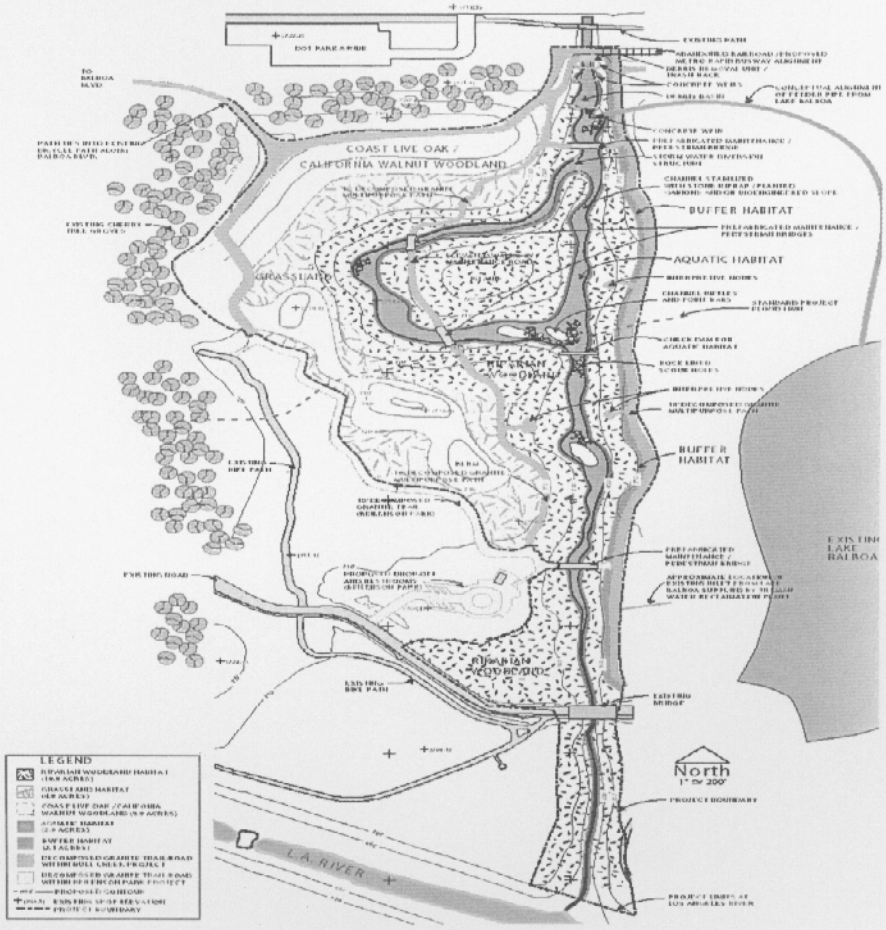
US Army Corps of Engineers®

Los Angeles District

DRAFT
DETAILED PROJECT REPORT
and
Environmental Assessment
SECTION 1135
Continuing Authorities Program

BULL CREEK CHANNEL ECOSYSTEM RESTORATION

Los Angeles County, California



Prepared for:

Department of the Army Los Angeles District Corps of Engineers
and
City of Los Angeles Department of Recreation and Parks

June 2005

EXECUTIVE SUMMARY

This report presents the results of the Detailed Project Report (DPR) analysis conducted for the Bull Creek Channel Ecosystem Restoration Project. The DPR evaluates potential restoration alternatives, and presents the process for selecting the optimal alternative for the restoration of the Bull Creek Channel. The Environmental Assessment (EA) evaluates the potential environmental impacts associated with the proposed Bull Creek Channel Ecosystem Restoration Project (project) and its alternatives. The proposed project involves restoration of the southern-most 3,000 feet of the Bull Creek Channel (Channel), which is within the Sepulveda Dam Flood Control Basin (Basin). The Basin is located in the San Fernando Valley, within the City of Los Angeles, California. The Basin consists of 2,097 acres and is used for flood control purposes. It is owned by the United States Army Corps of Engineers (USACE); and the majority of these lands are leased to the City of Los Angeles Department of Recreation and Parks (USACE, 1999).

Study of the proposed project and its alternatives falls under the authority of Section 1135 (b) of the Water Resources Development Act (WRDA) of 1986, PL99-662, as amended, which states that "the Secretary of the Army is authorized to carry out a program for the purpose of making modifications in the structures and operations of water resource projects constructed by the Secretary which the Secretary determines: (1) are feasible and consistent with the authorized purposes; and, (2) will improve the quality of the environment in the public interest." The Federal costs to carry out such modifications shall not exceed $5,000,000.00 without specific authorization by Congress with a non-Federal cost-share of 25 percent. The City of Los Angeles, Department of Recreation and Parks is the local sponsor for this project.

The purpose of the proposed project is to restore and enhance the habitat of the southern-most 3,000 feet of the Channel. The habitat along this portion of the Channel has been substantially degraded due to increased urbanization and changing land use patterns. The opportunity exists to restore habitat areas by modifying the Channel, increasing native vegetation cover, and increasing the amount of riparian habitat. In addition, the proposed project would increase recreational and educational opportunities and uses within the Basin. The total area proposed for restoration includes approximately 27.9 acres.

Project Alternatives. In total, four alternatives, including the No Project Alternative have been identified for the Bull Creek Channel Ecosystem Restoration Project. These alternatives were identified on the basis of on-going discussions between the USACE, the City of Los Angeles Department of Recreation and Parks, United States Fish and Wildlife Service (USFWS) as well as on the basis of input from several local interest groups associated with the Basin and its uses. Feasibility, practicability, cost and net-benefit were additional factors used in determining the alternatives. The four alternatives evaluated in the DPR and EA include:

- **No Project Alternative.** Under this alternative the southern-most 3,000 feet of the Channel would not be restored. Degradation of habitat would continue to occur within this reach of the Channel due to increased urbanization and the continued growth of invasive vegetation. Additionally, extreme flood events would likely cause severe bank erosion in some areas and subsequent loss of remaining native vegetation.

- **Alternative 2: Braided Stream Concept.** Alternative 2 involves grading the Channel and constructing a series of check dams to (1) increase overall channel capacity and, (2) achieve a braided stream system comprised of pools, riffles and point bars that are commonly found in perennial streams in Southern California. Five habitat types have been developed for this alternative: aquatic (including emergent wetland); riparian woodland; Coast live oak/California walnut woodland; and native grassland. A multipurpose trail system with educational interpretive nodes would be installed around the perimeter of the project area. The trail would be bordered with "wood look" four-foot high concrete fencing and buffer plantings that would help manage the interface between park users and habitat areas. Interpretive nodes and signage would be located at strategic locations along this trail system to educate park users regarding the composition of each habitat and its associated wildlife. This signage is also an opportunity to provide historical data of the evolution of the Bull Creek Channel Restoration, as well as the benefits the new habitat will produce, and to instruct people to avoid sensitive habitat zones. Subjects that would enhance a visitor's experience include detailed habitat and wildlife descriptions, and projected benefits of the project. To increase the quality of native vegetation and wildlife refuge, these trails would not enter into all portions of the habitat areas.

- **Alternative 3: Braided Stream with Islands Concept.** Alternative 3 incorporates the foundation elements included in Alternative 2, and expands the aquatic and riparian streamside habitat while reducing native grassland and Coast live oak/California walnut woodland. Grading would be done in combination with the construction of check dams to create pools and a braided stream system with riffles, point bars and sidebars. Two distinct channels would occur for a short distance around two islands that would support additional aquatic and riparian woodland vegetation. The larger island would have trail access for park visitors; the smaller island would offer protected nesting opportunities for wildlife. The volume of surface water flow into the restoration area would be increased, and a series of check dams would be installed to help reduce the chance of sediment erosion from seasonal flooding. This alternative could also include a fenced series of pedestrian trails, as well as interpretive nodes and signage, as described in Alternative 2, located at strategic locations along this trail system to educate park users and instruct people to avoid sensitive habitat zones.

- **Alternative 4: Oxbow Concept.** Alternative 4 represents the Preferred Alternative for the Bull Creek Channel Ecosystem Restoration Project. It incorporates the foundation elements included in Alternatives 2 and 3 in terms of check dams, pools, riffles and point bars. A sediment basin and trash collection element would be located at the north end of the channel, and a second pipeline would be constructed to Lake Balboa to import lake water. This alternative also would include grading of the existing channel corridor in a manner that would double the water flow capacity and be capable of accommodating peak water flow during winter storms. Alternative 4 would also include the development of a side channel along the west side of the existing creek in the shape of an oxbow, and include the creation of an island approximately one acre in size. Due to the lower slope gradient, (approximately one percent and less), the side channel would support a meandering type of stream, not a braided stream. This alternative would also include a fenced series of pedestrian trails, and interpretive nodes and signage, as described above, located at strategic locations along this trail system to educate park users and instruct people to avoid sensitive habitat zones. That portion of the trail system crossing the island could be closed during nesting season, and would be elevated to further deter visitors from entering habitat areas. Trail closure would need to be coordinated with the local sponsor.

Recommended Plan. Alternative 4, the Oxbow Concept Alternative, has been identified as the Recommended Plan. Alternative 4 provides the most incremental Habitat Units at the lowest total and per-unit Habitat Unit costs. This alternative provides the greatest level of habitat quality improvement to the Channel, while also providing a good cost/benefit ratio for the incidental recreational opportunities. Both of these project objectives are paramount to the USACE and City of Los Angeles, Department of Recreation and Parks. Although achieving Alternative 4 requires the greatest amount of earth disturbing activity during construction, the impacts associated with this construction are considered temporary in nature and would not create any impacts that cannot be reduced to a level of less than significant. The estimated cost for construction of the recommended plan is $5,771,249. Estimated annual Operations

and Maintenance costs for the Recommended Plan are approximately $140,622 including an annual water cost for the temporary irrigation system of approximately $72,870.

Summary of the DPR. Information regarding the project's study authority, background, purpose and need are provided in Section 1 of this DPR. Section 2 provides information on the projects location and general features. Section 3 provides a description of the project's existing conditions on a resource/issue-specific basis. Section 4 describes predicted future conditions without the proposed project (No Action). Section 5 provides the objectives, constraints and opportunities considered in creating project alternatives. It also provides a detailed description of the project's four alternatives. Section 6 describes the various analyses done to determine which alternative should be the Recommended Plan. Section 7 presents further expanded detail on the features of the recommended plan, including grading design, planting and maintenance information. Sections 8 and 9 provide information regarding local sponsor and Federal views and coordination efforts. Section 10 provides the DPR's references. The Environmental Assessment for the Bull Creek Channel Ecosystem Restoration is provided under separate cover.

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1. INTRODUCTION

1.1 STUDY AUTHORITY

This Detailed Project Report has been prepared to evaluate the proposed Bull Creek Channel Ecosystem Restoration Project (Project). Study of the Project falls under the authority of Section 1135 (b) of the Water Resources Development Act (WRDA) of 1986, PL99-662, as amended, which authorizes the Secretary of the Army to review the operation of water resources projects to determine the need for structural or operational modifications for the purpose of improving the quality of the environment and in the public interest. Federal costs to carry out such modifications shall not exceed $5,000,000.00 without specific authorization by Congress with a non-Federal co-sponsor cost-share of twenty-five percent. The non-federal sponsor of the Bull Creek Ecosystem Restoration Project is the City of Los Angeles Department of Recreation and Parks. They are responsible for future operations, maintenance, repairs, replacement and rehabilitation (OMRR&R). The non-federal sponsor also must be able to provide any required lands, easements, rights-of-way, relocations and disposal areas. They must cost-share any incidental recreational features at 50%. The non-federal contribution shall be 100% cash.

1.2 STUDY PURPOSE AND JUSTIFICATION

The purpose of this DPR is to investigate the feasibility of proposed modifications and alternatives to a portion of the Bull Creek Channel (Channel) that drains into the Los Angeles River. Bull Creek is a small tributary to the Los Angeles River that enters the northern end of the Sepulveda Flood Control Basin at Victory Boulevard just east of Balboa Boulevard. The current condition at the project site is a degraded ecosystem characterized by overgrown invasive exotic plants of little value to migrating birds or native resident species. The current condition is not aesthetically pleasing and can be improved to support a variety of species while enhancing the appearance of the surrounding area and providing opportunities for interaction with the community. This DPR will investigate opportunities for modification of the environment with recommendations for implementable solutions.

Justification. The justification for this study comes under the Water Resources Development Act of 1986. In 1994 the Assistant Secretary of the Army requested the USACE Los Angeles District recommend potential projects for ecosystem restoration. The scarcity of wetlands in California has been documented in other studies. According to the Ballona Creek ERR, California has lost 91% of its historic wetlands since the 1780's due to filling, dredging, flood control, agriculture and urbanization (USACE,

2000). Remaining wetlands in California have been degraded in quality and appearance through the introduction of exotic plant species, degradation of water quality and fragmentation of existing wetland systems. Opportunities to restore wetlands to provide habitat for rare and endangered species that are typically attracted to wetland ecosystems should be given high priority. The recommended plan expects to transform a man-made, polluted channel into a healthy riparian ecosystem capable of supporting a variety of wildlife.

The native habitat along the Channel has been degraded due to increased urbanization and changing land use patterns and the channelization of Bull Creek. The opportunity exists to restore habitat areas by making physical channel modifications, increasing multi-layered indigenous vegetation cover, and increasing the quality of riparian and upland habitat via the removal of invasive vegetation.

1.3 STUDY PROCESS

In December 1994, the Office of the Assistant Secretary of the Army requested that the Los Angeles District recommend potential projects for ecosystem restoration under Section 1135 of the Water Resources Development Act of 1986, as amended. The Preliminary Restoration Plan (PRP) was completed in November 1999 and approved by the U.S. Army Corps of Engineers, South Pacific Division (SPD) in February 2000. After further discussions between the City of Los Angeles Department of Recreation and Parks the local sponsor, and the Los Angeles District, it was determined that a Detailed Project Report (DPR) study should be initiated. Preparation of the Draft DPR was initiated in April 2000. This DPR represents the completion of a Feasibility Study and includes the recommended plan for approval by SPD.

1.4 STUDY SCOPE

The Sepulveda Flood Control Basin (Basin) consists of 2,097 acres and is used for flood control purposes. It was completed in 1941 on the Upper Los Angeles River. The lands at the Sepulveda Basin are owned by the U.S. Army Corps of Engineers (USACE); however, the majority of these lands are leased to the City of Los Angeles Department of Recreation and Parks (USACE, 1999). The proposed study area contains the downstream 3,000 feet of the Bull Creek Channel and surrounding areas, totaling approximately 27.9 acres. The proposed project would create and restore aquatic, riparian, and native upland habitat for the purpose of ecosystem restoration. In accordance with the provisions of Section 1135, the City of Los Angeles would be responsible for non-Federal costs.

The scope of this Detailed Project Report (DPR) is to complete a feasibility-level study that recommends implementable solutions to the degraded condition in the study area. Specifically, the DPR:

(1) Presents the findings and study results of the ecosystem restoration opportunities that were initially identified and developed in the Preliminary Restoration Plan (PRP), including a range of alternative plans to restore environmental habitats within the study area, and the potential costs and benefits associated with each plan.

(2) Determines the ecosystem restoration plan that maximizes net benefits based on Federal interest, cost, benefits, and the environmental impacts of the identified plans, and assures that the proposed project is in compliance with applicable statutes, executive orders, policies and regulations, and in accordance with current budgetary priorities;

(3) Provides a sound and well-documented report from which decision-makers can judge the merits of the recommended restoration plan; and,

(4) Assesses the level of non-Federal interest and support for the recommended restoration plan.

1.5 PRIOR AND CURRENT STUDIES

Prior and current studies involving the study area and/or the surrounding region are briefly described below.

Letter Report for Anthony C. Beilenson Park, Recreational Improvements Project, Los Angeles County, Los Angeles (January 2002). This letter amends the March 1981Final Updated Master Plan, Sepulveda Flood Control Basin and Recreation Area to remove the Arts Park as a feature of the Master Plan. The Arts Park was formerly proposed for development on the site that includes the Bull Creek Channel 1135 study area and the Anthony C. Beilenson Park Recreational Improvements Project currently under construction. It further amends the Project Cooperation Agreement (PCA) with the Corps to include a new scope and funding.

Bull Creek Section 1135 Draft Environmental Assessment (EA) (2004, In Preparation). Aspen Environmental is preparing this draft EA under subcontract to Tetra Tech, Inc. for the United States Army

Corps of Engineers, Los Angeles District. This draft EA evaluates the environmental effects of the proposed Bull Creek Channel Ecosystem Restoration Project and its alternatives. Study of the project falls under the authority of Section 1135 (b) of the Water Resources Development Act (WRDA) of 1986.

Final Supplemental Environmental Assessment (SEA) for the Anthony C. Beilenson Park Recreational Improvements Project (January, 2001). This SEA is a supplement to the Environmental Impact Statement for the Sepulveda Basin Master Plan (USACE, 1981). This report details improvements, which consist of recreational and access elements, adjacent to the western boundary of the Bull Creek riparian habitat restoration project currently under evaluation

Basis for Design, Recreation Improvements to Anthony C. Beilenson Park: Sepulveda Flood Control Basin (January 2000). Tetra Tech, Inc. prepared this report for the Los Angeles District of the Army Corps of Engineers. The report explains proposed project improvements, and then identifies all project components related to size, materials, construction methodology, facilities locations, and estimated costs. This proposed project is adjacent to the Bull Creek project site; therefore, the proposed improvement will have an impact on the restoration project. The report further evaluates the aforementioned issues by providing a rationale for the design decisions.

Bull Creek Section 1135 Preliminary Restoration Report (PRP) (November 1999). This plan was prepared by the USACE Los Angeles District as an initial step in assessing the Federal interest and feasibility of implementing a Section 1135 environmental restoration project for that portion of the Bull Creek Channel that is located within the Sepulveda Flood Control Basin. The PRP proposed a conceptual design alternative, with estimated costs, for the development of approximately 27.9 acres of aquatic, riparian, and native upland habitat to enhance and restore wildlife resources along the Channel. The proposed habitat restoration was prompted due to the impact of urbanization on the channel's geomorphologic features and related riparian system. The PRP was submitted to SPD in November 1999. SPD approved the PRP in February 2000, authorizing preparation of this DPR for the proposed modification project.

Feature Design Memorandum, Sepulveda Basin Recreation Lake (March 1987). This Feature Design Memorandum, which was prepared by the USACE Los Angeles District, validates the basic planning decisions stated in the Updated Master Plan of 1981, and identifies three major design components. The design components are a recreation lake, wildlife management area, and a water distribution system. The Feature Design Memorandum establishes the scope of the project and further

develops the optimum plan that was identified in the 1981 Master Plan from the alternatives studied. This report provides an up-to-date basis for preparation of plans and specifications and cost-sharing agreements.

