Chollas Creek
Enhancement Program

Adopted May 14, 2002

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Chollas Creek Enhancement Program

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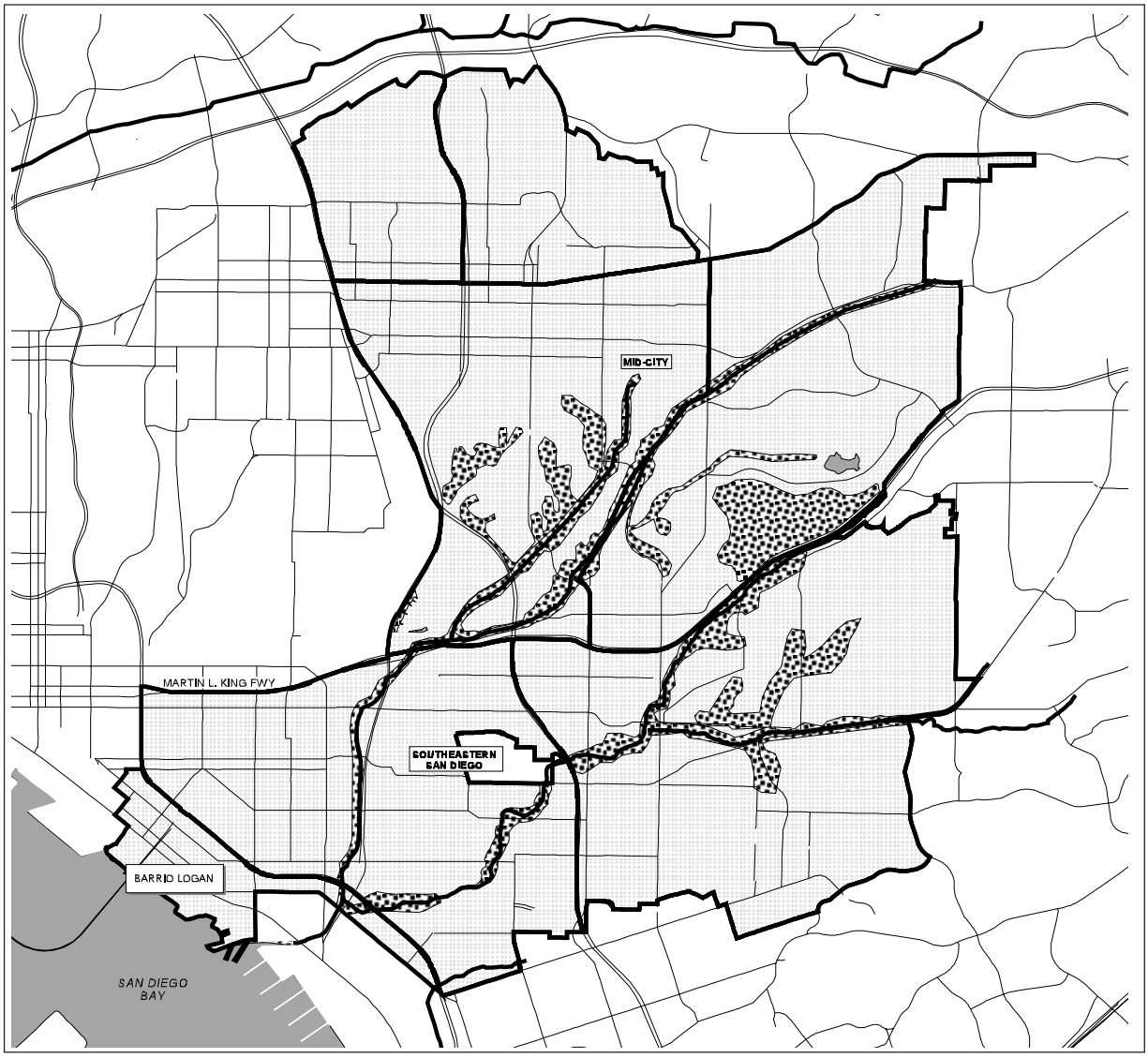
Chollas Creek Community Planning Areas
Mid-City, Southeastern San Diego, Barrio Logan



Chollas Creek Enhancement Program

EXECUTIVE SUMMARY

Chollas Creek is a natural drainage system that traverses inner-city neighborhoods within the Greater Mid-City (City Heights, Eastern), Encanto Neighborhoods, Southeastern San Diego, and Barrio Logan communities, from its headwaters in La Mesa and Lemon Grove to San Diego Bay. In its early history the creek was well known to Native Americans, who used it for settlement and as a major trail through the region. The creek also has a long geological history evidenced by a number of paleontological sites. In the past 50 years the creek has lost some of its natural geographic features due to freeways and other urban development that have segmented the creek so that in some areas it is barely recognizable as an open space system.

The historic channel and floodplain of Chollas Creek has been altered substantially as a result of decades of development and human activity. Today, the Chollas Creek-bed is an urban creek with little native vegetation and much of the channel is armored or is concrete channel and culverts. The U.S. Environmental Protection Agency has identified it as an "impaired" water body due to high levels of cadmium, copper, lead, zinc, and other toxicity found in the storm water collected. The creek's primary environmental value is its contribution to improved downstream water quality as a result of the filtering action of water flow through the channel. Enhancement of the remaining natural or soft bottom sections of the creek-bed will contribute to this overall environmental benefit.

The potential of the creek's development as an urban park asset was only identified in the late 1970's when work was initiated to update the first community plan prepared for the Southeastern San Diego communities. Since that time, restoration and enhancement of the creek has been the subject of numerous City polices and plans including the Barrio Logan-Harbor 101 Community Plan of 1978, the Southeastern San Diego Community Plan of 1987, and the Mid-City Communities Plan of 1998. With the population of Mid-City and Southeastern San Diego communities expected to exceed 380,000 people by 2015, and the growing inadequacy of parks and open space in the

inner city, as well as an income level below City average, the development of Chollas Creek Park will become a major catalyst for community revitalization.

The boundaries of Chollas Creek Enhancement Program encompasses the Chollas Creek channel, floodway and floodplain fringe including the first legal parcel abuting the Creek's floodway (channel).

This Chollas Creek Enhancement Program has been partially funded by a grant from the California Coastal Conservancy which financed an environmental consultant contract to analyze and develop recommendations for wetland conservation, restoration and rehabilitation. This document also consolidates information contained in numerous documents adopted by City Council since the late 1970's into a single document specifically designed for the enhancement of Chollas Creek. The Enhancement Program provides a *Community Vision for Development, Existing City Policies, Design/Development Guidelines, and a Strategy for Implementation,* as follows:

The Community Vision:

The Community Vision for Development was enunciated during a widely advertised and attended Community Workshop held on March 21, 1998.

The Community Vision for Development envisions a Linear Park encompassing the multiple branches of Chollas Creek, with possible natural and urban treatments give existing conditions and design/development opportunities. The vision for the Chollas Creek area is multi-faceted including: maintaining the natural areas in an undisturbed fashion, promoting cohesive new development that integrates buildings, open space, and the creek into successful and useable areas for the community, and restoring channeled creeks in urbanized areas to more natural and safe conditions. Finally, the vision creates useable linkages throughout the Chollas Creek and the community to San Diego Bay.

Existing City Policies Context:

The existing City policies are organized by element/theme in order to easily follow the policy precedent basis for the Design/Development Guidelines. The policies are referenced in the City's Progress Guide and General Plan, the applicable community plans, and other citywide policies and regulations.

The Design/Development Guidelines:

The Design/Development Guidelines are based on long established City policies and are specifically designed to address: Wetland Restoration and Rehabilitation, Channel Reconstruction, Lansdcaping, Trail System, Public Art, and Education/Interpretive Program. Some of these Guidelines are existent in City Council adopted documents, while others are new, designed to implement the stated policies in their related setting.

Through this document, it is the intent of this Enhancement Program to foster the restoration and rehabilitation of the Creek's remaining wetlands, using existing wetland remnants as the source for wetland mitigation and enhancement for projects that disrupt wetland environments within the communities of Mid-City, Encanto Neighborhoods, Southeastern San Diego, and Barrio Logan, all within the Chollas Creek geographic area and hydrological basin. Beyond the wetland restoration and rehabilitation actions, it is the objective of this Enhancement Program to foster quality design and development throughout.

Strategy for Implementation:

The Strategy for Implementation includes a 20-year phasing and funding timeline, as well as maintenance and oversight strategies. This document includes a Funding and Phasing Schedule with projected costs in year 2000 dollars. Cost projections are included to provide an early measure of funding levels required for each phase in order to give greater guidance to early funding requests. The phasing program includes the phased development of the following geographic sections of the Creek: South Branch, Encanto Branch, Emerald Hills Branch, Auburn Creek, Oak Canyon Branch, Main Branch, and Bayside. The Strategy for Implementation envisions each phase analyzed in detail through a separate and more specific enhancement plan, providing detailed implementation programs, phasing and funding.

Finally, considering the limited land availability and the need for quality design and engineering safety, it is recommended that the development of the Creek reconstruction areas should be approached as an arts project with artists to play a very active role or as lead designers supported by the required technical expertise of engineering, landscape architecture, hydrology and other required disciplines.

This document also includes two Appendices for reference: one is the Habitat Restoration Background for information details related to habitat restoration; the other, Guidelines for Crime Prevention through Environmental Design which are particularly applicable to supplement landscaping and structural development proposals.

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Chollas Creek Enhancement Program Funding and Phasing Schedule

Costs shown below are general projectons based on Year 2000 dollar costs per unit and an approximated assessment of the area involved. The costs are provided for purposes of implementation planning and assessing grant funding requests. With the development of Enhancement Plans for each phase of development, these costs will be updated.

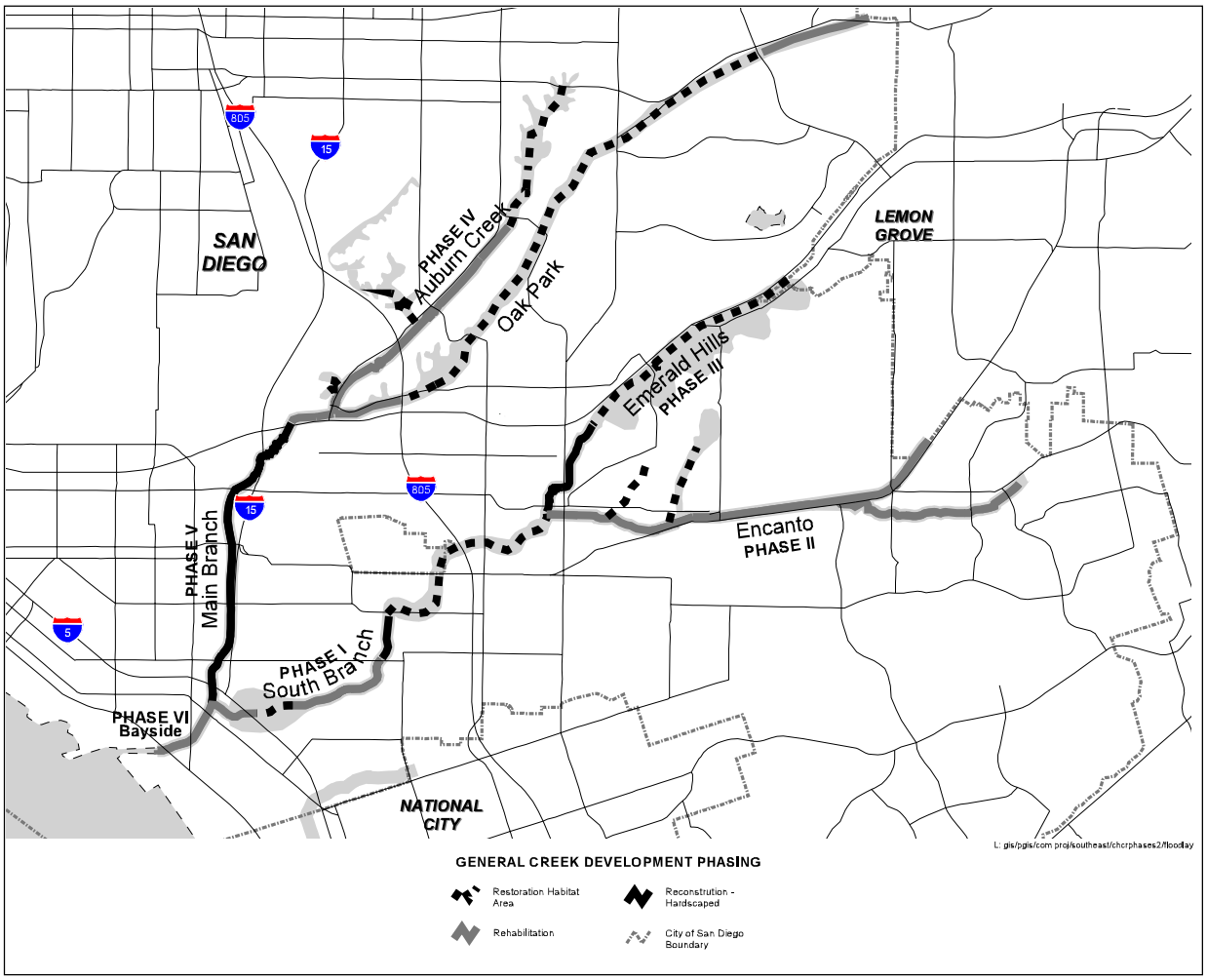
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Phase I-South Branch																					
1. Enhancement – ($100,000)	$100,000 Grant																				
2. Implementation Plan																					
Habitat Restoration – $2.0 million)	$1.2 Million Grant	$800,000																			
Channel Reconstruction – ($3.0 million)		$1.0 Million	$1.0 Million	$1.0 Million																	
Trails – ($1.3 million)	$372,000 Private	$1.0 Million	$1.0 Million	$1.0 Million																	
Landscaping – ($500,000)		$100,000	$200,000	$200,000																	
Interpretive Program – ($619,000)		$150,000	$70,000	$400,000																	
Maintenance – ($)																					
Phase II-Encanto Branch																					
1. Enhancement – ($100,000)			$100,000																		
2. Implementation																					
Habitat Restoration – ($100,000)				$100,000																	
Channel Reconstruction _ ($3.2 million)				$200,000	$1.0 Million	$1.0 Million	$1.0 Million														
Trails – ($320,000)				$100,000	$100,000		$120,000														
Landscaping – ($500,000)					$200,000	$200,000	$200,000														
Interpretive Program – ($500,000)					$100,000	$200,000	$200,000														
Maintenance – ($)																					
Phase III-Emerald Hills																					
1. Enhancement Plan – ($100,000)						$100,000															
2. Implementation Plan																					
Habitat Restoration – ($550,000)							$200,000	$350,000													
Channel Reconstruction – ($1.6 million)								$500,000	$500,000	$600,000											
Trails – ($1.0 million)							$200,000	$300,000	$500,000	$200,000											
Landscaping – ($500,000)								$100,000	$200,000	$200,000											
Interpretive Program – ($500,000)								$100,000	$200,000	$200,000											
Maintenance – ($)																					
Phase IVA - Fox Canyon																					
1. Enhancement Plan – ($100,000)								$100,000													
2. Implementation Plan																					
Habitat Restoration – ($250,000)									$250,000												
Channel Reconstruction – ($4.0 million)									$500,000	$1.0 Million	$1.0 Million										
Trails – ($1.0 million)									$250,000	$250,000	$500,000										
Landscaping – ($500,000)									$100,000	$200,000	$200,000										
Interpretive Program – ($500,000)									$100,000	$200,000	$200,000										
Maintenance – ($)																					

Chollas Creek Enhancement Program Funding and Phasing Schedule

Costs shown below are general projectons based on Year 2000 dollar costs per unit and an approximated assessment of the area involved. The costs are provided for purposes of implementation planning and assessing grant funding requests. With the development of Enhancement Plans for each phase of development, these costs will be updated.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Phase IVB - Oak Park																					
1. Enhancement – ($100,000)						$100,000															
2. Implementation Plan																					
Habitat Restoration – $2.4 million)							$500,000	$1.0 Million	$1.0 Million												
Channel Reconstruction – ($1.0 million)								$500,000	$500,000												
Trails – ($2.0 million)							$500,000	$500,000	$1.0 Million												
Landscaping – ($500,000)							$100,000	$200,000	$200,000												
Interpretive Program – ($500,000)							$100,000	$200,000	$200,000												
Maintenance – ($)																					
Phase V - Main Branch																					
1. Enhancement – ($100,000)										$100,000											
2. Implementation																					
Channel Reconstruction – ($5.5 million)																					
Trails – ($1.5 million)												$1.0 Million	$1.0 Million	$1.0 Million	$1.0 Million						
Landscaping – ($1.0 million)																					
Interpretive Program – ($1.0 million)												$500,000	$500,000	$500,000	$500,000						
Maintenance – ($)											$200,000			$500,000	$500,000						
Phase VI - Bayside																					
1. Enhancement Plan – ($100,000)														$100,000							
2. Implementation Plan																					
Habitat Restoration – ($100,000)															$100,000						
Channel Reconstruction – ($2.0 million)																$500,000	$500,000	$500,000	$500,000		
Trails – ($600,000)																$100,000	$200,000	$200,000	$200,000		
Landscaping – ($500,000)															$50,000	$50,000	$100,000	$100,000	$200,000		
Interpretive Program – ($1.0 million)																		$500,000	$500,000		
Maintenance – ($)																					

NOTE: $ costs are approximate projections based on 2000 unit costs and an approximation of the area involved. These costs are outlined for purposes of understanding the scope of the funding commitment necessary over the long term. With the development of the Enhancement Plan for each section, actual updated costs will eveloped for implementation.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15
SAN DIEGO
PHASE IV
Auburn Creek
Oak Park
LEMON GROVE
Emerald Hills
PHASE III
805
15
PHASE V
Main Branch
Encanto
PHASE II
5
PHASE I
South Branch
PHASE VI
Bayside
NATIONAL CITY
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GENERAL CREEK DEVELOPMENT PHASING
Restoration Habitat Area
Reconstrution - Hardscaped
Rehabilitation
City of San Diego Boundary

COMMUNITY WORKSHOP ISSUES AND VISION

Through the 1970's to the end of the 20th century, the inner-city communities developed an interest in Chollas Creek as a result of the City's Community Planning Program and the environmental consciousness that evolved through the later part of the century. Starting with the 1978 Barrio Logan/Harbor 101 Community Plan, the 1987 Southeastern San Diego Community Plan and the 1998 Mid-City Communities Plan, issues and visions for Chollas Creek have been discussed and developed. These include the Creek restoration and redevelopment at San Diego Bay, much of it within the Navy's 32nd Street Naval Station; the preservation and enhancement of the natural areas; and, the redevelopment of those disturbed concreted-in channel areas with urban parks and plazas to create a setting for new private redevelopment. The stated objectives of these plans have been modestly realized. Now, with a new interest in inner-city urban restoration and development, as well as the realization that creek systems can become very desirable urban parks, a new interest in realizing the objectives and vision of the 1979-1998 community plans has come to the forefront.

On March 21, 1998 a widely publicized community workshop was held, attended by a wide cross-section of community and agency representatives. At that workshop three major objectives were realized: one, the identification of key issues; two, development of design concepts; and three, the development of a common vision. The information that follows provides a synopsis of those key issues and common vision. A more detailed record of the proceedings is available in a report published after the workshop.

The sections that follow provide a short synopsis of the issues and the vision developed by the community representives at the workshop. This information provides an important context to the Design/Development Guidelines and Implementation Program contained in this Chollas Creek Enhancement Program document.

Community Issues:

- The lack of creek identification throughout, and lack of knowledge about its important role in the ancient history of San Diego.
- The development of win-win solutions to integrate both open space conservation and urban development opportunities.
- The need to realistically address creek improvement funding and maintenance costs.

The Major Design Concepts:

Recreation

- Need for a multi-use trail system which connect neighborhoods north and south of SR-94, Chollas Lake, Southeastern San Diego, the San Diego Bay, and Mission Valley
- Hiking trails along natural portions of creek and bike pedestrian paths in more developed areas
- Focus on youth and education through use of creek

*Riverwalk, San AntonioTexas**

Development

- Identify funding sources
- Incorporate creek in setting for all development, with Riverwalk type commercial use
- Maintain continuity and connection back to community
- More bridges to connect communities
- Community gardens

*1. Many workshop participants used the term " Riverwalk", which refers to design concepts embodied in San Antonio's "Riverwalk" a highly successful urban revitalization project in downtown San Antonio, Texas, that incorporates public pedestrian amenities such as pathways, seating, plazas, amphitheaters, and landscaping with private development including shops, hotels, restaurants and outdoor cafes along the riverfront.

Safety

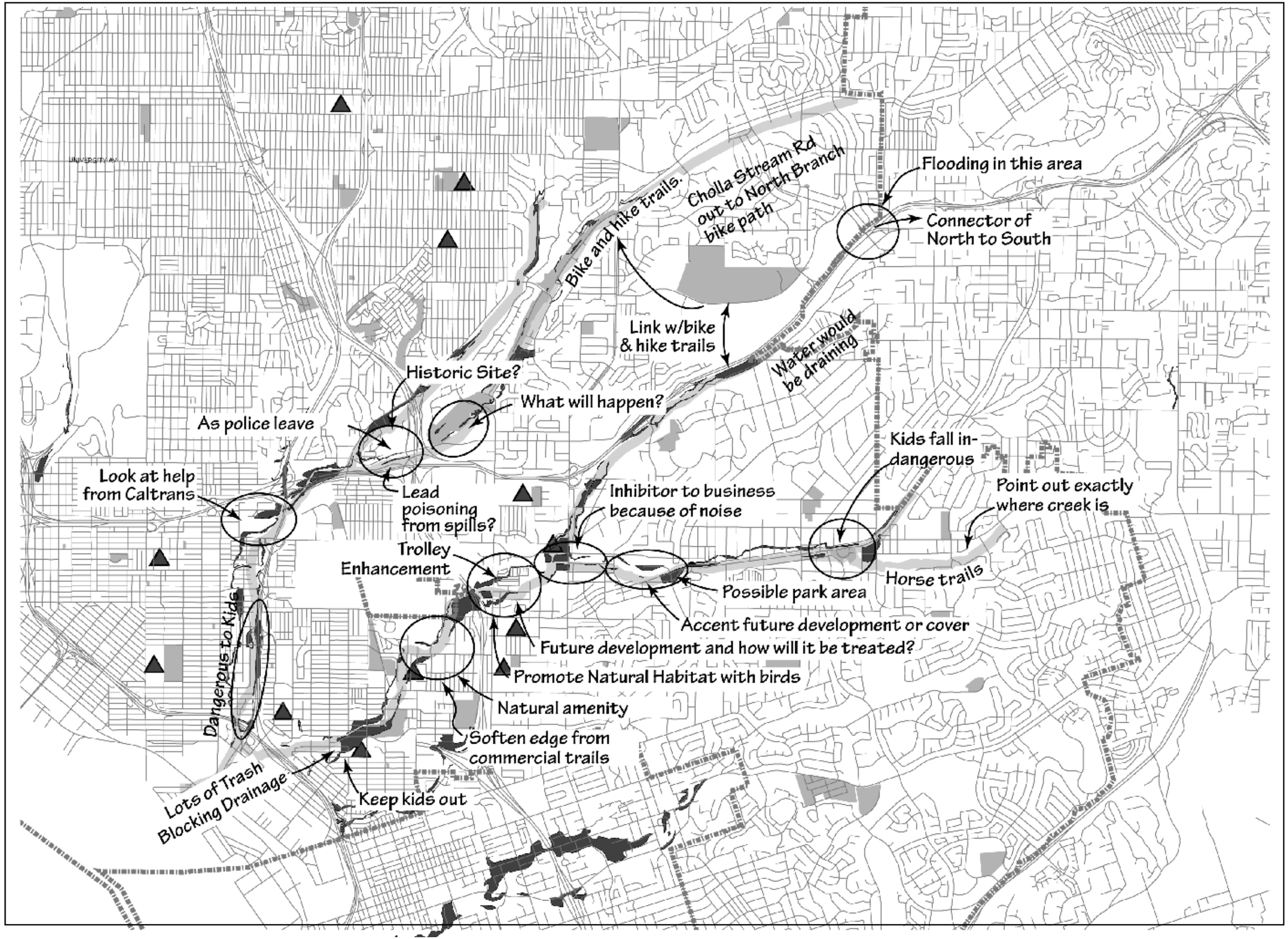
- Adequate flood protection
- Enhanced personal safety
- Solar panel emergency phones
- Lighting for pedestrian night use, with motion sensors

Maintenance

- Clean out debris and maintain using California Conservation Corps (CCC) and Job Corps

Beautification

- Emphasize natural setting and encourage wildlife Don't fence it off
- Use public art
- Water wanted all along creek, explore high water table and dredging opportunities
- Restore to wetland
- Theme of trees to connect creek system visually
- No concrete channelization
- Cultural history awareness



COMMUNITY WORKSHOP ISSUES

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Community Vision

The Community Vision developed at the workshop for the enhancement of Chollas Creek Includes the following concepts:

- Recognize Chollas Creek as a regional resource with a good blending of natural and "built" environments.

