimizing and controlling the migration of lead from disturbance of lead-containing materials incidental to the contract work, including a written lead hazard or lead abatement work plan and schedule as part of the Contractor's Hazardous Materials Management Plan (HMMP) to be submitted in accordance with Section 01110 - Hazardous Materials Procedures.

2. Submit the following, in accordance with Section 01300 - Submittals, within 5 calendar days of the request by the MRCA or within 5 calendar days of completion of the abatement or hazard control work.

a) Updated worker documentation, as needed.

b) Contractor periodic personal air-monitoring results.

c) Receipt and weight tickets from landfill operator or recycler as applicable.

d) Waste profiling data (TCLP, WET, and SW846, as applicable).

C. PCB Ballast-Related Work:

1. Submittals the following, in accordance with Section 01300 - Submittals, prior to commencement of the work:

a) Hazard Control Plan: Procedures for clean-up of leaking ballasts and disposal and transportation for incineration of PCB ballasts as part of the Contractor's Hazardous Materials Management Plan (HMMP) to be submitted in accordance with Section 01110 - Hazardous Materials Procedures.

b) Evidence of hazard awareness training of workers removing and packing PCB ballasts.

c) Identification of EPA approved incinerator and DOT approved transporter.

d) PPE to be used.

2. Submit the following, in accordance with Section 01300 - Submittals, within 30 calendar days of the request by the MRCA or within 30 calendar days of completion of the abatement or hazard control work.

a) Completed Uniform Waste Manifest.

D. Fluorescent Light Tube-Related Work Submittals:

1. Submittals the following, in accordance with Section 01300 - Submittals, prior to commencement of the work:

a) Identification of EPA approved recycler.

b) Temporary storage plan.

2. Submit the following, in accordance with Section 01300 - Submittals, within 5 calendar days of the request by the MRCA or within 5 calendar days of completion of the hazard control work.

a) Completed manifest or evidence of shipment date, recycler and quantities shipped.

E. Contaminated Soils-Related Work Submittals:

1. Submittals the following, in accordance with Section 01300 - Submittals, prior to commencement of the work:

a) Hazard Control Plan: Procedures for remediation of contaminated soils and schedule as part of the Contractor's Hazardous Materials Management Plan (HMMP) as outlined in the "Hazardous Materials Procedures" Section, approved and signed by a Certified Industrial Hygienist. Include the following material or sections:

1) Identification of key personnel and safety responsibilities.

2) A site description and background, including sampling locations and results.

3) Job hazard analysis.

4) Exposure monitoring and air monitoring requirements.

5) Required personal protective equipment.

6) Medical surveillance program.

7) Employee training requirements.

8) Applicable general safe work practices.

9) Site control work areas and decontamination procedures.

10) Emergency response plan.

11) Recordkeeping requirements.

b) Worker documentation, including:

1) Current OSHA 40-hour HAZWOPER training certificate with 8-hour annual refresher.

2) Current respiratory fit test records.

3) Current Medical Examination approvals.

c) Identification of EPA approved disposal site and DOT-approved transporter.

2. Submit the following, in accordance with Section 01300 - Submittals, within 5 calendar days of the request by the MRCA or within 5 calendar days of completion of the abatement or hazard control work.

a) Updated worker documentation, as needed.

b) Contractor periodic personal air-monitoring results.

c) Receipt and weight tickets from landfill operator.

d) Waste profiling data (Total Concentration, TCLP, and WET test, as applicable).

e) Completed Uniform Waste Manifest.

F. Underground Storage Tanks-Related Work Submittals (Not in scope.)

1. Submit the following, in accordance with Section 01300 - Submittals, prior to commencement of the work:

a) Not applicable.

G. Other Hazardous Materials-Related Work Submittals:

1. Submit the following, in accordance with Section 01300 - Submittals, prior to commencement of the work:

a) Not applicable.

2. Submit the following, in accordance with Section 01300 - Submittals, within 5 calendar days of the request by the MRCA or within 5 calendar days of completion of the abatement or hazard control work.

a) Not applicable.