Final Updated Master Plan, Sepulveda Flood Control Basin and Recreation Area (March 1981). This Master Plan updates the 1973 Master Plan prepared by the USACE. The updated plan serves as a guide for the orderly and coordinated development and management of all land and water areas of the Basin. A plan is formulated for developing project land, water, and other resources in an efficient manner that considers costs, future recreational demand, and the carrying capacity of the Basin.

Feature Design Memorandum, Revised Recreation Master Plan for Sepulveda Flood Control Reservoir (November 1973). This revised master plan, prepared by the USACE, was developed to serve as a guide for land development for recreational purposes within the Basin. The development is planned in three stages: initial, future, and ultimate. The Master Plan also describes existing recreational facilities that have been constructed by the City of Los Angeles and the West Valley Youth, Inc.

2. PROJECT DESCRIPTION

2.1 PROJECT LOCATION

The proposed study area is located within the Sepulveda Flood Control Basin behind the Sepulveda Dam. The Basin encompasses 2,097 acres located in the San Fernando Valley area of the City of Los Angeles, two miles southwest of the community of Van Nuys and approximately 10 miles west of the City of Burbank. The principal access roads to the Basin are the Ventura Freeway (U.S. Highway 101) and the San Diego Freeway (Interstate 405), Sepulveda, Ventura, Van Nuys, Burbank, Balboa, and Victory Boulevards, and White Oak Avenue. The Project location and vicinity maps are displayed in Figures 2.1-1 and 2.1-2.

The Sepulveda Flood Control Dam was completed in December of 1941 after it was incorporated into the Comprehensive Plan for flood control within the Los Angeles County Drainage Area as part of the Flood Control Act of 1941. Recreational uses of the Basin began in 1974 (USACE, 1999). Approximately 1,527 acres within the Basin are leased to the City of Los Angeles, Department of Recreation and Parks, for recreational development (USACE, 1987). The study area entails the downstream 3,000 feet of the Bull Creek Channel, a tributary channel which flows from north to south into the Los Angeles River. The Bull Creek Channel has a drainage area of approximately 25 square-miles.

The study area is bordered by Victory Boulevard to the north, Anthony C. Beilenson Park to the east, the Los Angeles River to the south, and the proposed expansion of Anthony C. Beilenson Park to the west. Lake Balboa, which is part of Anthony C. Beilenson Park, is located near the eastern edge of the study area. To the west of the study area, on the far side of the open space, lies Balboa Boulevard. The study area includes approximately 27.9 acres of disturbed aquatic, riparian, and upland habitat.

2.2 PROPOSED ACTION

The proposed project will restore and enhance the habitat of the downstream 3,000 feet of the Bull Creek Channel. The native habitat along this portion of the Channel has been degraded due to increased urbanization, changing land use patterns, and the channelization of Bull Creek. The opportunity exists to restore and improve quality of habitat areas by making physical channel modifications, increasing multi-layered indigenous vegetation cover, and increasing the amount of riparian and upland habitat by removing invasive vegetation. In addition, the proposed project would provide for increased incidental passive recreational and interpretive educational opportunities within the Basin.

Figure 2.1-1: Project Location Map

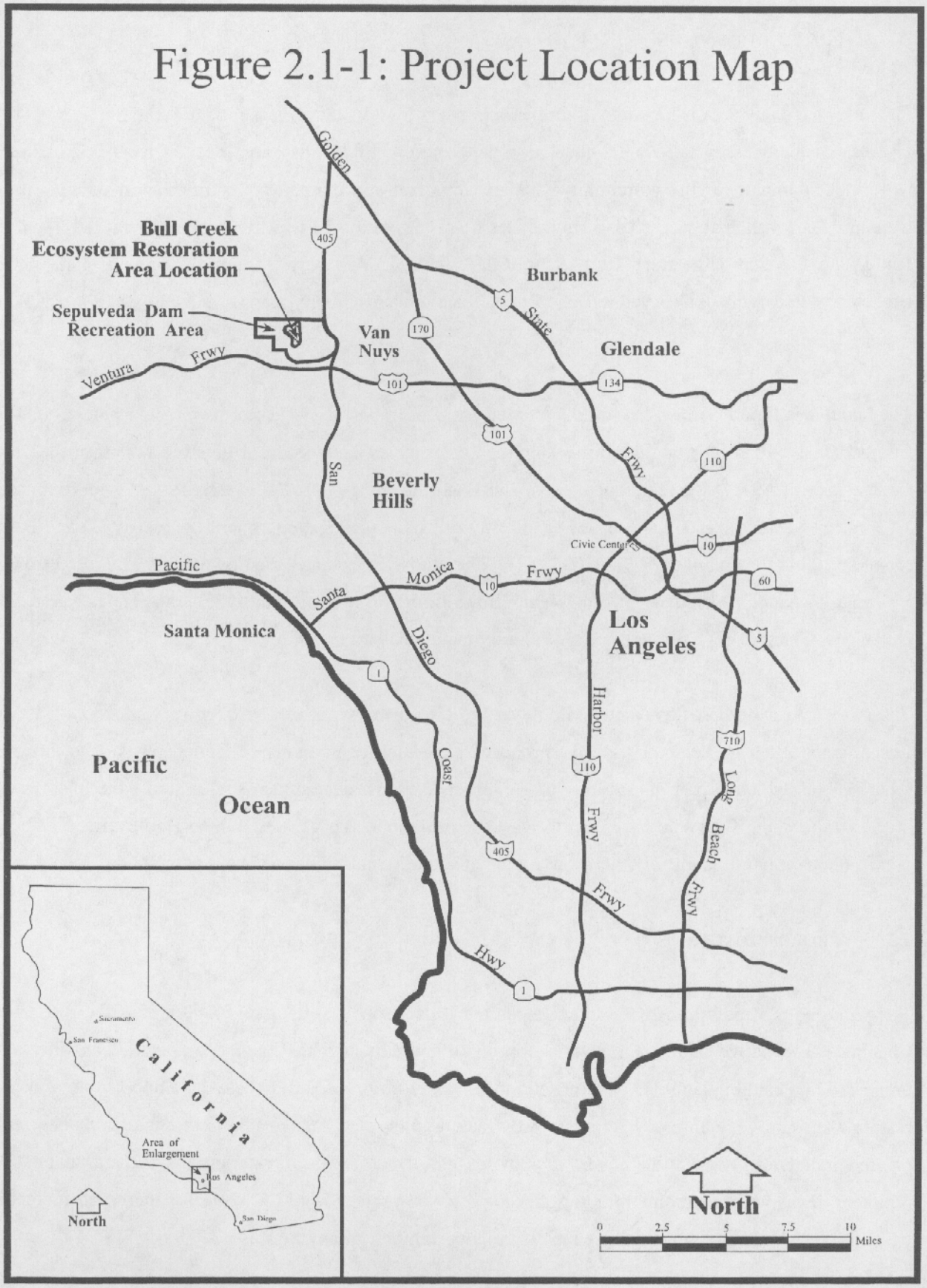
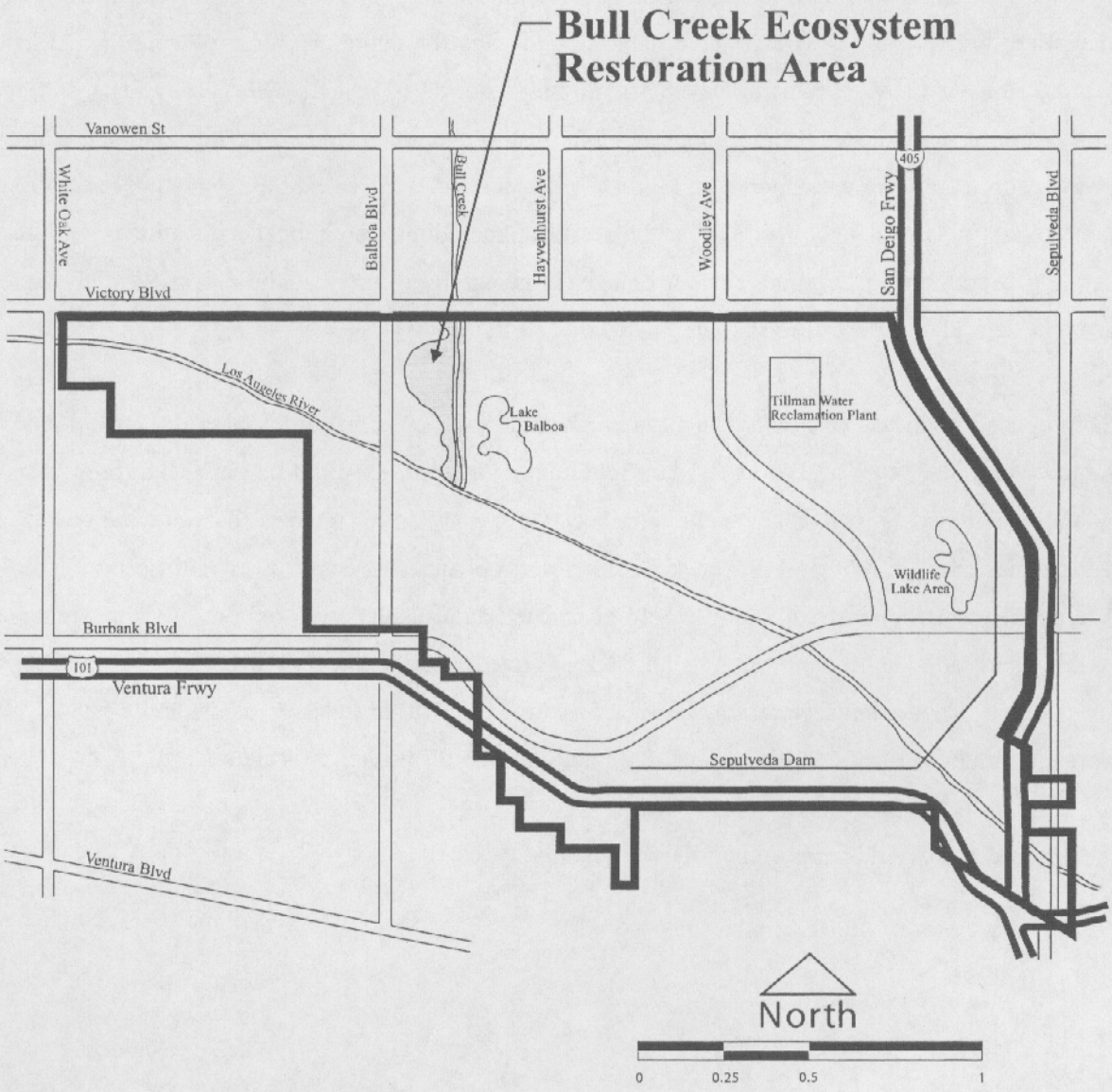


Figure 2.1-2: Project Vicinity Map



Based on the assessment of historic and current conditions, a series of goals and objectives have been established for the environmental restoration of the Channel. The Project goals emphasize the restoration of wildlife habitat through the establishment of approximately 27.9 acres of aquatic, riparian, and native upland habitat.

Project objectives include the restoration of scarce, high-value wildlife habitat to an area that has been impacted by urbanization and land-use changes. Reintroduction of native vegetative species along with open water areas would create suitable habitat conditions for migratory birds. According to historical records, Bull Creek was a major haven for migratory birds (USACE, 1999). Benefits resulting from habitat restoration include foraging opportunities, resting stopovers and wintering grounds, high species diversity, protection for endangered and threatened species and increased biodiversity. Restoration goals also include incidental benefits that can be realized, including recreational, educational, and scientific uses (e.g. Audubon bird counts, student or agency research projects) of the proposed study area. The recommended plan is described in Section 7 of this DPR.

The proposed modifications would involve approximately 27.9 acres (study area). Channel side slopes would be regraded from a 2:1 to a 3:1 configuration. Streamflow would be enhanced through sediment and debris removal as well as channel alterations. An oxbow or "C" shaped channel would be excavated in the upper reaches of the Bull Creek Channel and enhanced streamflow would be introduced using water from Lake Balboa. An island would be created as a result of the oxbow. A debris removal unit would be installed at the northern edge of the project site to prevent debris from moving further downstream. Vegetation restoration would involve the removal of invasive plants and a phased planting approach for native plants. See Section 7.8.2 Planting Plan for further information.

The restored area would support the following habitat types:

- Aquatic
- Riparian Woodland
- Coast Live Oak/Walnut Woodland
- Grassland
- Buffer

Plant species and wildlife groups associated with each of these habitat types are provided in Table 5.2-1.

In addition to the above, interpretive nodes would be placed periodically along the Channel to provide educational opportunities. Interpretive signs would discuss subjects that would enhance a visitor's experience, including detailed habitat and wildlife descriptions, and the history of the Bull Creek Channel. Sufficient space adjacent to the main pedestrian flow would be provided to accommodate individuals or small groups of people. Signage could include descriptions of the habitat visible from that location and associated wildlife that may be present. Other signs could include historical narrative describing the original condition of the Creek, the pre-project state, the design evolution and the projected benefits of the project. These nodes would be connected by maintenance access ways that double as pathways. Bridges would span the Channel to allow pedestrian and maintenance access and to connect to pedestrian and maintenance trails. These bridges would serve as overlooks, allowing users to see along the Channel into the core of the restored habitat areas. Additional pedestrian access to the area would be provided from the west side of the Los Angeles County Metropolitan Transportation Authority (MTA) San Fernando Valley East-West Transit Corridor Balboa Boulevard busway station. The new busway station is on the site of the former Department of Transportation's Park and Ride lot, which has been expanded westward to Balboa Boulevard (see Figure 2.2-1). Details of connection will be coordinated with MTA in the design phase. An unobtrusive four-foot high "wood look" post and rail fence would be installed along the paths and interpretive nodes to deter people from leaving the path and entering habitat areas. During peak migratory and nesting seasons, the island created by the oxbow could be gated off to prevent potential disturbances.

Construction activities would be limited to inside the channel perimeter, along the outer edges of the channel embankment, and a portion of an existing ruderal area near the northwestern portion of the Channel as well as activities associated with the installation of utilities such as irrigation and outflow/inflow conduits.

Construction is scheduled to begin in September 2005; however, unforeseen delays in funding or other approvals could delay the onset of construction to 2006 or 2007. The construction period is estimated to be about one year.

3. EXISTING CONDITIONS

The following sections provide a summary of the existing conditions of the study area on a resource/issue-specific basis.

3.1 BIOLOGICAL RESOURCES

3.1.1 General Background

Site visits to the study area were conducted on May 23, May 29, and June 5, 2000. The purpose of these visits was to conduct a preliminary inventory of vegetation and to make wildlife observations (USACE, 2004, in preparation).

The portion of the Bull Creek Channel that constitutes the study area is a highly altered and disturbed perennial stream. Previous grading and flood prevention actions have resulted in a relatively straight and narrow channel with a north to south alignment and water flow. The side slopes are very steep, ranging from 2:1 to 1:1 throughout. The Channel varies in depth from approximately fifteen to twenty feet; seasonal water flow from rains and urban runoff comes within four to five feet of the top of the channel banks. The north end of the Channel in Sepulveda Basin has been stabilized with concrete, grouted stone, and boulders, and is subject to the greatest impact from seasonal water flow and debris. The southern end of the Channel is also stabilized with boulders and cement where the Channel connects to the Los Angeles River. A series of low concrete check dams has been constructed across the bottom of the Channel at periodic intervals. Water and debris enter the north end of the Channel throughout the year. Winter rains produce near capacity flows in the Channel. Water flow during the dry months consists of urban runoff. Water from the Tillman water reclamation facility is piped from Lake Balboa to the Channel and released approximately 800 feet upstream from the Los Angeles River.

The land surrounding the Bull Creek Channel has been graded to accommodate recreational activities and open space uses. Prior to these uses, agriculture was prevalent in the project area, and Bull Creek may have served as an agricultural drainage channel. As a result of previous disturbances, virtually no native plant communities or vegetation have been preserved. Recreational development is nearing completion on the east side of the Channel. The west side is comprised of both recreation landscaping and grassy fields. A recreation improvement project immediately adjacent to the west side of the proposed Bull Creek Channel Ecosystem Restoration project was initiated in May 2004.

Access into the Channel is highly restricted as a result of the steep slopes and existing vegetation. Currently, the easiest points of access occur at the north and south ends, and adjacent to the vehicular bridge that crosses near the southern end of the Channel.

3.1.2 Vegetation

Existing vegetation within the Bull Creek Channel is comprised of both native and exotic plants. The site inventory presented in the Bull Creek Channel 1135 Draft Environmental Assessment reveals that the vegetation patterns and largest percentage of habitat areas are heavily dominated by exotic species, while native species are observed to dominate in only two to three limited areas (USACE, 2002). A vegetation inventory of the study area based on site visits in May and June 2000 is provided in Table 3.1-1 (USACE, 2002). A summary map of vegetation is provided as Figure 3.1-1

The structure of the Bull Creek Channel is comprised of three overlapping vegetation zones: an active aquatic zone with perennial water flow, a streamside border zone with intermediate biomes comprised of riparian vegetation, and a perimeter and higher zone comprised of scrub, woodland and ruderal vegetation.

Aquatic Vegetation. Aquatic vegetation within the Bull Creek Channel is highly limited, and estimated to cover less than one-half an acre of area. Plants surviving in flooded sandbars and pools include broadleaf cattail (*Typha latifolia*), California bulrush (*Scirpus californicus*), and tall flat sedge (*Cyperus eragrostis*). The narrow and straight configuration of the Channel in combination with seasonal flooding, varying water levels, and poor water quality are significant limiting factors affecting the occurrence of aquatic vegetation.

Riparian Vegetation. Riparian habitats are often seen as an ecotone or transitional community between an aquatic environment and the adjacent slope and upland environment. This observation helps explain the increased diversity of species that typically occurs in riparian areas. However, in the case of the study area, it is evident that the regrowth of plants over the years following the straightening and clearing of the Channel has favored the introduction and establishment of several aggressive exotic species. Two species, giant reed (*Arundo donax*) and tree of heaven (*Ailanthus altissima*), are identified as among the most invasive wildland pest plants by the California Exotic Pest Plant Council. Other exotic species, including evergreen ash (*Fraxinus uhdei*), castor bean (*Ricinus communis*), bull thistle (*Cirsium vulgare*), and black locust (*Robinia pseudoacacia*) are also common invasive species in the Bull Creek Channel.