- Identify the various creek tributaries and branches, creating identity for each, with a linkage system of trails * (a Riverwalk-type development all the way to the Bay.)

- Incorporate water areas into the creek by dredging, preservation of native habitats as an enhancement of disturbed areas through the development of Riverwalk concepts that integrate the river with urban development.

- Assure that private development and the City contribute to creek development and enhancement.

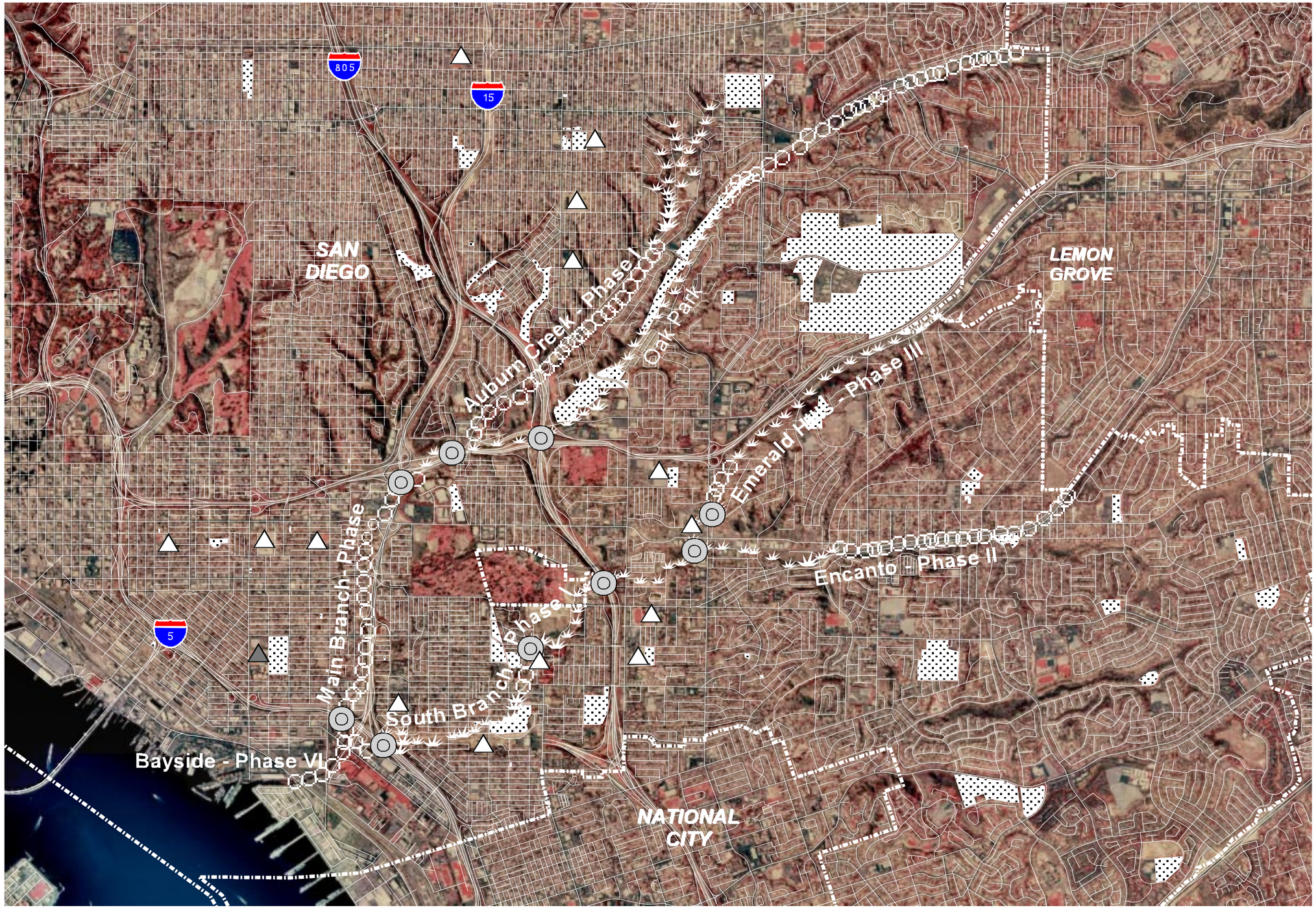
- Recognize the creek's natural habitat, its historical role and its educational resource potential through an interactive educational exhibit program.

- Create a safe environment with motion sensitive lights, emergency solar panel telephones, and continuing maintenance to relieve impacts from flooding.

- Create a setting for economic development through creek enhancements and linear park development reminiscent of its historical role with linkages to College Grove, Chollas Reservoir, Radio Canyon, and terminating in San Diego Bay.

- Provide design excellence and continuity throughout, with connections back to the neighborhoods.

- Incorporate public art into all Riverwalk improvements and constructions.



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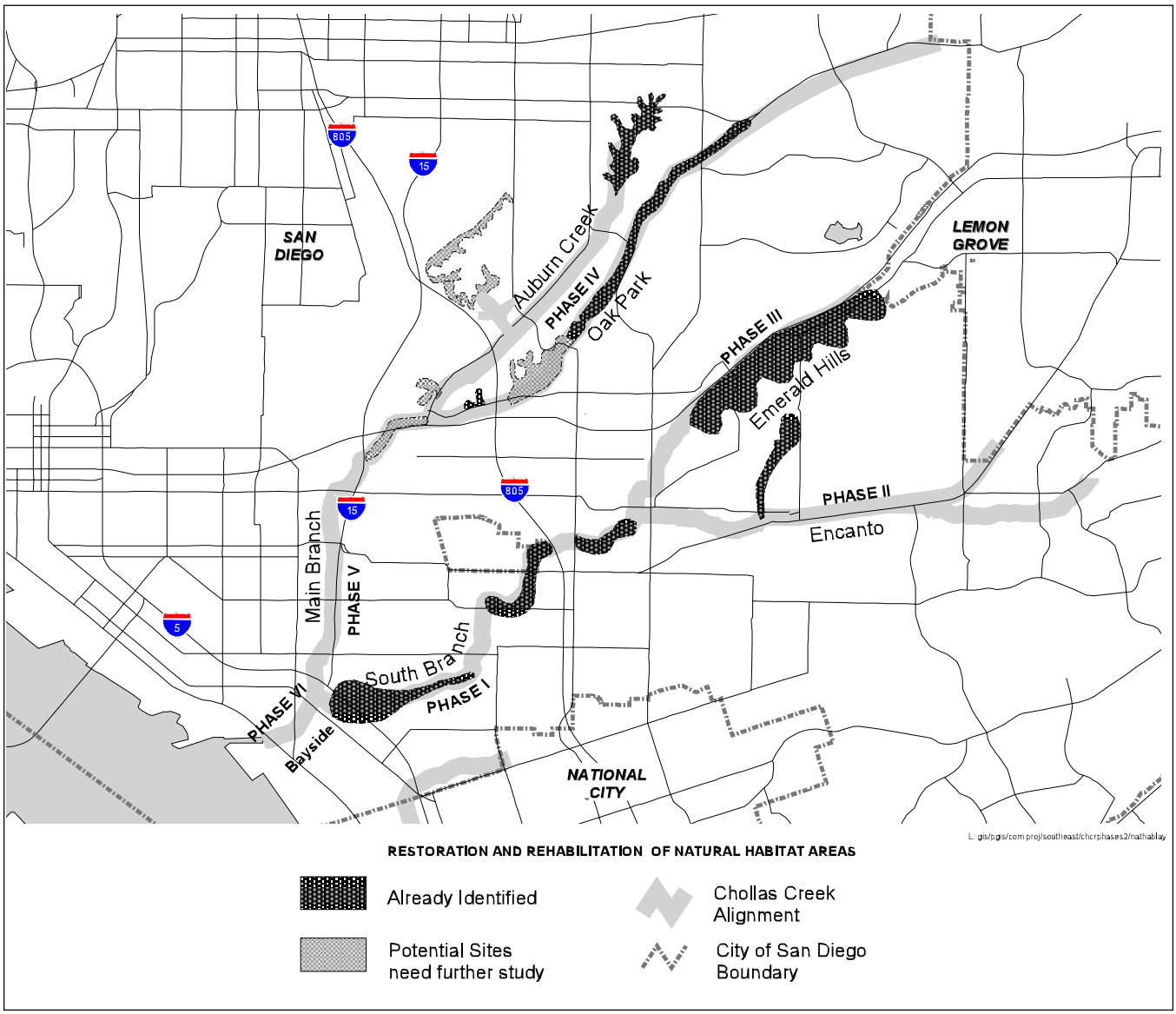
CHOLLAS CREEK VISION

DESIGN/DEVELOPMENT GUIDELINES

The creation of these Design/Development Guidelines have their basis in many City documents: the Barrio Logan-Harbor 101 Community Plan (1978), the Southeastern San Diego Community Plan (1987), Project First Class Urban Design Program (1989), the Imperial Avenue Corridor SEDC Urban Design Charrette (1995), and the Mid-City Communities Plan (1998). There is also direction found in City ordinances and City Council Policy: building upon these Council approved community plans, codes and policy, City staff held the community workshop in 1998. The key issues, major design concepts and vision from that workshop have been incorporated into the Chollas Creek Enhancement Program's final recommendations. Those conclusions, combined with the work of the City Wetlands Management Plan prepared by consultants Estrada Land Planning & KEA Environmental for the South Branch/Phase 1 improvements are the basis of this Enhancement Program.

The following Design/Development Guidelines for Chollas Creek, include a section on the adopted policy context with pertinent policies taken from the Barrio Logan-Harbor 101 Community Plan, the Southeastern San Diego Community Plan, Project First Class Urban Design Program, the Mid-City Communities Plan and other guiding City documents. The guiding policies are the basis upon which more specific Design/Development Guidelines have been created. It is important to note that the policies and guidelines that follow are based on existing City policy and federal and state regulations, specifically in relation to wetland and multiple species habitats, water runoff, hazardous materials, erosion control, etc. The Guidelines will apply to all of Chollas Creek, which covers over 25 miles of creek bed and floodplains. The development of these Design/Development Guidelines has been made possible by the work prepared for the South Chollas Creek Branch/Phase 1 Wetlands Management Plan. Specifically, the wetland restoration and rehabilitation guidelines prepared by consultants Estrada and KEA have been incorporated into this document.


SAN DIEGO
LEMON GROVE
NATIONAL CITY
Auburn Creek
Oak Park
PHASE IV
PHASE III
Emerald Hills
PHASE II
Encanto
Main Branch
PHASE V
South Branch
PHASE I
PHASE VI
Bayside
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L:\gis\pgis\com proj\southeast\chcrphases2\mathablay
RESTORATION AND REHABILITATION OF NATURAL HABITAT AREAS
Already Identified
Potential Sites need further study
Chollas Creek Alignment
City of San Diego Boundary

A. Wetland and Upland Restoration and Rehabilitation

One of the main objectives of the Community Vision for Chollas Creek Park is to restore the habitat in those areas that have some natural remnants. Restoration efforts should also include mitigation credits and improvements from projects that disturb wetland habitats within the sub-region hydrological basin covered by the community planning areas of Barrio Logan, Southeastern San Diego, City Heights, and the Eastern Area. Mitigation credits will be specifically applicable to zones that are presently disturbed and have been identified for reclamation to provide expanded wetland function. This program can assist the habitat enhancement effort and preclude the export of mitigation benefits to other creeks and rivers from the communities affected by development.

Wetlands are among the most important ecosystems in the world. They provide vital fish and wildlife habitat, suppress floods, recharge the aquifer, protect shorelines, cleanse polluted waters, and provide numerous other functions which underscore the need for protection and proper management of wetland resources (Mitsch, William J, and Gosselink, James G. Wetlands [3rd Edition], John Wiley and Sons, Inc. 2000). Wetlands and their related upland environments are protected by federal law, state law, and local policies and ordinances that regulate wetlands and associated sensitive plant species. The guidelines that follow are based on such policy and regulatory context.

The Southeastern San Diego Community Plan specifically recognizes the potential asset of habitat restoration as it states:

> "Creeks and related drainage areas are an important open area linkage that connect the community, from the inland canyons and hillsides to San Diego Bay. Chollas and Paleta Creeks, if carefully designed, can provide the Southeastern communities with a unique linkage system not available to any other community in San Diego. Design creativity should be exercised in the development and redevelopment of the sites adjacent to these creek areas. Two conditions exist relative to creek development. Some sections of the creek system are still in a natural or naturalized state. The naturalized condition is

represented by natural flood plains and/or channelized rip rap and earthen slopes. Different sets of standards have to be devised to address these two very different conditions....” (Source: Southeastern San Diego Community Plan, 1987, page 146.)

The natural creek condition is most prevalent in the Mid-City Communities, with some remaining natural sections in Encanto and Southeastern San Diego. There are areas that have been identified to contain sensitive plant and animal species by the City’s Multiple Species Conservation Plan (MSCP). One such location of the federally threatened Coastal California Gnatcatcher (*Poliophila californica*) and a large patch of sensitive Coastal Sage Scrub have been identified between Roswell and Market Streets in the Emerald Hills Branch. Several populations of Coast Barrel Cactus (*Fetocactus viridesious)*, a California Native Plant Society (CNPS) List 2 species, is known to occur along the slopes of the Encanto Branch and on some of the tributary canyons. Other sensitive plant species that potentially could occur within the study area, albeit in small numbers, include Western Dichondra (*Dichondra occidentalis*) also a CNPS List 4 species. These could exist in association with Coastal Sage Scrub or Chaparral vegetation. Southwest Spini Rush (*Junctus acutussup leopoldii*), another CNPS List 4 species, could occur along portions of Chollas Creek with a more permanent water supply. However, as of yet this species has not been observed.

Some of the native shrub elements are present, but are so scattered that they do not represent native shrub habitats, such as Chaparral or Sage Scrub. The more conspicuous natives include: Lemonade-Berry (*Rhus Integrifolia*), Toyon (*Heteromeles arbutifolia*), Cholla (*Opuntia sp.*), Broom Baccharis (*Baccharis sarohroides*), and Flat-top Buckwheat (*Eriogonum fasciculatum*).

Detailed Wetland Management and Habitat Enhancement Plans will be prepared for the various sections of the creek to identify the habitats of specific species. Their locations will determine the basis and scope of restoration plans for each phase of development.

Policy Context:

The following pertinent policies are found in the Mid-City Communities Plan, Southeastern San Diego Community Plan and Barrio Logan-Harbor 101 Community Plan, and are pertinent to wetland and upland habitat preservation, restoration, and open space system linkage. They are collected and listed here to provide a proper context to the Design/ Development Guidelines that follow.

Wetland/Riparian Habitat

"Improve and enhance riparian habitat In Chollas Creek." (Mid-City Communities Plan page 37)

"Apply the appropriate development restrictions to riparian areas along Chollas Creek." (Mid-City Communities Plan page 37)

"Improve and enhance riparian habitat in Chollas Creek as a means of improving water quality." (Mid-City Communities Plan page 38)

"Provide soil erosion and flood protection in a manner sensitive to the park's habitat values, using natural materials that blend with the surrounding environment." (Mid-City Communities Plan page 50)

"Preserve creeks and drainage areas in their natural state. The Chollas Creek system is an important linear open area resource. All creeks in the community should be made available for passive recreation where safe." (Source: Southeastern San Diego Community Plan page 79)

"The creek area should be maintained or rehabilitated to its natural environmental quality, as much as feasible. Any channelization should be of naturalized form, with stone and undulating earthen sloped edges." (Source: Southeastern San Diego Community Plan page 147)

Upland Habitat

"Apply appropriate zoning restrictions to all steep slopes (in Mid-City) to ensure that sensitive slopes and natural habitats are protected." (Mid-City Communities Plan page 37)

"Preserve Hillside areas. Preserve areas of native vegetation."
(Mid-City Communities Plan paga 39)

"Preserve sensitive slopes, canyons, flooplains and other areas designated as open space through acquisition, zoning, resource regulation or other available methods"
(Mid-City Communities Plan page 39)

Open Space System

"Preserve and enhance Chollas Creek as a linear open space system to provide passive recreational opportunities, visual relief and biological habitat preservation."
(Mid-City Communities Plan page 39)

"Provide soil erosion and flood protection in a manner sensitive to the Park's habitat values, using natural materials that blend with the surrounding environment."
(Mid-City Communities Plan page 50)

"Where acquisition of Chollas Creek is not feasible, explore other means of preservation such as open space easements, development restrictions and other means."
(Mid-City Communities Plan page 39)

"A natural linear park should be developd taking advantage of the Chollas Creek regional open space development potential." (Barrio Logan - Harbor 101 Community Plan page 136)

"The retention of undeveloped paper streets and alleys would assist in the preservation of the area as open space…..Utilize easements and appropriate open space zoning to manitain and enlarge parks and open space."
(Mid-City Communities Plan page 40)

"Encourage the use of reclaimed water for landscaping and encourage low water development landscaping."
(Mid-City Communities Plan page 38)

DESIGN/DEVELOPMENT GUIDELINES

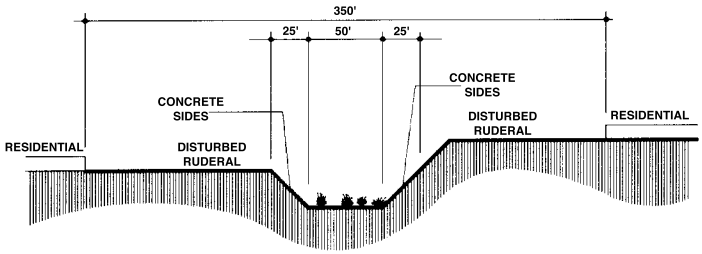
The Guidelines that follow are designed to give specific design direction to any development impacting wetland, upland and the open space system. As stated earlier, they are designed to address local, state and federal requirements in the context of the special environs of Chollas Creek.

Retain Natural Features

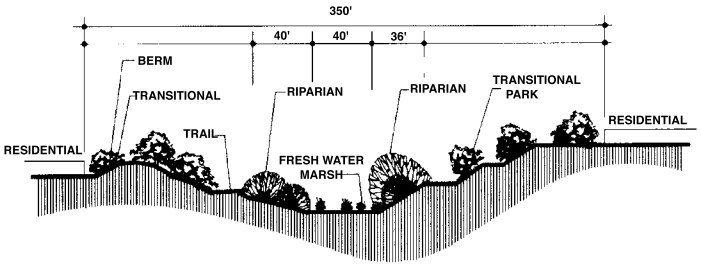
"Retain existing vegetation, ravines, watercourses and topographical features."
(Project First Class Urban Design Program, p. 94)

Natural Setting

Existing vegetation should be preserved, enhanced and maintained. All non-native, invasive plant material should be removed from the creek . Retention of the natural ravines, watercourses, drainage areas, and topographic features shall be a primary consideration. In addition, new landscaping should complement the natural selections (see vegetation selections that follow). Watercourses should not be altered or undergrounded. When some alteration of watercourse has to occur, a natural setting should be re-created, without concrete channeling, and without covering the channel.



Typical Existing Section

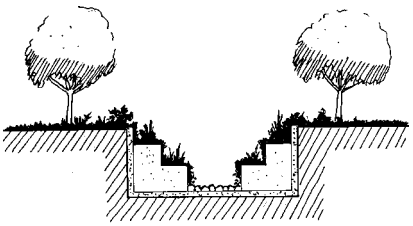


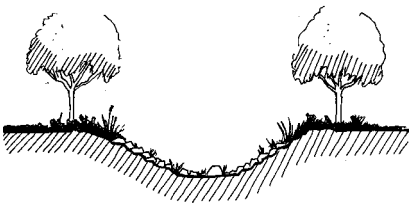
Proposed Section

Typical Restoration Area

Restore Disturbed Areas

In general, disturbed areas where some form of channelization has taken place with relatively wide earth bottoms, make wetland and vegetative restoration possible. Channels can be replaced by berms or "block-crete" that support steep grading and permit water drainage, aquifer recharge, and plant growth between structural elements. Please refer to Appendix I- Programmatic Habitat Restoration and Management Actions for details on methods to implement this Guideline.





Avoid Channelization

Avoid new channelization: channelizing the Creek creates a new set of environmental problems, visual dilemmas and physical safety issues that can be avoided by improving the creek's edge and upland area. As illustrated, the creek can be wrapped with stepping edges to ensure a safe exit from the channel.

Integrate Vacant Parcels Abutting the Creek

Small vacant parcels adjacent to the creek channel or streets rights-of-way should be developed and used, as feasible, for landscaping and pocket parks, intergrating them with the Chollas Creek landscaping system.

Restore Native Wetland Vegetation

Restore native soils and vegetation in the Creek channel and sides to re-stablish its natural wetland function and appearance. Please refer to Appendix I- Programmatic Habitat Restoration and Management Actions for details on methods to Implement this Guideline. The following vegetation tables should be used to guide wetland restoration.

Freshwater Marsh Species Composition

Species	Pounds Per Acre	Minimum Percent Purity	Minimum Percent Germination	Pounds of Viable Seed Per Acre
Anemopis californica - Yerba Mansa	5	45	60	0.3
Ambrosia psilostachya - Western Ragweed	3	45	60	0.9
Iva haysiana - San Diego Marsh Elder	1	35	20	0,7
Juncus acutus - Spiny Rush	2	85	40	0.7
Juncus mexicanus - Mexican Rush	2	85	40	0.7
*Pluchea orodrat*a - Marsh Fleabne	1	35	60	0.2
Pluchea serivea - Arrow weed	0.5	35	60	0.1
Acirpus acutus var. *occidentalis* - Tule	1	50	40	0.4

Notes:

Dry-spread seed mix shall be applied over the entire enhancement area following installation of container plantings. All seed shall have originated in either San Diego, Riverside, or Orange counties.