1.5 QUALITY ASSURANCE

A. Qualifications

1. Asbestos Abatement Work: Only qualified persons shall engage in asbestos abatement activities. Work involving asbestos-containing materials exceeding 100 square feet (SF) or 100 linear feet (LF) shall be completed by a Contractor holding a valid asbestos handling license issued by the California State Contractors Licensing Board (CSLB) and a valid current Certificate of Registration for Asbestos-Related Work as issued by the California Department of Industrial Relations - Division of Occupational Safety and Health (Cal/OSHA). Work shall be completed under the on-site supervision of a Competent Person, as defined by OSHA Regulation 29 CFR Part 1926.1101 (8 CCR 1529 in California). All abatement workers shall have AHERA training with annual 8-hour refresher training, current medical exams for the use of respiratory protection, and current fit test of appropriate respirators.

2. Lead Hazard/Abatement Work: Only qualified persons with CDPH approved Lead Workers training, current medical examinations and approval for the use of respiratory protection, and current fit testing of respirators under the direct supervision of a CDPH approved Lead Abatement Supervisor shall engage in work defined under Cal/OSHA regulation 8 CCR 1532.1 affecting lead-based paints and lead construction hazards, including but not limited to:

   a) Working in an environment where lead exposures exceed 30 micrograms per cubic meter.

   b) Abating lead-based paints, including but not limited to abatement of loose and peeling lead-based paints, demolition and disposal of concrete-encased primed structural steel and/or stripping of lead coatings from structural steel prior to torching or welding.

3. PCB Hazard Work: Removal of leaking or damaged PCB ballasts from lighting fixtures shall be completed by a trained worker, wearing protective gloves and following safety procedures as outlined in the HMMP. Hazardous waste shall be handled according to the U. S. Environmental Protection Agency's Standards 40 CFR 761.60 and 761.65 (22 CCR Section 66699(b) in California).

4. Contaminated Soils-Related Work: Subcontractors will be required to have current 40-hour HAZWOPER training and 8-hour annual refresher training per OSHA Regulation 29 CFR 1910.120 (8 CCR 5192 in California) and shall comply with other health and safety requirements as approved in a Site-Specific Hazardous Materials Management Plan, approved and signed by the Contractor's Certified Industrial Hygienist.

5. Underground Storage Tank-Related Work: Subcontractors will be required to have current 40-hour HAZWOPER training and 8-hour annual refresher training per OSHA Regulation 29 CFR 1910.120 (8 CCR 5192 in California) and shall comply with other health and safety requirements as approved in a Site-Specific Hazardous Materials Management Plan, approved and signed by the Contractor's Certified Industrial Hygienist.

B. Regulatory Requirements: The Contractor shall be alerted to and familiar with the following laws and regulations regarding the hazards, control measures, management, characterizing, transport and disposal of hazardous wastes:

1. Asbestos Abatement Work: All labor, materials, facilities, equipment, services, employees and training, and testing necessary to perform the work required for asbestos abatement and disposal of waste shall be in accordance with these Specifications and the most current regulations, including but not limited to:

   a) Environmental Protection Agency NESHAP and AHERA regulations (40 CFR Part 763, as applicable).

   b) Occupational Safety and Health Administration (inclusive of OSHA 29 CFR 1926.1101)

   c) California Department of Occupational Safety and Health (inclusive of Cal/OSHA 8 CCR 1529)

   d) California Environmental Protection Agency (Cal/EPA).

   e) South Coast Air Quality Management District (SCAQMD), Rule 1403.

   f) Other applicable federal, state, and local governmental regulations pertaining to asbestos-containing materials (ACM) and asbestos waste.

2. Lead Hazard/Abatement Work: All labor, materials, facilities, equipment, services, employees and training, and testing necessary to perform the work required for lead abatement, demolition, decontamination, hazard control, and disposal of waste shall be in accordance with these Specifications and the most current regulations, including but not limited to:

   a) Environmental Protection Agency National Ambient Air Quality Standards, as applicable (40 CFR 61).

   b) Occupational Safety and Health Administration (inclusive of OSHA 29 CFR 1926.62)

   c) California Department of Occupational Safety and Health (inclusive of Cal/OSHA 8 CCR 1532.1)

   d) California Environmental Protection Agency (Cal/EPA), Title 22.

   e) California Department of Public Health (17 CCR Sections 35001 -35099).

   f) Other applicable federal, state, and local governmental regulations pertaining to lead hazards and lead waste.

3. Polychlorinated Biphenyl Work: All labor, materials, facilities, equipment, services, employees and training, and testing necessary to handle, containerize, secure, label, manifest, transport and either reuse, dispose, incinerate, or recycle PCB-containing ballasts shall be in accordance with these Specifications and with Cal/EPA Regulation 22 CCR Sections 6628.110 and 66508.