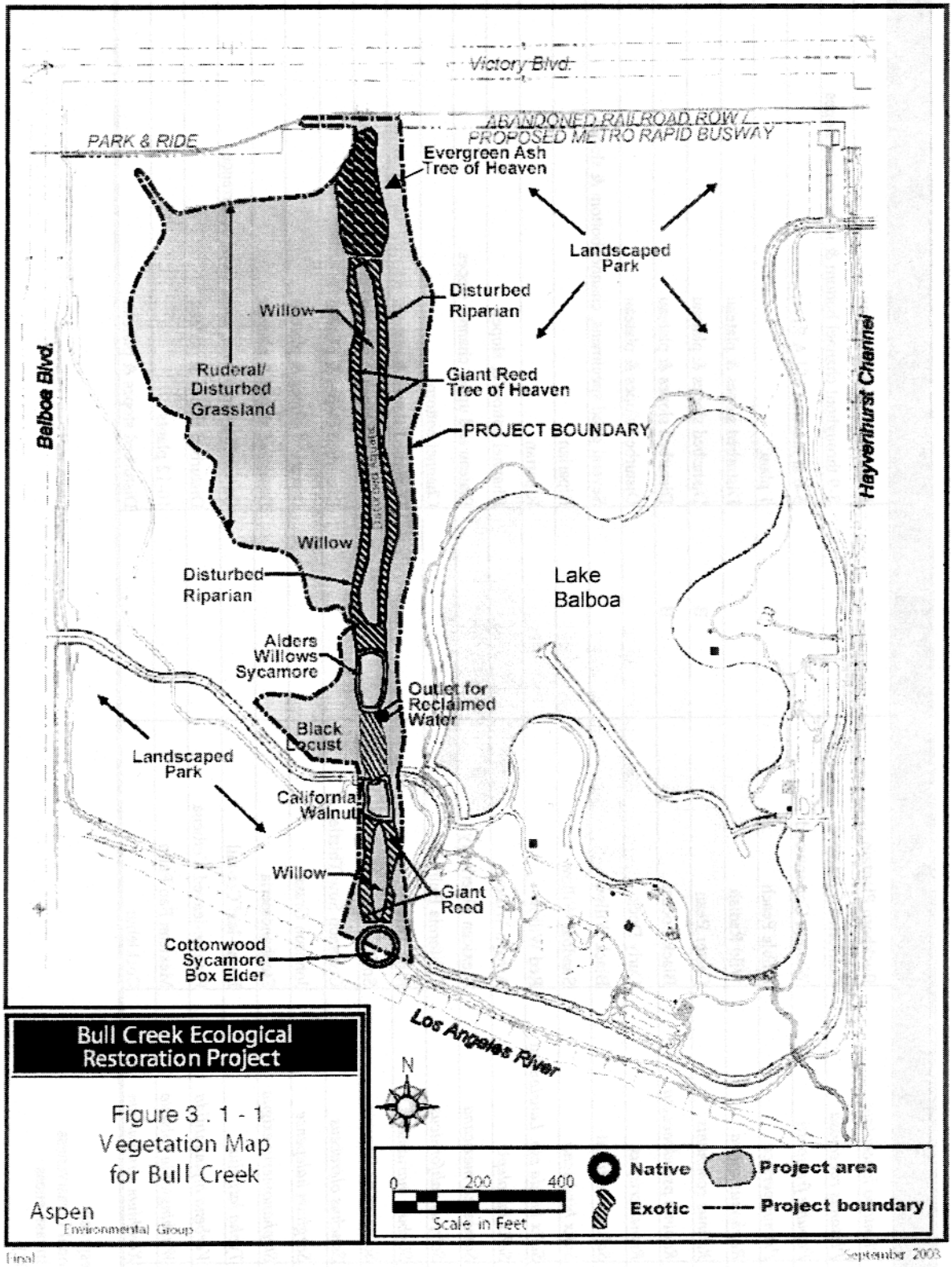
Table 3.1-1 Bull Creek Vegetation Inventory (6/1/00)a

Frequency	Scientific Name	Common Name	CEPPC INVASIVE List	Notes
Uncommon	Acer negundo	Box Elder		1 plant @ LA River junction
Common	*Alianthus altissima*	Tree of Heaven	A-2	Plateau West side + North End
Occasional	*Alnus rhombifolia*	White Alder		Channel bottom, 5-6 total
Common	*Amaranthus blitoides*	Tumbling Pigweed		Disturbed slopes + plateau
Frequent	*Amaranthus sp.*	Pigweed		Disturbed slopes + plateau
Common	*Ambrosia acanthicarpa*	Spiny Ragweed		Disturbed slopes + plateau
Common	*Ambrosia psilostachya*	Western Ragweed		Disturbed slopes + plateau
Common	*Artemisia californica*	California Sagebrush		Disturbed slopes + plateau
Common	*Artemisia douglasiana*	Mugwort		Disturbed slopes + plateau
Common	*Arundo donax*	Giant Reed	A-1	Very aggressive & common
Common	*Asclepias fascicularis*	Narrow-leaved milkweed		Disturbed slopes + plateau
Common	*Avena barbata*	Slender Wild Oat		Disturbed slopes + plateau
Occasional	*Baccharis salicifolia*	Mulefat		Disturbed slopes + plateau
Common	*Brassica geniculata*	Summer Mustard		Disturbed slopes + plateau
Common	*Brassica nigra*	Black Mustard	B	Disturbed slopes + plateau
Common	*Bromus diandris*	Ripgut Brome		Disturbed slopes + plateau
Common	*Bromus rubens*	Red Brome	A-2	Disturbed slopes + plateau
Occasional	*Catalpa bignonioides*	Common Catalpa		Channel bottom
Common	*Centaurea melitensis*	Tocalote	B	Disturbed slopes + plateau
Common	*Centaurea solstitialis*	Yellow Star Thistle	A-1	Disturbed slopes + plateau
Uncommon	*Ceratonia siliqua*	Carob Tree		2 plants at north end
Common	*Chenopodium album*	Lambs Quarters		Disturbed slopes + plateau
Common	*Chenopodium ambrosioides*	Mexican Tea		Disturbed slopes + plateau
Common	*Cirsium vulgare*	Bull thistle	B	Disturbed slopes & plateau
Uncommon	*Convolvulus arvensis*	Bindweed		Disturbed slopes & plateau

Frequency	Scientific Name	Common Name	CDFG CAL-IPC Cal-IPC	Notes
Uncommon	*Cucurbita pepo*	Pumpkin		Plateau in mulch piles
Occasional	*Cynodon dactylon*	Bermuda Grass		Disturbed slopes & plateau
Occasional	*Cyperus eragrostis*	Tall Flat Sedge		Aquatic
Occasional	*Datura meteloides*	Jimson Weed		Disturbed slopes & plateau
Common	*Echinochloa crusgalli*	Barnyard Grass		Disturbed slopes & plateau
Uncommon	*Eriogonum fasciculatum*	California Buckwheat		Disturbed slopes & plateau
Occasional	*Erodium cicutarium*	Red-stemmed Filaree		Disturbed slopes & plateau
Uncommon	*Eucalyptus globulus*	Blue Gum	A-1	1 specimen
Common	*Festuca megalura*	Foxtail Fescue		Disturbed slopes & plateau
Common	*Fraxinus uhdei*	Evergreen Ash		Disturbed slopes, channel edge + north end
Periodic	*Gnaphalium californicum*	California Cudweed		Disturbed slopes & plateau
Common	*Helianthus annuus*	Western Sunflower		Disturbed slopes & plateau
Uncommon	*Heliotropium curassavicum*	Heliotrope		Disturbed slopes & plateau
Occasional	*Hordeum leporinum*	Foxtail Barley		Disturbed slopes & plateau
Common	*Juglans californica var. californica*	California Black Walnut		Hybrids exist, naturalizing occuring on plateaus
Common	*Lactuca serriola*	Prickly Lettuce		Disturbed slopes & plateau
Common	*Leptochloa uninerva*	Sprangle Top		Disturbed slopes & plateau
Uncommon	*Lolium multiflorum*	Italian Ryegrass		Disturbed slopes & plateau
Common	*Malva parviflora*	Cheeseweed		Disturbed slopes & plateau
Common	*Marrubium vulgare*	Horehound		Disturbed slopes & plateau
Periodic	*Medicago polymorpha*	Bur-clover		Disturbed slopes & plateau
Common	*Melilotus albus*	White Sweet-clover		Disturbed slopes & plateau
Uncommon	*Morus alba*	Mulberry		1 plant
Common	*Nicotiana glauca*	Indian Tree Tobacco		Disturbed slopes & plateau
Uncommon	*Parthenocissus quinquefolia*	Virginia Creeper		1 plant covering slope
Common	*Paspalum dilitatum*	Dallis Grass		Disturbed slopes & plateau

Frequency	Scientific Name	Common Name	CEPPC Invasive List	Notes
Common	*Plantago lanceolata*	Buckhorn Plantain		Disturbed slopes & plateau
Periodic	*Platanus racemosa*	California Sycamore		8-9 throughout channel bottom & intermediate slopes
Uncommon	*Populus fremontii*	Western Cottonwood		5-6 at junction of LA River
Uncommon	*Prunus persica*	Edible Peach		1 plant
Uncommon	*Raphanus sativa*	Wild Radish		Disturbed slopes & plateau
Common	*Ricinus communis*	Castor Bean	B	Disturbed slopes & plateau
Occasional	*Robinia pseudoacacia*	Black Locust	B	Disturbed slopes & plateau
Common	*Rumex crispus*	Curly Dock		Disturbed slopes & plateau
Common	*Salix gooddingii*	Black Willow		Several good specimens, channel bottom & slopes
Common	*Salix hindsiana*	Sandbar Willow		Riparian
Common	*Salix lucida ssp. Lansiandra*	Red Willow		Riparian
Common	*Salix lasiolepis*	Arroyo Willow		Channel bottom & slopes
Periodic	*Sambucus mexicana*	Mexican Elderberry		Plateau and upper channel slopes
Periodic	*Scirpus californicus*	California Bulrush		Channel bottom
Frequent	*Silybum marianum*	Milk Thistle		Disturbed slopes & plateau
Uncommon	*Solanum nodiflorum*	Small-flowered Nightshade		Disturbed slopes & plateau
Frequent	*Sonchus oleraceus*	Common Sow Thistle		Disturbed slopes & plateau
Frequent	*Sorghum halepense*	Johnson Grass		Disturbed slopes & plateau
Common	*Stephanomeria exigua*	Stephanomeria		Disturbed slopes & plateau
Common	*Typha latifolia*	Broad-leaf Cat-tail		On sandbars in stream, some slope occurrence
Uncommon	*Verbena bipinnatifida*	Pinnate-leaved Verbena		Disturbed slopes & plateau
Periodic	*Washingtonia robusta*	Mexican Fan Palm		10-12 plants
Periodic	*Xanthium strumarium*	Cocklebur		Disturbed slopes & plateau

CEPPC Lists:
A-1 Most Invasive – Widespread
A-2 Most Invasive – Regional Invasiveness
B Pest Plants of Lesser Invasiveness
a Source (USACE, 2002)



Bull Creek Ecological Restoration Project

Figure 3 . 1 - 1
Vegetation Map
for Bull Creek

Aspen
Environmental Group

The strongest occurrence of native riparian species occurs among the willows. Arroyo willow (*Salix lasisolepis*) is most dominant and widespread as a ten to fifteen foot shrub; Goodding's willow (*Salix gooddingii*) is reaching tree-like proportions up to thirty feet; red willow (*Salix lucida ssp. Lansiandra*) is very common within the lower channel reaches. Infrequent specimens of white alder (*Alnus rhombifolia*) and occasional western sycamore trees (*Platanus racemosa*) occur throughout the length of the Channel, while a few specimens of Fremont cottonwood (*Populus fremontii*) exist only at the confluence of the Los Angeles River.

Scrub and Woodland Vegetation. Elements of native scrub and Southern California walnut woodland vegetation are established along the perimeter slope and terrace areas of the Bull Creek Channel. However, this zone is dominated by ruderal and successional annual and perennial species, including western ragweed (*Ambrosia psilostachya*), mugwort (*Artemisia douglasiana*), castor bean (*Ricinus communis*), tree tobacco (*Nicotiana glauca*), horehound (*Marrubium vulgare*), and numerous species of exotic grasses. These plants have become established in areas disturbed by grading or disking.

Periodic occurrences of Southern California walnut (*Juglans californica*) exist along the upper slopes of the Channel. A number of these specimens may be hybrids between southern California walnut and the cultivated English Walnut (*Juglans regia*) that have become mixed together in the basin through agricultural practices. Numerous walnut seedlings are becoming established on the upper terrace along the west side of the Channel, demonstrating their potential value in future restoration efforts. The most significant sage scrub species established throughout the sunnier and drier slope and terraces is the California sagebrush (*Artemisia californica*).

3.1.3 Wildlife

The study area is comprised of open fields and disturbed riparian habitat. The U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG) have noted Bull Creek to be a palustrine scrub-shrub/emergent habitat. Additionally, the USFWS maintains the view that no additional wetland area is to be lost within the Basin.

Table 3.1-2 provides a list of wildlife observed during the May and June 2000 field visits for this study. A more comprehensive list of wildlife potentially occurring on site is provided in the EA. Open fields in the Basin are used as foraging areas for a number of wildlife species, including the wintering flocks of Canada geese. The disturbed riparian vegetation contains many habitat conditions and a perennial source

of water. Wildlife sighted during reconnaissance visits include great blue heron (*Ardea herodias*), mallard duck (*Anas platyrhyncos*), Anna's hummingbird (*Calypte anna*), mourning dove (*Zenaida macroura*), common raven (*Corvus corax*), and feral cats (*Felis domesticus*). Issues specific to listed wildlife species are addressed in Section 3.1.4, below.

Table 3.1-2 Wildlife Observed May and June 2000

Scientific Name	Common Name	Listing	Observed
BIRDS			
Anas platyrhynchos	Mallard		X
Calypte anna	Anna's Hummingbird		X
Ardea herodias	Great Blue Heron		X
Zenaida macroura	Mourning Dove		X
Corvus corvax	Common Raven		X
MAMMALS			
Carnivora	**Flesh Eaters**		
Felis domesticus	Cat		X
Rodentia	**Rodents**		
Citellus beecheyi	California Ground Squirrel		X

3.1.4 Listed and Proposed Threatened, Endangered and Candidate Species

Vegetation. "Most [plant] extinction [in California] has been in association with low elevation grasslands, coastal scrub, wetlands and oak woodlands" so stated the California Native Plant Society (CNPS, 1994). However, a review of the State and Federal listed endangered, threatened, and rare plants of California indicates no species of concern presently occur in the study area. Rather than individual species, entire riparian, grassland, and black walnut habitats are increasingly recognized as significant habitats to protect and restore. This condition places significant importance upon proposed restoration actions.

The past sixty years of disturbance to the study area has resulted in a highly impacted environment that is dominated by exotic vegetation with the exception of periodic fragments of natural plant communities. The presence of native plants and overall natural habitat value is considered to be severely degraded and there are few signs indicating native regeneration would occur without pro-active restoration efforts.

Wildlife. Previous investigations into the wildlife of the Basin from the mid-1980's to mid-1991 revealed no species of concern listed in the California Natural Diversity Data Base (CNDDB) or in the Significant Ecological Area Study of Los Angeles County.

3.2 WATER RESOURCES

3.2.1 Groundwater

Historic water levels from two nearby water wells in the Sepulveda Dam reservoir area indicate that water levels in the project vicinity have ranged from five feet below ground surface to more than one-hundred feet below ground surface. Generally, the groundwater gradient is in the northeasterly direction away from the Santa Monica Mountains and the Los Angeles River. Four test holes were drilled in the vicinity of Bull Creek and the project area in 1981 and 1987. These holes varied in depth from twenty to seventy feet. Ground water was encountered in three of these test holes, at depths varying from twenty-five to thirty-one feet below ground surface. Additional groundwater data can be found in the Bull Creek Channel Environmental Assessment (USACE, 2004, in preparation).

3.2.2 Surface Water

Water and debris enter from the north end of the Channel throughout the year. Winter rains produce near capacity water flow through the Channel to the confluence of the Los Angeles River, located directly south of the study area. Water flow during the dry months is provided by urban runoff. Upstream urban runoff and the addition of trash within the Channel have negatively affected the water quality within the study area. A third source of water is provided from the Tillman reclamation facility. Secondary treated reclaimed water from the Tillman Water Reclamation Plant (hereby noted as the plant) is discharged into the Channel approximately 800-feet north of the Channel's confluence with the Los Angeles River. As required under the Clean Water Act, the plant requires a National Pollution Discharge Elimination System (NPDES) permit. As part of the permit provisions the plant must meet influent and effluent standards and conduct routine monitoring for influent and effluent. Per the 2001 Annual Summary Report (NPDES Permit No. CA0056227) for Monthly, Weekly, and Daily Monitoring of Final Effluent related to the plant, it appears that the plant remained in compliance. Additional surface water data can be found in the Bull Creek Channel Environmental Assessment (USACE, 2004, in preparation).

3.3 EARTH RESOURCES

3.3.1 Topography

Bull Creek rises on the alluvial apron of the Santa Susana Mountains near the downstream end of the Los Angeles Aqueduct and Lower Van Norman Dam. The creek flows almost due south for about ten miles before entering the Basin to join the Los Angeles River. The portion of Bull Creek that is the subject of this study is entirely in the north central portion of the Basin. The Basin is located in the south central portion of the San Fernando Valley. The San Fernando Valley is approximately twenty miles in length and ranges in width from two to twelve miles. The Valley is bounded by the Santa Susana and San Gabriel Mountains to the north, the Santa Monica Mountains to the south, the Verdugo Mountains to the east and the Simi Hills to the west.

3.3.2 Soils/Geology

The USACE has conducted numerous subsurface investigations in the Basin. However, the only available soil exploration data close to this study area are in the Feature Design Memorandum, Sepulveda Basin Recreation Lake (USACE, 1987). In addition to one test hole drilled in 1981, three separate subsurface explorations were conducted in 1987. The first exploration was conducted from 20 to 22 January 1987 using a 24-inch diameter bucket auger. Eight test holes were drilled and four "undisturbed" samples were taken, using the drive cylinder split-spoon sampling device. Two of these holes (TH 87-1 and TH 87-7) were adjacent to Bull Creek, approximately 300 feet east of the study area. In November of that same year, an 8-inch diameter hollow stem auger hole (TH87-1A) was drilled near bucket auger hole TH 87-1. Standard penetration tests were conducted every three feet to the groundwater table. In addition, in November 1987, a cone penetration test (CPT) method was used in test hole (CPT 87-1) adjacent to the hollow stem auger hole (TH 87-1A).

