



LOS ANGELES RIVER NATURAL PARK

STUDIO CITY, SAN FERNANDO VALLEY

PSOMAS

HYDROLOGY, HYDRAULICS & WATER QUALITY

MIA LEHRER + ASSOCIATES

L.A. RIVER REGIONAL PUBLIC ACCESS



TECHNICAL FEASIBILITY STUDIES

FUNDED BY:

SANTA MONICA MOUNTAINS CONSERVANCY & SAVE L.A. RIVER OPEN SPACE

ABOUT Community Conservation Solutions

COMMUNITY CONSERVATION SOLUTION'S MISSION is to tackle the most complex and challenging problems created when people and nature intersect. Community Conservation Solutions (CCS) does this by developing creative, practical and lasting solutions that unite diverse communities and interests and leverage investments of public funds. CCS has successfully crafted innovative solutions to serious environmental problems affecting California's natural and human communities by integrating the protection and restoration of natural lands and waters with compatible community uses, economic benefits and permanent public benefits.

Community Conservation Solutions works on diverse projects in urban and rural areas that help both natural habitats and people. Our projects range from parks and beaches to wilderness and watersheds, and from recreational sites to mixed-use developments. CCS is a 501(c)(3) non-profit, tax-exempt organization.

ABOUT The Los Angeles River Natural Park

THE LOS ANGELES RIVER NATURAL PARK is envisioned as a showcase "Green Solution" river-oriented park that will provide many public benefits. The 16-acre project site is the last remaining unprotected open space along 22 miles of the Los Angeles River in the San Fernando Valley. The L.A. River Natural Park presents a unique opportunity to help improve water quality in the L.A. River through creation of a wetlands habitat complex that will naturally capture and clean polluted runoff, while also providing people from throughout the region with easy, parking-friendly access to the L.A. River Trail. The Park will create an L.A. River Gateway and public access hub serving both pedestrians and bicyclists, and includes the public parking garage located 500 yards downstream, pedestrian bridges and improvements to the L.A. River Trail.

ABOUT The Project Team

CCS' PROJECT TEAM includes **PSOMAS** and **Mia Lehrer & Associates**. Psomas is a leading consulting engineering firm serving clients in the water/wastewater, transportation, public, institutional and private land development markets, and is committed to the advancement and implementation of sustainable stormwater solutions. Mia Lehrer + Associates is a full service, international landscape architecture practice. Under the leadership of Mia Lehrer, FASLA, the firm applies a comprehensive and intensely creative approach to all projects, and develops landscape design concepts that engender richly layered experiences, deploying the enduring qualities of natural and manmade elements as well as ephemeral characteristics of materials.

For a complete copy of this report, go to
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For more information, contact us at:

2554 Lincoln Boulevard Suite 223 Los Angeles, CA 90291 (310) 398-8584



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LOS ANGELES RIVER NATURAL PARK

STUDIO CITY, SAN FERNANDO VALLEY

TECHNICAL FEASIBILITY STUDIES



HYDROLOGY, HYDRAULICS
& WATER QUALITY



L.A. RIVER REGIONAL
PUBLIC ACCESS

Funded By:

Santa Monica Mountains Conservancy



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The 16-acre project site is the last remaining unprotected open space along 22 miles of the Los Angeles River in the San Fernando Valley. A 391-car public parking garage is located just downstream along the L.A. River Trail.

EXECUTIVE SUMMARY

Los Angeles River Natural Park: a showcase river project integrating natural water quality improvements with regional public access to the L.A. River



INTRODUCTION

Community Conservation Solutions is pleased to present these two technical feasibility studies for the Los Angeles River Natural Park: a [Hydrology, Hydraulic & Water Quality Components Technical Memorandum](#), produced by **Psomas**, and a [Los Angeles River Regional Public Access Feasibility Analysis](#), produced by **Mia Lehrer and Associates**. These studies were funded by the Santa Monica Mountains Conservancy and Save L.A. River Open Space.

The Los Angeles River Natural Park is envisioned as a showcase "Green Solution" river-oriented park that demonstrates how to naturally clean urban runoff and improve water quality, store and reuse runoff, preserve riverfront land and create native habitat, generate solar power, provide regional recreation amenities and establish an L.A. River Regional Public Access Hub and Trailhead for public access to the L.A. River in the San Fernando Valley.