4. Mercury-Containing Lamp Disposal/Recycling: All labor, materials, facilities, equipment, services, employees and training, and testing necessary to handle, containerize, secure, label, manifest, transport and either reuse, dispose, or recycle mercury-containing lamps impacted by the construction operations shall be in accordance with these Specifications and with Cal/EPA Regulation 22 CCR Section 66699(b).

5. Contaminated Soil Clean-up: All labor, materials, facilities, equipment, services, employees and training, and testing necessary to perform the work required for contaminated [soil and/or ground water] abatement, decontamination, hazard control, and disposal of waste shall be in accordance with these Specifications and the most current regulations.

6. Underground Storage Tanks (Not in scope.)

7. Underground Storage Tank-Related Work (Not in scope.)

C. Meetings:

1. Pre-Construction or Pre-Abatement Meeting:

a) Prior to any abatement work, the Contractor is to attend a pre-construction meeting to be attended by representatives of the MRCA, the MRCA's Consultants, the Contractor, the Hazardous Materials Abatement Subcontractor, and other Subcontractors whose work may be affected. The meeting agenda shall include the following considerations:

1) Review of the Specifications and Plans in detail related to the abatement and hazards work. All conflicts and ambiguities, if any, shall be discussed.

2) Review in detail the project conditions, schedule, construction sequencing, abatement application requirements, and quality of completed work.

3) Review in detail the means of protecting adjoining areas, protection of Contractor's, Subcontractor's, MRCA's workers, and completed work during the abatement activities.

4) Pre-job submittals requirements.

5) Site security requirements.

2. Weekly Meetings: At the MRCA's option, abatement projects extending over one week in length may require attendance of the Contractor at a weekly progress meeting. The purpose of this meeting is to review abatement and project scheduling, coordination with other trades, security and site-specific requirements.

1.6 TIME LIMITATION AND DELAY CHARGES

A. Complete all asbestos, lead, and other hazard work specified in this Section in no more than sixteen (16) calendar days.

B. In the event of failure to complete the Work of this Section within the specified time, the Contractor shall pay liquidated damages in the amount of one thousand dollar ($1,000.00) per calendar day for each day of delay in completion of work beyond the number of days specified in Paragraph 1.6A. The specified amount of liquidated damages represents the MRCA's estimate of costs which include, but are not limited to, those of the MRCA and the MRCA's Consultants for observations and inspections, daily air monitoring, equipment, transportation, and analysis charges which would be incurred by the MRCA after the number of calendar days specified for completion of the Work of this Section.

PART 2 - PRODUCTS

2.1 ASBESTOS WORK - MATERIALS AND EQUIPMENT

A. Protective Devices:

1. Temporary wash stations or showers, disposable clothing, respirators, gloves, hard hats, and other required items.

2. Respirators shall protect against asbestos and other appropriate dusts, fumes and mists as approved by the National Institute for Occupational Safety and Health (NIOSH) under provisions of 30 CFR Part 11.

B. Waste Receptacles: Conform to federal and State regulations, with 6-mil minimum thickness or glovebags or waste bags.

C. Sealants and Polyethylene Sheeting:

1. Polyethylene sheeting shall be flame-retardant and approved and listed by the State Fire Marshal in accordance with Section 13121 and/or 13144.1 of the California Health and Safety Code.

a) Thickness and Size: 6-mil thick minimum, unless otherwise specified, sized to minimize the frequency of joints.

b) Flammability: Comply with NFPA Standard 701 with a flame spread rating of no greater than 5 and a smoke development rating of no more than 70 when tested in accordance with ASTM E84 procedures.

2. Sealing Tape shall conform to the following:

a) 2-inches or wider, capable of sealing joints of adjacent sheets of polyethylene and attaching polyethylene sheet to finished or unfinished surfaces or similar materials.

b) Tape shall be capable of adhering under dry and wet conditions, including use of amended water.

3. Preservation Sealing Tape: Type specifically designed for adhering to critical or sensitive surfaces without damage to surface; 3M or equal.

4. Spray adhesives shall not contain methylene chloride or methyl chloroform (1,1,1-trichloroethane) compounds.

5. Fire resistant sealants shall be compatible with concrete, metals, wood, cable jacketing and other materials capable of preventing fire, smoke, water and toxic fumes from penetrating through sealants.

a) Sealants shall be asbestos free and shall have a flame spread, smoke and fuel contribution of zero.

b) Sealants shall be ASTM -and UL-rated for 3 hours for standard method of fire test for firestop systems.