The types of soils found during these field investigations were gravelly sand, sand, silty sand, clayey sand, sandy silt; sandy lean clay, clay, and fat clay with sand. Densities of granular material ranged from loose to dense. Cohesive material ranged from soft to stiff. Predominant soil types within the upper fifteen feet throughout the project area were medium-stiff to stiff sandy silt or sandy clay and medium dense clayey sand.

The mountains and hills surrounding the San Fernando Valley are part of the Transverse Ranges geologic province. The nearby Santa Monica Mountains are composed mainly of Cretaceous to Miocene sedimentary and volcanic rocks. The San Fernando Valley overlies a basin filled with both Tertiary marine and non-marine sedimentary rock and Quaternary alluvium. The Basin is as much as 14,000 feet deep. The Quaternary deposits in the southern part of the valley and in the vicinity of the project area include Pleistocene and Holocene alluvium composed primarily of clay, silt, and sand weathered from the sedimentary rocks exposed on the north flank of the Santa Monica Mountains. Underlying the alluvium in the project area are Tertiary (Miocene) shales and sandstones. The depth to these units varies from surface exposures located south of Ventura Boulevard to more than 400 feet in depth along Vanowen Street, approximately one mile north of the project area. Several water wells have been drilled in the vicinity in which the bedrock was penetrated at depths of several hundred feet. In general, the strike of the bedrock is parallel to the course of the Los Angeles River and the dip is northeasterly. There are no exposures of bedrock in the project area.

The project area is located in a highly seismic region. Since 1971, two major earthquakes have occurred nearby. The first event, a Magnitude (M) 6.4, occurred in February 1971 near the city of San Fernando, about 10 miles north of the project area. The second event, an M 6.7 (the Northridge earthquake), occurred in January 1994. This earthquake epicenter was approximately 5 miles from the project site. There are approximately 25 faults, either active or potentially active, located within a 25-mile radius from the project area. Several active faults including the Oak Ridge, Northridge Hills, Santa Monica and Sierra Madre-San Fernando faults are located within 10 miles. Although the Project is not located in any Alquist-Priolo Zones where fault rupture is anticipated, there is a high probability of severe seismic shaking due to nearby or more distant earthquake events. The highly active San Andreas Fault is located 32 miles from the Project. The project area, according to web-posted records of the California Division of Mines & Geology, is entirely within a liquefaction hazard zone (usually due to near-surface saturated sediments and seismic potential).

3.4 AIR QUALITY

3.4.1 Climate

The study area has a Mediterranean climate characterized by mild winters and warm, dry summers. The temperature and precipitation data were derived from the nearest weather monitoring station in Canoga Park, which is less than four miles away. Air quality data was reviewed from two air pollution monitoring stations; one is about three miles away in Reseda, and the other is more than ten miles away in Burbank. As shown in Table 3.4-1, the average summer temperatures range from average highs of mid-nineties (°Fahrenheit) to average lows of mid to upper fifties, while in winter, the average highs are in the upper sixties and average lows are in the range of upper thirties to low forties. The average annual precipitation in the Canoga Park area is approximately 16.67 inches, more than 90 percent of which occurs between November and April (Western Regional Climate Center, 2000).

The most important climatic and meteorological characteristics influencing air quality in the study area are the: persistent temperature inversions; predominance of onshore winds, mountain ridge and valley topography; and, prevalent sunlight. With regard to wind direction and speed, the study area is characterized as having easterly winds with an average wind speed of seven miles per hour (CARB, 1984).

Table 3.4-1 Average Temperatures and Precipitation Data, Canoga Park Station[a]

Month	Average Maximum Temperature (°F)	Average Minimum Temperature (°F)	Average Precipitation (Inches)
January	67.6	39.2	3.79
February	70.1	40.7	3.66
March	72.1	41.7	2.87
April	77.0	44.7	1.13
May	80.6	48.9	0.26
June	87.2	52.8	0.05
July	94.8	57.0	0.01
August	95.3	57.4	0.11
September	91.5	54.6	0.17
October	84.1	48.8	0.43
November	74.8	42.6	1.90
December	68.8	38.8	2.27
Annual	80.3	47.3	16.67

Source: Western Regional Climate Center. 2000 Internet site (http://www.wrcc.dri.edu). May.

[a] Canoga Park Station is located on the campus of Pierce College, less than four miles away.

3.8 NOISE

General Characteristics of Community Noise. A noise environment consists of a base of steady "background" noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is usually the sound from individual local sources. These sources can vary from an occasional aircraft overflight to virtually continuous noise from traffic on an adjacent street.

Sensitive Receptors. Six non-residential sensitive receptors (e.g., schools, parks and churches) have been identified near the study area. Table 3.8-1 illustrates the locations of the three sensitive receptors near the study area.

Table 3.8-1 Sensitive Receptors Near the Proposed Study Area

#	Sensitive Receptor	Jurisdiction	Location Description
1	Anthony C. Beilenson Park	Encino & Tarzana Planning Area	East of the study area
2	Balboa & Encino Golf Courses	Encino & Tarzana Planning Area	South of the confluence with Bull Creek and the LA River
3	Birmingham Senior High School	Reseda & West Van Nuys Planning Area	Northwest of the intersection of Balboa and Victory Boulevards
4	Independence School	Reseda & West Van Nuys Planning Area	North of Birmingham SH along Balboa Blvd.
5	Valley Alternative School	Reseda & West Van Nuys Planning Area	North of Independence School along Balboa Blvd.
6	Mulholland Middle School	Reseda & West Van Nuys Planning Area	North of Valley Alternative School along Vanowen Street

Noise Environment in Project Area. Within the study area, the primary noise sources include in-park vehicular traffic and aircraft overflight serving the Van Nuys, Burbank and Los Angeles Airports. Secondary noise sources include activities associated within the recreational area (e.g., maintenance equipment, playground activities, roller blades/bike traffic, domesticated pets, and human interactions). Noise measurements were recorded at four locations along the Bull Creek Channel and two locations at the two nearest sensitive receptors (sensitive receptor numbers 3 and 7 presented in Table 3.8-1).

Table 3.8-2 provides a summary of the four sites where noise measurements were taken. Noise conditions are described in terms of: Equivalent Sound Level (L_{eq}), a measurement that accounts for the moment-to-moment fluctuations due to all sound sources during the measurement period (in this case ten to twenty minutes); the maximum sound level (L_{max}) reached during the sampling period; and, the minimum sound level (L_{min}) reached during the sampling period. Table 3.8-2 provides site-specific measurements and descriptions.

Table 3.8-2 Measured Ambient Noise Levels for the Bull Creek Project

#	Description	Survey Time	L_{eq} (dBA)	L_{max} (dBA)	L_{min} (dBA)	Notes
1	East Bank of Bull Creek near its confluence with the LA River	11:00 a.m. to 11:11 a.m.	60.1	75.9	47.8	A parking area, secondary road, pedestrian/bike bath are east of the survey location and a golf course is to the south. Small planes and jets prevalent over the study area.
2	Secondary road bridge crossing at the East Bank of Bull Creek	11:15 a.m. to 11:25 a.m.	65.1	81.9	49.3	The southern portion of Lake Balboa is east of the survey location and open space is north and south of the survey location. Helicopters, small planes/jets were prevalent over the study area.
3	Secondary road bridge crossing at the West Bank of Bull Creek	11:30 a.m. to 11:40 a.m.	59.9	81.6	47.8	Open space is north and south of the survey location. Balboa Blvd. is several yards to the west of the survey location. Helicopters, small planes/jets were prevalent over the study area. Vehicular traffic including park maintenance vehicles and equipment.
4	East bank of Bull Creek near the northwest section of Lake Balboa	11:50 a.m. to 12:00 p.m.	63.1	87.2	45.9	Open space and Victory Blvd. respectively are to the north and open space is to the south of the survey location. The northwestern portion of Lake Balboa is to the east of the project area. The riparian corridor and open space respectively are west of the survey location.
5	North side of Victory Boulevard at the northern end of project area	12:00 p.m. to 12:20 p.m.*	71.4	86.4	47.1	Residential area located along the north side of Victory Blvd., at the north end of the proposed project area. Vehicle traffic, including trucks and school busses, regularly traveling on Victory Blvd. is the major source of noise, even more prevalent than the noise from helicopter and plane flights over the area.
6	Outside Birmingham High School, on Victory Blvd at the northwest corner of Balboa Blvd. and Victory Blvd. intersection	12:55 p.m. to 1:10 p.m.*	71.8	91.3	56.8	Birmingham High School is located on the northwest corner of the intersection of Victory and Balboa Blvd. Noise level at the intersection of these two major roads is very high, however, the school buildings are further inland from the streets and are partially shielded by some tarps used across the school fence.

L_{eq}= Equivalent Sound Level, a measurement (in this case 10 to 20 minutes) that accounts for the moment-to-moment fluctuations due to all sound sources during the measurement period, combined.
L_{max}= The maximum sound level reached during a sampling period
L_{min}= The minimum sound level reached during a sampling period
* Measurements taken on 11/29/00. All other measurements were collected on 5/22/00. The calibration value was 113.7 dBA

3.9 LAND USE, RECREATION, AND FLOOD CONTROL

3.9.1 Land Use

The Basin is located in the heavily urbanized San Fernando Valley area of the City of Los Angeles, two miles southwest of the community of Van Nuys and approximately ten miles west of the City of Burbank. The majority of the Basin is within the Encino-Tarzana Planning area; however, the extreme northwestern and eastern (along I-405) portions of the Basin overlap into the Reseda-West Van Nuys and Van Nuys-North Sherman Oaks Planning Areas, respectively. The study area is located in the northwest portion of the Basin, within the Encino-Tarzana Community Planning Area. Surrounding urban development, which is located in the Reseda-West Van Nuys Planning Area, consists of a mix of the full range of urban

land uses, including residential single and multiple family housing, institutional, public facilities and open space land uses. The surrounding transportation routes include two main freeways: the Ventura Freeway (U.S. Highway 101) and the San Diego Freeway (Interstate 405). Surrounding arterials include the Sepulveda, Ventura, Van Nuys, Burbank and Victory Boulevards, and Woodley Avenue. (City of Los Angeles, 2000).

The Basin is a 2,097-acre site of a flood control dam/reservoir completed in 1941 on the Upper Los Angeles River. Lands at the Sepulveda Basin are owned by the USACE and the primary purpose of the basin is for flood control. Approximately 1,527 acres are leased to the City of Los Angeles, Department of Recreation and Parks, for recreational development. Other land use within the Basin includes open space, public facilities, wildlife management, and limited agriculture. The recreational sites associated with the open space include community parks, neighborhood parks, regional parks and public golf courses. Other facilities associated with the open space include a special feature (Lake Balboa) and equestrian trails (City of Los Angeles, 2000). The Public and government facilities are located near the northern boundary of the basin, just south of Victory Boulevard. These include the California Army National Guard Armory near the northwestern corner of the basin, the Navy and Marine Corps Reserve Center, immediately west of Balboa Boulevard, the Army Maintenance Support Activity west of Woodley Avenue, and the California Air National Guard facility east of Woodley Avenue. The City of Los Angeles Bureau of Sanitation's Donald C. Tillman Water Reclamation Plant is just south of the California Air National Guard facility (USACE, 1987; verified as current, USACE Real Estate Division, 2004).

The study area is located in the north central portion of the Sepulveda Basin, south of Victory Boulevard and east of Balboa Boulevard. The study area is on land leased to the City of Los Angeles, Department of Recreation and Parks, for recreational development. The study area consists of a linear stream/riparian corridor that has been influenced by urbanization. Dense exotic plant species, such as castor bean and giant reed, continue to degrade the riparian habitat. Deposits of trash, debris and sediment accompanied by channel scour are other degrading features within the Channel. An improved road, with a bridge that accommodates vehicular traffic, crosses Bull Creek about 600 feet north of the confluence with the Los Angeles River. The bridge includes a bicycle trail on the south side, separated from the traffic lanes, that is also suitable for pedestrians. Hardscape features such as riprap and concrete bank stabilizers line the channel side slopes at the northern and southern portions of the proposed project area and around permanent improvements such as the bridge and storm-water facilities. The area of the proposed oxbow is ruderal/disturbed open space. (USACE, 1987, verified as current with Corps Real Estate Division and

Operations Branch, 2004, and field observations 2000-2004). The City of Los Angeles mows the herbaceous vegetation annually (USACE, Operations Branch, 2004). .

The MTA San Fernando Valley East-West Transit Corridor busway (under construction), including a busway bridge over Bull Creek and a portion of the Balboa Boulevard busway station, borders the Bull Creek Channel Ecosystem Restoration site on the north, (between Victory Boulevard and the study area). The busway station will include two platforms within the former railroad right-of-way and parking for up to 285 vehicles (Los Angeles County MTA, 2002). The Los Angeles River borders the site south, with the Balboa and Encino Golf Courses just on the other side of the river. Anthony C. Beilenson Park (including Lake Balboa, parking and recreational facilities) borders the eastern side of Bull Creek. Additions to Beilenson Park are currently under development in the open space between the restoration site and Balboa Boulevard to the west. The area to the west of Balboa Boulevard consists of a sod farm and open space.

The project area is managed by the City of Los Angeles Department of Recreation and Parks. Table 3.9-1 provides goals, objectives, policies and the project's applicability with respect to recreation and open space.

Table 3.9-1 Recreation/Parks & Open Space Encino-Tarzana Planning Area

Goals	Objectives	Policies
Adequate recreation and park facilities to meet the needs of the residents in the plan area.	To conserve, maintain and better utilize existing recreation and park facilities that promote the recreational experience and encourage the Department of Recreation and Parks to develop new recreation and park facilities.	Preserve the existing recreational facilities and park space by encouraging the Department of Recreation and Parks to continue identifying funding sources and other mechanisms for the continuing maintenance of recreation and park facilities. Encourage the Department of Recreation and Parks to continue utilizing existing funding and other mechanisms and coordinate efforts with other agencies and non-profit organizations for the acquisition and development of suitable recreation and parkland within the plan area.
A community with sufficient open space in balance with development to serve the recreational, environmental and health needs of the community and to protect environmental and aesthetic resources.	To preserve existing open space resources and where possible develop new open space	Encourage the retention of passive and visual open space that provides a balance to the urban development of the Plan Area.

Source: City of Los Angeles Planning Dept. 2000 internet site (http://www.cityofla.org/PLN/index.htm). June

3.9.2 Recreational Facilities and Opportunities

Recreational sites associated with the Basin include community parks, neighborhood parks, regional parks, and public golf courses. Other facilities associated within the Basin include a special feature (Lake Balboa) and equestrian trails (City of Los Angeles, 2000).

The main recreational feature to the east of the study area is Lake Balboa, which is located in Anthony C. Beilenson Park. Recreational opportunities at the lake include boating and fishing. The recreational facility for the lake includes a boat ramp designed to accommodate the launching of small non-motorized boats. A nearby parking lot is designed to allow vehicles with boats to access the ramp. Other recreational opportunities near the study area and the lake include paths constructed for pedestrian and bike use, picnicking areas and a playground. Associated recreational facilities near the study area consist of a parking area, picnic facilities (grills and tables), shade structures, benches, roads, drinking water supply and restrooms (USACE, 1987). In the 1981 Master Plan, the northern and western portions of Beilenson Park were designated to support an Arts Park. The sources that were to fund the Arts Park were unable to provide sufficient funds. The Arts Park site contained approximately the northern two-thirds of the 27.9-acre site currently proposed for the Bull Creek Ecosystem Restoration project. The 2002 letter report for the Anthony C. Beilenson Park Additions eliminates the Arts Park as a feature of the Master Plan. Removal of the Arts Park designation leaves the area in compliance with the 1981 Master Plan as amended.

3.9.3 Flood Control Operations

The Sepulveda Dam and the Reservoir (Basin) lands behind the dam are owned by the Federal Government and are under the jurisdiction of the U.S. Army Corps of Engineers (USACE), Los Angeles District. The primary purpose for the Sepulveda Dam is flood control. Other uses and benefits of the dam and reservoir, such as recreation, agriculture, and wildlife mitigation are secondary. Sepulveda Dam regulates flows on the Los Angeles River and is designed to prevent flooding along the river below the dam. The operation of the Sepulveda Flood Control Dam (Sepulveda Dam) is the responsibility of the USACE, Los Angeles District. The District Engineer has delegated authority for this function through the Chief, Engineering Division, Chief, Hydrology and Hydraulics Branch, to the Chief Reservoir Regulation Section. The USACE is also responsible for the regulation and maintenance of Sepulveda Dam and associated structures and facilities in Sepulveda Reservoir (Basin) (USACE, 1989).

Sepulveda Dam is located across the Los Angeles River, 43 miles above the mouth of the river, and 6 miles above the confluence of Tujunga Wash and the Los Angeles River. The Sepulveda Dam is in the south-central portion of the San Fernando Valley, just northwest of the junction of the Ventura Freeway (U.S. Highway 101) and the San Diego Freeway (Interstate Highway 405). The geographical coordinates of the outlet works of the Sepulveda Dam are 34°09'48"N latitude, and 118°27'59"W longitude (USACE, 1989).

The Sepulveda Basin is a 2,097-acre site of a flood control dam/reservoir, which was completed in 1941. The Sepulveda Dam consists of an earthfilled embankment with a reinforced concrete spillway and outlet works. The Sepulveda Dam has a crest length, including outlet works and spillway, of 15,440 ft and a crest width of 30 ft and has a maximum height above the original Los Angeles River streambed of 57 ft (USACE, 1989). The top of dam elevation is 725 feet, NGVD. The Basin is designed for a Standard Project Flood of 3 days of inflow with a total volume of 68,2000 acre-ft and inflow peak velocity of 50,000 cubic feet per second (cfs) (USACE, 1989).

At the time of construction of the Sepulveda Dam in 1941, the downstream channel of the Los Angeles River had a capacity of about 7,100 cfs. Therefore, the initial water-control plan limited releases from Sepulveda Dam to 7,100 cfs or less. In 1953, the USACE improved the downstream tributary flow to a capacity of about 16, 900 cfs. Accordingly, the water control plan was revised to allow release rates as high as the new channel capacity. Within this upper limit, the operation criteria for Sepulveda Dam were based strictly upon Basin water surface elevation criteria, irrespective of downstream channel flows (USACE, 1989). A summary of the inundation in the Sepulveda Basin by the impoundment of water behind Sepulveda Dam is listed in the following Table 3.9-2:

Table 3.9-2 Inundation Caused by the Impoundment of Water Behind Sepulveda Dam

Basin Level	Max. Elev. (ft., NGVD)	Volume (acre-ft)	Area (Acres)
At Revised Spillway Design Flood	716.66	27,563	1,710
At Standard Project Flood	713.52	22,493	1,529
At Top of Spillway Gates (raised position)	710.00	17,425	1,335
At 50-Year Flood	706.50	13,037	1,156
At Historical Maximum	705.10	11,503	1,067
At 25-Year Flood	703.00	9,378	926

Source: Water Control Manual –*Sepulveda Dam and Reservoir Los Angeles River, California*. Los Angeles District. 1989, May.