Estimated percent purity/percent germination figures.

The pounds per acre of seed to be applied shall be adjusted to achieve the specified pounds per acre of viable seed when actual percent purity/germination figures are calculated.

Riparian Scrub Species Composition

Species	Container Size (gal)	Spacing (Feet on Center)	Percentage of Cover	Density Per Acre
Baccharis salicifolia - Mulefat	1	8	40	200
Platanus racemosa - Sycamore	5	2	20	30
Populus fremontii - Cottonwood	5	2	20	30
Rosa californica - California Rose	1	6	20	100
Sambucus mexicana - Mexican Elderberry	1	15	5	40
Salix exigua - Sandbar Willow	1	10	10	50
Saelix leavigata - Red Willow	5	8	15	100
Salix lasiolepis - Black Willow	5	8	35	200
Vitis girdiana - Desert Wild Grape	1	8	5	500

Notes:
Container Plants should be propagated from materials collected within a 100-mile radius from the site.

Plants shall be grown by a qualified nursery specializing in native plant propagation.

Relative position of trees and shrubs is subject to approval byproject biologist/landscape architect.

Riparian Scrub Dry-Spread Seed Mix

Species	Pounds Per Acre	Minimum Percent Purity	Minimum Percent Germination	Pounds of Viable Seed Per Acre
Artemisia douglasiana - Mugwort	4.0	10	50	0.2
Baccharis salicifolia - Mulefat	3.0	2	40	0.2
Iva hayesiana - San Diego Marsh Elder	1.0	35	20	0.7
Mimulus puniceus - Monkey flower	1.0	2	55	0.1
Oenotheras elata ssp. - Evening Primrose	1.0	98	75	0.7
Plantago ovata - Plantain	5.0	98	75	7.3
*Pluchea orodrat*a - Marsh Fleabne	0.5	35	60	0.1
Urtica holosericea - Nettle	2.0	50	60	0.6

Notes:
Dry-spread seed mix shall be applied over the entire enhancement area following installation of container plantings.
All seed shall have originated in either San Diego, Riverside, or Orange counties.

Estimated percent purity/percent germination figures.

The pounds per acre of seed to be applied shall be adjusted to achieve the specified pounds per acre of viable seed when actual percent purity/germination figures are calculated.

Vegetate Upland Areas to Complement Creek Habitat

Upland vegetation areas ouside the creek-bed should be designed to supplement creek-bed vegetation and present an enhanced park-like entry into the creek bed. Usually trails will be provided and designed along the top of the creek bed in conjunction with the upland vegetation. Please refer to Appendix I- Programmatic Habitat Restoration and Management Actions for details on methods to implement this Guideline. The following Vegetation Tables should be used to guide wetland restoration.

Transitional Buffer Species Composition

Species	Container Size (gal)	Spacing (Feet on Center)	Percentage of Cover	Density Per Acre
Artemisia californica - Sage Brush	1	5	30	50
Baccharis pilularis - Chaparral Broom	1	5	40	40
Heteromeles arbutifolia - Toyon	1	8	40	20
Quercus agrifoia - Coast Live Oak	5	20	10	20
Platanus racemosa - Sycamore	5	15	10	20
Populus fremontii - Cottonwood	5	15	10	20
Rosa californica - California Rose	1	5	30	50
Sambucus mexicana - Mexican Elderberry	1	8	30	15
Salix exigua - Sandbar Willow	1	8	30	50

Notes:
Container Plants should be propagated from materials collected within a 100-mile radius from the site.

Plants shall be grown by a qualified nursery specializing in native plant propagation.

Relative position of trees and shrubs is subject to approval by project biologist/landscape architect.

Transitional Buffer Dry-Spread Seed Mix

Species	Pounds Per Acre	Minimum Percent Purity	Minimum Percent Germination	Pounds of Viable Seed Per Acre
Artemisia douglasiana - Mugwort	4	10	50	0.2
Baccharis pilularis - Chaparral Broom	3	2	40	0.2
Isocoma menziesii - Coastal Golden Bush	4	20	20	0.3
Mimulus puniceus - Monkey flower	1	2	55	0.1
Oenotheras elata ssp. *leopoldii* - Evening Primrose	1	98	75	0.7
Oenothera hooderi - Hooker's Primrose	1	98	75	0.7
Phacelia sp. - Phaselia	0.25	35	60	0.1
Pluchea sericea - Arrow Weed	0.5	35	60	0.1

Notes:
Dry-spread seed mix shall be applied over the entire enhancement area following installation of container plantings.
All seed shall have originated in either San Diego, Riverside, or Orange counties.

Estimated percent purity/percent germination figures.

The pounds per acre of seed to be applied shall be adjusted to achieve the specified pounds per acre of viable seed when actual percent purity/germination figures are calculated.

Maintain Natural Drainage Patterns

Natural drainage should be maintained by: preserving slopes and soil elevation to maintain natural runoff patterns; maintaining soil composition that allows natural water filtration; and carefully assessing appropriate ground cover and new soil import to assure that the natural runoff and drainage patterns are not changed.

Recharge the Creek's Aquifer

Maintain porous and natural materials to permit the natural recharge of the aquifer. If grading in the creek is undertaken, assure that a soil analysis is made and new soils or surfaces applied will allow for proper drainage, filtering, and aquifer recharge.

Maintain and Enhance Water Quality

Maintain and enhance the creek's water filtering function, if at all possible, by maintaining natural soils. If grading is necessary, replace with new soils and ground cover that will maintain and enhance the water quality. Sandy soils, porous soils, and plant materials that provide cleansing action should be used to restore disturbed areas.

Control Erosion

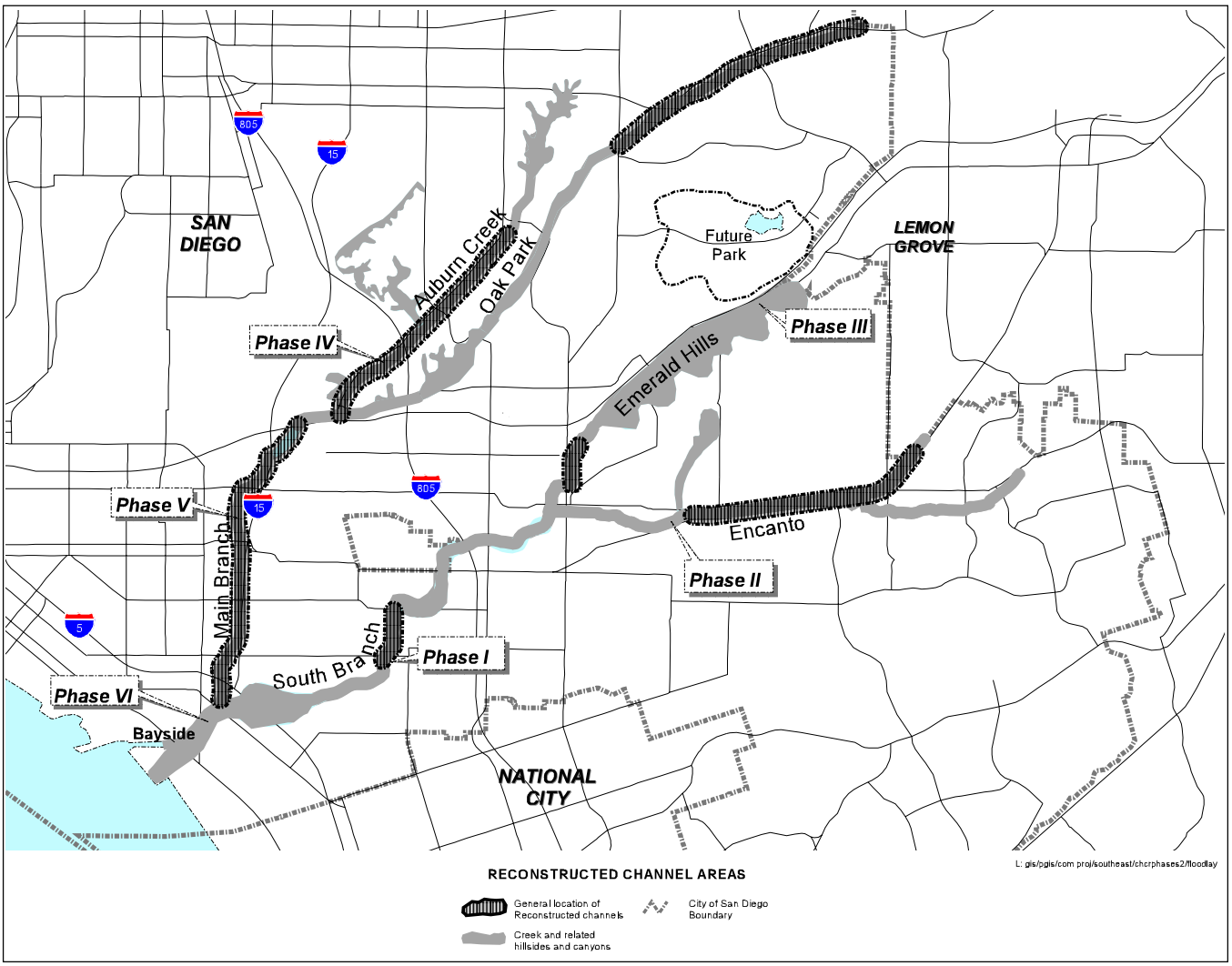
Prior to any grading or changes in topography, an analysis should be made of erosion-related issues through an evaluation of new soils or surfaces applied, projected water velocity, vegetation impacts on the slowing down of water, and siltation conditions. Water de-celeration structures and erosion control structures may need to be considered where high erosion levels are identified.

Water Reclamation

Use reclamation technologies whenever ponds or other water areas are planned as part of the Chollas Creek development. Water reclamation programs may also be used to recharge the aquifer. This is a long-term program which will be available upon development of improved technologies and community acceptance. In the meantime, pilot projects may be considered in conjunction with interpretive programs and development.

Flood Safety

All new improvements in the Chollas Creek will address flood safety.


SAN DIEGO
LEMON GROVE
NATIONAL CITY
Bayside
Auburn Creek
Oak Park
Future Park
Emerald Hills
Encanto
Main Branch
South Branch
Phase I
Phase II
Phase III
Phase IV
Phase V
Phase VI
805
15
5
L: gis/pgis/com proj/southeast/chcrphases2/floodlay
RECONSTRUCTED CHANNEL AREAS
General location of Reconstructed channels
City of San Diego Boundary
Creek and related hillsides and canyons

B. Channel Reconstruction

Open space development opportunities are made possible by Chollas Creek's multiple branching system. Those areas that have been concreted-in should be reconstructed and beautified. The concrete channelization presents unique problems. There is not enough space to work with since the channel has been designed exclusively to carry water at high speed during a flood event of up to 50-100 year probability. Removing the concrete surfaces could result in loss of protection from flooding for the adjacent properties. Yet, in their present form, these channels present their own safety challenges with water traveling at high speeds, making it a dangerous situation to be caught in. Accidents that have occurred in Chollas Creek have been in these concrete channel areas. The challenge to design and development is to introduce designed landscape elements, including the hardscape materials, creating safety harbors, and beautifying the sections in an artistic manner.

Policy Context

The following policies taken from the applicable community plans address the issue of channelization and channel area reconstruction. These policies are the basis for the Design/ Development Guidelines that follow.

Urbanized Creek Areas

"Other sections of the creek system are no longer natural, and should be considered urbanized. The urbanized condition is represented by narrow channels with concrete sides and soft or hard bottom."
(Southeastern San Diego Community Plan Page 146)

"Development should view these channel areas as sculptural hardscape elements…"
(Southeastern San Diego Community Plan page 149)

DESIGN/DEVELOPMENT GUIDELINES

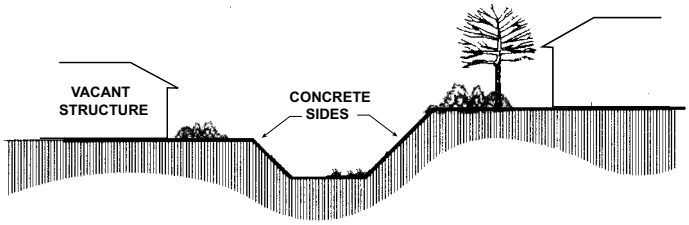
The guidelines that follow are designed to implement the urban creek policies of the community plans.

Hardscape Channelization

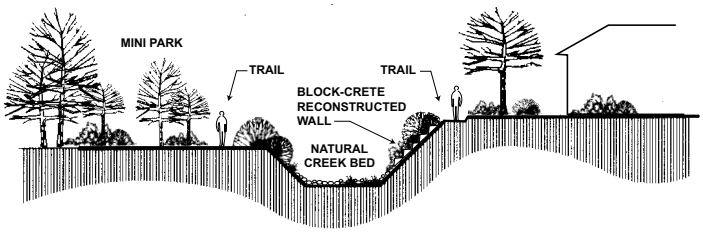
New channelization of the creek, if it should occur, should consist of stones or stepped concrete. When stones are not possible due to land availability constraints, the slope of the creek wall may be stepped or modified creating a hardscape sculpture.

Creek Wall

Care should be taken to ensure that the grade of the creek wall slope is consistent with the Land Development Code requirements, Section 142.0133, which are currently 50% if the slope is greater than 10 feet in height, or 66% if the slope is less than 10 feet in height. The safety of the area should be the guiding force in the overall design.



Typical Existing Conditions



Proposed Improvements

Concrete Channel Removal

To the extent possible, concrete channels should be removed and underground channels should be daylighted. This may be possible in a few cases. Channel walls may be reconstructed with berms and block-crete, resulting in a more natural function and appearance.

Channelization as an Arts Project

Development of the creek through hardscape should be approached as a public art design and development program through the City's Public Arts Commission, in order to provide a quality human made environment. The importance of hydrology and flood safety will require that any consultant or artist hired for creek design include in his/her team a hydrologist and civil engineer that can capably address the flood and safety related development issues.

Organic Design

Design options include undulating walls and bottoms designed to slow down or provide safe ledges, artistic hardscape surfaces, safe pedestrian trail ledges within the channel, partial closure or covering all or portions of the concrete channel turning its surface areas into pocket or linear parks.

> "Design should emphasize undulating organic or jagged walled surfaces, create patterned paved surfaces, and provide designs that are multi-functional hydrologically and recreationally."
> (Southeastern San Diego Community Plan page 149)

Use of Porous Materials

In order to maintain the creek's aquifer, enhance its water quality/filtration function, and control flooding and erosion, use of porous materials should be given priority over impermeable materials. Earth embankments, block-crete, sandy soils, and vegetation are preferable to impervious concrete and other hardscape surfaces that do not make allowances for water filtration and aquifer recharge through the materials or the joints between materials.

Multi-functional Active Uses

> "Multi-functional uses within a paved channel element can include such activity as skating areas, competition track areas, spectator seating, small amphitheaters, etc. These high activity uses should be limitted to locations adjacent to parks, schools or high activity development areas [with strictly controlled access]." (Southeastern San Diego Community Plan page 149)

Multi-functional Passive Uses

"Locations adjacent to residential uses should be designed as passive sculptural areas for the visual enjoyment of adjacent neighbors."
(Southeastern San Diego Community Plan page 149)

Underground Passages

Another reconstruction-retrofit issue relates to underground passages of the Creek under freeways and major roads. Whereas these locations are today passable by pedestrians, they are socially unsafe and should not be used for such purposes until a safe option is provided within the context of an arts project.

Bayside

"Design considerations for its development should include: Elevating the area to the south of Rigel Street industrial area, and developing berms for flood protection purposes, maintaining the channel bottom natural and developing landscaping areas along its edges. The landscaped area could include man made structures with sculptural qualities that are combined with natural landscaping, trees and plants…"
(Barrio Logan/Harbor 101 Community Plan page 189)

C. Landscaping

Proper development of Chollas Creek requires that special consideration be given to landscaping amenities along the corridor, for both hardscape and vegetation. The Mid-City, Southeastern San Diego, and Barrio Logan/Harbor 101 community plans provide policies regarding appropriate landscape treatments, from vegetation palette suggestions supportive of wetland and other habitat restoration purposes, to sculptural and artistic approaches to hardscape treatments. As the suggestions are implemented over time, the result will be a park-like environment which will substantially enhance the surrounding neighborhoods, ultimately assuring their revitalization.

Policy Context

The following policies from the Mid-City Communities Plan, Southeastern San Diego Community Plan and Barrio Logan/Harbor 101 Community Plan address landscaping issues related to the development of the creek and are the basis for the Design/Development Guidelines that follow.

Wetland Vegetation

"Revegetate wetland areas with native wetland habitat." (Mid-City Communities Plan page 50)

"Landscaping along the channel should include plant species that are typical of wetland creek environments and native to the San Diego area, or are native drought-resistant, depending on their location within the project and proximity to creek water areas. All project landscaping should be designed in a manner that contributes to the overall enhancement of the channel as a sculptural form within a park-like environment." (Southeastern San Diego Community Plan page 149)

"Landscaping along the Creek should use plant species that are typical of wetland/creek environments. Other project landscaping and architectural treatment should contribute to an overall enhancement of the creek's parklike corridor." (Southeastern San Diego Community Plan page 147)

"The Southcrest 252 corridor presents an opportunity to develop a finger of open space from Southcrest Park westward along the corridor."
(Project First Class Urban Design Program page 9)

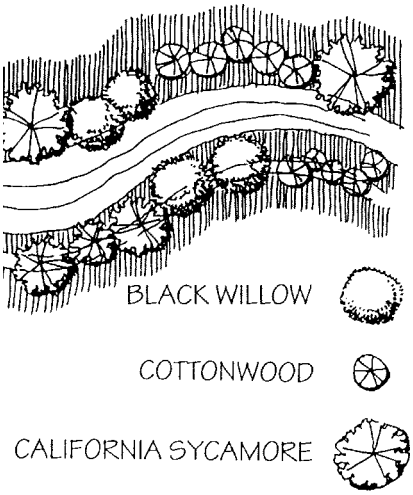
Water Reclamation

"Encourage use of reclaimed water for landscaping and encourage low water demand landscaping."
(Mid-City Communities Plan page 38)

Upland Areas

"Develop passive recreational space in undeveloped canyons, where the natural integrity of the canyon may be preserved."
(Mid-City Communities Plan page 39)

"Properties along the rim of the park should provide setbacks with landscaping materials consistent with the wetland habitat and ambiance." (Mid-City Communities Plan page 50)



"Vegetation areas should be used to set-off the man-made sculptural elements, as in a sculptural garden."
(Southeastern San Diego Community Plan page 149)

"Develop landscaping buffer areas and pedestrian easements along the community's major watershed, Chollas Creek."
(Barrio Logan-Harbor 101 Community Plan page 189)

"Sufficient setbacks should be provided in order to allow for future use of the creek's edge as park-like linkages for pedestrians and bikes."
(Southeastern San Diego Community Plan page 147)

DESIGN/DEVELOPMENT GUIDELINES

The following guidelines have been developed to address established policy direction.

Minimum Vegetation Ratios

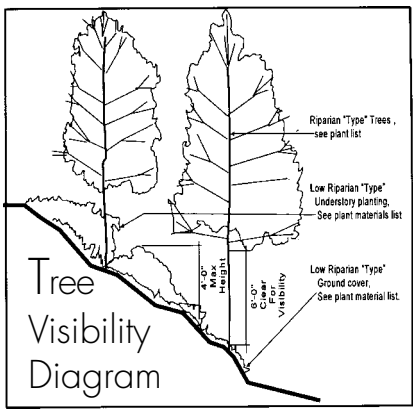
Vegetation should constitute no less than 25% of the landscape design in a given improvement area.

Vegetation Edges Plant Palette

"Vegetation for the Chollas Creek edge should include *Cedrus* (cedar), *Pinus torreyana*, *Cupaniopsis*, *Plantanus acerfolia*."
(Project First Class Urban Design Program, page 37)

Fast Growing Riparian Trees

One design strategy is to incorporate large, fast growing riparian trees within the creek sloped area or in the bed to create a "ribbon of trees that will follow the creek". In essence this would allow the location of the creek to be distinguished from the surrounding community through the visual high canopy. Types of trees should include: *Platanus racemosa*, *Alnus rhombifolia,* and *Populus sp.*



Riparian Understory Shrubs

A second strategy is that the planting concept for the Chollas Creek Enhancement Program area should utilize riparian type tree plantings and introduce a similar understory planting to complement the creek-like feeling. The understory shrub planting should be located in small masses and should reach a height of 3 feet to 4 feet. A low slope stabilizing groundcover should be planted in addition to the shrubs. Once the trees have become established, the lower branches should be trimmed up to maintain a clear and unobstructed view within the planting areas.

Creek Plant Palette

TREES

Platanus racemosa
Alnus rhombifolia
Populus sp.
Salix sp.
Betula pendula

SHRUBS

Artemisia douglasiana
Baccaris solicifolia
Epilabium californiaca
Minulus cardinalis
Ribes speciosum
Rosa californica
Sambucus mexicana
Rhus laurina

GROUND COVER

Ceanothus Horizontalis
Arctostaphylos Edmunsii
Baccaris Pilaris

HYDROSEED MIX

100% Seed

Pluchea odorata
Limonium californicum
Layia platyglossa
Trifolium obtusiflorum
Achillea millefolium
Camissonia cheiranthifolia
Oenothera elata
Amrosia psilostachya
Grindelia strita
Deschampsia cespitosa
Polygonum punctatum
Scrophularianica
Mimulus guttatus
Hordeum brachyantherum

Bayside

"Tree and plant material should be drought resistant and fast growing, and require little manicuring. The open space buffer and pedestrian easement on both sides of the creek channel and outside the channel proper should be 40 feet." (Barrio Logan/Harbor 101 Community Plan page 189)

Reclaimed Water Use

Reclaimed water should be used, as available, for landscaping special water features and aquifer recharge, taking advantage of the creek's natural filtering qualities.

Landscaped Setbacks

Properties along the rim of the creek should provide landscaped setbacks of 10 feet minimum, or observe their required property setbacks. Their vegetation should use the vegetation lists suggested by this Program.

Porous Paving Materials

Hardscape areas should use porous materials that permit continued water filtration to maintain the creek's aquifer. For large paved areas, use vegetation or grass breaks, grasscrete, sand, gravel, and other combinations of porous materials.

Setting for Development

"Development should be oriented to use the creek areas as the project's park like frontage, and not turn its back on it. The creek should be used as a positive park-like feature of the project." (Southeastern San Diego Community Plan page 147)

D. Trail System

Trails provide important continuity and accessibility throughout all reaches of Chollas Creek, effectively creating the much needed linear park-open space system that will ultimately link San Diego's central mesas to San Diego Bay.

The trail system will encompass not only the creek-bed and edges, but adjacent streets and open spaces. Some trails will be rural in appearance to complement natural restoration areas, while other trails will be of an urban character linking the creek to various urban areas. Trails will also have an important phasing component related to timing and phasing of public improvements and creek enhancements. For example, trails will not be incorporated in the creek bed until such incorporation is carefully designed and safe. This condition primarily affects the creek reconstruction areas, where environmental enhancements are not immediately possible, and the creek area does not have space for the development of safe trails on its edge at this point in time.