6. Lagging sealer for enclosing and sealing raw exposed edges of piping, fitting, equipment and duct insulation (as applicable) shall meet the requirements of NFPA 90A.

D. Surfactants and Encapsulants:

1. Wetting agents or surfactants shall be effective and compatible with the ACM and ACBM being wetted.

2. Bridging or penetrating type encapsulants shall have the following characteristics:

a) Water based. Do not utilize an organic solvent in which the solid parts of the encapsulant are suspended.

b) Non-flammable with no methylene chloride.

c) U.L. listed encapsulants, in full-scale ASTM E119 fire test, compatible with W.R. Grace "Retroguard, RG-1" fireproofing with "Spatterkote Type SKII" bonding treatment for structural and decking widths exceeding 24 inches.

d) Compatible with replacement materials, especially mastics, fireproofing, and adhesives.

E. Mastic Removers shall conform to the following:

1. Non-flammable solvent or gel, with a flash point above 140 degrees Fahrenheit.

2. Solvent waste shall not result in the generation of hazardous waste as described under 22 CCR, Division 4.

3. Removers shall not contain methylene chloride, halogenated hydrocarbons, or any of the following glycol ethers:

Common Name	Abbrev.	CAS#	Chemical Name
ethylene glycol methyl ether	EGME	109-86-4	2-methoxyethanol
ethylene glycol methyl ether acetate	EGMEA	110-49-6	2-methoxyethyl acetate
ethylene glycol ethyl ether	EGEE	110-80-5	2-ethoxyethanol
ethylene glycol ethyl ether acetate	EGEEA	111-15-9	2-ethoxyethyl acetate
ethylene glycol dimethyl ether	EGDME	110-71-4	1,2-dimethoxyethane
ethylene glycol diethyl ether	EGDEE	629-14-1	1,2-diethoxyethane
diethylene glycol	DEG	111-46-6	2,2'-dihydroxyethyl ether
diethylene glycol methyl ether	DEGME	111-77-3	2-(2-methoxyethoxy) ethanol
diethylene glycol ethyl ether	DEGEE	111-90-0	2-(2-ethoxyethoxy) ethanol
diethylene glycol dimethyl ether	DEGDME	111-90-6	bis(2-methoxyethoxy) ether
triethylene glycol dimethyl ether	TEGDME	112-49-2	2,5,8,11-tetraoxadodecane
dipropylene glycol	DPG	110-98-5	2,2-dihydroxyisopropyl ether

F. Vacuums and Negative Pressure Units (NPUs) used for clean-up of materials and detail shall be HEPA-filtered. Provide SCAQMD annual registration on-site for all units.

2.2 LEAD-RELATED WORK - MATERIALS AND EQUIPMENT

A. Protective Devices:

1. Polyethylene drop cloths and dust barriers, temporary wash stations or showers, disposable clothing, respirators, gloves, hard hats, and other required items.

2. Respirators shall protect against lead and other appropriate dusts, fumes and mists as approved by the National Institute for Occupational Safety and Health (NIOSH) under provisions of 30 CFR Part 11.

B. Sealants and Polyethylene Sheeting:

1. Polyethylene sheeting shall be flame-retardant and approved and listed by the State Fire Marshal in accordance with Section 13121 and/or 13144.1 of the California Health and Safety Code.

a) Thickness and Size: 6-mil thick minimum, unless otherwise specified, sized to minimize the frequency of joints.

b) Flammability: Comply with NFPA Standard 701 with a flame spread rating of no greater than 5 and a smoke development rating of no more than 70 when tested in accordance with ASTM E84 procedures.

2. Sealing Tape shall conform to the following:

a) 2-inches or wider, capable of sealing joints of adjacent sheets of polyethylene and attaching polyethylene sheet to finished or unfinished surfaces or similar materials.

b) Tape shall be capable of adhering under dry and wet conditions, including use of amended water.

3. Preservation Sealing Tape: Type specifically designed for adhering to critical or sensitive surfaces without damage to surface; 3M or equal.

4. Spray adhesives shall not contain methylene chloride or methyl chloroform (1,1,1-trichloroethane) compounds.

5. Fire resistant sealants shall be compatible with concrete, metals, wood, cable jacketing and other materials capable of preventing fire, smoke, water and toxic fumes from penetrating through sealants.

a) Sealants shall be asbestos free and shall have a flame spread, smoke and fuel contribution of zero.

b) Sealants shall be ASTM -and UL-rated for 3 hours for standard method of fire test for firestop systems.