The Water Control Plan for Sepulveda Dam and Reservoir states that the objective of the Sepulveda Dam is flood control, specifically, the minimization of flood damages on the Los Angeles River downstream from Sepulveda Dam. In this regard, water is temporarily stored behind Sepulveda Dam during periods of high inflows and is released more slowly through the downstream Los Angeles River channel (USACE, 1989). There is no objective to operate the dam to reduce inundation damages to its improved reservoir lands. All usage of reservoir land is intended to have purpose secondary to its role as the bottom of the flood control reservoir. The following table summarizes the Amount of Rainfall, Inflow, Outflow and Elevation Frequency for the Sepulveda Basin (Table 3.9-3):

Table 3.9-3 Rainfall, Inflow, Outflow, and Elevation Frequency for Sepulveda Basin[a]

Return Period (Years)	24-Hour Rainfall (In)	Rainfall Loss (In)	Excess Rainfall (In)	48-Hour Runoff Volume (acre-ft)	48-Hour Runoff Volume (acre-ft)	Peak Inflow (cfs)	Peak Outflow (cfs)	Maximum Elevation (ft., NGVD)
500	11.23	3.82	7.41	60,049	91,038	108,970	77,584	714.57
100	8.84	3.77	5.07	41,106	71,663	82,516	16,989	712.24
50	7.37	3.63	3.74	30,334	59,746	54,863	15,465	706.46
25	6.59	3.47	3.12	25,292	53,423	47,327	14,7410	703.04

Source: Water Control Manual –*Sepulveda Dam and Reservoir Los Angeles River, California.* Los Angeles District.1989, May.
[a]Peak Inflow, outflow, and maximum elevation values represent 1980 watershed conditions.

The Bull Creek Channel Restoration Project area falls within the Sepulveda Flood Control Basin between elevations 694 ft, NGVD and 730 ft, NGVD. Bull Creek is a minor tributary of the Sepulveda Basin. The existing Bull Creek channel alignment will be altered and the channel side slopes would be re-graded from a 2:1 to 3:1 configuration. The proposed grading indicates no negative impacts to the existing flood storage capacity in the Basin (Appendix A –Hydrology, Hydraulics, and Engineering Analysis). The cut/fill calculations from all three proposed alternatives result in net storage gain in the project area, which will maintain the existing flood control capacity of the Basin.

3.10 AESTHETIC RESOURCES

The study area consists of a linear stream/riparian corridor that has been influenced by urbanization. There is a moderate amount of structural diversity in vegetation created by a few tall trees, mixed small trees and shrubs with areas dominated by grasses (*Bromus* and *Hordeum*) and other herbaceous plants to

create some vertical and horizontal visual variation visible from a distance. Dense exotic plant species such as castor bean and giant reed degrade the natural qualities of the stream corridor. From the upper banks, deposits of trash, debris, sediment and channel erosion degrade views. In-stream views looking north towards Victory Boulevard are also negatively affected by the presence of riprap lined channel slopes and a railroad crossing marked by graffiti. A park access road crosses Bull Creek at the lower portion. Viewpoints at the western edge of the bridge looking north-northwest include open, disturbed areas with ruderal, weedy vegetation. Passive and active open space comprised of maintained ornamental vegetation and bike/rollerblade paths, respectively, are the viewpoints looking south-southwest from the western edge of the bridge. A viewpoint looking west from the western edge of the bridge is a ruderal area bordered by a landscaped berm that parallels Balboa Boulevard. A viewpoint from the eastern edge of the bridge looking north-northeast is considered passive and active open space, comprised of maintained herbaceous and woody vegetation, bike/roller blade paths, and an unimproved access road that parallels Bull Creek. North of the aforementioned area views consist of a ruderal area. The study area supports some waterfowl and songbirds, as well as the presence of some established populations of California black walnut and red willow.

The backdrop (one or more miles) from the study area extending from the southeast to the southwest includes the Santa Monica Mountains and Hollywood Hills, the west side of the San Fernando Valley, and the Basin. These long-range views include a mixture of residential development in the hills, and residential, commercial, agricultural and recreational uses in the flat areas.

The foreground features of the study area include the Balboa and Encino Golf Courses and the Los Angeles River to the south; Sepulveda Dam Recreation Area/Anthony C. Beilenson Park (including Lake Balboa, parking, recreational facilities and open space) east and Balboa Boulevard to the west; and, Victory Boulevard bordered by urban land uses (commercial/residential) to the North. The abundance of mature trees in the Balboa and Encino Golf Courses also provide an attractive landscaped backdrop for the recreational activities proposed at the project site. Because of the street trees and activities to the west, Balboa Boulevard is not visually obtrusive. Large earthen berms along the northern boundary of Beilenson Park screen the view of the commercial development along the north side of Victory Boulevard (USACE, 1987).

5. PLAN FORMULATION

5.1 PLANNING OBJECTIVES AND CONSTRAINTS

The general objective of the DPR is to identify and describe the optimal restoration plan based upon an assessment of viable restoration plans and an associated analysis of environmental outputs and incremental costs. The DPR will also provide a resource impact assessment presented and coordinated with the public through the completion and public review of an Environmental Assessment (EA) (Appendix L). This EA provides compliance with the National Environmental Policy Act of 1969 (NEPA).

5.1.1 Specific Planning Objectives

The primary objective of the restoration effort is to restore high quality riparian and woodland habitat suitable for wildlife native to the area. Part of achieving that objective is to restore the Channel and clean up the trash in the Channel (both current and potential), thus further improving the value of the adjacent habitat. These habitat improvements are expected to attract a variety of waterfowl, shorebirds, and migratory birds to the area.

5.1.2 Planning Constraints

Plan formulation, evaluation, and selection were conducted in accordance with existing laws, regulations, policies, and the authorizing resolution that limits the study to ecological restoration and related purposes. Section 1135 of the Water Resources Development Act (WRDA) typically limits the Federal contribution to the project to $5,000,000 or less, unless specifically authorized by Congress. The purpose of this Continuing Authority is for implementation of projects relatively small in scope. Therefore, plans formulated consist of fairly small projects focused in the immediate project area.

There are various constraints that will need to be considered in formulating alternative restoration designs for the project area. Many of these constraints are related to the project area's location in an urban area and to the local sponsor's preference. The variety of human activities that occur in the surrounding area will affect the habitat and, conversely, the habitat could exert an influence on adjacent land uses. The primary constraints associated with the restoration project are briefly described below.

Water Quality and Quantity. At the present time, there are two sources of water for the Channel: urban run-off from upstream and a pipeline located 800 feet upstream of the confluence with the Los Angeles River from Lake Balboa. Potential additional water sources are a second pipeline from Lake Balboa or pipeline from directly from the Donald C. Tillman Water Reclamation Plant (Tillman). Lake Balboa is located in an existing recreation area east of the project site. Tillman is located in the northeast section of Sepulveda Basin and currently supplies treated water for the recreational facilities within the Basin, including Lake Balboa and landscape irrigation requirements. Either of the new water sources would be delivered to the Channel by pipes at the upstream end of the Project above the proposed oxbow.

The reclaimed water produced at the Tillman Wastewater Treatment Facility must meet NPDES Permit No. CA0056227 water quality standards for discharge into the Los Angeles River. There is some difference among local and Federal environmental agencies in whether to classify Tillman reclaimed water as advanced secondary or tertiary treated wastewater. The term "advanced secondary" describes the level of treatment that includes extensive organic digestion and filtration processes that produce water with minimal dissolved organic matter. Advanced secondary treatment also removes viruses, bacteria, and trace metals. The reclaimed water does contain a high concentration of nutrients (phosphorus and nitrogen) that could encourage algae growth. Its use, therefore, will require a careful design and management program. Hydrologic and hydraulic analyses have determined that, since Bull Creek is a minor tributary of the Los Angeles River, there will be little risk of damage to the restored habitat after a flood event. See Section 7.2.2 Hydrology/Hydraulics for further information.

Flood Control and Maintenance of Channel and Basin Capacity. In accordance with the provisions of Section 1135 of the Water Resources Development Act of 1986, the proposed restoration project must not adversely affect the flood control capacity of Bull Creek Channel or the Sepulveda Flood Control Basin. For instance, the establishment of vegetation in the streambed could decrease the capacity of the Channel. If restoration activities were limited to the top (higher elevation) berm area of the Channel, no adverse effects on the Channel capacity would be expected to occur. Any modifications within the Channel or to the channel banks would need to be evaluated for effects on flood conveyance capacity. Similarly, the addition of berms might decrease the capacity of the Sepulveda Flood Control Basin. However, if the berms were created from earth excavated from a lower elevation on-site, the overall capacity would be maintained. Any modifications to the topography of the Basin would need to be evaluated for effect on the basin capacity.

Safety and Security. In order to protect the habitat areas from damage and to maximize public benefits, maintenance and security concerns will need to be considered in the design and operation of the project modification. Various safety and security issues may need to be addressed, including control of public access to the habitat areas in order to prevent accidents and injury, and ways to protect these areas from human habitation.

Pest species. The proximity of the Bull Creek Channel to urbanization exposes the site to numerous pest species that constrain the extent of restoration possible the site. Some species of animals (both native and non-native) that might inhabit or visit the area may pose a human health threat, for example, mosquitoes, which may carry West Nile virus or other diseases. Others, such as feral cats, would prey upon the native wildlife attracted to the project area. Such species will need to be controlled.

Standing or slow-moving water in the habitat area could increase mosquito breeding, creating both a nuisance and a potential health hazard. Water bodies and watercourses in the habitat areas will need to be designed and controlled to minimize stagnant or standing water. One management technique to control excess emergent vegetation, a likely mosquito breeding area, would be to minimize standing water areas, and periodically lower and raise water levels. Although existing mosquito fish in the system may migrate into the project from adjacent water bodies, consideration may also need to be given to the introduction of native fish species that feed on mosquito larvae, and bird and insect species that feed on adult mosquitoes. Non-native plant and animal species degrade the natural integrity of habitat areas, upsetting the balance established within a natural ecosystem.

Exotic wildlife species can be destructive, often out-competing or preying upon native species. In addition, past experience indicates that it is very likely that a variety of pets will be released into the restored habitats by their owners or will find their way there on their own. These abandoned pets often prey upon native wildlife or compete for food sources. Measures may need to be taken to control such species.

Recreational Uses of the Sepulveda Basin. The Sepulveda Dam Recreation Area, which surrounds the project area, is associated with other recreational sites including community parks, neighborhood parks, regional parks and public golf courses. Within the Basin are facilities that include a lake, equestrian trails, paths for pedestrian and bicycle use, picnicking areas and a playground. This nearby recreational activity could result in various kinds of human disturbance to the habitat. These disturbances could include noise, physical intrusion into habitat areas, litter discarded by recreational users, and general

proximity of human activity. These conditions will need to be considered in evaluating alternative restoration designs and in determining habitat valuations.

5.2 ALTERNATIVES DESCRIPTIONS

Three project alternatives, in addition to the no-action alternative (Alternative 1), have been identified for the project. The objective of these alternatives is to restore 27.9 acres encompassing the downstream 3,000 feet of the Channel and adjacent land into habitat for native riparian plant communities and associated wildlife. To meet this objective, each alternative provides for revegetation, increasing surface water flow and topographic and structural variation in the stream and adjacent areas to sustain the development and/or enhancement of aquatic, riparian woodland, Coast live oak/California walnut woodland, grassland and buffer habitat. Buffer habitat would be placed between higher quality habitat in relatively inaccessible areas and areas of more intense recreational use.

5.2.1 Final Alternatives

Alternative 1: No Action Plan. It is presumed that some form of periodic maintenance would be required following extreme flood events, and that weed control activities currently undertaken in other parts of the Basin may be extended to the proposed project area. Although bed scouring and deposition are relatively stable, bank erosion would continue and, as a result, some mature native trees may be either lost over time or require efforts to stabilize their root systems. Even though waterfowl currently use the project area for resting and foraging, continued urban pressures and degradation from invasion of exotic species, as well as litter, will likely diminish resources available to wildlife.

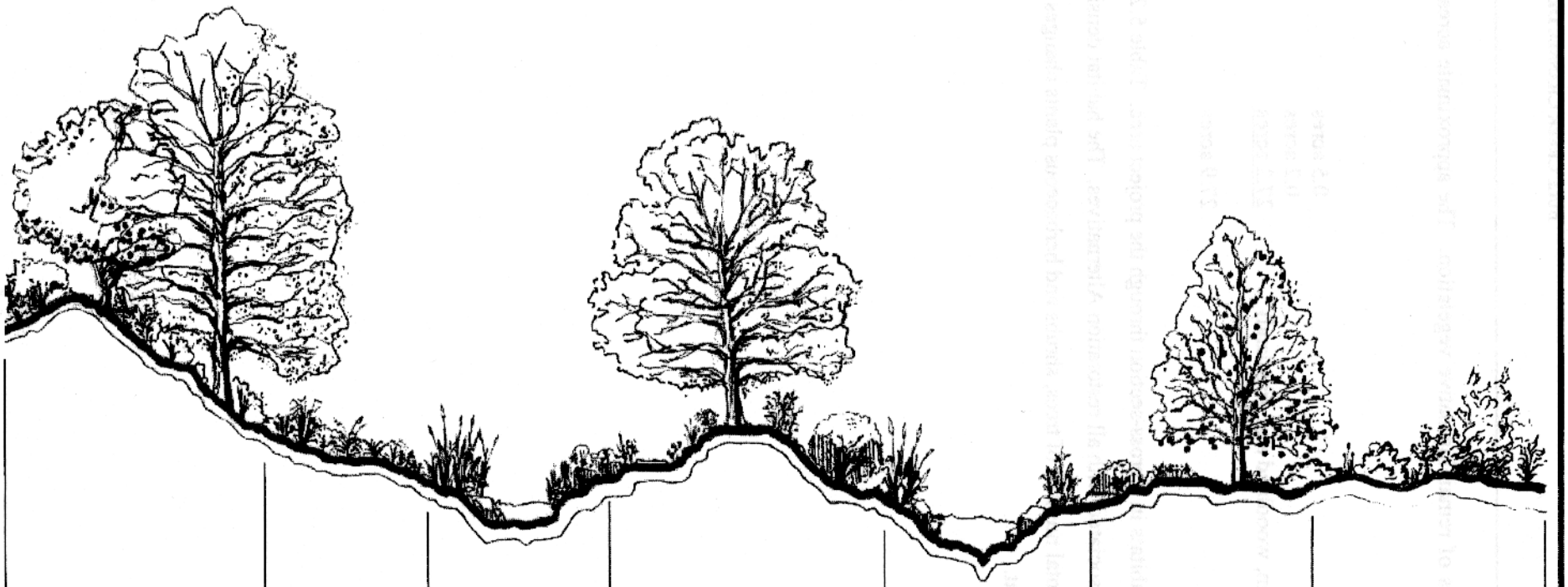
The City of Los Angeles Department of Recreation and Parks has plans to develop the western lot adjacent to the upper two-thirds of the project area. It is likely that some of the trails and other amenities planned for this area will be extended to the upper banks of Bull Creek. However, without minimal revegetation and litter control efforts, it is unlikely that the project area would provide additional recreational or aesthetic value to the proposed park additions. It is anticipated that the project area would continue to degrade at a moderate rate and extreme flood events could cause severe bank erosion in some

areas and subsequent loss of remaining native vegetation. The approximate acreage of each habitat in Alternative 1 is:

Aquatic	0.5 acres
Emergent	0.2 acres
Ruderal (degraded riparian, woodland and grassland)	27.2 acres
Total	27.9 acres

Figure 5.2-1 shows the habitats in a cross-section through the project area. Table 5.2-1 provides the proposed plant species associated with all restoration Alternatives. The habitat densities are the same for each alternative, but the total number of trees, shrubs and herbaceous plants changes proportionately with the acreage of each habitat.

Figure 5.2-1: Habitat Transitions



COAST LIVE OAK / CALIFORNIA WALNUT WOODLAND HABITAT AREA		GRASSLAND HABITAT AREA		AQUATIC HABITAT AREA		RIPARIAN WOODLAND HABITAT AREA		AQUATIC HABITAT AREA		RIPARIAN WOODLAND HABITAT AREA		BUFFER HABITAT	
DOMINANT PLANTS		DOMINANT PLANTS		DOMINANT PLANTS		DOMINANT PLANTS		DOMINANT PLANTS		DOMINANT PLANTS		DOMINANT PLANTS	
coast live oak	*Quercus agrifolia*	needlegrass	*Stipa spp.*	cattails	*Typha latifolia*	willow	*Salix spp.*	cattails	*Typha latifolia*	willow	*Salix spp.*	mule fat	*Baccharis salicifolia*
California walnut	*Juglans californica*	fescue	*Festuca spp.*	bulrush	*Scirpus spp.*	western sycamore	*Platanus racemosa*	bulrush	*Scirpus spp.*	western sycamore	*Platanus racemosa*	California sagebrush	*Artemisia californica*
laurel sumac	*Malosma laurina*	onlongrass	*Melica spp.*	sedge	*Carex spp.*	white alder	*Alnus rhombifolia*	sedge	*Carex spp.*	white alder	*Alnus rhombifolia*	California buckwheat	*Eriogonum fasciculatum*
California coffeeberry	*Rhamnus californica*	bluegrass	*Poa spp.*	rush	*Juncus spp.*	boxelder	*Acer negundo*	rush	*Juncus spp.*	boxelder	*Acer negundo*	toyon	*Heteromeles arbutifolia*
toyon	*Heteromeles arbutifolia*					seep willow	*Baccharis salicifolia*			seep willow	*Baccharis salicifolia*	laurel sumac	*Malosma laurina*
						California rose	*Rosa californica*			California rose	*Rosa californica*	California coffeeberry	*Rhamnus californica*

Table 5.2-1 Summary of Habitat Types Proposed in all Restoration Alternatives

Habitat Type	Physical Features (topography, soils and hydrology)	Dominant Plants (Taxonomic reference)		Wildlife Group
Aquatic	Pools with standing or flowing water	cattail bulrushes rushes duckweed	*Typha latifolia* *Scirpus acutus* *Scirpus americanus* *Scirpus cernuus* *Juncus bufunius* *Juncus balticus* *Juncus effuses* *Juncus mexicanus* *Lemna minor*	Herons, egrets, waterfowl, red-winged blackbird, frogs, salamanders
Riparian woodland	Edges of perennial streams, channel slopes and seasonally flooded islands and banks	black willow red willow arroyo willow western sycamore white alder boxelder mule fat (seep willow) California rose duckweed scarlet monkey flower Fremont's cottonwood deergrass	*Salix gooddingii* *Salix laevigata* *Salix lasiolepis* *Platanus racemosa* *Alnus rhombifolia* *Acer negundo* *Baccharis salicifolia* *Rosa californica* *Lemna minor* *Mimulus cardinalis* *Populus fremontii* *Muhlenbergia rigens*	Herons, egrets, raptors, perching birds, owls, deermice, coyote, ground squirrel
Coast live oak/ California walnut woodland	Upland elevations on slopes and berms, out of seasonal flood zone	coast live oak California walnut laurel sumac California coffeeberry toyon sugarbush	*Quercus agrifolia* *Juglans californica* *Malosma laurina* *Rhamnus californica* *Heteromeles arbutifolia* *Rhus ovata*	Raptors, owls, woodpeckers, perching birds, lizards, snakes, cottontail
Grassland	Flat terrace zones with fine textured soils	purple needlegrass foothill needlegrass California fescue melic or oniongrass giant wildrye California poppy blue-eyed grass chia tidy tips California fesue foxtail fescue California brome lilac mariposa lilly blue dicks	*Nassella (Stipa)* pulchra *Nassella lepida* *Festuca californica* *Melica californica* *Melica imperfecta* *Elymus condensatus* *Eschscholzia california* *Sisyrinchium bellum* *Salvia columbariae* *Layia platyglossa* *Festuca californica* *Vulpia microstachys* *Bromus carinatus* *Calochortus splendens* *Dichelostemma capitatum*	Perching birds, quail, doves, migratory birds, raccoon, coyote, snakes, lizards

Habitat Type	Physical Features (topography, soils and hydrology)	Dominant Plants (Taxonomic reference)		Wildlife Group
Buffer	Terrace on east bank of channel	mule fat California sagebrush California buckwheat black sage coast goldenbush California bush sunflower toyon laurel sumac California coffeeberry	*Baccharis salicifolia* *Artemisia californica* *Eriogonum fasciculatum* *Salvia mellifera* *Isocoma menzesii* *Encilia californica* *Heteromeles arbutifolia* *Malosma laurina* *Rhamnus californica*	Perching birds, quail, doves, cottontail, rodents

* Other suggested local native grasses can be found in the encyclopedia of ornamental grasses (Greenley, 1990).