Policy Context

The policies below are taken from the Mid-City Communities Plan, Southeastern San Diego Community Plan, and Barrio Logan-Harbor 101 Community Plan, and are the basis for the Design/Development Guidelines that follow.

Link Open Space

"Permanently link and preserve all canyons, slopes and floodways, designated as open space."
(Mid-City Communities Plan page 39)

"Provide access to usable public open space systems in order to increase passive recreational opportunities."
(Mid-City Communities Plan page 40)

"Create a system of linkages between Mid-City parks and open space." (Mid-City Communities Plan page 39)

"Provide a pedestrian and bicycle linkage from Chollas Park to the Mid-City athletic area and other parks via Chollas Creek."
(Mid-City Communities Plan page 50)

"Enhance links between park and open space areas within and outside the community."
(Mid-City Communities Plan page 39)

"Increase the opportunities for the public enjoyment of open space areas, including limited access to Radio Canyon and Chollas Creek."
(Southeastern San Diego Community Plan page 75)

"Chollas Creek: The remaining natural portions of Chollas Creek should be planned as a linear park with bicycle and pedestrian paths along a natural or landscaped creek bottom. Concrete channelization shall be forbidden. Public access to the creek should be provided from and through private development and public rights-of-way along the creek. Funding for acquisition, improvements and maintenance should be from an assessment district or similar means."
(Southeastern San Diego Community Plan page 78)

"Southeast San Diego's creeks and related drainage areas are an important open area linkage that connect the community, from the inland canyons and hillsides to San Diego Bay. Chollas and Puleta Creeks, if carefully designed, can provide the Southeast community with a unique linkage system not available to any other community in San Diego."
(Southeastern San Diego Community Plan page 146)

Enhance Pedestrian Trails

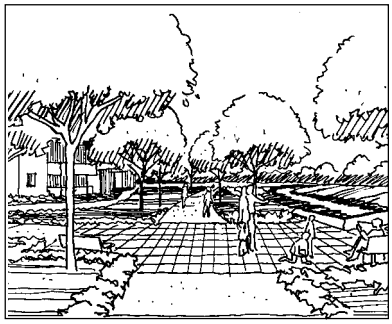
"Preserve and enhance Chollas Creek making it accessible, while maintaining and rehabilitating its habitat values."
(Mid-City Comminities Plan page 50)

"The remaining natural portions of Chollas Creek should be planned as a linear park with bicycle and pedestrian paths along a naturalized or landscaped creek bottom."
(Source: Southeastern San Diego Community Plan page 78)

"Achieve a more connected system of active and passive open space. Chollas Creek and Paleta Creeks should be carefully designed to provide a unique pedestrian linkage system for the community. Public access to the creek should be provided from and through private development and public rights of way along the creek." (Source: Southeastern San Diego Community Plan page 75 & page 146)

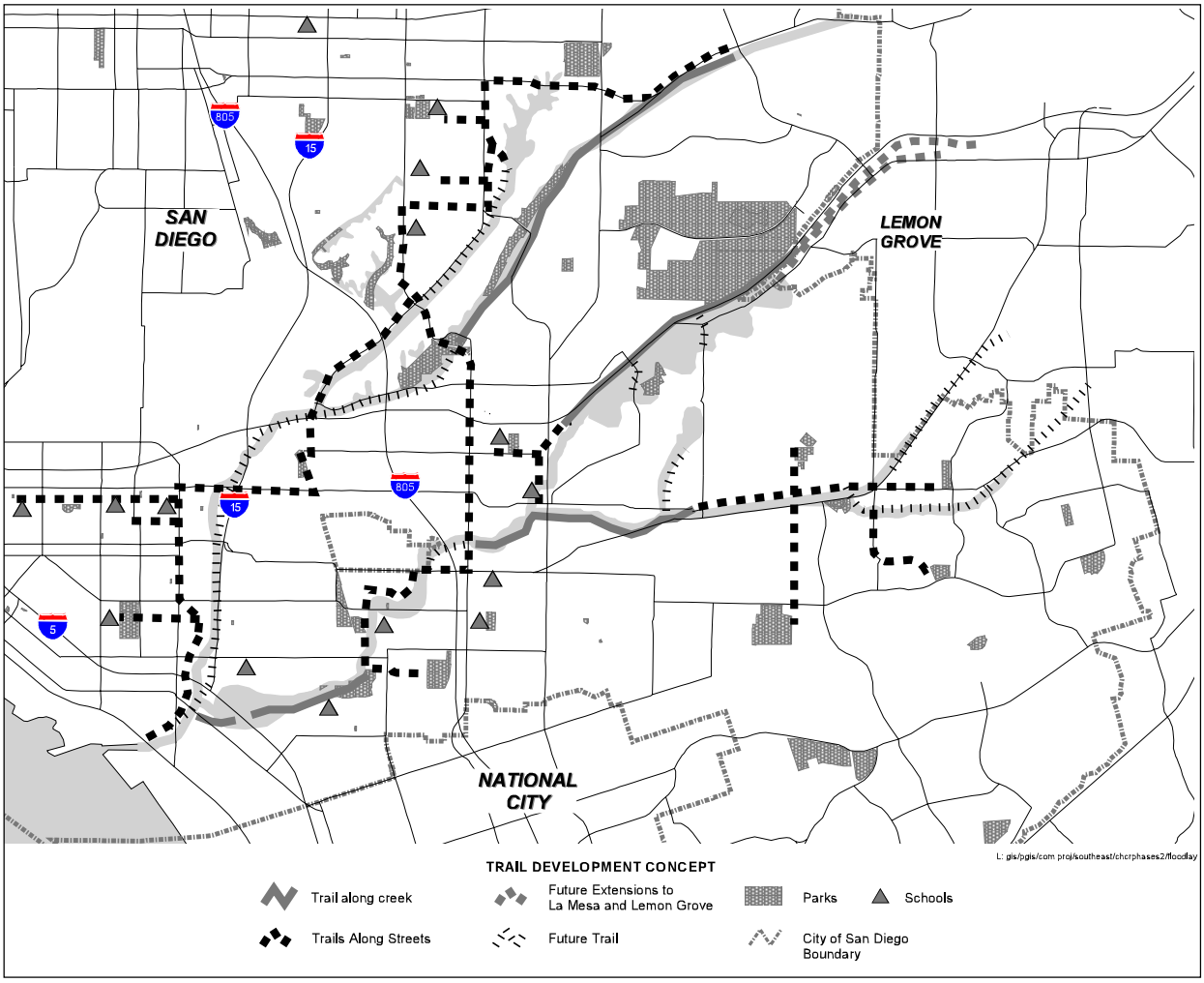
"Sufficient setbacks should be provided in order to allow for future use of the creek's edge as park-like linkages for pedestrian and bicycles."
(Southeastern San Diego Community Plan page 147)

Development Orientation



"Development should be oriented to use the natural creek areas as the project's park-like frontage, and not turn its back on it. The creek should be used as a positive park-like feature of the project."
(Southeastern San Diego Community Plan page 147)

"Minimal setbacks from the edge of the channel should be observed. These setbacks should be based on safety facts. The setbacks should be designed as linkages in and adjacent to high activity areas."
(Southeastern San Diego Community Plan page 149)



Off-street parking should not be located on the creek setback, and should be sited so that landscaping can be provided between the parking area and the creek's edge. (Southeastern San Diego Community Plan page 147)

DESIGN/DEVELOPMENT GUIDELINES

The following guidelines are designed to implement the adopted policies.

Linear Park Trail

Whenever physically feasible, the land adjacent to Chollas Creek should be planned as a linear park and trail system. When there is inadequate space, the trail system should be routed back to public sidewalks until it can be constructed along the creek bed.

Natural Trail Design

For new development, wherever existing width allows, an 8 - 10 foot multi-use trail should be developed, flanked with shrubs and trees as illustrated. Trees should be planted in areas at least 5 feet wide on both sides of the trail at a minimum of 30 foot intervals. The trail surface shall consist of the native soil, or where the soil is highly erosive, a tread surfacing material, such as decomposed granite, which will blend with the natural environment. Trail gradients must meet current Americans with Disabilities Act (ADA) standards.Where appropriate, interpretive displays of cultural and natural resources should be installed along the trail route (See Interpretive Section).

Trail Safety

Trail development adjacent to the creek should specifically address the issues of safety and maintenance. Lighting should be placed to provide proper surveillance of the area. Solar energy sources should be considered. Safety call boxes should be placed along the trail to provide adequate safety. Removable bollards should be placed at strategic access points along the trail, in order to allow access for emergency and maintenance vehicles. Trail markers should be installed at each entrance or access point, as well as along the route to direct users - especially in areas where following the trails is difficult. An emblem common to the entire system should be developed.

Street Trails

Wherever a trail has to follow a public street instead of the creek, enhanced sidewalks with street trees should be provided on both sides of the street.

Urban Furniture

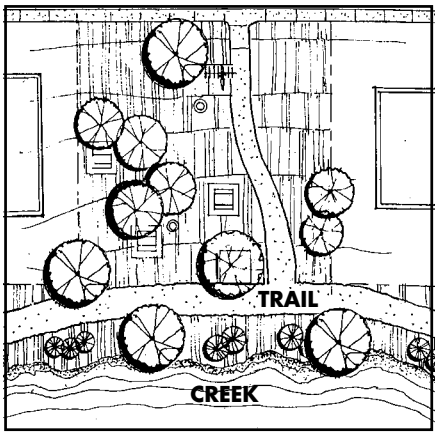
Amenities such as seating, drinking fountains, bicycle racks, and trash receptacles should be located intermittently along the trail. Seating should be included and be of one type for continuity throughout the Chollas Creek project. Picnic tables may also be located along the trail. They should be of the same character as the benches. Waste receptacles should be located for convenient use and efficient maintenance. Bicycle racks should be located in parks, staging areas, or strategic access points along the trail. Consideration for disable access and use should be included.

Staging Area

Staging areas should be located in adjacent parks and at strategic access points along the trail such as street ends. The purpose of staging areas is to facilitate trail use by providing features such as: parking, regulatory and directional signage, bicycle racks, information kiosks, drinking fountains, restrooms, picnic tables, seating and waste receptacles.

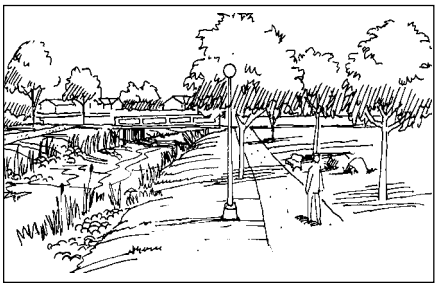
Public Access

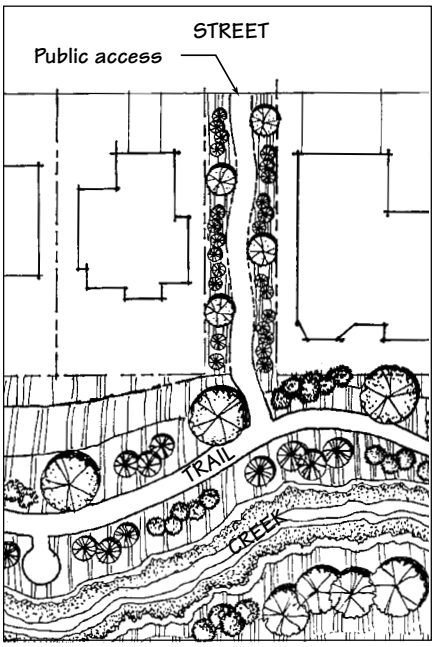
Public access should be provided to the creek from every parcel of private development or every 200 feet. Public access points should include a path 10 feet wide with shade trees flanking the pathway, provide adequate signage, be well-lit, and contain any necessary amenities. This is intended to reduce the possibility of the trail being an isolated amenity in the community.



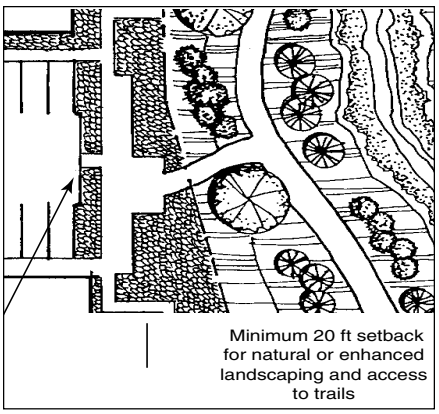
Safety Design

Trail development should avoid the creation of unsafe pockets such as secluded areas with no outlets, or dead-end trail sections. Generally this includes careful design considerations for: surveilance, access control, territoriality, and adequate maintenance. Appendix II- Crime Prevention Through Environmental Design, should be used as the basis for safety trail design.





Public access concept drawing



Setting for Development

"State Route 252 Corridor lands offer an opportunity to develop a continuity of open space from Southcrest Park extending along the Chollas Creek channel all the way to Interstate 5. The open space link will serve the new residential development proposed for the area. This open space, although modest in size, could be made effective if imaginatively designed and utilized. Encroachment into the flood channel should be avoided to maintain recreational use of Las Chollas Creek. The plan recommends an 11-foot dedication on the north of the existing channel for passive use and 25 feet on the south for active use as a combination bike and pedestrian trail." (Southeastern San Diego Community Plan, Southcrest Neighborhood Element page 236)

Residential Connections

Connections from the creek should be made at the end of cul-de-sacs, and in between parcels at frequent locations to ensure safe and easy access.

Commercial/Industrial Connections

Connections from the creek trail to Commercial/Industrial development and adjacent streets should be established.

Setbacks

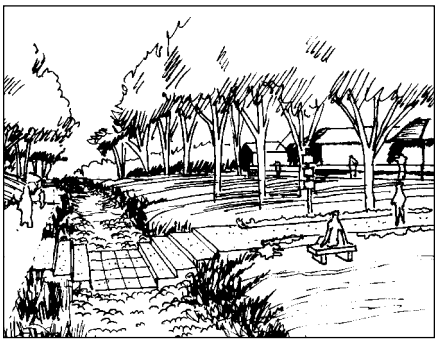
Minimum setbacks of 20 feet from the edge of an urban creek channel, or 15 feet from a property line abutting the creek should be observed to provide additional safety and setback.

Transparency

New development should provide 50% transparent walls facing the creek and provide access every 200 feet. The area between the building and the creek should not include parking, but provide seating areas, shade trees and an overall design that compliments the creek.

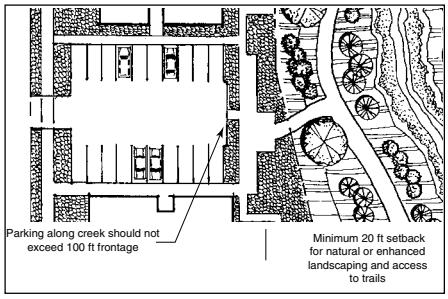
Buffer

A buffer of at least 20 feet should be provided to accommodate a planting strip and shade trees between the creek and the public trail.



Parking

"Off street parking should not be located in the creek setback, and should be sited so that landscaping can be provided between the parking area and the creek's edge. Off-street parking should not be allowed to encroach into setback areas. Parking areas should be located with the widest axis of the parking lot perpendicular to the channel in order to reduce the amount of parking area fronting on the channel." (Southeastern San Diego Community Plan page 147 & 149)



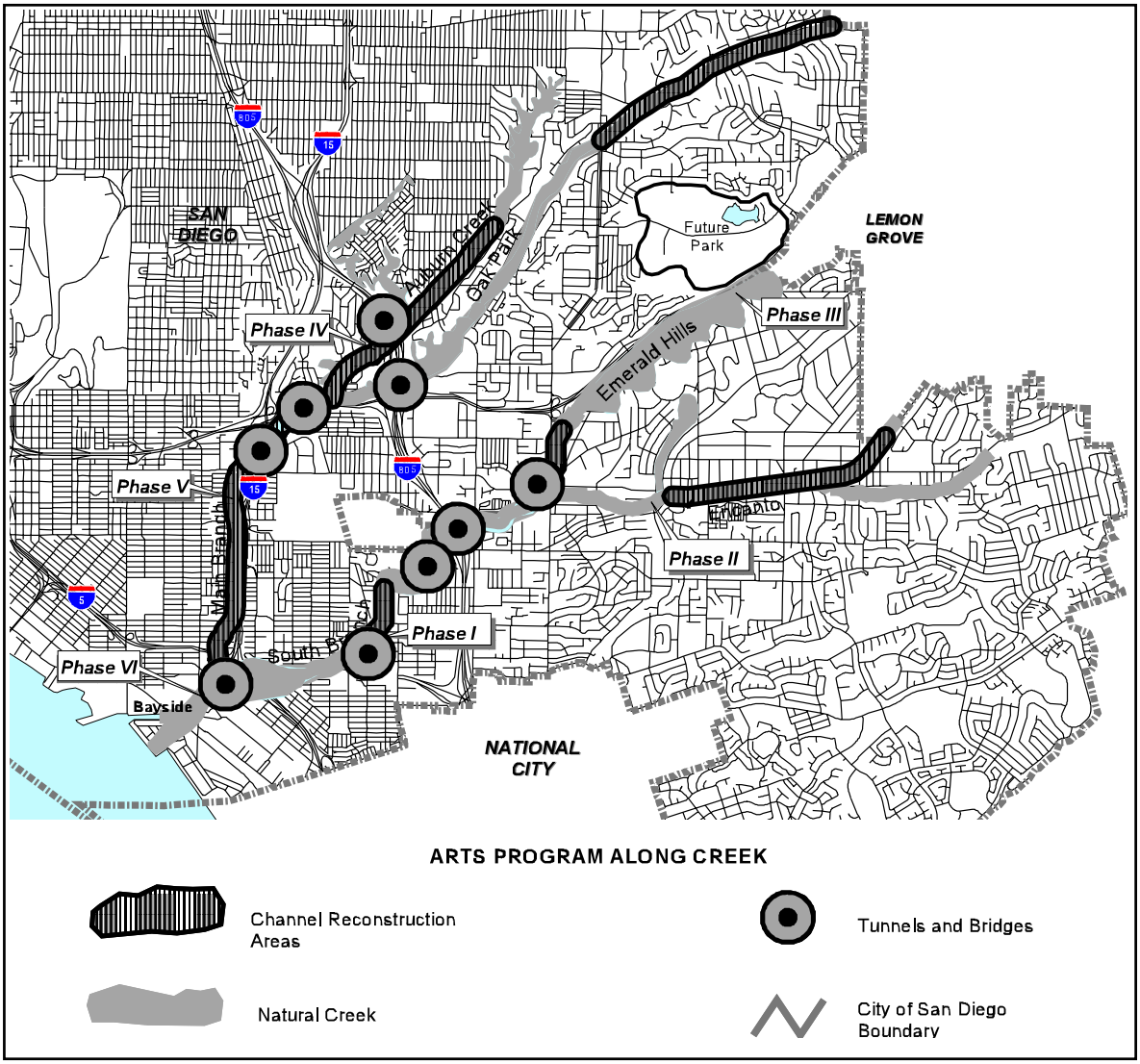
Fence Design

"Fencing should be carefully considered for its safety as well as visual qualities. Chain link fencing is not appropriate from a visual standpoint. Chain link fencing, if used, should be carefully designed with wood frames and vinyl coating. High fences should be strategically located to make them appear lower that they are, in order to maintain a human scale to the creek's edge. Wrought iron, open wood, open concrete block, and other types of specially designed fences are appropriate." (Southeastern San Diego Community Plan 147 & 149)

E. Public Art Opportunities

When the City of San Diego commits to new building and renovation projects, it commits to the reform and renewal of the City by carefully planning the way a space or facility looks, operates, and relates to the community. The City of San Diego Commission for Arts and Culture's Public Art Program is transforming San Diego's built environment by making the artist an integral participant in public planning and design. Since the program began in 1988, more than 90 public art projects have been initiated.

The potential public and private development and revitalization of the Chollas Creek corridor offers a range of possibilities for public art. From environmental and educational projects to the artist-led design of park space and trails, and the special design of street furniture, the opportunities for artist involvement are numerous.



Policy Context

The following policies are from the Council Policy Manual, the Mid-City Communities Plan, Southeastern San Diego Communities Plan and Barrio Logan-Harbor 101 Community Plan and are the basis for the Design/Development Guidelines that follow.

"...establish a policy of the City Council to involve artist(s) in selected City Capital Improvement Projects and to provide guidance to City staff and design consultants to implement this policy..address a commitment to excellence in the design of San Diego's built environment…" (Council Policy 900-11)

"Ensure that new development preserves and enhances framed public views of existing aesthetic resources such as parks and community landmarks."
(Mid-City Communities Plan page 43)

"Design open space signage and safety fencing in a manner that is visually compatible with, and enhances, the surrounding environment." (Mid-City Communities Plan page 49)

"Sponsor art competitions to design and improve at least one freeway interchange per year."
(Mid-City Communities plan page 52)

"Provide public art." (Mid-City Communities Plan page 65)

"Development should view (those) channel areas as sculptural landscaped elements."
(Southeastern San Diego Community Plan page 149)

"Design creativity should be exercised in the development and redevelopment of the sites adjacent to these creek areas."
(Southeastern San Diego Community Plan page 146)

"Development should view these channel areas as sculptural hardscape element. Their design should emphasize undulating organic or jagged walled surfaces, create patterned paved surfaces, and provide designs that are multi-functional hydrologically and recreationally. Such additional recreational uses could include such activities as skating areas, competition track areas, spectator seating, small amphitheaters, etc. These high activity used should be limited to locations adjacent to parks or high activity development areas (commercial/indus-

trial). Locations adjacent to residential uses should be designed as passive sculptural areas for the visual enjoyment of adjacent neighbors."
(Southeastern San Diego Community Plan page 149)

"Vegetation areas should be used to set-off the man-made sculptural elements, as in a sculpture garden."
(Southeastern San Diego Community Plan page 149)

"All project landscaping should be designed in a manner that contributes to the overall enhancement of the channel as a sculptural form within a park like environment."
(Southeastern San Diego Community Plan page 149)

"Fencing should be considered for its safety as well as visual qualities. All walls or fencing should be designed as an integral element of the channel's sculptural design. The closer a wall or fence is to the channel, the more the fence or wall needs to be incorporated into the channel form."
(Southeastern San Diego Community Plan page 149)

"Chollas Creek development...Landscaped areas could include manmade structures with sculptural qualities, that are combined with natural landscaping, trees and plants."
(Barrio Logan/Harbor 101 Community Plan page 189)

"Improve public and semi-public agency images through compatible urban design considerations sensitive to the community's assets."
(Barrio Logan/Harbor 101 Community Plan page 190)

"Reinforce existing community identity through environmental beautification."
(Barrio Logan/Harbor 101 Community Plan page 52)

DESIGN/DEVELOPMENT GUIDELINES

The following guidelines are designed to implement the adopted policies.

Incorporate Public Art Throughout

"Incorporate public art into all Riverwalk improvement and Constructions." (Source: Chollas Creek Community Workshop Common Vision, March 21, 1998.)

The Role of the Artist

Design and construction projects should provide opportunity for artist involvement. When the artist's concepts are included, and when the overall design of the project is first developed, an enhanced environment results.

With the artist as a lead designer, a project benefits most from the leadership and vision of an artist when, the artist assumes the leadership for the team for the development of the facility. In other cases, the artist may be hired by the City to lead the entire design effort. The artist, in turn, selects and hires the architect, landscape architect, engineer and other technical support.