C. Provide waste receptacles that meet federal and State regulations.

D. Paint Removers shall conform to the following:

1. Non-flammable removing solvents or gels, with a flash point above 140 degrees F.

2. Solvent waste shall not result in the generation of hazardous waste as described under 22 CCR, Division 4.

3. Removers shall not contain methylene chloride, halogenated hydrocarbons, or any of the following glycol ethers.

Common Name	Abbrev.	CAS#	Chemical Name
ethylene glycol methyl ether	EGME	109-86- 4	2-methoxyethanol
ethylene glycol methyl ether acetate	EGMEA	110-49-6	2-methoxyethyl acetate
ethylene glycol ethyl ether	EGEE	110-80-5	2-ethoxyethanol
ethylene glycol ethyl ether acetate	EGEEA	111-15-9	2-ethoxyethyl acetate
ethylene glycol dimethyl ether	EGDME	110-71-4	1,2dimethoxyethane
ethylene glycol diethyl ether	EGDEE	629-14-1	1,2diethoxyethane
diethylene glycol	DEG	111-46-6	2,2'dihydroxyethyl ether
diethylene glycol methyl ether	DEGME	111-77-3	2-(2-methoxyethoxy) ethanol
diethylene glycol ethyl ether	DEGEE	111-90-0	2-(2-ethoxyethoxy) ethanol
diethylene glycol dimethyl ether	DEGDME	111-90-6	bis(2-methoxyethoxy) ether
triethylene glycol dimethyl ether	TEGDME	112-49-2	2,5,8,11tetraoxadodecane
dipropylene glycol	DPG	110-98-5	2,2'dihydroxyisopropyl ether

E. Cleaning Agents: Cleaning agents, equipment, and methods employed shall not in any way damage the substrate or adjoining surfaces and finishes. Cleaning solvents shall be non-injurious to the surfaces upon which they are applied. The methods used shall cause no pitting, erosion or damages to the surfaces.

1. Do not use chemicals that may attach or leave deposits on the substrate material.

2. Modify the process or processes to suit the finish, hardness, and condition of the surface to be cleaned.

F. Vacuums and negative pressure units shall be HEPA-filtered for clean-up of loose debris and contaminants. Provide SCAQMD annual registration on-site for all units.

2.3 OTHER HAZARDOUS MATERIALS - MATERIAL AND EQUIPMENT

A. Soil, Pea Gravel or Other Backfill Materials:

1. Import engineered fill in uniform layers (lifts) not exceeding twelve (12) inches loose thickness and compacted to at least ninety percent (90%) of the maximum dry unit weight of the soil, or as otherwise directed by MRCA.

2. Fill shall be free of all excess organic material and hazardous or toxic materials, man-made or naturally occurring, including serpentine rock (serpentinite), hydrocarbon materials, metals, and construction debris of any sort.

B. Asphalt and Concrete Surfacing Materials:

1. Provide materials that conform to all requirements of the LADPW, MRCA and DOT.

2. Materials shall closely match the existing materials in the same area. Where new materials are installed adjacent to older materials, care shall be taken to match the height, slope, color, and surface texture of the new material with the old.

C. Waste Containers:

1. Provide sealable metal drums, 55-gallon capacity, with sealable lids. Label the drums in accordance with EPA and DTSC requirements, including the Generator I.D. or location identification and manifest number. Drums shall be air and water tight.

D. Miscellaneous Other Materials and Equipment:

1. Use dry ice in pelletized form.

2. Use non-recycled, fire-rated polyethylene sheeting, 20 mil or greater thickness, underneath and on top of excavated soils or materials.

3. Provide adequately rated equipment with sufficient capacity to remove the tank and perform ancillary excavation and compacting work within the allowable time constraints identified by the MRCA.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Review the hazardous material report(s) to familiarize oneself with hazardous material locations and conditions, and previous abatement by Others, as applicable.

B. Review site conditions to verify quantities, work zones, available utilities, security, etc.

3.2 PREPARATION

A. Minimum Protective Procedures for Asbestos Work:

1. Protection of Visitors and Other Site Personnel: Cordon off the abatement area(s) with appropriate signs, and provide temporary tunneling or scaffolding, as applicable.