Alternative 2: Braided Stream Concept. Restoration Alternative 2 involves grading of the current Bull Creek Channel and construction of a series of check dams to increase overall channel capacity, and to achieve a braided stream system comprised of pools, riffles and point bars that are commonly found in perennial streams in Southern California (Figure 5.2-2). Grading would be done to flatten portions of the existing 2:1 slopes on both sides of the Channel to 3:1 or less. This grading would ensure that the flow capacity of Bull Creek is not reduced, enabling the Channel to function with a soft bottom with dense vegetation on the channel banks and an increase in surface flow. A series of check dams would be located at irregular intervals to achieve a series of pools to promote the establishment of aquatic vegetation. The design of the check dams would permit control of the water level in the pools, while ensuring that flood control capacity in the Basin would not be adversely affected. These check dams, along with stabilizing vegetation, would reduce the magnitude of erosion or excessive scouring of the Bull Creek Channel during periods of heavy flow. Riffles with coarse, rocky materials will occur below the check dams on shallow and sloped stretches of the Channel and are important for oxygenating stream water. Point bars and shallow islands will occur in bends and in mid-channel and side-channel locations to achieve a braided channel system. During low flow periods, the pools will sustain deeper, slower moving water in comparison to the remainder of the Channel where water flow will tend to be faster and shallower as it passes over riffles. Sediment may collect in pools during periods of low flow, reducing their depth for a period of time. Increased flow during winter months will naturally scour pools and move sediments downstream. The check dams will provide a permanent framework for pools and riffles to be reestablished after seasonal stormflows have subsided. The channel banks will be protected from erosion and seasonal flooding through the construction of planted gabions and terraces.

Under this Alternative, the use of artificial structures and reshaping of the Channel would restore to Bull Creek some of the former stream dynamics that are critical components of riparian and aquatic habitats in the Los Angeles River watershed. Streamflow would be augmented to support vegetation that stabilizes the banks and point bars within the Channel. This would maintain the effectiveness of the Channel to transport peak flows.

Grading techniques and treatment with EPA-approved herbicides would be used to remove stands of giant reed, while protecting, in-place, several significant stands of willow (*Salix sp.*), sycamore (*Platanus racemosa*), and alder (*Alnus rhombifolia*). Soils contaminated with stems and stolons of giant reed should be disposed from the site. The remaining excavated soil would be used to enhance the topographic character of the adjacent habitat area to the west. This additional soil will provide greater landform diversity and support the development of native grassland and Coast live oak/California walnut woodland plantings.

A debris basin and series of weirs would be placed at the north end of the Channel to trap trash and debris from urban runoff, and to reduce the velocity of water flow under non-peak flow conditions. A pipeline from Lake Balboa would bring lake-water to this upstream limit of the Channel to mix with urban runoff during the dry season of the year to achieve an increased volume of flow. This pipeline could provide up to 1 million gallons daily (Mgd) of lake-water, with the greatest volume being discharged in the early hours of each day. The combined water from urban runoff and Lake Balboa would flow over a check dam into a small pool that could be stocked with native fish with an affinity for mosquito larvae and planted with aquatic and streamside riparian vegetation. This pool would provide quality habitat for a small number of waterfowl. The native fish would swim downstream to populate other locations in the Channel. The existing water supply pipeline from Lake Balboa just north of the existing vehicular bridge would be retained in this concept. As described above, this braided stream design is intended to achieve a combination of fast and slow water flow during the dry season and to help oxygenate both urban runoff and Lake Balboa water.

A multipurpose trail system with interpretive nodes would be established along the perimeter of the project site. This trail would be comprised of decomposed granite, average ten feet wide and will be used to accommodate park users and maintenance vehicles. This trail would be bordered with "wood look" four-foot high concrete fencing and buffer plantings to manage the interface between park users and habitat areas. The fencing and buffer plantings will be particularly important on the east side of the

Channel where recreational park visitors will be greatest. Interpretive nodes and signage would be located at strategic locations along this trail system to educate park users and to instruct people to avoid sensitive habitat zones. Further description of the interpretive nodes is located in Section 2.2 Proposed Action. Two pedestrian/maintenance bridges and a network of smaller trails would provide an opportunity for park users to explore and observe various parts of the creek environment. These trails would not enter into all portions of the habitat areas to prevent a decrease in the quality of native vegetation and wildlife refuge.

Five habitat types are proposed in this alternative: aquatic (including emergent wetlands), riparian woodland, Coast live oak/California walnut woodland, native grassland, and buffer plantings. The principal characteristics of these habitats are described in Table 5.2-1 Description of Habitat Types Considered in the Restoration Alternatives. The approximate acreage of each habitat in Alternative 2 is:

Aquatic (and emergent wetlands)	1.0 acres
Riparian woodland	8.5 acres
Coast live oak/California walnut woodland	9.4 acres
Native grassland	5.5 acres
Buffer habitat	3.5 acres
Total	27.9 acres

Alternative 3: Braided Stream and Island Concept. Alternative 3 for Bull Creek incorporates the foundation elements included in Alternative 2 and expands the aquatic and riparian streamside habitat while reducing the native grassland and Coast live oak/California walnut woodland (Figure 5.2-3). Grading would be done in combination with construction of check dams to create pools and a braided stream system with riffles, point bars and sidebars. In addition to this foundation, two distinct channels would surround two islands that would support additional aquatic and riparian woodland vegetation. The larger island would have trail access for park visitors and interpretive functions; the smaller island would offer protected nesting opportunities for wildlife. The surface water volume flowing into the restoration area would be increased. A series of check dams, combined with planted gabions and terraces, would be located to reduce the chance of erosion from seasonal flooding. These two channels would be capable of accommodating periodic floodwaters to the Los Angeles River without reducing peak flows.

As in Alternative 2, the north end of the Channel would have a debris basin and series of weirs to trap trash and debris, and to reduce the velocity of water flow under non-peak conditions. A pipeline from Lake Balboa would be designed to bring up to 1 Mgd of lake water to the Channel to mix with urban runoff to achieve a higher volume of stream flow. A small pool would be developed immediately downstream of the trash and debris traps to provide habitat for a small number of waterfowl. This pool could be stocked with native fish with an affinity for mosquito larvae that would swim to downstream locations in the Channel. The existing water supply pipeline from Lake Balboa just north of the existing vehicular bridge would be retained in this concept and similarly maintained as in Alternative 2.

A multipurpose trail system with interpretive nodes would be placed along the perimeter of the project site. This decomposed granite trail would be ten feet wide to accommodate pedestrians, joggers, cyclists, and light weight maintenance vehicles. "Wood look" four foot high "woodcrete" post and rail fencing, interpretive nodes, and signage would be located at strategic locations to provide educational value to park users and to reduce the intrusion of people into the habitat zones. A secondary trail would also be located to provide maintenance and pedestrian access to the grassland and riparian habitat areas. A fence would be installed along paths where access is to be restricted for user safety and habitat protection. Pedestrian bridges would allow access to a trail on the larger island.

The five primary habitat areas proposed in this restoration program include: aquatic (including emergent wetland), riparian woodland, Coast live oak/California walnut woodland, native grassland and buffer habitat. The approximate acreage of each habitat is as follows:

Aquatic (and emergent wetland)	1.5 acres
Riparian woodland	8.7 acres
Coast live oak/California walnut woodland	9.0 acres
Native grassland	5.0 acres
Buffer Habitat	3.7 acres
Total	27.9 acres

Alternative 4: Oxbow Concept. Alternative 4 for Bull Creek incorporates the foundation elements included in Alternatives 2 and 3 in terms of check dams, pools, riffles and point bars (Figure 5.2-4). A sediment basin and trash removal element would be located at the north end of the Channel. A pipeline would be designed to import up to 1 million gallons per day (Mgd) of lake water from Lake Balboa. This alternative also includes the reforming of the existing channel to double the water flow capacity and maintain the ability to convey peak water flows. In addition to these features, this concept includes the development of a side channel along the west side of the existing creek in the shape of an oxbow and the creation of an island approximately one acre in size. The concept of the oxbow was generated by the local sponsor and the Sepulveda Basin Wildlife Steering Committee. These groups determined that the oxbow and associated island would increase habitat diversity and afford some degree of protection to nesting birds from predators. Approximately three quarters of the flow would be diverted to provide a perennial supply of water to the oxbow channel. The design may include bio-engineered slopes using Geotechnical fabrics or matting with native plant materials or planted gabions, to maintain slope stability. Since the oxbow channel is approximately two times the length of the main channel and must match the main channel slope at the two connection points, this channel will have a lower slope than the main channel. Due to the lower slope gradient, the oxbow would be designed as a meandering type of stream. Pools and shallow channels with point bars and sidebars would be developed. Riffles would be absent in the oxbow channel due to the low gradient, but rocks or other design structures could be added to produce riffles.

In Alternative 4, seasonal floodwaters would flow primarily through the main Bull Creek channel, resulting in minor disturbance to the oxbow channel. A diversion system would be placed in the primary channel to divert controlled amounts of storm-water into the oxbow channel to help reduce scour and maintain a more dynamic habitat character. The addition of this channel to the project site would nearly double the area of aquatic and streamside riparian habitat in comparison to Alternative 2.

Alternative 4 would also provide an expanded multipurpose trail system with four stream crossings and interpretive nodes to increase the level of educational interpretive experience. The interpretive nodes have been further described in Alternate 2. These trails and crossings would provide access to the island; however, such access could be restricted during nesting periods or other periods of high wildlife use. To reduce the impact of the trail on the island habitat, this portion of the trail will be a 'boardwalk' raised approximately 18 inches above ground level. It would have a railing on both sides to deter pedestrians from leaving the path.

As in Alternatives 2 and 3, grading techniques and EPA-approved herbicide application would be used to remove stands of giant reed while protecting, in-place, several significant stands of willow, sycamore and alder will. Excavated soil would be used to enhance the topographic character of the adjacent plateau designated for Coast live oak/California walnut woodland on the west side of the Channel. The composition of habitat areas included in this site include:

Aquatic (and emergent wetland)	2.0 acres
Riparian woodland	10.8 acres
Coast live oak/California walnut woodland	9.0 acres
Native grassland	4.0 acres
Buffer habitat	2.1 acres
Total	27.9 acres

7. RECOMMENDED PLAN

7.1 RECOMMENDED PLAN SELECTION

As a result of the evaluation process, the Oxbow Concept, Alternative 4, is recommended as the preferred alternative for the Bull Creek Habitat Restoration project.

The configuration of the Oxbow Concept provides the highest acreage of aquatic and riparian woodland habitats, with significant patches of grassland and oak woodland habitats. This combination of habitat offers an adequate scale of each habitat type to support a high level of diversity of target wildlife species.

7.2 ENGINEERING DESIGN

This section provides a detailed design description of the Recommended Plan and presents design guidelines for the preparation of plans and specifications for project construction.

7.2.1 Grading Plan

The primary objective of the grading for the Recommended Plan is to create a variety of habitats that encourage and support a higher level of biological diversity. The site grading would include altering the main channel from a very linear alignment to a slightly gentler meandering form with occasional point bars. The plan also includes excavating an oxbow off the main channel, which would create an island habitat. Earthen mounds would be formed along the west side of the project site with the excavated earth from the channel modification. The slopes near the maintenance trail on the east side of the site would be modified to reduce the steep gradient from a 2:1 slope to a 3:1 slope.

The preliminary calculations for the earthwork in this plan require an approximate 228,245 cubic yards of cut and 197,732 cubic yards of fill. The existing contours of the project site are shown in Figure 7.2-1. The proposed grading plan for the project area is shown in Figure 7.2-2. Cross sections of the proposed grading for the restoration project are shown in Appendix D.

The native plant material salvaged and stone removed during the clearing phase of construction would be stockpiled and utilized in the habitat development phase. Excess fill will mostly likely be disposed of at the Sunshine Canyon Landfill in Sylmar, located approximately 12 miles north of the project site.

7.2.2 Hydrology / Hydraulics

Bull Creek Channel is fed by a twenty-five-square-mile drainage basin. The Channel is designed to exceed the capacity necessary for the 11,000 cfs flow during a 100-year flood event. The proposed modification to the Channel would not adversely impact the capacity. The channel modifications, check dams, and point bars described in Section 5.5.1 would slow the water velocity during non-peak flows, allowing the plant material to utilize the water before it is discharged into the Los Angeles River. An inlet pipe from Lake Balboa would be installed at the north end of the project site to supplement water supply during the dry season. A check dam would be constructed at the downstream end of the oxbow to maintain sufficient water level to sustain aquatic habitat.

A comparative analysis of the existing and proposed Bull Creek Channel was conducted with HEC-RAS. The values for the existing and proposed channels were compared; the capacity of the proposed Bull Creek channel was found to be greater than the capacity of the existing channel (See Appendix A).

Evaluations of hydrologic and hydraulic data in indicate habitat introduction to the basin to be a compatible use. Based upon the HEC-RAS Analysis there would be little risk of major damage to habitat restoration due to overbank flow of Bull Creek in a major flood event. In most reaches of Bull Creek within the project area, velocities with the project would be lower than without the project. Based upon flood frequency analysis, there would be little risk of major damage to habitat restoration due to inundation by the rising flood control impoundment within Sepulveda Basin during a major flood event.

7.3 LANDSCAPE FEATURES

The c-shaped side channel and the resultant island characterize the Oxbow Concept. The existing berm would be reshaped with soil added to it from the areas excavated during site grading to provide a naturalistic landform that provides variations necessary for a dynamic and diverse ecosystem, and to allow vista points along the trail. Some method of bio engineered slopes using materials such as gabions or bio-mat products will be used to protect the slopes from seasonal flooding and erosion. The increased size of the berm would create an appropriate setting for more walnut/live oak habitat. A raised, boardwalk type path will allow light-duty maintenance vehicles and limited pedestrian access to the island while limiting the disturbance of such activity to wildlife. The maintenance paths may also be used by pedestrians for viewing habitat areas. The paths extend through all of the habitat areas with the exception of the aquatic habitat. A four-foot high wood-look fence will be used throughout the restoration area to

control access. Bridges are provided across Bull Creek to facilitate movement of small maintenance vehicles (similar to golf carts). These bridges serve secondary functions as pedestrian accessways and viewing platforms, allowing pedestrians to view habitat within the channel that might otherwise be blocked from view by dense vegetation.

7.4 BIOLOGICAL FEATURES

The low-lying areas nearest the Channel would be planted with various bulrushes *(Scirpus sp),* rushes *(Juncus sp.)*, cattails *(Typha latifolia)* and sedges *(Carex sp.)*, gradually transitioning along the channel slope to a riparian woodland vegetation community. The understory of riparian woodland community will consist of willow *(Salix sp.)*, mulefat *(Baccharis salicifolia)*, and California rose *(Rosa californica)* with a canopy of western sycamore *(Platanus racemosa)*, white alder *(Alnus rhombifolia)* and boxelder *(Acer negundo)*.

Along the east edge of the project site a thicket of various shrubs will be planted to create a vegetative buffer. This narrow buffer habitat area along the east side of the project site is designed to reduce the impact of the adjacent recreational land use on the proposed habitat areas. The buffer community will include mule fat *(Baccharis salicifolia)*, California sagebrush *(Artemisia californica)*, California buckwheat *(Eriogonum fasciculatum)*, toyon *(Heteromeles arbutifolia)*, laurel sumac *(Malosma laurina),* and California coffeeberry *(Rhamnus californica)*.

The west side of the project site will incorporate a grassland vegetation zone. This area will be a terraced meadow of grasses. Plants included in this vegetation zone are needlegrass *(Nassella sp.),* fescue *(Festuca sp.)*, melic *(Melica sp.,),* and annual and perennial wildflowers.

The terrain along the west side of the site will be contoured with earthen berms creating a slightly higher elevation for a walnut/oak woodland vegetation zone. This plant community comprises the second largest habitat area in the Recommended Plan and provides habitat for a broad scope of wildlife species. The walnut/oak woodland is dominated by California black walnut *(Juglans californica),* coast live oak *(Quercus agrifolia)*, laurel sumac *(Malosma laurina)*, California coffeeberry *(Rhamnus californica),* and toyon *(Heteromeles arbutifolia)*.

7.5 RECREATIONAL FEATURES

The primary purpose of the Recommended Plan is habitat restoration, therefore incidental recreation features are limited to low impact activities. The recreation features of the plan include maintenance paths that can be used as pedestrian trails. Appropriate passive recreational opportunities would include wildlife viewing nodes with interpretive signage and educational information pertaining to the restoration of the site.