With the artist as a team member, as a project is just beginning, an artist may be selected as a member of the design team. This is the role most often assumed by the artist in City of San Diego design and construction project. When a facility is fully designed or construction is underway, an artist may be commissioned to create an artwork for a specific location. In 1992, the City of San Diego City Council adopted a visionary public art policy that promotes diversity and artist involvement at the inception of selected City design and building projects.

Public Art Diversity

The historic cultural and ethnic diversity of the central San Diego communities offers a wealth of opportunities to engage in a variety of artistic expressions. Public art in Chollas Creek should take many different forms, it may be incorporated into private development along the creek, trail systems - natural as well as along public sidewalks or walkways, and in public areas on public or private property.

Public Art in Civic Projects

Properties owned by the City of San Diego for purposes of Park and Recreation, Water Utilities, and MSCP, or agencies such as MTDB provide great opportunities to engage the community artistic projects. Public art opportunities within government owned or controlled parcels or easements may consist of: interpretive programs, sculptures, lighting, linkage connections between public transit lines and the Chollas Creek Park trail system, artwork in the public right-of-way.

Public Art Integrated in Habitat Restoration Projects

Large sections of the creek such as the State Route 252 Corridor in Southcrest, and the Oak Park section lend themselves to a combined effort of habitat restoration and public art project, where interpretive programs and improvements should be integrated into the project.

Creek Trail System

Trail development throughout the creek should be designed as an arts project. Public Arts approach to project design and development can benefit the quality of design of natural trails, walkways and sidewalks. Public Art elements should be expressed in the paving form, pattern, and color, as well as in interpretive signage, and urban furniture.

Creek Underpasses

As has already been mentioned, creek underpasses exist where a major street or freeway crosses the creek. For the most part these underpasses are presently socially unsafe, they are ugly, single-function, and forbidding. However, the structures have the possibility of becoming wonderful artistic elements of the pedestrian experience if designed with forethought to human interest and use. An artist has the capability of conceiving such an approach, and creating a work of art that will instill pride in the community.

Creek Bridges

There are numerous bridges that cross Chollas Creek. Most are streets but some are exclusively pedestrian oriented. Bridges should also be designed by artists, since for the most part they provide special views of the creek, or gateway entries into the creek environs. The typical single purpose bridge is not adequate to provide the multiple functions and visual quality desired for the ultimate development of Chollas Creek. The involvement of an artist would substantially enhance the design and provide special human interest.

Bayside

The Bayside is the area at the creek's estuary in San Diego Bay within the Barrio Logan/Harbor 101 community that has multiple functions. Some are strictly engineering functions addressing flooding, hydrology, habitat restoration, water quality, education, recreation and human related functions. Other important functions which the area can satisfy are recreational since the area has bay frontage, pedestrian orientation, view enhancement, and commercial development opportunities. A Public Arts project would be an excellent approach to its ultimate development, which could balance engineering, habitat enhancement and human needs and development opportunities.

Urban Furniture

Public Art can become an important feature of urban furniture design and construction creating a special signature for Chollas Creek. This approach should not be just limited to benches and water fountains, but should include features such as fencing, lights, pavement patterns, etc.

Public Art and Crime Prevention

Often, improvements such as fencing, gates, landscaping lighting and other improvements have to be provided in order to create controlled human environments that are not inducive to crime. Public Art can have a major positive impact on the design of these improvements by tailoring designs to inspire and meet the need. Artists should be involved in the design of major sections where crime prevention is a particular issue that has to be addressed. For more information on Crime Prevention Through Environmental Design, typically implemented through the City's Police Department review, please see Appendix II.

Public Art for Private Development

Art opportunities proposed on private property will remain at the discretion of the private developer. The San Diego Arts Commission can provide assistance for the selection process of artists on projects.

Public Art and the Interpretive Program

Art opportunities should be provided in the design of interpretive exhibits, stations, and centers.

F. Education and Interpretive Program

A major component of the Chollas Creek Enhancement Project is to educate the citizenry about the importance of the Creek. Interpretive elements are those which provide individuals with opportunities for self-exploration and discovery without the assistance of an educator. These elements serve to inform citizens as stakeholders, and therefore, encourage them to be stewards of the creek.

Policy Context

It is the City's policy to use open space park resources and habitat preservation as vehicles for community education about the city's geographic context, natural resources and history. Examples of such endeavors are Mission Trails Regional Park, Penasquitos Canyon Preserve, and San Dieguito River Park. The guidelines that follow are based on this important city policy and practice.

DESIGN/DEVELOPMENT GUIDELINES

The following guidelines are designed to take advantage of the Chollas Creek system as a basis for community education and interpretation of habitat and cultural values.

Recognize Nature and History

"Recognize the creek's natural habitat, its historical role and its educational resource potential through an interactive educational exhibit program." (Chollas Creek Community Workshop Common Vision, March 21, 1998.)

Paleontology

Fossil remains, fossil sites, fossil-producing geologic formations, and geologic formations that have the potential for containing fossil remains are all considered to be resources/potential resources. The goal of paleontological mitigation programs is the recovery and permanent storage of significant fossil remains that would otherwise have been destroyed and therefore lost to excavation activities. Recovered fossils represent a sample of the paleontological resources of our area and they will be available

for research, education, and enjoyment of future generations. Paleontological resources are scarce non-renewable natural resources and are subject to the same environmental review process as biological and cultural resources. Paleontological exhibits should be fostered throughout Chollas Creek using the schools as a focus. (Please refer to the City of San Diego Paleontological Guidelines Revised June 2000).

Promote Education About Chollas Creek

In addition to the interpretive element, there is a need to reach out to the community schools and provide educators with a variety of resources. The primary difference between the Interpretive Program and the Educational Program is that educators are actively involved in assisting students in the learning process. Additionally, sites designed specifically for school use may sometimes be limitted to the general public. Possible education themes that could be developed include: cultural resources, prehistory, history, archaeology, paleontology, biology, environmental quality, and hydrology. (Chollas Creek Community Workshop Common Vision, March 21, 1998)

Informational Exhibits

Chollas Creek is an important natural urban open space feature that should become a valuable educational and interpretive resource for central city communities. Informational exhibits should be created which specifically demonstrate the interaction between natural and urban processes. Groups that would benefit from such a resource include: schools and universities, public agencies, special interest groups, families, and local residents.

Interpretive Centers

Interpretive Centers should be constructed intermittently along the creek. These centers may include such features as: gallery and exhibit space, auditoriums with audio/visual presentation capabilities, meeting/conference rooms, and a small library or reading room. Other amenities may include an amphitheater or outdoor classroom, picnic areas, and demonstration areas. Restrooms should also be considered as a component of these centers.

Interpretive Stations

Interpretive Stations should be established intermittently along the creek. These should consist of large permanent exhibits, usually comprised of several single or double sided panels of information. The panels may have hinged plexiglass covers which can be opened to replace temporary informational notices. The panels may be freestanding, uncovered, or covered by a small shade element. Stations may also include amenities such as seating and lighting, as well as workspace for students to conduct research. They may be located within a shade structure or gazebo.

Interpretive Signage

Interpretive signage should be provided along the entire creek trail system. It should consist of small, informative signs that would identify special natural features along the trail system, as well as adjacent cultural, historical and paleontological resources. These should be located where opportunities and needs arise.

Educational Resources

In order to foster a relationship between Chollas Creek and surrounding schools, a number of educational resources should be constructed along the creek. These should be planned in conjunction with school sites located near the creek.

Educational Facilities

The creation of hands-on learning opportunities is something which is widely-needed along the creek corridor. Facilities such as science laboratories and water quality monitoring stations, would allow teachers to bring their students to the creek for firsthand educational experiences. Larger facilities could include; classrooms, demonstration areas, amphitheaters, audio/visual equipment, lab equipment, restrooms, and a host of other amenities. Smaller facilities could include such amenities as a shade structure with seating and workspace for students. Security measures, such as fencing, key-card entry systems, and monitoring, should be carefully considered.

Watershed Protection Theme

The subject of watershed protection is something which should be incorporated into the curriculum of surrounding schools. In an effort to make students more aware of the effects of

pollution, the Chollas Creek Watershed is now being studied as an example of how household toxic substances pollute our waterways. Several years ago, the Environmental Health Coalition, in conjunction with dozens of local organizations, developed a comprehensive educational program known as the Chollas Creek Watershed Protection Project. The goal of the program is to increase awareness about the causes and prevention of nonpoint source water pollution. The following materials have been developed by this project, and should be available to local educators. Lessons include:

"What is a watershed"
"A raindrop goes to sea"
"Storm drain walk"
"Duck stencil activity"
"Oil spill"
"Water on the move"
"Everybody need a home"
"Food chain"
"Sticker activity" and,
"Teacher's key to mapping the San Diego Bay Watershed" (grade levels K-6).
"Watershed"
"What goes around comes around"
"Mapping the watershed of San Diego Bay"
"Wetland metaphors"
"River watershed exercise,Where does water go after school?"
"Storm drain walk"
"No water off a duck's back"
"Deadly links, Phosphate problems"
"Where have all the marshes gone"
Living research: "Aquatic heroes and heroines" (Grade Levels 7-12).

Cultural Resource Theme

Chollas Creek was the site of Native American villages and trails. The Citys "pre-contact" history should be memorialized and celebrated with exhibits, designs, and features reminiscent of our historical past.

IMPLEMENTATION

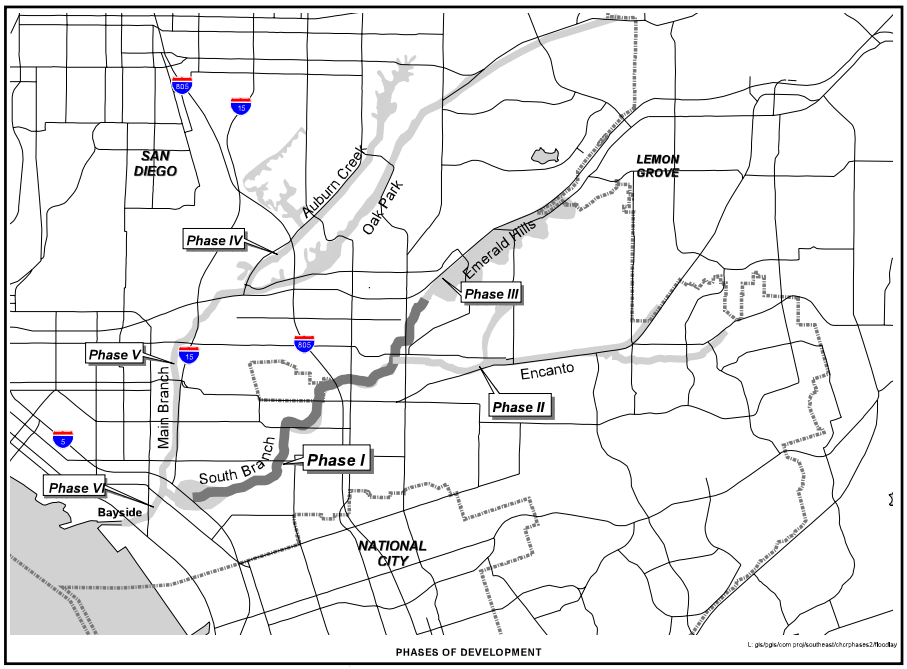
This implementation section addresses the following basic components: creek enhancement phasing and funding strategy, permitting, maintenance, public outreach and marketing.

A. Phasing and Funding

The development of the Chollas Creek Enhancement Program includes an implementation phasing program which involves the development of six sections of the Creek: South Branch, Encanto Branch, Emerald Hills Branch, Oak Park and Fox Canyon Branch, Main Branch, and Bayside. These phases will strategically address the enhancement of the entire Chollas Creek system, beginning with the highest profile area, the South Branch. It is expected that the implementation of the Chollas Creek Enhancement Program will be an ongoing, long term process, undertaken over a 20 year period.

The Chollas Creek implementation will require an ongoing funding effort, through private project-related improvements, grant requests and City allocations, for at least 20 years, to the year 2022. The Funding and Phasing Schedule Table included with the Executive Summary of this document provides a glimpse of the actions and funding levels that have to follow. The Funding and Phasing Schedule (page 9) only gives general projected costs using year 2000 dollars as the basis. The objective is to provide an early assessment of the scope of this project and cost. Both cost and phasing may vary over time, depending on local and national economic conditions, and grant funding availability. Funding information is included in this chapter with each phase description. Notations are also included describing when various funding requests or allocations should be made. As the Funding and Phasing Schedules show, the grand total cost projection for the implementation of Chollas Creek Park Enhancement Program is approximately $42.0 million in Year 2000 dollars. This amount may be obtained in small funding increments over time. Success is totally dependent on a coordinated public/private funding partnership, leveraging City and private funds to match other state and federal grants and general economic conditions.

Work undertaken for the implementation of the South Branch/ Phase I establishes the model to follow for the implementation of all other phases. The Chollas Creek Enhancement Program



Funding and Phasing Schedule fold-out included in the Executive Summary, outlines the overall project development implementation program. Each phase will include the development of a detailed Habitat Wetlands Management Plan for that section of the creek, with construction and creek restoration projects to follow the plan's proposal.

In the case of the South Branch, the City prepared the implementation program as part of a $1.23 million grant from the California Coastal Conservancy. A portion of the funding allocated to the preparation of the South Branch Enhancement Plan is a separate document which establishes specific construction and restoration programs to be undertaken throughout. This document will be the model for other remaining development phases. The remaining Phase I funding of $1.23 million is allocated to the implementation of high priority projects.

As shown in the funding and phasing schedule, potential additional funding sources for all phases of development of the Chollas Creek Enhancement program will include grant requests from: the California Coastal Conservancy, California Department of Water Resources, US Department of Transportation, US Department of Interior, US Federal Highway Administration, US Environmental Protection Agency, US Army Corps of Engineers, California Propositions 12 and 13 funds, US Endowment for the Arts, Community Development Block Grants, and numerous other sources, organizations and agencies.

South Branch – Phase I

This is the highest profile area, and the one that contains the greatest diversity with small habitat areas, large disturbed areas that can be restored, several rehabilitation areas, and two limited reconstruction areas. It was selected on the basis that it provides ultimate access to San Diego Bay, opportunities for wetlands restoration, and the greatest possible exposure since it traverses sections of the Southeastern community where major urban centers exists, such as the Educational-Cultural Center, and two commercial centers (Market Creek, and Imperial Creek) now under construction.

The Southeastern San Diego Community Plan pays special attention to this area, as follows:
"*State Route 252 corridor lands offer an opportunity to develop a continuity of open space from Southcrest Park extending along the Chollas Creek channel all the way to Interstate 5. The open space link will serve the new residential development proposed for the area. This open space, although modest in size, could be made effective if imaginatively designed and utilized. Encroachment into the flood channel should be avoided to maintain recreational use of Las Chollas Creek. The plan recommends a 11-foot dedication on the north of the existing channel for passive use and 25 feet on the south for active use as a combination bike and pedestrian trail.*

> *1. Development should not "turn its back" on the creek channel. Developments should instead enhance this creek area and use it as a positive feature of the project.*
> *2. Sufficient set backs should be provided in order to allow for the future use of the channel edges as parkway linkages, including pedestrian and bicycle paths.*
> *3. Required off-street parking should not be located within the setback along the channel and should be sited so that landscaping can be provided between the parking area and the channel.*
> *4. Project landscaping and architectural treatments should contribute to an overall enhancement of the channel parkway.*

The western end of State Route-252 recommended open spaces uses could include a neighborhood park, a community garden, or a botanical preserve." (Southeastern San Diego Community Plan, Southcrest Neighborhood Element page 236)

Phase I - Funding Projections

The following funding projections are from the Phase I Wetlands Management Plan. Some of the funding improvements have already been made by private development interests in conjunction with permit requirements. Other funding is presently available from the California Coastal Conservancy. Unfunded improvements include suggested grant funding programs which should be pursued. It is expected that the South Branch improvements will be programmed for 2002 and nearing completion by 2006. (See Executive Summary Funding and Phasing Schedule)

1. **Enhancement Plan** – $95,000 funded by the California Coastal Conservancy
2. **Implementation**

   Habitat Restoration – $2.0 million of which $1.2 million is already allocated from California Coastal Conservancy grant. The remainder $800,000 should be sought from permit mitigation funds, habitat restoration, water quality, or, other available grants.

   Channel Reconstruction– $3.0 million should be sought from grant requests from water quality, urban parks, or other available grants.

   Trails – $1.3 million of which $372,000 has been funded privately as part of a permit approval. The remaining $1.0 million should be sought from open space, and transportation grants or other available grants.

   Landscaping – $500,000 should be sought from open space, habitat restoration, urban parks and other grants as available.

   Interpretive Program – $619,000 should support educational grants by others.

Habitat Restoration or Rehabilitation

Reconstruction / Arts Project

Parks

Tunnel / Bridge Arts Project

City of San Diego Boundary

Schools

Encanto Branch – Phase II

This portion of Chollas Creek has been selected for near term implementation because it is the logical eastward extension of Phase I. In it there are a number of areas where the Creek interfaces with Imperial Avenue, with opportunities for redevelopment. Early enhancement of the creek in those areas will set the stage for supportive design of new development along the eastern section of Imperial Avenue. Much of the creek area is channelized and adjacent to the railroad tracks and Imperial Avenue. A special project should consider the linear park qualities of this multiple use transportation corridor-floodway and park. This section links to downtown Lemon Grove.

Phase II - Funding Projections

The following funding projections are general in nature and based on Year 2000 dollars. They are provided to establish a general idea to the level of funding and grant request effort that will be necessary. A few of the funding improvements may be made by private development interests in conjunction with permit requirements. Unfunded improvements include suggested grant funding programs which should be pursued. It is projected that the Encanto Branch improvements will be programmed for 2004 and nearing completion by 2009.
(See Executive Summary Funding and Phasing Schedule)

1. **Enhancement Plan** –$100,000 funded by water quality, open space, or other funds.

2. **Implementation**

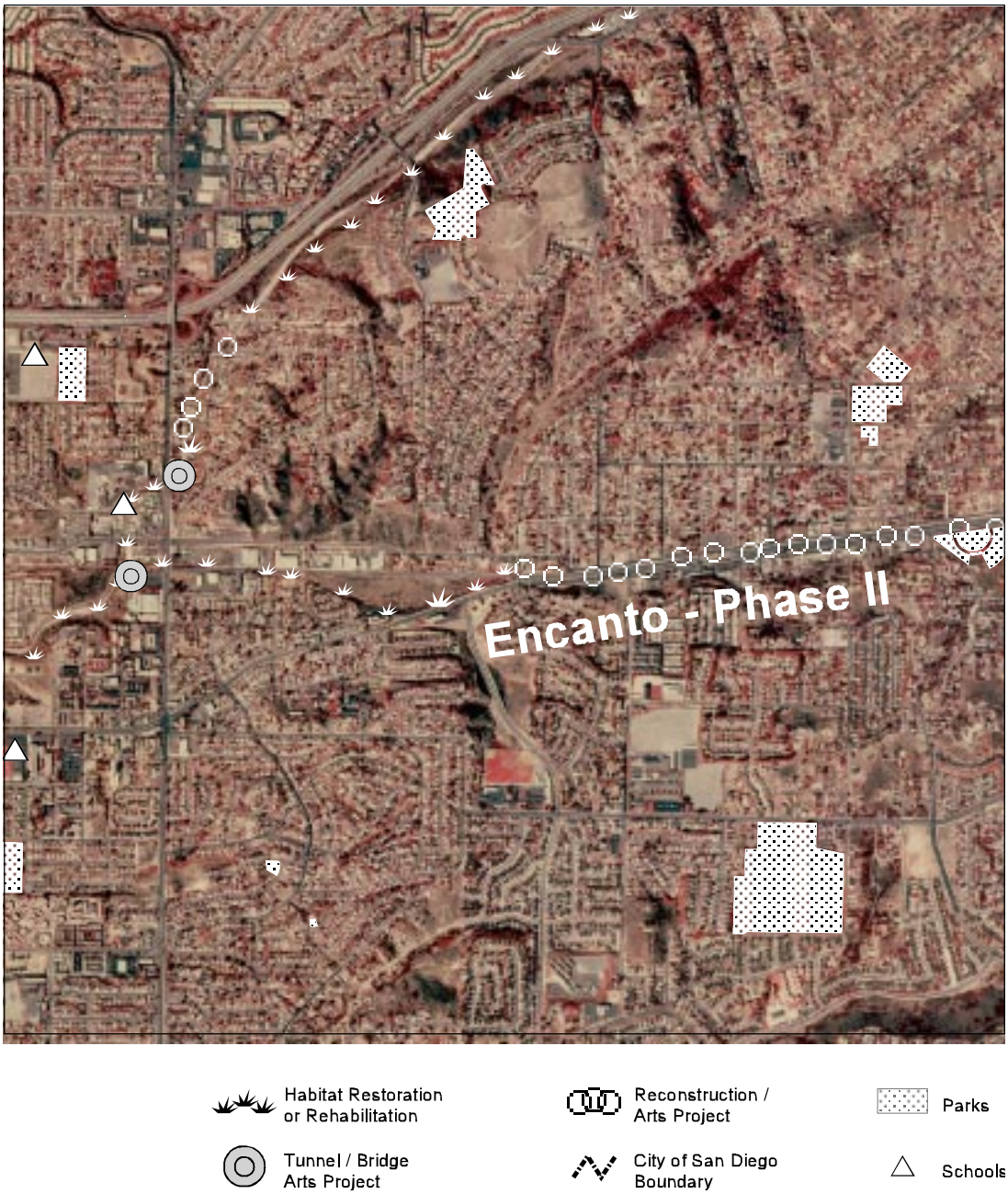
   Habitat Restoration– $100,000 funding should be sought from permit habitat mitigation requirements, habitat restoration programs, open space or other available grants.

   Channel Reconstruction– $3.2 million should be sought from grant requests from water quality, urban parks, or other available grants.

   Trails – $320,000 should be sought from open space, and transportation grants or other available grants.

Landscaping – $500,000 should be sought from open space, habitat restoration, urban parks and other grants as available.

Interpretive Program – $500,000 should support educational grants by others.



Emerald Hills Branch – Phase III

This branch will involve creek and upland habitat preservation and restoration primarily, as well as hillside preservation actions. The hillsides in this section have been identified by the City's Multiple Species Conservation Program (MSCP) as sensitive habitat areas. The creek also links to the new commercial area of Lemon Grove, along State Route SR-94. The preservation and restoration of habitat and the area's exposure to the SR 94 transportation corridor are the special features of this phase.Encanto Branch – Phase II

Phase III - Funding Projections

The following funding projections are general in nature and based on Year 2000 dollars. They are provided to establish a general idea to the level of funding and grant request effort that will be necessary. A few of the funding improvements may be made by private development interests in conjunction with permit requirements. Unfunded improvements include suggested grant funding programs which should be pursued. It is projected that the Emerald Hills Branch improvements will be programmed for 2007 and nearing completion by 2012. (See Executive Summary Funding and Phasing Schedule)

1. **Enhancement Plan** –$100,000 funded by habitat restoration, water quality, open space, or other funds.

2. **Implementation**

   Habitat Restoration – $550,000 funding should be sought from permit habitat mitigation requirements, habitat restoration programs, open space or other available grants.