2. Respiratory Protection: Comply with Cal/OSHA Regulation 8 CCR Section 1529 and ANSI Standard Z88.2, "Practices for Respiratory Protection." Use respirators approved by the National Institute for Occupational Safety and Health (NIOSH).

3. Provide site security to assure that no member of the public is able to gain access to the asbestos work area at any time. Maintain access and egress routes at all times.

4. Provide worker training, respiratory protection, and medical examinations to meet applicable regulations.

5. Provide temporary lighting and power to work areas, including installation of ground fault interrupters.

6. Fully ground all equipment within the work zone and decontamination assemblies.

7. Establish negative pressure in work area(s) as required under 8 CCR Section 1529. Note that where approved by the MRCA, negative pressure units *may* be removed overnight from unoccupied buildings where site security and equipment are at risk. Under such conditions, the Contractor shall be responsible for sealing all openings and the decontamination assembly before completion of the day's work and re-establishing negative pressurization of the zone before abatement commences.

8. Construct enclosure system(s) for worker and equipment decontamination.

9. Provide workers with sufficient sets of protective full-body clothing to be worn in the designated work area and whenever a potential exposure to airborne asbestos or potential safety hazards exist. Such clothing shall include but not be limited to: full-body coveralls, headgear, eye protection, and gloves. Disposable-type protective clothing, headgear, and footwear may be provided.

a) Full-Body Clothing: Assure that workers wear hoods covering their hair in the designated work areas at all times. Do not wear protective clothing in lieu of street clothing outside the work area. Leave non-disposable-type protective clothing and footwear in the wash room until the end of the asbestos abatement work. An acceptable alternative to disposal is proper storage in a sealed and

labeled container so that containers would be opened and clothing reused only in an asbestos work area.

b) Eye protection: Provide eye protection to be worn as required by applicable safety regulations. Wear eye protection at all times within the asbestos work areas during all phases of work: preparation, removal, clean-up, encapsulation, waste handling, and similar operations. When appropriate, based on regulatory mandates, a full facepiece respirator may be worn to satisfy this requirement. Equipment shall conform with ANSI Z87.1. Use of contact lenses with respiratory protection is prohibited.

c) Head Protection: Provide hard hats or other head protection as required by applicable safety regulations, conforming with ANSI Z89.1, Class A or B.

d) Foot Protection: Provide nonskid footwear to all abatement workers, conforming to ANSI Z41.1, Class 75.

B. Minimum Protective Procedures for Lead-Related Work:

1. Follow, at the minimum, dust control procedures as outlined under Cal/OSHA regulation 8 CCR 1532.1 and Article 1.4 above.

2. Respiratory Protection: Comply with Cal/OSHA Regulations included in 8 CCR Section 1532.1 and ANSI Standard Z88.2, "Practices for Respiratory Protection."

a) Use respirators approved by the National Institute for Occupational Safety and Health (NIOSH).

b) Provide respiratory protection to employees involved with lead-based paint demolition and/or abatement elements or as required for demolition work where employees may be occupationally exposed to lead at or exceeding the Action Level (AL) at no cost to the employees or MRCA.

c) Workers shall wear appropriate respiratory protection during lead hazards work, unless initial testing verifies that employee exposures are below the Action Level.

3. Site security to assure that no member of the public is able to gain access to regulated work areas. Maintain access and egress routes at all times.

4. Worker training, respiratory protection, medical examinations, and blood lead monitoring to meet applicable regulations.

5. Activity Class I work areas, as a minimum, with a 2-stage decontamination assembly, including an equipment and contiguous clean room with bucket wash-up facilities positioned as follows:

a) Equipment Room shall have lockers or labeled bags and containers for storing contaminated protective clothing and equipment.

b) Clean Room shall have lockers or containers for storing employee's street clothes and personal items. Clean Room shall also contain a suitable supply of

potable water to permit each employee to wash their hair, hands, forearms, face and neck.

6. Sufficient sets of protective full-body clothing for workers to be worn in designated work area and/or whenever a potential airborne lead hazard exists. Clothing shall include, but not be limited to, full-body coveralls, headgear, eye protection, and gloves. Disposable-type protective clothing, headgear and footwear is acceptable.

7. Full-Body Clothing: Workers shall wear hoods covering their hair in the designated lead hazard work areas at all times.

   a) Wearing of protective clothing, in lieu of street cloths, outside the work area is not permitted.

   b) Non-disposable-type protective clothing and footwear shall be left in the Wash Room decontamination assembly for disposal.

   c) The use of cloth coveralls following the prescribed laundry procedures as identified in 8 CCR, 1532.1 is acceptable.