7.6 REAL ESTATE REQUIREMENTS

The project area is owned by the U.S. Army Corps of Engineers and leased to the City of Los Angeles Department of Recreation and Parks. Therefore, no property acquisition is required. The Corps will provide right-of-entry to contractors for survey, exploration (e.g., soil borings), and construction. This will be provided without cost as an item of Federal cooperation.

7.7 HAZARDOUS AND TOXIC MATERIALS

The groundwater gradient would continue to flow in a northeasterly direction away from the Santa Monica Mountains. Although no hazardous and toxic materials have been identified in the study area, 14 nearby sites ranging from less than 1/8 mile to 1/4 mile from the Channel have been identified that could potentially contaminate soils and/or groundwater. Therefore, if upgradient groundwater contamination has occurred, the Channel may be affected. Implementation of the following recommendation would verify that no significant impact would occur from nearby HAZMAT properties:

- Oversight agency records should be assessed to verify no risk from three adjacent and three more distant fuel USTs and LUSTs, including the adjoining U.S. Navy/Marines Reserve Center, S. N. Petit Ranch, and Chevron Station, and the more distant Thrifty, UNOCAL, and United Oil/Rapid Gas properties. Oversight agency data also should be obtained and assessed for an undefined, upgradient hazardous substance release at 6459 Forbes Avenue, in Van Nuys. Many of the locations may potentially be eliminated from further risk consideration with the benefit of this review of additional oversight agency data.

7.8 CONSTRUCTION

7.8.1 Site Preparation

After final grading, all construction-generated trash and debris shall be removed from the revegetation sites and disposed of at an off-site legally approved solid waste management facility. The most likely disposal site will be the Sunshine Canyon Landfill is Symlar located approximately 12 miles north of the Bull Creek project. Any areas containing spills of oil or other such spills from grading equipment shall be dug out and the contaminated soil removed to an off-site facility legally approved for the management and/or disposal of such contaminated soils.

Weed Removal

- Prior to planting, all non-native weed species shall be cleared from the site. The appropriate clearing method (e.g., bulldozers, hand tools) will depend on the size of the species or population to be removed. Herbicide use to eliminate existing vegetation should be minimized. Only EPA-approved herbicides should be used.
- Clearing shall include all roots to minimize risk of re-sprout. In the event that roots cannot be dug out and removed, an EPA registered systemic herbicide shall be applied to the above-ground portion of the root to kill remaining buried root material in accordance with the herbicide's registered uses and appropriate application procedures.
- All vegetative debris containing weeds shall be hauled from the site or, alternatively, placed in a chipper and stored as compost to be used later as soil amendments. Composting would need to exclude those species that readily re-sprout vegetatively from stem, leaf or root fragments (such as salt cedar, pampas grass, and giant reed). These species should instead be disposed of off-site. If composting cannot be properly accomplished to ensure the destruction of seeds, all vegetative debris should instead be removed to a legally approved off-site management and/or disposal facility.
- Soils should be turned and wetted to germinate weed seed remaining in the soil. Weeds should then be removed following previously described methods. Treating soils with herbicides should not be employed to avoid possible soil contamination that may cause suppression of native seed germination.

Soil Preparation

- All soils compacted by heavy vehicles or by prolonged storage of construction materials shall be graded or disked to loosen soils prior to plant installation.
- Soils shall be tested to determine their characteristics prior to any plant installation or seeding. Soils shall be modified according to their deficiencies, if any, to bring them to an acceptable range of constituents.
- Prior to plant installation, all the planting areas shall be water soaked to properly moisten the soils.
- Large rocks and boulders with a diameter greater than 10 inches shall be removed from the soil but saved for use in construction of stream riffles and cascades or for additions to upland landscape surfaces. Small stones (10 inches or less in diameter) shall not be removed as these increase the drainage capability of the soils.

7.8.2 Planting Plan

The Recommended Plan has been divided into various habitat types based on topography and target wildlife species. The largest habitat area is riparian woodland, which surrounds the Channel outside the aquatic habitat. The narrow buffer habitat area along the east side of the project site is designed to reduce the impact of the adjacent recreational land use. The grassland habitat is a transitional zone leading to the Coast live oak/California walnut woodland, which comprises the second largest habitat area in the plan. The initial planting stage will begin after all exotics and weed material are removed. Planting shall occur in stages with the initial stage providing complete coverage of the project. Subsequent stages will provide filler plant materials or re-seeding depending on the progression of the plant and seed growth. When stands of weeds dominate an area, these will be removed and the appropriate native plant will be installed.

An inventory of the vegetation stands and an evaluation of the status of invasive species versus native species should be conducted bi-annually for the first three (3) years. Replanting and weed removal should occur in conjunction with the seasonal rains. The rains stimulate the germination and growth any remaining invasive species, but the wet soil conditions also facilitate weed removal and encourage growth of the new seed/cutting/liners/containers that are replaced in the unvegetated areas. This process should be repeated over a period of three (3) years to assure the purest stand of native vegetation.

Plants should be grown from locally collected seed or cuttings at a local native plant nursery, or in an on-site nursery dedicated to restoration. For some of these species, at least a year's growth will be needed to

provide an adequate size for planting. The nursery must specialize in producing high-quality native plant species for habitat restoration projects. Plant production will begin as seed becomes available.

Native soil will be used in the plant containers. If more native soil is needed than is available to fill plant containers, each container should receive some native soil mixed with an appropriate commercial soil mix with low nutrient levels. The native soil provides arbuscular mycorrhizae (fungi) and other microorganisms that enhance native plant growth. Soil mixes with high nutrient levels tend to produce a healthy looking plant, but they may inhibit root growth, which can be detrimental to the plant when put in the field. It is desirable to produce a plant with a high root to shoot ratio (Bainbridge, et. al. 1995). These plants are much more water efficient and more likely to transition through the process of weaning off supplementary watering.

A variety of sizes of each species should be grown to allow different age classes of plants to be introduced into the system. Using different sized plants also allows some large individuals (which cost the most money and time to produce, but have the highest chance for survival) into the system along with many smaller individuals (that cost the least to grow in a short time, but with a lower chance of survival) balancing cost and survival. Trees that can be grown from cuttings, such as willows, may be planted from cuttings or liners. Cuttings are live branches cut from trees; they have no root system and are planted directly into the ground near the water table. Liners are narrow cylinders that allow root development. Liners are best for areas that are drier and slightly higher above ground water (but still within 10 feet). Cuttings work well in wetter areas that will promote root development. Cuttings are cheaper but can take four to six weeks to develop the same root system as liner-sized plants.

In general, 1-gallon, 5-gallon, and 15-gallon container stock, liners, tall pots, and small and large pole plantings will be used to propagate riparian species. Most herbaceous species will be produced in flats, 4-inch pots, "D-40" pots (2.5" diameter by 10" deep), and 1-gallon pots. The D-40 and 1-gallon pots are especially useful for growing plants with dense and long roots, particularly grasses. Flats are useful for propagation of rhizomatous species.

The restoration sites will also be seeded with locally collected native species. Seed may be applied using various techniques including land imprinting, hydroseeding, or hand seeding depending on the specific site conditions, amount of seed available, and species to be used for specific restoration projects. Seeding rates will be determined by reference site data and the amount of seed available for collecting and sowing. The best time to apply seed is just before the winter rainy season (October).

The seeding technique chosen should be based on the location and accessibility of the restoration area, and the habitat type to be restored. Hand seeding allows for a more precise seed application than hydroseeding. The seed mix can vary from one area to the next; therefore, each area can receive a specific combination of plant species and amount of seed. Hand seeding is also beneficial if only a small amount of seed is available or a specific species is desired in a particular area.

Hydroseeding is recommended for large areas where the seed mix does not need to be adjusted for changes in slope aspect, soil conditions, or type of habitat to be restored. In addition, tackifiers and binders included in the hydroseed mix provide some erosion protection and cover from birds.

Specific guidelines should be followed when preparing the hydroseed mix. Before mixing hydroseed ingredients, the tank and hose used to apply the hydroseed mix should be thoroughly rinsed with water at least three times to ensure any previous seed mix is removed. After the initial cleaning the tank does not require washing between batches, providing the same hydroseed mix is being applied. The hydroseed mix should contain an organic binder such as M-binder, which does not prolong seed germination. The organic binder should be applied at a rate of 200 pounds/acre with 2,000 pounds/acre of wood fiber. No fertilizer should be included in the mix (as this may promote weed growth).

The seed/slurry mix should be mixed thoroughly before, and continuously during, application. The hydroseed mix should be applied in an even and consistent manner, and halted if windy conditions occur. Seeded areas should be protected from pedestrian traffic at least through germination and establishment. Temporary plastic webbing is frequently used as protective fencing. It can be reused many times, making it a cost-effective measure.

Standard plant installation procedures for native plants will be followed for this project. For container stock, this involves digging a hole approximately the same depth and more than twice the width of the root ball of the plant. The hole is then filled with water and allowed to drain. Installation of large poles or tall pot type containers will require auguring. If soils are excessively hard, auguring may leave a smooth, hard face on the plant hole. This face may be impenetrable by roots causing them to spiral resulting in a root bound condition. A tree in this condition will have a low root to canopy spread resulting in increased likelihood of blow over in high winds. If this soil condition exists, the augur must be fitted with irregular protrusions on the edges or the plant holes must be scarified manually. Once the hole is prepared, plants are then positioned so that the surface of the soil in the container is at ground

level, with backfill from the excavation of the hole added carefully beneath and around the installed plant's root ball. The soil is then firmly tamped in around the plant. A small berm, only two to three inches high, should surround the edge of the planting hole to hold irrigation water. The plant should be watered thoroughly immediately after installation.

Plantings will not be regularly spaced (for example, on 10-foot centers), but instead will be placed to mimic a natural setting. Some will be planted in dense groups, some in sparse groups (as determined by the reference site sampling). Final locations will be determined in the field by the monitoring biologist, to account for microhabitats and other field conditions.

Specific locations and planting densities will be determined during the plans and specifications phase, developed using information obtained at reference sites.

Areas planned for stream creation will be densely planted with small stature species that have potential to stabilize stream banks. Stream margins will be planted with a diversity of stream bank adapted species to maximize channel stability. Plantings would include species with high root length densities concentrated in the top 20-50 centimeters of soil.

Plant protection from rabbits, and other herbivores may also be required on some or all of the newly planted species.

The planting plan is shown in Table 7.8.2-1.

Table 7.8.2-1 Overall Planting Plan for all Alternatives

Common Name	Scientific Name	Propagule Type	Minimum Density (per acre unless otherwise noted)	Spacing (in feet unless otherwise noted)
Aquatic				
cattail	*Typha latifolia*	Self-establish	not applicable (NA)	NA
sedge ex. clustered field sedge	*Carex praegracilis*	D-40 (2.5" X 10")[1] or plugs	200	1
bulrush ex. three-square bulrush ex. California bulrush	*Scirpus americanus* *Scirpus californicus*	D-40 or plugs	200	1
rush ex. Mexican rush	*Juncus mexicanus*	D-40 or plugs	200	
duckweed	*Lemna minor*	Self-establish	NA	NA
Riparian Woodland				
black willow	*Salix gooddingii*	1 gal	25	8
black willow	*Salix goodingii*	cuttings	100	2
red willow	*Salix laevigata*	1 gal	20	8
red willow	*Salix laevigata*	cuttings	75	3
arroyo willow	*Salix lasiolepis*	1 gal	25	8
arroyo willow	*Salix lasiolepis*	cuttings	100	2
Fremont's cottonwood	*Populus fremontii*	15 gal	15	15
Fremont's cottonwood	*Populus fremontii*	5 gal	15	8
western sycamore	*Platanus racemosa*	15 gal	15	15
western sycamore	*Platanus racemosa*	5 gal	15	8
white alder	*Alnus rhombifolia*	1 gal	30	8.
boxelder	*Acer negundo*	1 gal	30	8
mule fat	*Baccharis salicifolia*	cuttings	50	6.
California rose	*Rosa californica*	cuttings	225	3
scarlet monkey flower	*Mimulus cardinalis*	D-40	70	5
deergrass	*Muhlenbergia rigens*	1 gal	25	5

[1] D-40 refers to large pots of the dimensions 2.5 inches in diameter and 10 inches high for adequate root growth.

Common Name	Scientific Name	Propagule Type	Minimum Density (per acre unless otherwise noted)	Spacing (in feet unless otherwise noted)
Oak/Walnut Woodland				
coast live oak	*Quercus agrifolia*	5 gal	30	20-30
coast live oak	*Quercus agrifolia*	acorns	270	8
scrub oak	*Quercus berberidifolia*	D-40	30	10
California black walnut	*Juglans californica*	5 gal	30	20-30
laurel sumac	*Malosma laurina*	D-40	25	20 – 30
California coffeeberry	*Rhamnus California*	D-40	25	20
toyon	*Heteromeles arbutifolia*	D-40	25	20
sugarbush	*Rhus ovata*	D-40	25	20
Grassland				
purple needlegrass[2]	*Nassella pulchra*	seed	1 lb/acre	broadcast/hydroseed
foothill needlegrass	*Nassella lepida*	seed	1 lb/acre	broadcast/hydroseed
California fescue	*Festuca californica*	seed	6-8 lb/acre	broadcast/hydroseed
melic or oniongrass	*Melica* spp.	seed	0.5/acre	broadcast/hydroseed
giant wild rye	*Elymus condensatus*	seed	0.25/acre	broadcast/hydroseed
foxtail fescue	*Vulpia microstachys*	seed	6 lb/acre	broadcast/hydroseed
California brome	*Bromus carinatus*	seed	1 lb/acre	broadcast/hydroseed
lilac mariposa lily	*Calochortus splendens*	seed	0.3 lb/ acre	broadcast/hydroseed
California poppy	*Eschschotzia californica*	seed	0.25 lb/acre	broadcast/hydroseed
blue-eyed grass	*Sisyrinchium bellum*	seed	0.25/acre	broadcast/hydroseed
blue dicks	*Dichelostemma capitatum*	seed	0.5 lb/acre	hand sown/hydroseed
chia	*Salvia columbariae*	seed	1.5 lb/acre	broadcast/drillseed/ hydroseed
tidy tips	*Layia platyglossa*	seed	0.5 lb/acre	broadcast/drillseed/ hydroseed

[2] Seed of *Nassella* spp. shall be de-awned.

Common Name	Scientific Name	Propagule Type	Minimum Density (per acre unless otherwise noted)	Spacing (in feet unless otherwise noted)
Buffer				
mulefat	*Baccharis salicifolia*	cuttings	50/acre	6 ft.
California sagebrush	*Artemisia californica*	seed	1.5 lb/acre	broadcast/drillseed/ hydroseed
California buckwheat	*Eriogonum fasiculatum*	seed	5.0 lb/acre	broadcast/drillseed/ hydroseed
Black sage	*Salvia mellifera*	seed	3 lb/acre	broadcast/drillseed/ hydroseed
Coast goldenbush	*Isocoma menzesii*	seed	1.5 lb/acre	broadcast/drillseed/hydroseed
California bush sunflower	*Encilia californica*	seed	2 lb/acre	broadcast/drillseed/ hydroseed
toyon	*Heteromeles arbutifolia*	D-40	25	20
laurel sumac	*Malosma laurina*	D-40	25	20
California coffeeberry	*Rhamnus californica*	D-40	25	20

7.8.3 Irrigation Plan

A temporary irrigation system would be used until the plants are established and have adapted to the patterns of rainfall. The design of the irrigation system should be to promote natural root growth. Once the plants are established, slowly tapering off the supplemental watering would allow the plantings to adapt to the naturally occurring precipitation. The establishment period will take two to three years. As the third year ends, initial tapering off of the water supply should begin during the winter rainy season. Plants should receive wider spaced, briefer irrigation through the spring and summer. Plants must be carefully monitored, especially if a drought situation occurs. Unless drought occurs, plants should receive gradually lower levels of irrigation through the fifth or sixth year until they are fully weaned. Temporary irrigation systems should remain in place for another two years for sensitive habitats. This will ensure the availability of supplemental water if adverse drought conditions should occur.

Planting and seeding will also be timed to coincide with appropriate weather conditions. Vegetation implementation will occur during the fall and winter rainy season, October through March.

A variety of irrigation systems are available and suitable for this project. Combinations of systems will result in the ideal coverage of the basis with its habitat varieties.

- Drip Irrigation. An automatic drip irrigation system of very basic design can be installed relatively easily to provide seasonal supplemental water. Temporary systems are typically installed above ground, using rigid PVC pipe, flexible polypipe, or a combination of the two. Although typically designed to operate under 30 psi or less, drip systems can support spray emitters that work well for the germination of small forbs and seedlings.

- Low-flow Bubblers. A low-flow bubbler system can be installed using all rigid PVC piping, which by its nature is somewhat sturdier and more wildlife resistant than poly-pipe. Current bubbler head products can control flows such that runoff is avoided. This would be a good alternative for larger plants with higher water requirements. An additional benefit of bubblers is that the more concentrated flow of water, if controlled from running off, permeates deeper into the soil, promoting tree roots to a greater depth for stability.

- Spray Sprinklers. Overhead spray can be an effective way to establish newly seeded areas and provide supplemental water to still-establishing grassland areas. Low precipitation, low angle heads are preferred because they minimize runoff and are less affected by breezy conditions. Spray systems can be modular and mobile, depending on the area of coverage required and the seasonal nature of the irrigation needs. By mimicking natural rainfall patterns, spray systems encourage surface lateral roots of trees, which also contribute to their stability.

- Leaky-pipe. This porous piping extends out into planting areas and provides a linear band of high soil moisture. It may be suitable for areas where the establishment of tree or shrub planting is desired around the outer perimeter of a newly created stream community. It can be installed above or below ground.

A combination of the above systems should be used in the restoration areas.

- Drip irrigation is appropriate applied to trail sides, high visibility areas, and interpretive points. Use three-quarter-inch to one-inch emitter poly line (not smaller), install underground, and extend distribution tubing to the plants. This will reduce damage by rodents.

- Low flow bubblers are appropriate for larger container plant materials. Focus should be on groups of trees and shrubs in perimeter areas.

- Impact spray heads work well for establishing seeded areas, particularly those that have either small woody plants or herbaceous plants.

- Increased watering duration of all systems should mimic natural rainfall seasonal patterns. Interim irrigation must occur to allow establishment during the initial years, but increased irrigation during the winter season (especially if drought conditions prevail) will tune plants to the natural seasonal patterns and promote a successful weaning phase.