   Channel Reconstruction– $1.6 million should be sought from grant requests from water quality, urban parks, or other available grants.

   Trails – $500,000 should be sought from open space, and transportation grants or other available grants.

   Landscaping – $500,000 should be sought from open space, habitat restoration, urban parks and other grants as available.

Habitat Restoration or Rehabilitation

Reconstruction / Arts Project

Parks

Tunnel / Bridge Arts Project

City of San Diego Boundary

Schools

Auburn Creek Branch – Phase IVA

This is the northern branch of the City Heights section of Chollas Creek, which is surrounded by residential neighborhoods that have expressed interest in natural creek and canyon restoration. Its western section includes a larger, recently channelized section which should be reconstructed, and as such, will provide an early example of the integration of a public arts program with commercial and residential development, as well as canyon and hillside restoration. This project can thus become a model for the reconstruction effort to follow in Phase V.

Phase IVA - Auburn Creek Branch Funding Projections

The following funding projections are general in nature and based on Year 2000 dollars. They are provided to establish a general idea to the level of funding and grant request effort that will be necessary. A few of the funding improvements may be made by private development interests in conjunction with permit requirements. Unfunded improvements include suggested grant funding programs which should be pursued. It is projected that the Fox Canyon Branch improvements will be programmed for 2009 and nearing completion by 2015. (See Executive Summary Funding and Phasing Schedule)

1. **Enhancement Plan** _ $100,000 funded by habitat restoration, water quality, open space, urban parks, or other funds.

2. **Implementation**

   Habitat Restoration – $250,000 funding should be sought from permit habitat mitigation requirements, habitat restoration programs, open space or other available grants.

   Channel Reconstruction – $4.0 million should be sought from grant requests from water quality, urban parks, or other available grants.

   Trails – $500,000 should be sought from open space, and transportation grants or other available grants.

   Landscaping - $500,000 should be sought from open space, habitat restoration, urban parks and other grants as available.

Habitat Restoration or Rehabilitation

Reconstruction / Arts Project

Parks

Tunnel / Bridge Arts Project

City of San Diego Boundary

Schools

Oak Park Branch –Phase IVB

This is the southern branch of the City Heights section of Chollas Creek. Improvements in this area will restore the natural floodplain close to the creek's headwaters in this area. Although surrounded by single family development its eastern and western ridges at University Avenue and 54th Street, and Home Avenue and 47th Street respectively, provide public areas and opportunities for integration of creek improvements with urban development. The area links to downtown La Mesa.

Phase IVB - Oak Park Branch Funding Projections

The following funding projections are general in nature and based on Year 2000 dollars. They are provided to establish a general idea to the level of funding and grant request effort that will be necessary. A few of the funding improvements may be made by private development interests in conjunction with permit requirements. Unfunded improvements include suggested grant funding programs which should be pursued. It is projected that the Oak Park Branch improvements will be programmed for 2007 and nearing completion by 2013. (See Executive Summary Funding and Phasing Schedule)

1. **Enhancement Plan** – $100,000 funded by habitat restoration, water quality, open space, urban parks, or other funds.

2. **Implementation**

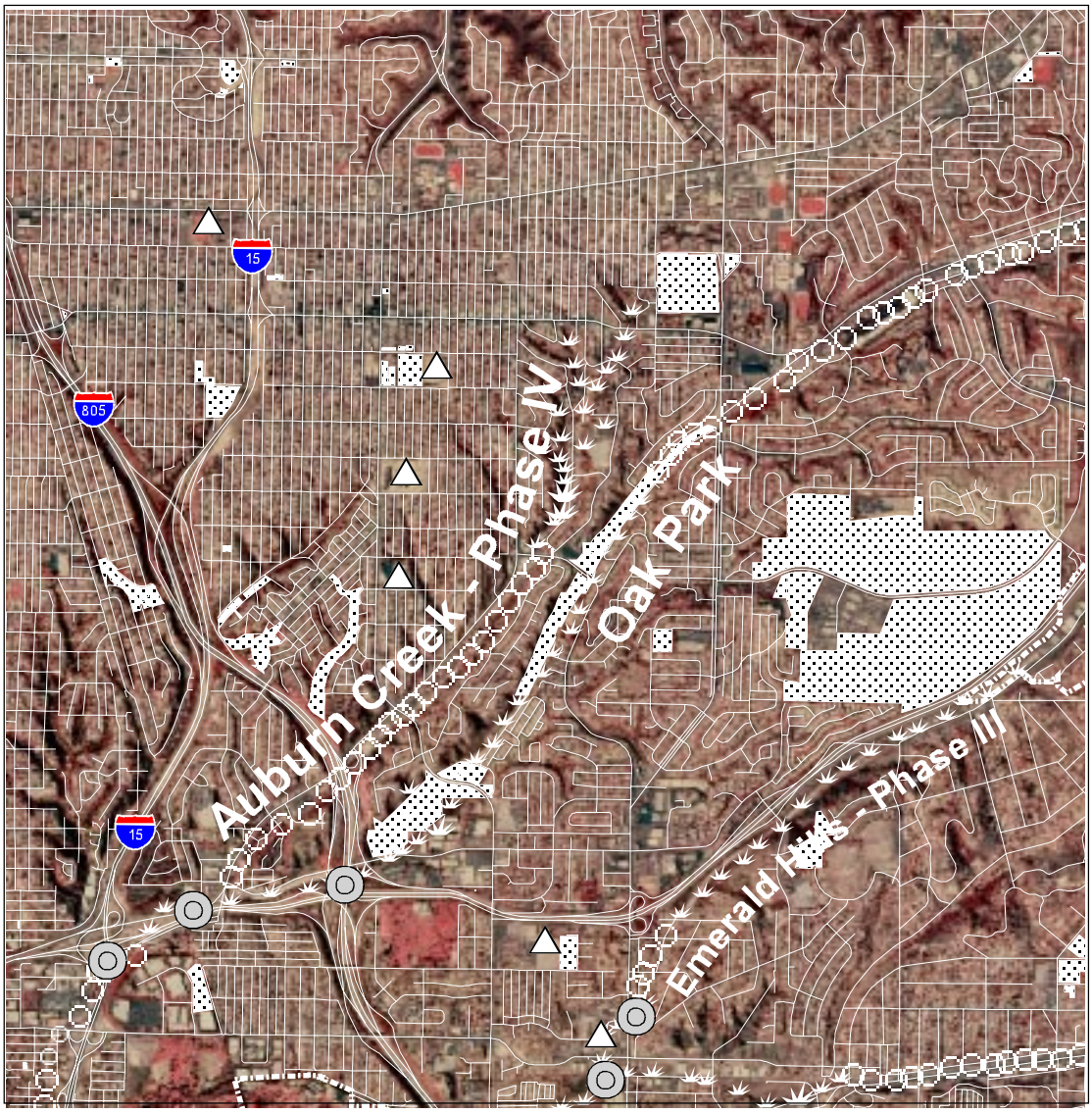
   Habitat Restoration – $2.4 million funding should be sought from permit habitat mitigation requirements, habitat restoration programs, or other available grants.

   Channel Reconstruction – $1.0 million should be sought from grant requests from water quality, urban parks, or other available grants.

   Trails – $2.0 million should be sought from habitat restoration, water quality, open space, and transportation grants or other available grants.

Landscaping – $500,000 should be sought from open space, habitat restoration, urban parks and other grants as available.

Interpretive Program – $500,000 should support educational grants by others.



Habitat Restoration or Rehabilitation

Reconstruction / Arts Project

Parks

Tunnel / Bridge Arts Project

City of San Diego Boundary

Schools

Main Branch – Phase V

This section is the most difficult to address because of its present concrete channel condition, and will require the greatest creativity and experience to reconstruct as an urban park worthy of the community. Its reconstruction and redevelopment as an urban park will be a much needed catalyst to the restoration of the residental neighborhoods that exist to the west of it. The creek in this area is adjacent to State Route SR-15, thus any project undertaken should integrate the freeway, creek, and residential neighborhoods into a comprehensive master plan for enhancement. Because of the difficulty of addressing the existing conditions of the creek, it has been scheduled for one of the later phases.

Phase V - Main Branch Funding Projections

The following funding projections are general in nature and based on Year 2000 dollars. They are provided to establish a general idea to the level of funding and grant request effort that will be necessary. A few of the funding improvements may be made by private development interests in conjunction with permit requirements. Unfunded improvements include suggested grant funding programs which should be pursued. It is projected that the Main Branch improvements will be programmed for 2011
and nearing completion by 2017. (See Executive Summary Funding and Phasing Schedule)

1. **Enhancement Plan** – $100,000 funded by water quality, open space, urban parks, or other funds.

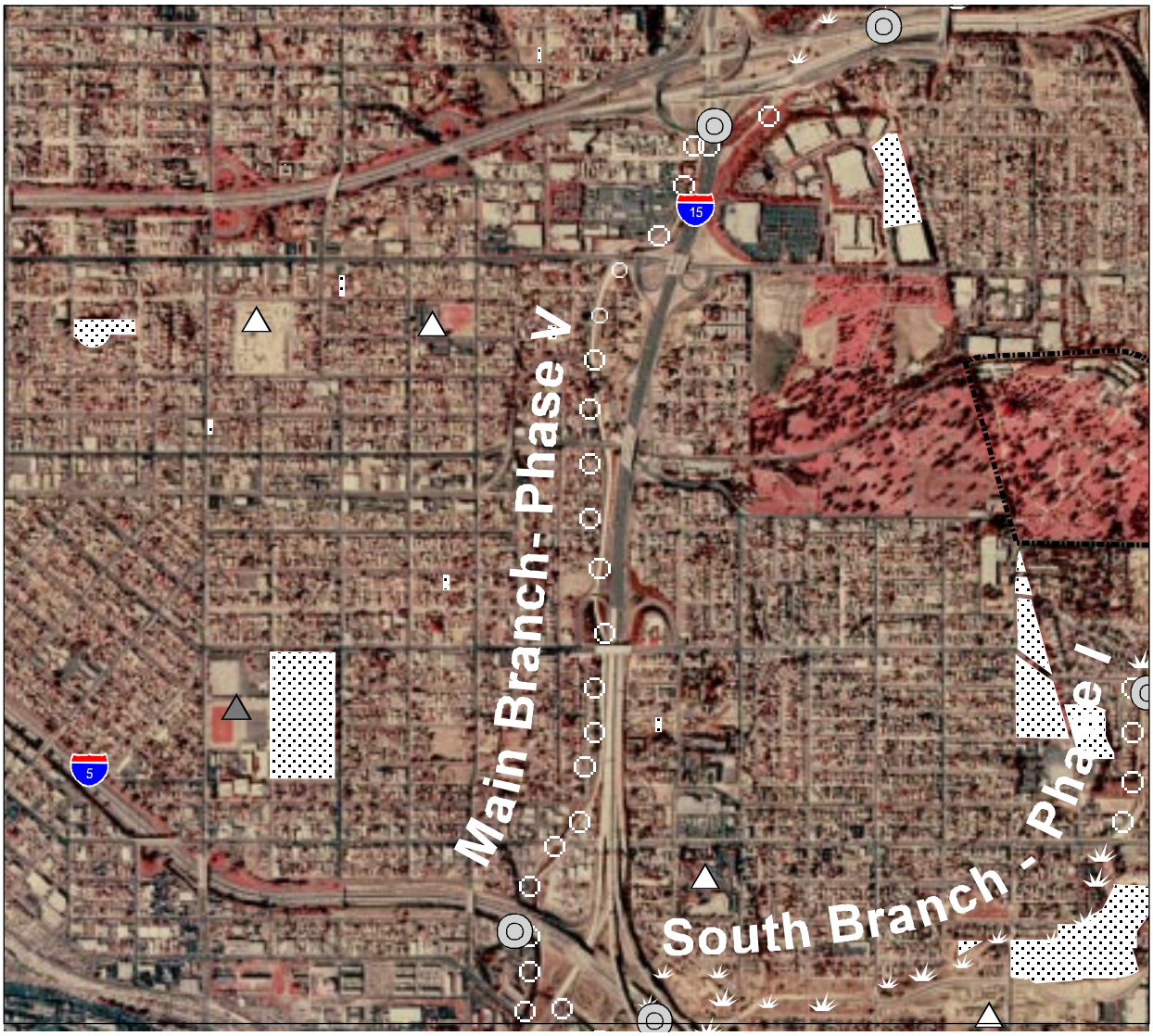
2. **Implementation**

   Channel Reconstruction – $5.0 million should be sought from grant requests from water quality, urban parks, or other available grants.

   Trails – $1.5 million should be sought from habitat restoration, water quality, open space, and transportation grants or other available grants.

   Landscaping – $1.0 million should be sought from open space, water quality, urban parks and other grants as available.

   Interpretive Program –$1.0 million should support educational grants by others.



Habitat Restoration or Rehabilitation

Reconstruction / Arts Project

Parks

Tunnel / Bridge Arts Project

City of San Diego Boundary

Schools

Bayside – Phase VI

This area includes the Chollas Creek Estuary in San Diego Bay. The Barrio Logan-Harbor 101 Community Plan of 1978 envisoned the enhancement of this section as "*A natural linear park should be developed taking advantage of the Chollas Creek Regional Open Space development potential* ". The Plan went further describing the actions that had to follow:

"*Additional studies should be made as part of a redevelopment plan for the creek, regarding potential uses for the creek. A number of questions will need to be answered: Is the area east for Harbor Drive which is in the tidal area, suitable for some type of aquaculture or marine oriented scientific research or habitat rehabilitation, or a potential wildlife rehabilitation area for sea birds? Could potential industries develop based on these creek activities, and is the area valuable for commercial development, or for recreation? Questions like these should be the subject of a study undertaken jointly with the Coastal Commission, Coastal Conservancy, local universities and scientific groups. Questions should also be posed relative to the wider recreational value of the creek. Such as whether the area is adequate for swimming, and if so, how can it be rehabilitated for such purposes, considering the present water runnoff conditions."*
Barrio Logan/Harbor 101 Communities (Plan page 136-137)

The vision stated in the Barrio Logan-Harbor 101 Community Plan of 1978, couldn't be more appropriate to today's practices and vision. Furthermore, the success of this area's enhancement depends on the success of the upstream enhancements and their impacts on water quality improvements. Also coordination with the US Navy, Regional Water Quality Control Board, San Diego Unified Port District, engineering and natural resources agencies will be key to the success of this phase. Its success, however, would be of major importance to the redevelopment of bayside properties, including residential, commercial, industrial, and government owned properties.

Habitat Restoration or Rehabilitation
Reconstruction / Arts Project
Parks
Tunnel / Bridge Arts Project
City of San Diego Boundary
Schools

Phase VI - Bayside - Funding Projections

The following funding projections are general in nature and based on Year 2000 dollars. They are provided to establish a general idea to the level of funding and grant request effort that will be necessary. A few of the funding improvements may be made by private development interests in conjunction with development proposals. Unfunded improvements include suggested grant funding programs which should be pursued. It is projected that the Bayside improvements will be programmed for 2015 and nearing completion by 2021.(See Executive Summary Funding and Phasing Schedule)

It should be noted that much of the area is presently within the jurisdiction of the US Navy, as part of the Navy's 32nd Street Naval Station. It is not known what the future plans are for this area, but any development proposals will have to be approved and coordinated with the agency. During the 2000-2001 period the US Navy has been working with the City and the community on issues related to historic preservation and hazardous materials clean up. It is expected that this work and relationships will continue and result in a future multiple use project that will successfully address the bay access opportunities for inner-city communities via Chollas Creek Park, while maintaining the mission established by the Navy and any prior owner of the property

1. **Enhancement Plan** – $100,000 funding should be sought from California Coastal Conservancy, waterfront restoration programs, habitat restoration, water quality, open space, urban parks, or other funds.

2. **Implementation**

   Habitat Restoration – $100,000 funding should be sought from permit habitat mitigation requirements, California Coastal Conservancy, habitat restoration programs, open space or other available grants.

   Channel Reconstruction – $2.0 million should be sought from grant requests from water quality, waterfront parks, California Coastal Conservancy, urban parks, or other available grants.

   Trails – $600,000 should be sought from habitat restoration, California Coastal Conservancy, water quality, open space, and transportation grants or other available grants.

   Landscaping – $500,000 should be sought from open space, habitat restoration, California Coastal Conservancy, urban parks and other grants as available.

   Interpretive Program – $1.0 million should support educational grants by others.

B. Project Permitting

Development activity within the Chollas Creek floodplain requires permits issued at many levels from federal, state, and local agencies. A listing of permits which may be required and what is entailed is provided to allow for the early planning of the implementation effort,
as follows:

Wetlands

Chollas Creek is within a large mapped urban floodplain, as such, any alteration to it is subject to a Federal Permit under Section 404 of the National Environmental Protection Act. The permit is under US Army Corps of Engineers jurisdiction. This applies to any project which affects floodplains and wetlands or other related habitat. A variety of permits are available depending on the nature and size of the project. Smaller projects with less significant wetlands impacts could be permitted under a variety of Nationwide Permits, procedures for which vary, while larger projects would require an Individual Permit. When a permit is submitted to the US Army Corps of Engineers, numerous governments agencies, private individuals, and special interest groups will be informed of the proposed project, through the circulation of a Public Notice for review and comment.

Cultural Resources

Before a Section 404 permit is issued, the Army Corps of Engineers will also coordinate with the City's Historical Recources Board, a Certified Local Government (CLG) and confer with the California State Historic Preservation Officer for project conformance with Section 106 of the National Historic Preservation Act, in relation to preservation of cultural resources.

Water Quality

Permits impacting drainage and water quality are also required to obtain a Section 401 Water Quality Certification. This permit is obtained through the California Water Quality Control Board. This certification also requires a copy of any agreement with the California Department of Fish and Game under Section 1600 Streambed Alteration Agreement of the California Endangered Species Act Consultation. Also required is a copy of the certified environmental compliance document for the project.

Endangered Species

If a federal endangered species is affected by a project, a Biological Assessment will be required to determine whether or not a formal Federal Endangered Species Act, Section 7 Consultation is required by the US Fish and Wildlife Service.

In addition to the above, the City of San Diego has its own local permitting requirements which will apply, these include:

Flood Management

The City of San Diego must comply with the Federal Emergency Management Act (FEMA) regulations to reduce risk of flooding along Chollas Creek. The City is a participant in the National Flood Insurance Program administered by FEMA. This program provides subsidized flood insurance for all property owners, provided that the local government institutes adequate flood control measures for prevention and reduction of property damage from flooding. The City meets this requirement via the Land Development Code Regulations for floodplain development. In addition, the City has to insure that projects within or fringing on a floodway or flooplain comply with FEMA regulations amd requirements

Multiple Species Conservation Program

The Land Development Code defines sensitive biological resources as those lands included within the Multiple Habitat Planning Area as defined by the Multiple Species Conservation Program (MSCP) for the City of San Diego (1995). Other lands outside of the MSCP area that contain wetlands, specially identified vegetation communities (Tiers I, II, IIA, IIIB), habitats for rare and endangered, or threatened species, and/or narrow endemic species, are also subject to review and mitigation under both the California Environmental Quality Act and the City of San Diego Land Development Code.

California Environmental Quality Act (CEQA)

Certain wetlands management and other development measures along Chollas Creek will require documentation and review under CEQA. Through a variety of environmental studies, CEQA requires state and local agencies to disclose and consider the environmental implication of development actions. It further

requires agencies, when feasible, to avoid or reduce the significant environmental impacts of their decisions. Often project evaluations under CEQA require mitigation measures to reduce impacts to insignificant levels. Implementation of the Chollas Creek Wetlands Management Program would not have authorization to proceed without a certified CEQA document. The CEQA review process requires adherence to all other applicable environmental regulations.

Pollution Discharge

The National Pollution Discharge Elimination System (NPDES) identifies site specific beneficial uses for this region in a Basin Plan, of which the City of San Diego, and Chollas Creek, are a part. To implement the Basin Plan and protect water resources from adverse consequences of development, the Regional Water Quality Control Board implements provisions of the Clean Water Act and, in particular, administers permitting procedures for National Pollution Discharge Elimination System. The eighteen cities in San Diego County are co-permitees for a general NPDES permit. These regulations also apply to stormwater discharges and area wide generators of urban runoff. Municipalities require permits that establish comprehensive stormwater management and monitoring programs. While no specific permit is issued for construction activities, the project proponent must comply with the general conditions of the master permit, such as source control of pollutants through the preparation of a Storm Water Pollution Prevention Plan, implementation of appropriate best management practices, minimization of soil erosion and transport of pollutants, and training for operators.

California Coastal Act

The Bayside Section of Chollas Creek is within the Coastal Zone and as such any development in the area has to comply with the California Coastal Act. The California Coastal Act includes specific policies related to public access and recreation, lower cost visitor-oriented accomodations , terrestial and marine habitat protection, agricultural lands, commercial fisheries, industrial uses, water quality, cultural resources, transportation, development design, power plants, ports, universities and public works. Development within the Coastal Zone is subject to a Coastal Development Permit that has to address the applicable impacts and has to be approved consistent with the Certified Local Coastal Program.

Planned District Ordinances

The Chollas Creek area is covered by three tailored zones, the Mid-City Communities, Southeastern San Diego, and Barrio Logan Planned District Ordinances, which provide special regulations for urban development in the area. Private development abutting the creek is governed by these regulations primarily in relation to use and site development standards such as building setbacks, parking requirements, landscaping, and height. Any development within these communities has to obtain a development permit as required by these regulations.

Land Development Code

The Land Development Code is the citywide zoning ordinance that covers many development regulations not covered by the tailored zones described above. The requirements of this citywide ordinance include floodplain and open space regulations, and are further modified by any additional habitat preservation related regulations established by federal or state codes.

Crime Prevention Through Environmental Design

The San Diego Police Department encourages the use of crime prevention measures to be incorporated into he initial design of new projects. These measures are intended to complement and reinforce efforts to improve public safety and security through community planning, redevelopment, urban design, transit-oriented design, code enforcement, and are consistent with urban design principles found in the City's Progress Guide and General Plan, community plans, and related documents. Generally, this program addresses the following concepts and measures: surveillance, access control, territoriality, and maintenance. Because these guidelines primarily apply to private development areas, they are included for reference in Appendix II to this document.

C. Maintenance

In order for the Enhancement Program to be successful, the creek's long term maintenance must be a high priority. Maintenance activities include: wetland maintenance, weed control and monitoring, flood and drainage control, trash pick up and control, landscape maintenance, and general clean up. In the past, maintenance programs were the implied responsibility of the City (pre-1970). After 1970, maintenance of open space has been undertaken in conjunction with community assessment districts. Neither of these alternatives is realistic in todays socio-economic environment, so more creative ways to undertake the necessary maintenance have been studied as part of this project. The maintenance program will require the development of a programatic and funding mechanism. A combination of maintenance programs should be pursued, as follows:

Permit Requirement

A permit may require the creek area to be maintained for life. Another alternative could require bonding in place upon initiation of project construction. The bond would assure that the required maintenance is covered during the period of time established by the permit approval.

Permit Fees

The City Council has approved the assessment of permit fees for maintenance of habitat and open space areas. Two types of fees may be considered:

A minimal one time fee could be paid at the project approval stage. This fee may be used by the City's Park and Recreation Department Open Space Division, or a non-profit maintenance organization to fund basic semi-annual trash abatement and weed removal. This option would be appropriate for residential developments along the creek where maintenance by individual owners would be difficult to assure.