8. Eye Protection: Eye protection, conforming to ANSI Z87.1 shall be worn at all times within the lead hazard areas.

9. Head Protection: Hard hats or other head protection as required by applicable safety regulations and conforming to ANSI Z89.1, Class A or B.

10. Foot Protection: Construction workers shall use non-skid footwear conforming to ANSI Z41.1, Class 75.

C. Site Protective Controls:

1. Protect against unnecessary disturbances or damages to sensitive finishes or furnishings that will remain within the facility.

2. Locate temporary scaffolding and containment barriers, as required, and proceed with the construction or demolition, allowing for continued operation of any adjacent occupied areas, as applicable.

3. Protect existing furnishings and building finishes from water, lead dusts, or chemical strippers.

4. Erect temporary protective covers over pedestrian walkways and at points of passage for persons or vehicles that are to remain operational during the lead hazard work.

5. Exterior lead hazard operations shall utilize mini-containments, drop cloths, wet methods, and HEPA vacuums as outlined in Cal/OSHA regulation 8 CCR Section 1532.1 and the HUD Guidelines, Chapter 8.

6. The MRCA may evaluate the lead dust concentrations outside the work area on adjoining finishes during the work progress by collecting wipe samples to evaluate the integrity of the containment and to detect dust contamination.

a) Evaluation will review possible contamination resulting from:

(1) Failure to adequately cordon off or contain work area dusts, clean-up debris, and use approved work practices, such as wet wiping and HEPA vacuuming.

(2) Failure or breaches in the work area isolation containment.

(3) Failure or rupture in the negative pressurization/HEPA filtration system.

(4) Incomplete decontamination of personnel or equipment removed from the work area(s).

b) Perimeter wipe samples may be collected adjacent to each work area and compared to the pre-construction background concentrations. The wipe sample will be analyzed by the MRCA by flame atomic absorption per NIST Standard 1578.

c) The Contractor shall re-clean adjoining occupied areas with surface concentrations exceeding background level or 800 micrograms/ft^2 during the construction activities. The Contractor shall bear the costs (including engineering, administrative, housekeeping, analytical and the labor and materials costs of the MRCA's consultant(s)) to return surface lead concentrations in elevated areas to acceptable levels.

3.3 ASBESTOS ABATEMENT PROCEDURES

A. Notifications:

1. Notify, in writing, the SCAQMD 10 working days prior to commencement of any non-emergency asbestos project involving more than 100 linear feet (LF) or more than 100 square feet (SF) of asbestos materials.

2. Notify Cal/OSHA 24 hours in advance of any disturbances of any amount of friable or non-friable asbestos-containing materials, or prior to performing asbestos-related work.

B. Procedures:

1. Vinyl Floor Tiles and Mastics:

a) Remove the flooring and mastics as indicated on the Contract Drawings using full isolation procedures, satisfying the requirements of Cal/OSHA Regulation 8 CCR 1529, Work Class II.

b) Set-up critical barriers and splash guards and establish negative pressurization.

c) Remove the tiles using wet methods to minimize breakage and airborne fiber releases.

d) Remove the mastic using a mastic remover.

e) HEPA vacuum the contained area following abatement for clearance; minimize use of encapsulant on substrates to be retiled.

f) Provide a full decontamination system with shower for areas exceeding 25 SF.

g) Dispose of tiles and mastic as Category 1 non-friable waste.

3. Sheet Vinyl ("Linoleum") Flooring and Mastic:

a) Remove the flooring and mastics as indicated on the Contract Drawings using full isolation procedures, satisfying the requirements of Cal/OSHA Regulation 8 CCR 1529, Work Class II.

b) Set-up critical barriers and splash guards and establish negative pressurization.

c) Remove the sheet vinyl backing using wet methods to minimize breakage and airborne fiber releases.

d) Remove the mastic using an approved mastic remover.

e) HEPA vacuum the contained area following abatement for clearance; minimize use of encapsulant on substrates to be retiled.

f) Provide a full decontamination system with shower for areas exceeding 25 SF.

g) Dispose of sheet vinyl backing and mastics as friable asbestos waste.