7.9 OPERATION AND MAINTENANCE

This section presents requirements and recommendations for the initial and long-term operation and maintenance of the habitat area. The information in this section is intended to identify maintenance requirements associated with the Recommended Plan and guide future management of the restored habitat in the project area. While the guidance provided in this section represents professional judgment regarding the anticipated operation and maintenance requirements for the habitat areas, it should be understood that operation and maintenance activities will need to adapt to conditions that develop in the project area over time. An adaptive management approach will be required to respond to actual conditions, and adjustments will need to be made to operation and maintenance practices accordingly in order to ensure the continuing health and success of the habitat. The information in this section is organized according to the following topics:

- Project Features Operation and Management
- Habitat Maintenance and Monitoring

7.9.1 Project Features Operation and Management

Public access to the habitat area will need to be restricted to visual access only, to minimize disturbance to wildlife and avoid damage to fragile plant life. This will primarily be achieved by limiting the construction of trails or other recreational facilities within the habitat area. In addition, signs should be posted at the perimeter of the habitat indicating that public access is not permitted. It may be necessary to construct barricades or fences in locations that prove to be inviting to the public. Four-foot-high "wood look" post and rail fences constructed of "woodcrete" or other durable materials will be used along the maintenance trails to deter entry into habitat areas.

Although general public access to the habitat areas will be limited, activities that promote public education and scientific research should be allowed. The Recommended Plan includes a multipurpose trail system with interpretive nodes built along the perimeter of the project site. This trail would consist of decomposed granite and would be bordered with four-foot-high "wood look" post and rail fencing and buffer plantings to manage the interface between park users and habitat areas. Interpretive nodes and signage could be located at strategic points along this trail system to educate park users and to instruct people to avoid sensitive habitat zones. These trails would not enter into all portions of the habitat areas to prevent a decrease in the quality of native vegetation and wildlife refuge.

7.9.2 Habitat Maintenance and Monitoring

Maintenance activities associated with the restored habitat include weeding of exotic plants, replacement of dead plants, removal of unwanted debris and sediment, and repair of potential damage caused by large floods. A schedule of maintenance is presented in Table 7.9-1 and guidelines for conducting these maintenance activities follow.

Table 7.9-1 Schedule of Maintenance Activities

Activity	Frequency	Duration
Weeding of exotic plant species	Weekly	First growing season*
Weeding of exotic plant species	Monthly (after first growing season)	Ongoing
Replacement of dead or damaged plants	As needed	First 2 growing seasons*
Systematic litter removal	Quarterly	Ongoing
Sediment and debris removal	As needed	Ongoing
Debris removal from check dams	As needed	Ongoing
Debris removal unit maintenance	After storms (and as needed)	Ongoing
Habitat damage repair from storms flows	After large storms (or as needed)	Ongoing

* These items should be included in the construction phase and cost of the project.

Weeding

- A strict weekly weeding regime within the habitat shall be adhered to during the first growing season. Thereafter, weeding shall be undertaken on a monthly basis.
- All weed species shall be flagged or noted by a vegetation monitor for removal by the landscape maintenance crew.
- Weeds shall be pulled by hand, dug out with hand tools, or treated with herbicide, as described below.

- If abatement requires herbicide, only EPA-approved, environmentally safe, systemic herbicides shall be used. Herbicide shall only be applied using a lever-operated knapsack (LOK) unit. This device affords optimal control of herbicide application. Soil and pre-emergent herbicide shall not be employed as these may have an effect on the success of any native seed in the soil. In order to minimize herbicide drift (the physical displacement of herbicide from the intended target during application) the following precautions should be followed:
  - The amount of drift is related to the size of the droplet of the liquid used. The smaller the droplet, the further the drift. LOK diameter should be set so that the droplets produced are no smaller than 100 microns in diameter. Droplet size may also be increased by the addition of nonphytotoxic or phytobland oils to the water used as the liquid carrier of the herbicide.
  - Drift may be reduced by keeping the application wand and nozzle as close to the soil surface or vegetation as possible.
  - Because drift increases with wind and temperature inversions, herbicide should not be applied when wind speed is five miles per hour or greater and should only be applied downwind, avoiding application against winds or in crosswinds. Applications should only be performed during the morning hours when temperature inversions are less likely.
- Weed debris shall be either composted or disposed of off-site.
- Native seed (for grass, annual, or perennial herbs) should be hand broadcast into the weeded soil.
- During establishment of the site (the first two growing seasons), all weeding should be supervised by a vegetation monitor on a weekly basis during the first growing season and monthly during the second growing season.
- Subsequent to habitat establishment, a monthly check and weeding of the habitat should be performed by the landscape maintenance crew.

Plant Replacement

- Reasons for plant failure should be assessed and corrective measures initiated before replacing dead or damaged plants.
- During the first two growing seasons, plants damaged by herbivores, erosion, disease, or trampling shall be immediately replaced with container stock of like species of no less than one gallon in size. If one-gallon stock is not available, pony pack seedlings shall be used at a suggested replacement ratio of 3 to 1.
- After the first two growing seasons, plants should be replaced as needed based on the judgment of the habitat manager or qualified horticulturist.

- Replacement stock (whether seedlings or container) should be protected from herbivores with wire caging or other proven herbivore deterrents.
- Large standing dead trees should be left in place when they do not cause a threat to human safety. If they do, they must be removed.

Flood Damage Repair

- Periodically, large storm flows may cause damage to the habitat. Although extensive damage is unlikely, scour from flows from large storms could uproot plants. After large storms, habitat managers will need to check for damage and determine whether any repairs are needed. Likely repairs would include bank stabilization, erosion repair, pruning of damaged trees and shrubs, and replacement and re-seeding of vegetation. Care should be taken during all maintenance activities to minimize damage to habitat. To the degree possible, low-impact methods shall be utilized for the removal of debris and sediment from the habitat area.

Habitat Monitoring

The Project will need to be monitored at various intervals to evaluate the success of the restoration process in creating habitat for bird and other wildlife species. The success and integrity of the native plant communities will also need to be monitored. Based on the concept of adaptive management, it is anticipated that adjustments in design and operation may be needed in response to changing conditions in the area in order to ensure the continuing health and success of the habitat. In addition, monitoring will provide the further benefit of data that can be applied to the design and implementation of other environmental restoration projects. The following specific types of monitoring are recommended:

- Monitoring for vegetation success.
- Monitoring for wildlife and bird species.

Monitoring for Vegetation Success

A monitoring and maintenance program should be implemented to evaluate the success of the restored areas in terms of vegetation growth and development, and to identify those areas that will require further re-planting and weed abatement. The monitoring program will consist of periodic assessments of the habitat for a period of five-years after construction. Additional assessments may be required in the event of a flood, fire, or other occurrence that causes a substantial loss or degradation of habitat. Monitoring is also proposed during project construction to ensure that the habitat restoration activities are conducted as

specified. In the first five years after construction, a vegetation monitoring program is recommended to qualitatively evaluate plant health and to identify and correct problem areas.

- A vegetation monitor with expertise in restoration ecology will oversee all phases of habitat restoration construction activities, conduct the post-construction vegetation monitoring program, and prepare reports documenting the status of the restoration.

- The monitor will be available on-site during restoration implementation to assist in making any necessary modifications to the specifications, so that work may proceed. Detailed records will be kept of any significant problems encountered. Also, necessary changes made to the specifications during the implementation activities will be recorded. Any modifications to the specification must be approved by the Corps Contracting Officer's Representative.

- The monitor shall be present upon delivery of container plant material and when the plants are spotted in- place for planting, during excavation of plant holes and container plant installation, and during seeding operations.

- A five-year vegetation monitoring program will be necessary upon completion of the vegetation installation to evaluate plant health and to identify and correct problems areas. The vegetation monitor will visit the site on a regular schedule during the establishment of the newly planted vegetation to evaluate plant growth and vigor. The following schedule is recommended:

  - The frequency of visits during the first year will be once a month unless more visits are deemed necessary (such as to monitor the installation of replacement stock or re-hydroseeding efforts, if required).

  - Site assessment visits will be conducted every other month during the second year following the completion of the vegetation installation. Quarterly site assessment visits may be adequate, at the discretion of the vegetation monitor.

  - Site assessment visits will be conducted once every six months from the third through the fifth years of the five-year post-construction monitoring program.

- Subsequent to the completion of the five-year monitoring program, the local sponsor will be responsible for future monitoring and maintenance of the restoration areas. An annual site assessment visit will be conducted by a qualified biologist under the direction of the local sponsor, who will evaluate the health, vigor, and the integrity of the species composition of the restoration areas. The monitor shall make recommendations for the timely correction of any problems within the habitat and be present for quality control when landscaping and/or maintenance personnel implement the recommended measures.

- The vegetation monitor shall provide specific maintenance recommendations regarding irrigation of container plants and hydroseeded areas, weed control, debris removal, re-planting/re-seeding, erosion control, horticultural treatments, pest control and site protection, if needed.

- The success of the container stock portion of the revegetation efforts will be based on the percent of survivability of the plantings. If care is taken prior to and during planting (such as using only healthy stock, proper planting methodologies, etc.), an 80% survival rate for each species type is realistic during the first (and most critical) season. All dead plants will be replaced with new container stock. Should a species be found to have less than a 50% survival rate, regardless of the care used in installing and maintaining the plantings, a re-evaluation of the use of the species in the habitat and recommendations for using an appropriate alternate species will be made. One hundred percent replacement of dead plants will continue through the second year.

- Success of the hydroseeded species will be based on the overall cover of the hydroseeded areas. Because some bare areas can occur in natural habitats and because hydroseed may take 1 to 2 years to establish fully, bare ground within the restoration areas will not be used as an indication of vegetation failure unless hydroseed cover is found to be less than 75% in non-understory areas after the second monitoring year. If hydroseed does not attain 75% cover after the second season, reseeding will be implemented. However, large bare areas (greater than 10 feet in diameter and not part of a wooded understory) will be considered problematic and require immediate re-seeding. Because riparian woodlands typically have little understory, a 25% cover will be the minimum required after the second monitoring year.

Monitoring for Birds and Other Wildlife

Monitoring of birds and other wildlife will be conducted under the direction of the Corps. The habitat managers may utilize Corps staff or volunteers from the local birding and wildlife community to assist in implementing a monitoring program for birds and other wildlife by arranging a cooperative agreement with local organizations (e.g., Partners in Flight, American Birding Association, Audubon Society). In exchange for providing access to the wildlife features at various times throughout the year, the birding and wildlife community could complete a summary report of the species observed, to be submitted to the project's habitat managers on a seasonal basis.

The habitat managers would provide their staff and/or community volunteers with standard forms that will allow the managers to track bird and other wildlife populations in the project area over time. A form would be created that contains a list of possible key species. Table 7.9-2 gives an example of a format that may be considered using a potential bird species list. There would be a sidebar that allows the observer to rank the population size as either abundant, common, uncommon or rare. Additional species may be added to this list of examples. The monitors would also be provided with a checklist of all potential birds or other wildlife, which would allow them to submit their lists of observed species without regard to abundance. Blank lines would be included in the form for monitors to add species that were not anticipated. At the end of every season, the monitors would turn in their species observations and estimates of population abundance. This information would then be compiled into a summary table. An example of a table for bird species is shown in Table 7.9-3.

The populations of key species should gradually increase over time as vegetation matures. Because many of the birds are migratory, few species would have abundant and conspicuous populations (which scores a "4" in the ranking system) year-round, which would equate to an expected total of 16 for the whole year (see Table7.9-3). Most key potential species have a mid-range expected total of 10 that represents a species that is common (which scores a "3" in the ranking system) for two seasons and uncommon (which scores a "2" in the ranking system) for two seasons. If the actual total for the year (Table 7.9-3) never approaches the expected total, the habitat managers should investigate the potential causes.

Table 7.9-2 Key Bird Species: Current Regional Status and Expected Abundance at Restored Habitat Area

KEY POTENTIAL SPECIES EXPECTED TO UTILIZE HABITAT	CURRENT REGIONAL STATUS	Year 1[1]		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8		Year 9		Year 10	
		Expected Total[2]	Actual Total3	Expected Total	Actual Total	Expected Total	Actual Total	Expected Total	Actual Total	Expected Total	Actual Total	Expected Total	Actual Total	Expected Total	Actual Total	Expected Total	Actual Total	Expected Total	Actual Total	Expected Total	Actual Total
Blue Grosbeak																					
California Towhee																					
Canada Goose																					
Great Blue Heron																					
Red-tailed Hawk																					
Red-winged Blackbird																					
Snowy Egret																					
Spotted Towhee																					
Yellow-breasted Chat																					
Yellow Warbler																					

[1]Monitoring should begin in the Winter of the year after all habitat components have been put into place and construction deemed complete (see Table 5-7)
[2]Expected Total reflects the goals set for population abundance in a given year per the scoring system specified in Table 5-9
[3]Actual Total is a summation of the actual scores obtained during the winter, spring, summer and fall season surveys (see
[4]Numbers for the Abert's towhee to be determined.

Table 7.9-3 Summary Table for Monitoring of Potential Species

KEY POTENTIAL SPECIES EXPECTED TO UTILIZE HABITAT	CURRENT REGIONAL STATUS	Year 1[1]				Year 2				Year 3				Year 4				Year 5			
		Winter2	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Blue Grosbeak																					
California Towhee																					
Canada Goose																					
Great Blue Heron																					
Red-tailed Hawk																					
Red-winged Blackbird																					
Snowy Egret																					
Spotted Towhee																					
Yellow-breasted Chat																					
Yellow Warbler																					
Number of Additional Species Observed in the Project Area																					

Scoring System: 4 = Abundant/conspicuous populations; 3 = Moderately common; 2 = Uncommon; 1 = Rare (Pima County, 1997)

1 Monitoring should begin when all habitat components have been put into place

2 Winter is defined here as Jan. 1-March 31, Spring as April 1 - June 31, Summer as July 1 - Sept. 31, and Fall as Oct. 1 - Dec. 31.

7.10 PROJECT COSTS

An MCACES construction cost estimate of $5,771,249, which includes contingencies (25%), has been prepared for construction of the recommended plan. (See Appendix E for estimate). Operation & Maintenance costs are estimated at $140,622 annually, including $72,870 annual water costs for irrigation.

7.11 CHANGES FROM PRELIMINARY RESTORATION PLAN

After careful analysis, it has been determined that there are few changes found in the Recommend Plan of the DPR from the proposed project features of the PRP. Although the total project acreage of 27.9 did not change, the acreage of the individual habitats did change. In addition, two features were added to the stream, weirs and check dams (See Table 7.11-1). The purposes of both these features are described in Section 5.2.

Table 7.11–1. Summary of Changes from PRP

	PRP	DPR- Alternative 4
Habitats:		
Aquatic *	1.0 acres	2.0 acres
Emergent *	1.6 acres	0.0 acres
Riparian Woodland	9.8 acres	10.8 acres
Coast live oak/California walnut woodland **	9.2 acres	9.0 acres
Native Grassland ***	5.8 acres	4.0 acres
Ruderal/Disturbed ****	0.5 acres	0.0 acres
Buffer*****	0.0 acres	2.1 acres
Number of Weirs	0	3
Number of Check Dams	0	1

* In the DPR, the 'Aquatic' includes emergent habitat.
** In the PRP, habitat is called 'Upland Woodland.'
*** In the DPR, 'Native Grassland' is called 'Grassland.'
**** The maintenance paths that were included in the 'Ruderal/Disturbed' habitat in the PRP are included in each individual habitat in the DPR.
***** The buffer habitat was added in the DPR.

8. COORDINATION, PUBLIC VIEWS, AND COMMENTS

8.1 NON-FEDERAL VIEWS AND PREFERENCES

The non-Federal views and preferences regarding this ecosystem restoration project were obtained through coordination with the non-federal sponsor (City of Los Angeles Department of Recreation and Parks) and with various local and regional agencies, as well as public interest groups. These coordination efforts consisted of agency meetings, phone calls, and written public comments and responses.

8.2 LOCAL SPONSOR VIEWS

The local sponsor supports the Recommended Plan. Information supplied by the City was integral to the plan formulation process and formed the basis for a number of planning and feasibility assumptions. The local sponsor has indicated a willingness to continue to be local sponsor through project implementation. They have indicated their support for the project and a willingness to assume cost-shared financial obligations for its implementation.

8.3 COST SHARING

The City will contribute 25% of the project costs for the restoration and 50% for the project costs for purely recreational items in cash, in-kind services, or a combination of services. The Corps will be responsible for the remaining project costs including the Operation and Maintenance for the first two years. After the first two years of operation, the City of Los Angeles Department of Recreation and Parks will be responsible for all operations and maintenance costs. The City of Los Angeles will supply the water needed to sustain the habitat for the life of the project. Responsibility for the costs of construction of the Project will be as described in the Project Cooperation Agreement (PCA) executed between the Corps and the City of Los Angeles.

8.4 COORDINATION WITH OTHER AGENCIES

During preparation of the DPR and EA, the following personnel were consulted with:

Agency/Company	Contact
City of Los Angeles Department of Recreation and Parks	Stephen C. Moe
City of Los Angeles Department of Recreation and Parks	Kevin Regan
City of Los Angeles Department of Recreation and Parks	Bob Fawcett
City of Los Angeles Department of Recreation and Parks	James Ward
Tillman Water Reclamation Plant	Bob Crevak
United States Fish and Wildlife Service	John Hanlon
California Employment Development Department	Karen Hardy
Congressman Brad Sherman – 24th District Office	Susan Little Lori Fernand Michael Tou

9. RECOMMENDATIONS

9.1 RECOMMENDATIONS

I recommend that this Detailed Project Report for Bull Creek (Victory Boulevard to the Los Angeles River), Los Angeles, California, be approved as the basis for preparation of plans and specifications. The Project would be designed and constructed pursuant to Section 1135(b) of the Water Resources Development Act of 1986. The Project will accomplish City, State, and Federal objectives of protecting and enhancing valuable riparian habitat, a greatly diminished resource in the San Fernando Valley of California.

The recommended plan will restore aquatic, riparian woodland, coast live oak/California walnut woodland, and grassland habitats to 27.9 acres around the downstream reach of Bull Creek, located within an existing flood control basin that was constructed by the Corps of Engineers in 1941. The banks of the creek will be laid back to a lesser slope. The channel will be modified to create an oxbow-like area with an island. The restoration area will be graded to provide a naturalistic landform that provides variations necessary for a dynamic and diverse ecosystem. A project cooperation agreement, with a complete list of non-Federal sponsor's responsibilities has been coordinated with the non-Federal sponsor.

The recommendation contained herein reflects the information available at this time and current department policies governing formulation of individual projects. The level of study is consistent with the scope of the recommended plan and is sufficient to proceed into plans and specifications. It does not reflect program and budgeting priorities inherent in the formulation of a national civil work construction program nor the perspective of higher review levels within the executive branch.

David H. Turk
Colonel, US Army
Acting District Engineer

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