A one time fee deposit paid at the project approval stage for the amount projected to finance a wider maintenance program could be paid at the project approval stage. This fee may be used by the City's Park and Recreation Department Open Space Division or a non-profit maintenance organization. This alternative could provide a comprehensive maintenance program for the creek and would be more costly.

Assessment District

Assessment districts may be considered at one point in the future to provide ongoing minimal maintenance. It should be noted that it is difficult to establish a community wide Maintenance Assessment District in low income communities, and this alternative is not presently viewed as a realistic option, but should be considered in the future.

Corporate Donor Program

Corporate donors could provide donations into an Endowment Fund for the maintenance of the creek. This fund could be used by the City for restoration projects necessary to enhance creekwide maintenance.

Neighborhood Youth Corps Program

A Neighborhood Youth Corps Program could be established to draw upon the communities' broad range of talents. City staff's Volunteer Services would assist schools and youth groups throughout the neighborhoods along the creek to work with the City in maintaining and overseeing their community resource. Under this program, youth groups would work under the supervision of City and school or university staff to learn about biology and urban communities, participating in multiple aspects of creek maintenance ranging from restoration and rehabilitation activities to day to day oversight.

Schools Adopt the Creek Program

A variation of the Corps Program could be a more aggressive local schools program to "Adopt the Creek." Such program could be based on the schools that rim the Chollas Creek floodplain, and would be tied to special biology curriculum that would allow students to study, undertake laboratory work on the creek, maintain and oversee the effort over the years. Each school could adopt a segment of the creek, and the City's open Space Division of the Parks and recreation department could work with school teachers to coordinate the effort.

The new programs listed can be used in combination, and to supplement the traditional City programs for open space maintenance.

E. Public Outreach and Marketing

An important element of the Chollas Creek Enhancement Program involves outreaching to the community at large and generating support for the overall effort related to both improvements and maintenance. In the development of this Enhancement Program document, participation from affected neighborhoods has been overwhelming. In order to pursue its ultimate implementation, this level of participation and interest needs to continue. The City also needs to do its part to raise awareness about the Chollas Creek Enhancement Program implementation at state and federal levels. City staff should coordinate with the neighborhoods, community planning organizations, civic groups, corporate businesses, and agencies to pursue outreach and marketing.

Outreach Brochure

Through the course of the Enhancement Program development, City staff has prepared a brochure to outreach to community groups, decisionmakers, businesses, non-profit organizations, government leaders and others. The brochure has been designed to portray the hidden beauty of Chollas Creek and its benefits, and is aimed to attract support and generate interest in the enhancement effort. It is also designed as a graphic art piece to be exhibited as a marketing tool in businesses, offices and homes.

Chollas Creek Foundation

To support the long-term improvements and maintenance of Chollas Creek, a non-profit corporation should be created. The Chollas Creek Foundation would provide opportunities for individuals, businesses, community organizations and foundations to support a variety of programs and projects, such as the creation of trails, interpretive centers, arts projects, and urban amenities along the creek. The Foundation could also establish a volunteer Park Ranger program made up of community residents who wish to take an active role in monitoring the creek activities and projects. Volunteers could lead interpretive trail walks, patrol the trails, and work on trail and maintenance projects.

Events

City staff should also spearhead additional public outreach programs. Some of these may include annual events such as clean-up days, planting day, and other activities. The scheduling could be tied to the annual seasons and the natural cycles. Other related activities could include newsletter and publication of informational brochures, establishment of a Chollas Creek WebPage, construction of informational kiosks displaying upcoming events, as well as continuing meetings and educational programs for children and the general public. These outreach programs will be instrumental in developing strong bonds for the creek's development and maintenance as a community asset.

Appendix I

HABITAT RESTORATION BACKGROUND

PROGRAMMATIC HABITAT RESTORATION AND MANAGEMENT ACTIONS

The following detailed management actions apply to the above management and enhancement areas either individually or combined. The information that follow includes, Wetlands Preservation, Wetlands Creation and Enhancement, Exotic Species Management, Permitting Request, and Regulatory Compliance.

WETLANDS PRESERVATION

Wetlands are important resources, particularly as they pertain to the improvement of water quality in such urbanized environments as Chollas Creek. Although the creek rarely contains valuable wetlands, it is prudent to protect the few wetlands present within the creek environment. It is the resources agencies' highest priority to protect wetlands resources and avoid or minimize impacts to wetlands. Careful review of any planned project along the creek will ensure that wetlands impacts are kept to a minimum. The following guidelines should be employed by City personnel when reviewing project applications:

- Does the project impact Chollas Creek?
- Does the project impact wetlands associated with Chollas Creek?
- What can be done to avoid impacts to wetlands associated with Chollas Creek?
- Could the wetlands be incorporated into the project design?
- If avoidance is not feasible, what can be done to minimize impacts to wetlands associated with Chollas Creek?
- Does the project propose wetlands protection, restoration, enhancement, mitigation or management measures?
- Are the measures proposed in the project consistent with the Chollas Creek Wetlands Management Plan?
- Are mitigation measures and restoration plans likely to be accepted by the resources agencies?
- How will the project affect economic revitalization plans for the area?

The City of San Diego has discretion over accepting projects that include sound and sustainable wetlands protection, planning and management. Wetlands protection benefits the community by providing enhanced water quality, a pleasant ambience that enhances living conditions, increased property value, and potential recreational value.

WETLANDS CREATION AND ENHANCEMENT

The long-term goal of watershed restoration projects is the establishment of a self-sustainable ecosystem that is in equilibrium with the surrounding landscape. The Chollas Creek watershed, after decades of urbanization, is an example of a system in a state of disequilibrium made apparent by the severe stream degradation and channel instability. Restoration is an effective tool for returning a degraded riparian system to, or near, its pre-disturbed condition. It also serves as a tool for preventing environmental degradation provided that the source of the degradation has been corrected. In the context of riverine restoration, mitigation or enhancement projects in the Chollas Creek watershed the specific objectives are:

- Increase the quality and quantity of riparian habitat within the Chollas Creek watershed.
- Increase the abundance of woody vegetation in riparian corridors to improve habitat structure along Chollas Creek.
- Promote revegetation with native species appropriate for the project area.
- Remove concrete where feasible to create permeable soils for aquifer recharge.

Ideally, habitat restoration is intended to restore the habitat value of an area beyond simply "revegetating" or planting vegetation within disturbed areas, but by attempting to create a sustainable and functioning ecosystem. A functioning wetlands ecosystem is not restricted to vegetation, but also includes hydrological, soil, wildlife functions, and the interaction of all natural wetlands components. However, the urbanized nature of Chollas Creek and the fragmented condition of the restoration and enhancement sites along the creek preclude restoration projects that are focused on wildlife and ecological functions; restoration and enhancement in the study area is better suited to benefit the human environment.

Functions of Wetlands Restoration and Enhancement

Wetlands habitat has a wide range of beneficial uses, which should be incorporated into the wetlands creation concept, such as:

- it protects and extends the existing water supply;
- serves as habitat and cover for many wildlife species;
- enhances the recreational value of the human environment;
- provides erosion control;
- enhances nutrient cycling;
- provides a valuable potable water source; and
- recharges the aquifer and reduces flow levels and velocity-associated erosion.

It is likely that wetlands vegetation will require 15 years or longer to approach the general structure and composition of an established and functioning habitat. However, it should be apparent in three to five years whether restoration efforts have been successful.

Restoration and enhancement within Chollas Creek will achieve the following functions:

- instream restoration: improving water quality and associated stream configuration; creek shading; water temperature reduction and re-aeration; realigning meander and sinuosity adding substrate composition and structural complexity; permitting flood waters to percolate and recharge aquifer and reducing discharge and water velocity.

- riparian restoration: preserving and establishing wetlands habitats; enhancing and creating contiguous habitat corridors; adding structural complexity; and improving water quality (natural filters).

- upland restoration: establishing upland buffers and wildlife corridors, controlling nonpoint source inputs from the watershed such as hydrological runoff, and applying urban, agricultural and forestry Best Management Practices.

Site-Specific Baseline Studies

Prior to the formulation of a planting concept, ecological and hydro-geomorphological data, such as hydrology, soils, stream morphology and habitat suitability for certain target species potentially attracted by the restoration project, should be gathered and applied to the site-specific restoration plan. If uplands currently occupy the planned riparian habitat restoration site, it is advisable to conduct a hydrological study through modeling, or at least through soil borings or piezometer readings, to establish a groundwater contour and understand the geomorphology of the site. This facilitates the design of accurate grading plans and allows for potential soil salvaging, amendment or topsoil replacement decisions. Site-specific creek profiles will also need to be developed with the help of hydrological data collected for the entire watershed.

Positioning of different habitat types within the context of the stream represents an important step in the planning process, such as the placement of emergent freshwater marsh versus juvenile riparian scrub or mature willow woodland components. Adjacent habitats would also need to be analyzed to evaluate the compatibility of the plant palette with its surrounding environment. In urban environments such as Chollas Creek, a buffer needs to be planted to facilitate the transition between wetland habitats represented in the plant palettes and their surrounding upland habitat. This buffer may contain recreational elements such as trails, playgrounds and seating areas. Wetland buffers should be provided at a minimum 100 feet in width adjacent to all identified wetlands. The width of the buffer may be either increased or decreased as determined on a case-by-case basis, in consultation with the California Department of Fish and Game, The U.S. Fish and Wildlife Service and the Army Corps of Engineers. Additional definitions and requirements are outlined in the Environmentally Sensitive Lands (ESL) Guidelines of the City of San Diego Land Development Code, Chapter 14, Article 3, Division 1.

Finally, plant palettes need to be refined and tailored to the site to include spacing/density information and the amount of plants to be planted within a certain habitat context. Removal of exotic species prior to, during, and after restoration efforts should be addressed in the respective restoration plans and/or specifications. Exotic weed control should also be maintained during a post restoration monitoring effort, which should last for at least

three years. (Refer to the "Exotic Species Management " section for weed control guidelines.) Often, regulatory and resource agencies require that certain performance criteria, defined in the restoration plans, will be adhered to and statistically analyzed through sampling methods for the entire duration of the monitoring period, particularly if restoration is being performed as mitigation for project impacts. Reporting at a regular schedule, usually set by the agencies, will assure that performance criteria are met and that the restoration site will be successful and sustainable at a long-term level.

Step By Step Restoration Guidelines

The following schedule outlines steps that may be necessary to restore and create functional wetland systems at the three enhancement sites outlined in this document. Some steps contain information that may be required if the restoration effort is consistent with a Section 404 permit or subject to agency review, which may be ignored if regulatory review is not required.

Determine necessary restoration/revegetation acreage to be created - In consultation with or through conditions set forth by applicable jurisdictions and agencies (such as the ACOE or wildlife resources agencies), determine (or confirm) the site and acreage for restoration/enhancement. This effort could be performed through field visits and review of environmental documents created for the project or adjacent projects. Consult with the respective agencies to verify agency expectations. In addition, confirm the necessity of invasive species removal in association with wetlands creation.

Determine suitability of mitigation land - Conduct site-specific surveys to determine the percentage of uplands versus wetlands available on the site, if applicable or required through a Section 404 permit. This survey will be supported by a wetlands delineation using the ACOE *1987 Wetlands Delineation Manual* to confirm that the wetlands creation site is, indeed, an upland site and does not fall under ACOE jurisdiction. This step is necessary to ensure that a wetlands is being created in upland habitat to conform with the no-net loss policy of wetlands, again, if applicable. In addition, vegetation communities will be identified, including potentially sensitive plants and noxious weed species. If sensitive plants were to occur on the selected wetlands creation site, respective resources agencies, such as

USFWS and CDFG, will be consulted to determine such alternatives as avoiding or salvaging and transplanting these sensitive resources. Noxious, and potentially invasive weeds will be removed prior to wetlands creation.

Determine groundwater availability - There are at least two ways to determine sustainable water sources for the restoration effort: well excavation and piezometer installation. Well excavation constitutes excavating pits using a back hoe to determine the presence of or depth of groundwater. Piezometer installation would acquire groundwater contours and a range of general hydrological and soils information. This information is mandatory to ensure that groundwater will be available to permanently sustain the newly created wetlands site without artificially adding water to the site. Groundwater contours will provide important baseline information for the creation of grading plans.

Determine soil suitability - Soil tests would be helpful during the installation phase of the wetlands creation project to determine soil suitability and prescribe appropriate soil amendments, if necessary, to ensure the establishment of adequate growing conditions.

Determine potential creek alterations - Hydraulic modeling (i.e., HEC 2 models and FEMA overlays) will determine, if an alteration of creek conditions is feasible. If floodplain widening is desired as a restoration and enhancement feature, analyze the flood risk from potential removal of flood walls, wider creek cross section and roughness coefficient from the establishment of vegetation on a site-specific basis.

Determine appropriate plant species composition - In the field, verify the appropriateness of the following recommended native plant palettes for the wetlands restoration and enhancement sites. Freshwater marsh vegetation will be established in the creek invert, riparian scrub vegetation on the creek banks (also surrounding the trail system) and transitional buffer vegetation as a transition between the riparian corridor and the adjacent uplands or developments. Vegetation bandwidths vary from site to site. The following palettes are intended as a guideline only.

Formulate restoration concept - Establish restoration concepts, including: grading contours; topsoil salvage, testing and storage; invasive species removal, if appropriate; soil prepara-

tion requirements; planting specifications, such as plant palettes, growing requirements (e.g., seed distributions or plantings of cuttings and container stock, inoculation requirements); irrigation needs; plant-establishment monitoring; remedial measures; performance standards and long-term monitoring and maintenance. Often, a long-term monitoring program is developed separately, in addition to the concept plan, if required by the resources agencies through the permit process.

Formulate long-term monitoring and maintenance program - Devise performance standards in accordance with standards acceptable to the agencies. Formulate a monitoring and maintenance program to consist of tasks such as irrigation control, removal and replacement of dead vegetation, fencing to avoid trespassing, weed and erosion control and monitoring successful ecosystem establishment according to above performance standards. The goal of monitoring and maintenance is to achieve a self-sustainable wetlands ecosystem similar to natural systems. Therefore, natural scour and deadwood should not be remedied, since these phenomena are typical of the dynamic nature of a wetlands ecosystem. Monitoring will follow a set schedule, which involves site visits conducted monthly between the end of the establishment period and the first month of spring (March), twice per week for the first three months following the first growing season (March, April, May), and monthly for the following six months. Quarterly monitoring visits will be conducted thereafter and for the following two years. If two more monitoring years would be required, visits will be conducted three times per year in March, July, and November. Monitoring typically consists of a field check by the monitoring biologist of plant success (assess percent cover, density, and size of individual plants) using statistically valid sampling methods. Permanent vegetation sampling stations will be established and sampled by using transects and quadrats to determine vegetation success. Statistical data on success are only valuable if compared with data gathered from natural systems. Therefore, sampling results will be compared to data from a control site located in a well-established natural wetlands in the vicinity of the creation site and sampled using the same methods as used for the creation site. In addition, the monitor will also assess the successful establishment of hydrology (e.g., deposition of debris, overbank flows, and evidence of water force), hydric soils (saturated soil in soil pits dug following rain event) and faunal utilization (note evidence of wildlife use and wildlife sightings).

Finalize restoration and monitoring plans - Have restoration and monitoring plans approved by the appropriate jurisdiction and regulatory agencies and finalize the restoration plan.

Select project biologist - Retaining a project biologist to oversee the restoration efforts would be of value to the restoration process. If the project biologist is different from the biologist that formulates the restoration concept, the best time to retain a project biologist is prior to initiating contract growing of plant material. The project biologist will be responsible for the successful implementation of the wetlands creation project. The project biologist must be able to provide records of past successful native wetlands creation experience.

Initiate contract growing of plant material - It takes time to establish appropriate plant material for wetlands creation, particularly if a structurally diverse canopy cover is desired. Native plant nurseries typically do not hold a stock of appropriate plant materials large enough to satisfy the creation of even the smallest wetlands. Therefore, advanced notice must be given to the nurseries to prepare plant materials at least six months prior to the desired planting date. If large plant stock is required (e.g., 5-gallon containers and larger), a nursery will often request advanced notice in excess of six months. In addition, it is important to verify that the contract grower is experienced in native plants for restoration purposes and is knowledgeable in plant inoculation methods. Another component of the plant acquisition includes the collection of plant material by an experienced collector. Plant material such as seeds and cuttings should be collected within the immediate vicinity of the creation area and within the appropriate plant communities. This may not be feasible due to the scarcity of riparian habitat within Chollas Creek and the relatively low species diversity of these habitats. The project biologist should confirm the growing success of plant materials at least once prior to plant delivery to ensure that the plant material conforms with specifications. If unsatisfactory plant material is delivered to the site, the project biologist retains the right to refuse the delivery and acquire appropriate plants at the contracting nursery's expense.

Develop landscape specifications - Formulate restoration specifications to detail contractor responsibilities according to, but more detailed than, the restoration concept plan. In addition, develop landscape plans (signed by a California licenced landscape architect), including grading plans, irrigation plans

and planting plans. Planting plans would include the species composition and spacing. Grading plans will be developed according to the groundwater contours that were established during hydrological studies. Depending on the type of wetlands to be created, surface contours should be no more that 12 feet above the groundwater contour and should, as best as possible, model contours found in natural wetlands ecosystems. Irrigation should be designed to be temporary and removable following two to four years of plant establishment. If available and permissible by law, reclaimed water constitutes an appropriate irrigation source for the establishment of a riparian wetlands system.

Retain landscape contractor - Based on contractor specifications, acquire bids from landscape contractors knowledgeable and experienced in native wetlands creation.

Initial site visit - Schedule a field visit with all responsible parties, including installation contractor(s), project biologist, representatives of the jurisdiction, and, potentially, resources agencies. This field visit is intended to describe the project, project responsibilities, reporting procedures, educate the contractor regarding the presence of potentially sensitive resources, and discuss potential foreseeable problems.

Initiate site preparation - Site preparation, according to the concept plan and specifications, typically include such measures as site fencing and flagging, clearing and grubbing (including removal of exotic weeds), topsoil salvage and storage, soil testing, grading and installation of a temporary irrigation system.

Prepare planting - Planting preparation includes such measures as inspection and lay-out of plant material by the project biologist. In addition, the project biologist will also supervise the application of soil amendments, if specified or deemed appropriate, as well as the planting or seeding of plant materials by the installation contractor. Container stock should be planted prior to seed applications to keep seed beds free of disturbance.

Monitor plant establishment - During the plant establishment period (typically 120 days), the project biologist will monitor the site and complete remediation measures, such as replacing dead plant material, fixing irrigation systems, removing weeds and trash, and repairing erosion damage, as necessary. Reporting procedures to the applicable jurisdiction and agencies will be adhered to as established in previous documents (e.g., permits, restoration concept).

Initiate long-term monitoring, maintenance and reporting procedures - According to the restoration concept and monitoring program, retain a monitoring biologist (if different from the project biologist) and maintenance contractor to perform long-term monitoring of the wetlands creation project. Both the monitoring biologist and the maintenance contractor need to be knowledgeable in the identification of native plants versus exotic weeds and need to demonstrate past experience in native vegetation monitoring. Following the restoration implementation period, the site would ideally be monitored and maintained for three to five years (or longer) at a schedule determined in the monitoring program. The monitoring or project biologist would brief the applicable jurisdiction and resource agency on the site's success by biannual or annual monitoring reports. A final monitoring report and subsequent site visit with the agencies would conclude the project, provided the agencies find that the site fulfills required performance standards to their satisfaction. If subject to a Section 404 permit, the ACOE often requests a final wetlands delineation to confirm that the created wetlands indeed conforms to the ACOE's definition of wetlands by at least showing the successful establishment of hydrophytic vegetation and hydrology [hydric soils, the third parameter the ACOE requires as wetlands parameter often need more time to establish themselves than the monitoring period allows.

EXOTIC SPECIES MANAGEMENT

As discussed in the existing conditions section, the vegetation surrounding Chollas Creek within the study area is dominated by exotic, often weedy and invasive, plant species. Exotic plant species are those plants that arrived in an area through human actions. Once introduced, exotic plants are considered "invasive weeds" when they colonize natural areas and dominate or displace natural communities. Some potential impacts resulting from exotic plant infestation include:

- alteration of ecosystem processes, such as nutrient cycling, erosion, and fire frequency;
- suppression of native plant recruitment and growth; and
- reduction of wildlife resources, such as food, cover, and nesting habitat

Exotic plants considered invasive weeds often have several characteristics that permit them to successfully compete with

native plants by rapidly becoming established and precluding the growth of other plants. Generally, invasive weeds have more than one method of reproduction. Many species can reproduce vegetatively through the sprouting of stem and root segments, as well as sexually through seed production. Often, invasive weeds reach reproductive maturity quickly and produce large amounts of readily dispersed seeds that remain viable for long periods, even when stored in the soil. In addition, invasive weeds tolerate a wide variety of habitat conditions and, in many cases, are favored by repeated disturbance.

Many of the exotic plant species that occur in the Chollas Creek watershed have been introduced to the area during the past 200 years (i.e., since establishment of the first European settlement). Wetlands that are typically common along the banks of undisturbed creeks such as Chollas Creek have been replaced by patches of disturbed and most weedy vegetation, which is largely attributable to disturbance such as development, frequent urban use (trampling, mowing, etc.) and flood control.

General Considerations

Development of strategies to control exotic plant infestations includes more than deciding which control measure to use on which target species with current infestations in the watershed. This section discusses weed management as a component of other project types and general elements that should be considered as part of both species-specific and watershed-level exotic vegetation control programs.

Prior to initiating species- and site-specific weed control activities, a broader, watershed-level strategy toward exotic species control should be considered to eradicate weeds more efficiently. Activities proposed as a component of reducing current infestations of giant reed, for example, should be evaluated for potential impacts on other exotic plant infestations and on currently un-infested areas. This broader strategy should incorporate aspects of all proposed weed control activities so that an action with potential negative impacts to other proposed actions can be resolved prior to implementation. Watershed-level planning must address the on-going dispersal and recruitment of weeds into infested areas through natural and human-induced events that open up new ground to potential infestation, such as landslides, tree falls, trail establishment, streambank stabilization, and recreational use.

Implementation of a Weed Management Program

Comprehensive Management

Management of exotic plant species involves more than merely controlling certain plant species at selected sites within the watershed. Projects and actions along the creek, for example bank stabilization, flood control, landscaping, plant community restoration, and trail maintenance, must consider the project's potential to:

- create new sites for weed colonization;
- spread existing weed species to un-infested areas;
- expand the extent of existing weed populations, and
- introduce new weed species to the watershed.

The following factors need to be considered in the assessment of each project's effect on exotic plants:

- areas to be disturbed by the project, including the particular site of the project action, existing desirable vegetation, and known weed occurrences (identifying all noxious weeds potentially impacted by the project and their invasive habit—for example, do they spread vegetatively, sexually, or both?);

- means in which project staff and equipment will access the site (e.g., will they travel through an existing weed infestation?);

- type of ground disturbance associated with project actions (e.g., depth, type, and means of ground disturbance such as overland travel by vehicles on soil surface, trenching by hand-digging to three feet deep, or discing top several inches with a tractor)

- potential removal of existing vegetation; and

- method and time frame for remediating the ground disturbance (e.g., revegetation, mulching, or swamp mat installation).