4. Transite® (Asbestos Cement) Materials:

a) Remove interior materials as noted on the Contract Drawings using full isolation procedures satisfying the requirements of Cal/OSHA Regulation 8 CCR 1529, Work Class II.

b) Set-up critical barriers and establish negative pressurization.

c) Remove the exterior materials by cordoning off the work area, installing polyethylene drop cloths on the ground and nearby objects, and removing the Transite® intact, where feasible.

d) Remove the materials using wet methods, minimizing breakage and airborne fiber releases.

e) Abate all adjoining mastics or caulking as Category 1 non-friable waste.

f) HEPA vacuum the contained area following abatement for clearance.

g) Provide a full decontamination system with shower for areas exceeding 25 SF.

h) Dispose of Transite® as Category 2 non-friable waste, double wrapping intact segments in 6-mil polyethylene sheeting.

5. Roofing:

   a) Remove the roofing and flashing materials as indicated by the Contract Drawings.

   b) Cordon off the work area, installing critical barriers at the skylights, roof-level windows, and other penetrations, as applicable.

   c) Remove all 3-dimensional materials using wet methods per Cal/OSHA's Regulation 8 CCR 1529, Work Class II.

   d) Set-up drop cloths on the ground and nearby objects to contain falling materials the ground or public access areas surrounding the work area.

   e) HEPA vacuum the roof following abatement.

   f) Provide a full decontamination system with shower for areas exceeding 100 SF.

   g) Dispose of roofing as Category 1 non-friable waste.

   h) Use of disposal chutes shall be pre-approved by the MRCA, per the Contractor's Hazardous Materials Management Plan (HMMP) submittal. Chutes shall be leak-tight, using negative air and HEPA equipment. The bottom of the chute shall be continuously manned during use, by a worker in full PPE.

6. Gypsum Board Walls and Ceilings and Joint Compounds:

   a) Remove composite materials using full isolation or mini-containment procedures within occupied building per Cal/OSHA Regulation 8 CCR 1529, Work Class II.

   b) Use wet methods and HEPA vacuums, setting up critical barriers for occupied areas.

   c) For building demolition projects, cordon off the area and use dust control methods to minimize airborne fiber releases.

   d) Provide full decontamination system with shower for areas exceeding 100 SF.

   e) HEPA vacuum the entire contained area prior to clearances for renovation projects.

   f) Dispose of composite materials as "trace" (<1%) asbestos waste, unless otherwise contaminated with other asbestos or hazardous wastes.

7. Asbestos Plasters and Sprayed-on Surfacing Materials:

   a) Remove ACM as indicated on the Contract Drawings using full isolation or mini-containment procedures per Cal/OSHA Regulation 8 CCR 1529, Work Class I, minimum.

   b) Use wet methods and HEPA vacuums.

c) Set-up critical barriers for quantities greater than 25 LF.

d) Seal HVAC systems and install drop cloths below and over nearby objects. Ventilate away from the workers, using a HEPA filtration system.

e) Provide a full decontamination system with shower for abatement quantities exceeding 25 LF or as otherwise directed by the Contract Documents.

f) HEPA vacuum the entire contained area prior to clearance air testing.

g) Dispose of ACM in double goosenecked bags properly labeled as friable asbestos waste.

8. Perimeter Window and Door Caulking:

a) Remove the caulking as indicated by the Contract Drawings.

b) Cordon off the work area, installing critical barriers at the windows, doors, and other penetrations, as applicable.

c) Remove ACM using wet methods per Cal/OSHA's Regulation 8 CCR 1529, Work Class II.

d) Set-up drop cloths on the ground and nearby objects to contain falling materials on the ground or public access areas surrounding the work area.

e) HEPA vacuum the sills and frames following abatement.

f) Provide a full decontamination system with shower for areas exceeding 100 SF.

g) Dispose of caulking as Category 1 non-friable waste.

9. "Trace" Asbestos Materials (Except Gypsum Wallboard and Joint Compounds):

a) Remove composite materials as indicated on the Contract Drawings using full isolation or mini-containment procedures within occupied building per Cal/OSHA Regulation 8 CCR 1529, Work Class II.

b) Use wet methods and HEPA vacuums, setting up critical barriers for occupied areas.

c) Set-up critical barriers for occupied areas.

d) For building demolition projects, cordon off the area and use dust control methods to minimize airborne fiber releases.

e) HEPA vacuum the entire contained area prior to clearances for renovation projects.

f) Dispose of composite materials as "trace" (<1%) asbestos waste, unless otherwise contaminated with other asbestos or hazardous wastes.