After assessing the project's potential effect on weeds, means of mitigating these effects must be designed. These may include defining Best Management Practices or other project- and site-specific mitigation measures suitable for the particular activity (such as restoration or revegetation using desirable, native vegetation).

Best Management Practices

Best Management Practices may be defined generally for application to a range of project types and activities or may focus on a particular type of impact, such as erosion and sedimentation control or weed control. General principles applicable to weed control are cited below and include means of preventing weed propagule dispersal within the project area, obstructing or limiting the germination and growth of weed propagules, and preventing the introduction of new weed taxa. The following Best Management Practices shall be applied to any project within a 500-foot corridor of Chollas Creek:

- Avoidance of weed plants and seed sources shall be accomplished through project design (e.g., work area placement is one manner in which weed populations can be avoided).

- All seeds and straw material used shall be certified as weed-free by the California Department of Food and Agriculture seed laboratory.

- All gravel and fill materials used during the project shall be certified as weed-free by the local County Agriculture Commissioner's office.

- The removal site for fill materials shall be examined for presence of noxious weeds and approved.

- Materials will not be stockpiled in a noxious weed location unless they are to be used at that location.

- Equipment must be cleaned after use in a designated noxious weed infested area and prior to moving to a new (un-infested) area. This may involve the use of wash stations or air compressors to clean vehicle tires and underbodies of seeds and other plant material, or may be as simple as cleaning shoes and tools after working in an infested area.

- Signs must be posted in all weed infested construction areas indicating a noxious weed area and inspected daily to ensure that signs remain in place.

Other considerations to prevent weed spread that may be appropriate to a particular project include:

- timing activities such that sensitive periods for a weed species are avoided (e.g., during seed production and dispersal); and

- scheduling activities to ensure that final actions do not adversely affect areas previously completed (e.g., beginning work in the upper portion of the watershed and continuing downstream).

Weed Management Planning

Planning for the management of exotic vegetation should occur prior to implementing control measures. An exotic species management plan should be prepared for Chollas Creek, because this creek is located in a highly urbanized area that lacks native vegetation and is plagued by an exotic species problem. Such an exotic species management plan would include the following components:

- Objectives and goals;

- Priorities (particular weed species and/or locales);

- Current extent of the weed species and rate and type of expansion (e.g., many small occurrences scattered throughout the watershed or one large infestation; slow expansion through increasing size of existing occurrence or rapid expansion through establishment of newly infested sites);

- Vegetation and animals associated with or present adjacent to the infested area (desirable vegetation to be retained, potential impacts on plants and animals as a consequence of weed control);

- Treatment options (primary treatment method and alternatives, conditions under which alternative treatments will be applied);

- Specific actions (what treatments, where, when, using what materials and equipment, who will implement treatments, estimated costs);

- Monitoring methodology and evaluation of success/failure of achieving goals;

- Remedial measures; and
- Documentation.

Clear objectives for the site and the watershed must be established. In some cases, eradication of a particular exotic plant species may not be practicable within a few years and other, short-term goals should be identified. These may include control of seed production by removing inflorescenses, limiting the spread of an existing population by controlling new recruits, and reducing the percent cover of a particular species by increments over many years. The objectives should be measurable so that monitoring activities can evaluate success or failure of the actions.

The Nature Conservancy has produced a Weed Management Plan Template available through their Internet site. This template includes the components cited above and provides additional guidance in evaluating needs and developing information to complete a management plan.

Weed Control Implementation

A contractor knowledgable of the local weed species and their biology should be retained by the City of San Diego to implement the weed management plan. The contractor must hold a current pesticide and herbicide application license and must document thorough experience with similar project. Since the contractor is working in a populated area surrounded by parks and playgrounds, the contractor must document safe operating procedures, including an emergency clean-up plan.

A qualified project biologist would be retained by the City to oversee exotic removal procedures and compliance with wetlands permits requirements. The biologist would mark access routes such that the process of removing exotics would avoid impacting native woody riparian vegetation. Prior to the initial removal of exotic species, the biologist would coordinate with the City and maintenance contractor in the field to review the weed control areas, access flagging, disposal methods, and any other specifications in the weed management plan. The biologist will then monitor the initial removal effort and provide documentation to the City upon completion.

Weed Management Monitoring

Monitoring the effectiveness of treatments and assessing the weed management actions relative to the programs goals and objectives is a necessary component of weed management.

The following weed species were detected along Chollas Creek. Weed removal would be applicable for all areas. Control measures are also identified in the table below.

Summary of Exotic Plant Species

Description					Control Methods		
Species	**Lifeform**	**Growth Habit**	**Reproduction**	**Invasive Habitat**	**Biological**	**Chemical**	**Physical**
Arundo donax (giant cane)	perennial grass	erect to >20 feet tall (rhizomatous)	roots and rhizomes	rapid growth (can spread outside existing locales	no	yes	yes (with limitations)
Centaurea solstitialis (yellow starthistle)	annual herb	erect 2 to 3 feet tall	seed	highly competitive and invasive	yes	yes	yes
Cirsium arvense (Canada thistle)	perennial herb	erect; colony-forming (creeping rootstalks)	seed (wind dispersed) vegetative (lateral roots and root fragments)	aggressive, colony-forming	no	yes	yes
Cirsium vulgare (bull thistle)	biennial herb	erect 2 to 5 feet with spreading branches	seed (wind dispersed)	aggressive	yes	yes	yes
Cortaderia spp. (pampas grass)	perennial grass	erect	seed (root crown resprouts)	rapid growth	no	yes	yes (with limitations)
Cynara cardunculus (artichoke thistle)	perennial	erect 1.5 to 2 feet freely branched	seed (root crown resprouts)	aggressive and invasive	no	yes	no
Eucalyptus globulus (eucalyptus tree; Tasmanian blue gum)	evergreen tree	tree	seed	rapid (fast-growing)	no	yes (with limitations)	yes
Nicotiana glauca (tree tobacco)	evergreen shrub	erect shrub 6 to 15 feet tall	seed	aggressive	no data	no data	yes
Ricinus communis (castor bean)	annual herb	erect 4 to 6 feet	seed	(low temperature kills)	no data	no data	no data
Salsola tragus (Russian thistle)	annual	erect to 3 feet	seed	invades disturbed sites	yes	yes	no
Schinus terebinthi-folius (Brazilian pepper tree)	deciduous tree	shrub or small tree	seed	rapid	under study	yes	no
Tamarix spp. (tamarisk)	deciduous tree	shrub or small tree	seed vegetative (stems and stem fragments)	aggressive and invasive	yes	yes	no
Vinca major (periwinkle)	perennial herb	trailing vine	vegetative (stolons root at tip)	spreads from existing plantings in shade	no	yes	yes
Washingtonia sp. (palm)	evergreen tree	tall tree	seed	invasive, particularly in sandy creek inverts	yes	yes	yes

In many cases, alternative treatments must be included in the schedule of activities and the decision on when to implement alternatives should be based upon an evaluation of previous actions. Information gained from monitoring is needed to modify and improve control techniques, to evaluate priorities (including allocation of available labor and budgets), and to measure success/failure of the program.

TREATMENT COSTS

The general cost for restoration and enhancement measures are generated by adding land acquisition costs, restoration and enhancement costs, monitoring costs and an administration fee. These costs vary for different habitats to be restored and whether the project is a result of a mitigation requirement. The following list illustrates general weed control and habitat restoration costs per unit:

Treatment Costs

Treatment	Minimum Range	Maximum Range
Exotic Species Removal (per acre)	Herbaceous Species: $4,000	Tree Removal: $15,000
Clearing and Grubbing (per acre)	Surface Clearing: $1,500	incl. stumps, asphalt: $4,000
Grading , incl. disposal fees (per cubic yard)	Simple grading: $14	Grading for structures: $23
Hydroseeding (per acre)	Basic native mix: $6,000	Special mix + mulch: $10,000
Planting - 1 gal. containers (installed)	Shrubs: $7	Trees: $12
Planting - 5 gal. containers (installed)	Basic trees: $20	Specialty trees: $30
Irrigation Simple (optional)	Overhead: $5,000	Overhead plus drip: $15,000
Five-year maintenance /monitoring (per acre)	Low maintenance: $30,000	High Maintenance: $60,000

Generally, wetlands restoration and enhancement projects may be calculated between $30,000 and $60,000 per acre, depending on the complexity of the project. However, treatment costs may vary by project size and accessibility, and by project features (e.g., concrete berm removal, installation of flood control features, etc.). Accurate cost estimates should be based on detailed restoration and construction specifications.

POTENTIAL FUNDING SOURCES

Potential funding sources are available for restoration projects, including exotic vegetation removal. Not all funding sources are available in a given year (many are dependent on state legislature or congressional appropriation of funds). The potential funding sources are not generally geared exclusively toward the removal of invasive exotic species; rather, funding applicants would be required to show how an exotic species removal program would be consistent with a particular program's priorities (e.g., restoring the natural resource value of a stream). Additionally, many of the potential funding sources require some form of matching contribution from local governments or local citizen groups. In some programs, however, matching contributions can include in-kind services, such as the value of donated (volunteer) labor.

Appendix II

CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN

CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN:

CONCEPTS AND MEASURES FOR USE IN LAND DEVELOPMENT IN SAN DIEGO

A Guide for Architects, Designers, Developers, and Urban Planners

San Diego Police Department
Neighborhood Policing Resource Team
March 2001

The San Diego Police Department's philosophy of Neighborhood Policing recognizes the need for partnerships with other elements of the community to identify and solve neighborhood crime and disorder problems, and where practical, to create an environment in which problems do not arise. In land development, the SDPD would like to see a variety of crime prevention measures incorporated in the initial design of new projects. These measures are intended to complement and reinforce other efforts in the City to improve public safety and security through community planning, redevelopment, urban design, transit-oriented design, Livable Neighborhoods, and code enforcement, and be consistent with the urban design principles found in the City's *Progress Guide and General Plan,* community plans, and related documents.

Examples of such measures are outlined in this paper under the four basic concepts of Crime Prevention Through Environmental Design (CPTED). Some caveats regarding CPTED and a list of references are also included.

In addition to distributing this paper widely to people and organizations involved in land development, the SDPD is actively involved in the City of San Diego's project management process where it participates in preliminary project reviews and suggests alternative design measures that will help to prevent crime in the future. Questions about the application of these CPTED concepts and measures to land development in the City should be directed to the Neighborhood Policing Resource Team at (619) 533-5757.

CPTED CONCEPTS AND MEASURES

CPTED is based on a set of four design and usage concepts that can lead to a reduction in the incidence and fear of crime, and an improvement in the quality of life. These concepts are defined briefly as follows:

1. Surveillance. Involves the location and use of physical features, electrical and mechanical devices, activities, and people to maximize visibility. Creates a risk of detection for intruders and offenders, and a perception of safety for legitimate users.

2. Access control. Employs people, electrical and mechanical devices, and natural measures to create a perception of risk to offenders and deny them access to targets. Also guides legitimate users safely through the environment.

3. Territoriality. Uses physical features and activities to express ownership and control of the environment. Promotes neighborhood pride. Discourages presence of outsiders by delineating private and semi-private spaces, controlling the movement of people and vehicles, and making someone responsible for maintaining all spaces in the neighborhood.

4. Maintenance. Allows the continued use of space for its intended purposes. Maintains the effectiveness of measures employed for surveillance, access control, and territoriality.

Measures to implement these concepts are of three types: organized/formal, electrical/mechanical, and natural/informal. Measures can be implemented in the initial design, as additions or modifications to the initial design, or in maintaining the initial design. Many measures support more than one concept.

Organized/formal measures are labor intensive and can be very expensive if people have to be hired specifically for them. However, they need not be expensive if they can be carried out by volunteers or by workers hired primarily for other purposes. Electrical/mechanical and natural/informal measures tend to have low personnel and capital costs, especially if they are included in the initial design. Some examples of these two types of measures are outlined in the following sections to provide design guidelines for architects, designers, developers, and urban planners involved in land development.

1. Surveillance

Surveillance measures include (1) the design and location of physical features and electrical/mechanical devices to enhance visibility by people during normal/everyday activities, and (2) the location of people and activities to facilitate surveillance. These measures create a risk of detection for intruders and offenders, and a perception of safety for legitimate users.

a. Lighting

- Provide exterior lighting for visibility at night on streets, parking areas, sidewalks, pedestrian paths, possible entrapment spots, etc., to enable people to see where they are going and identify others along their route. Light should be consistent to reduce contrast between shadows and illuminated areas.
- Avoid lighting isolated areas that people should not use at night.
- Provide interior lighting and stain or paint walls white to enable people to see well indoors, e.g. in parking garages.
- Make sure that light is not blocked by trees or other landscaping.

b. Windows and Doors

- Provide two-way visibility in areas open to the public. Windows and doors should not be obstructed by signs, displays, plants, etc.
- Provide one-way visibility (from inside to outside) in areas not open to the public. Use mirrored glass or see-through curtains to maintain inside privacy. Use glare-proof glass to enable occupants of a lighted building to see out at night.
- Install peepholes for viewing people seeking entrance to secure areas.

c. Unobstructed Sight Lines

- Maintain tree canopies at least 8 ft above the ground.
- Keep shrubs trimmed to less than 3 ft except where privacy or environmental noise mitigation is a primary concern.
- Grade land where practical without substantially altering the natural terrain to provide unobstructed sight lines within the project and from adjacent streets and developed areas.
- Use open landscaping and see-through fences instead of

solid walls or hedges for boundaries where privacy or environmental noise mitigation is not needed.

- Orient buildings in a complex for good visibility of the streets, parking lots, and other buildings in the complex.
- Orient parking spaces to provide good visibility between cars.
- Maintain continuous front setbacks for buildings along a street.
- Orient houses in a neighborhood for clear visibility of the streets and the sides of nearby houses.
- Place garages even with or set back from front of homes.
- Use open or see-through structures for exterior stairways, walkways, porches, sitting areas, patios, parking spaces, etc.
- Use open structures for interior walls, e.g., in parking structures and garages.
- Eliminate possible hiding or entrapment spots along pedestrian paths.
- Install closed-circuit television (CCTV) cameras or mirrors where sight lines are obstructed.
- Provide a clear view of room interiors from room entry points.
- Install mirrors where sight lines are obstructed.
- Use straight short cul-de-sacs instead of curved, angled, or long ones where practical without substantially altering the natural terrain to enable the end of the cul-de-sac to be seen from the cross street.
- Use streets as buffers between housing and parks, playgrounds, commercial and industrial sites, etc.

d. Communications Systems

- Install emergency phones, alarms, or intercoms in convenient places for people to use to report intruders or suspicious activities, or to call for help.
- Post signs to show locations of emergency communications systems.

e. Indoor Facilities and Activities

- Locate high-activity rooms and areas so they face public and semi-public areas. These include kitchens and family rooms in homes, lobbies with guards or receptionists in buildings, offices of property managers in multi-family residences, offices of administrators and supervisors in businesses and other establishments, cashiers in stores and restaurants, etc. Provide large, unobstructed windows for good visibility of outside areas.

- Locate facilities for activities that involve a few people at a time in areas of high usage and good visibility so they can benefit from the natural surveillance already in the area. These include rest rooms, elevators, stairs, ATMs, pay phones, laundry rooms, trash containers, etc.

f. Outdoor Facilities and Activities

- Include front porches and benches to provide places where people can sit and observe activities on streets, sidewalks, open spaces, etc.
- Locate facilities for activities that attract large numbers of people in areas of low usage and poor visibility so that users can provide surveillance of the area. These include basketball courts, ball fields, eating establishments, etc.
- Locate facilities for activities that involve a few people at a time in areas of high usage and good visibility so they can benefit from the natural surveillance in the area. These include pay phones, ATMs, bus stops, bike racks, parking lots, hiking or jogging trails, etc.
- Locate activities within a facility to reduce potential causes of conflict and confusion, and make individual activities easier to supervise.
- Locate paths to and from entrances and exits of building through areas that need surveillance. Use the most direct route where possible.
- Mix compatible residential, commercial, and other land usages permitted by zoning regulations to provide round-the-clock presence and surveillance opportunities.
- Locate parking lots where non-conflicting users, e.g., church goers on weekends and office workers on weekdays, can share the spaces to expand the times that people are in the area.

2. Access Control

Access control measures include design features and target hardening that create a perception of risk to offenders and deny them access to targets. They also guide legitimate users safely through the environment. Controls should also be established on exits to deny offenders escape opportunities.

a. Security Systems

- Consider installation of alarms, cameras, intrusion detectors, metal detectors, activity decoys, intercoms, etc, to protect and control of all entrances and exits,

including garage, basement, service, loading and unloading doors, fire, roof, and attic. Make systems visible to potential intruders.

- Provide special protection for ground floor units.
- Install alarmed, self-locking emergency exits.
- Provide keys, entry cards, or access codes to residents or occupants.
- Provide safes or other secure facilities for storing cash and other valuables.

b. Doors and Windows

- Use strong locks and construction materials on all doors and windows. Avoid use of bars, if possible.
- Limit numbers of entrances and exits to buildings, parking lots, etc.
- Locate entrances and exits in areas that are under surveillance or direct supervision.
- Locate windows next to doors on hinge side, not on lock side.
- Eliminate rear-yard gates to alleys, pedestrian paths, open areas, etc.

c. Walls and Fences

- Make walls and fences attractive as well as durable.
- Use open fences, e.g., vertical wrought iron or decorative iron. They are preferred because they are easier to see through, harder to climb, and less susceptible to graffiti.
- Use vines, thorny plants, and other landscaping along walls to make access more difficult and prevent graffiti.

d. Signs

- Make signs legible and unambiguous. Use symbol signs where possible.
- Locate signs in strategic places.
- Use signs to:
  - Discourage access to dangerous areas
  - Indicate opening and closing times
  - Indicate minimal cash on hand
  - Direct people to safe paths, exits, assistance, means of calling for help, etc.
  - Inform people how to report maintenance problems
  - Inform intruders of access control measures

e. Safe Paths and Common Areas

- Provide adequate light for nighttime use of paths to and from the entrances and exits of buildings, and throughout the project or neighborhood.
- Close or discourage nighttime use of certain paths where adequate lighting, visibility, and surveillance cannot be provided.
- Eliminate entrapment spots, e.g., dense shrubs, high walls or hedges, or alcoves, along pedestrian paths.
- Locate amenities and activities at or near entrances, exits, and major circulation paths to increase risk of detection for intruders.
- Place common areas within the building complex.
- Group common areas for increased surveillance.
- Locate common mail boxes in secure, controlled-access areas.

f. Restraints

- Install barriers or other devices to prevent misuse of public facilities or areas, e.g., bathing in fountains, camping overnight under bridges, or violating protected open space.
- Design public amenities to discourage misuse, e.g., shape benches to be comfortable for sitting but not for sleeping, and roughen or install breaks in low walls, curbs, steps, railings, and smooth surfaces to discourage skateboarding.
- Install barriers to prevent trespassing on private property.
- Locate homes along borders of open space to prevent uncontrolled street access to the open space. Provide designated access points on streets or in parks for controlled access.
- Limit numbers of entrances and exits to buildings, parking lots, etc., to those that can be kept under direct surveillance, supervision, or control.

3. Territoriality

Territoriality measures involve the use of physical features to express ownership and control of the environment, and promote neighborhood pride. They discourage the presence of outsiders by delineating private and semi-private spaces, and controlling the movement of people and vehicles.

a. Streets

- Locate and design streets into and out of a neighborhood or development to reduce safety and security problems associated with through traffic.
- Employ measures to reduce the amount and speed of vehicular traffic. These include narrow road widths, two-way traffic, on-street parking, speed limits, bumps/humps, signs, traffic signals, curb indentations, bollards, cul-de-sacs, etc.
- Build sidewalks and seating to promote walking through the neighborhood or project.

b. Boundaries

- Define clear boundaries between public, semi-public/private, and private spaces. Boundaries are needed at entrances to courtyards, yards, patios, terraces, storage areas, play areas, parking lots/garages, etc. They can be established by signs, walls and fences, gates, landscaping, sidewalks, curbs (vertical instead of rolled), and pavement treatment like tiles and cobblestones.
- Use boundaries to prevent conflicts between different groups, e.g., teens and seniors, so all user groups will be able to enjoy an area or facility and maintain an ownership interest in it.
- Place address numbers where they are clearly visible from the street.

c. Public Spaces

- Create display and performance areas for local artists. A beautiful environment attracts people while a barren one repels legitimate users.
- Design neighborhood facilities to meet the needs of the people living in the neighborhood.
- Define uses for all areas in the neighborhood to prevent "no man's lands" from existing.

d. Public and Low-Income Multi-Family Housing

- Units with separate entrances are preferred. Smaller is better for number of units per building.
- For buildings with common entrances, smaller is better for numbers of units and floors per building, and units per corridor/entrance/stairway.
- Limit numbers of parking spaces per parking lot/garage. Several parking areas are preferred to one large one.
- Cluster buildings around common areas, amenities, and parking.

4. Maintenance

Maintenance measures permit continued use of the space for the intended purposes. They help maintain the effectiveness of the measures employed for surveillance, access control, and territoriality.

a. Low-Maintenance Landscaping

- Use low-maintenance designs and irrigation systems, and drought-resistant plants to facilitate upkeep over time.
- Avoid use of loose rocks.

b. Hardening against Vandalism

- Employ design features and materials that cannot easily be vandalized, stolen or used to damage the property.
- Use graffiti-resistant paint or anti-graffiti coatings on walls, benches, light poles, signs, etc.
- Avoid blank facades at street level.
- Use screens, wired glass, or other protection for light fixtures and bulbs.
- Use shiny aluminum or shatter-resistant glass for mirrors.

CAVEATS

CPTED measures employ three elements — people, devices, and design features — to deter crimes of opportunity by making it more difficult for an offender to commit a crime and escape without being stopped or detected.

Although devices and design features are important, the human element is the critical one. People in the environment must:

- Take advantage of the visibility provided to observe and question intruders,
- Report suspicious behavior and criminal activities,
- Use the access control measures provided to keep intruders out,
- Use the security measures provided to protect themselves and their property,
- Exercise control over their environment,
- Maintain the effectiveness of the various measures provided for surveillance, access control, and territoriality, and

- Be willing to testify in court to help convict the criminals.

But even all of this will not stop many types of offenders. Other concepts and strategies will also be needed to deal with offenders who are:

- Determined and skillful in defeating surveillance and access control measures,
- Irrational in their behavior,
- Acting as a member of an organized gang,
- Under the influence of drugs or alcohol,
- Reckless or undeterred by the risks of detection and apprehension,
- Unconcerned about possible punishment, or
- Residents and others legitimately in the area.

The need for the community, police, and other agencies and organizations to work together as partners to employ other concepts and strategies is especially critical in dealing with gangs. This is because organized gangs can use many of the same surveillance, access control, and territoriality measures outlined in this paper, along with terror and intimidation, to make an environment safe for their criminal activities.
Finally, CPTED measures do not deal with many types of crimes that occur in social, home, and business environments. For example, they do not help to prevent crimes in which the victim knows or provides access to the offender, i.e., domestic violence, child abuse, acquaintance rape, substance abuse, workplace violence, fraud, and forgery. Counseling, education, enforcement, and other measures are needed to deal with these situations.

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