The 16-acre project site is the last remaining unprotected open space along 22 miles of the Los Angeles River in the San Fernando Valley. The L.A. River Natural Park presents a unique opportunity to help improve water quality in the L.A. River through creation of a natural wetlands system, while also providing people from throughout the region with easy, parking-friendly access to the 51-mile L.A. River Trail and creating a central staging area for both pedestrians and bicyclists. The site's capacity to serve visitors is particularly significant because public access to the L.A. River is very limited elsewhere in the Valley.

The project includes a public parking garage 500 yards downstream and L.A. River trail improvements from the parking garage to Coldwater Canyon. The site links to existing and planned trails and greenways along the Tujunga Wash, Pacoima Wash and Arroyo Seco, as well as to public transit and regional bicycle transportation networks.

The technical studies in this report were directed by Community Conservation Solutions (CCS) and funded by the Santa Monica Mountains Conservancy and Save L.A. River Open Space. The studies were based on the L.A. River Natural Park Vision and Concept Design developed by CCS and BlueGreen Consulting in 2008, with community input and technical assistance from Geosyntec. The feasibility studies provide preliminary analyses and estimated costs of the proposed urban and stormwater runoff management, water quality improvement, regional public access and bicycle hub elements of the Vision and Concept Design.

The L.A. River Natural Park would divert urban runoff from over 200 surrounding acres, providing a treatment volume of 11.4 acre feet and natural treatment of polluted runoff that otherwise flows directly to the L.A. River with no treatment of any kind. A "treatment train" would include vegetated swales, subsurface detention and retention, constructed wetlands and associated native habitat to capture and naturally clean all dry weather runoff and first flush storm events. Runoff would be stored under the driving range and would be re-used for irrigation, and solar power generated on site would offset normal site electricity usage.

This "Green Solution" approach to improving water quality in the L.A. River through creation of natural wetlands habitat would be integrated with a Los Angeles River Gateway providing bicycle-friendly, regional public access to the L.A. River that would serve people from throughout the entire San Fernando Valley and beyond. The L.A. River Natural Park would provide easily accessible linkages to ample public parking, adjacent public transit and regional bicycle networks, and connects to both the Metro Rail and Metro Bus systems.

Other project benefits would include walking trails, extension of the L.A. River Trail to Coldwater Canyon and preservation of green open space in the densely-developed Valley. Links to public transit and creation of a bicycle-friendly hub and staging area would connect to miles of planned regional bicycle networks. Preservation of the regional tennis components, putting green and driving range would help provide economic support necessary to maintain the park. The project would further the goals of the City of Los Angeles L.A. River Revitalization Master Plan and the Los Angeles City 2010 Bicycle Plan, and would help the City meet state-mandated air quality improvement goals.



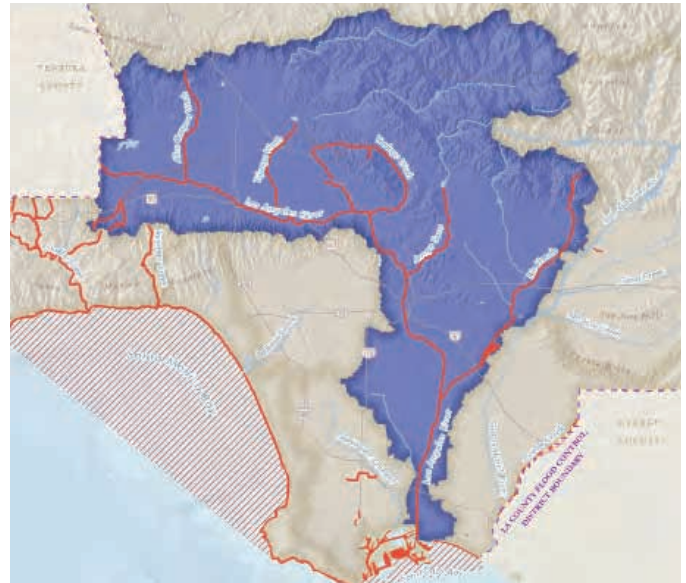
Naturally Improving Water Quality. Using a system of wetland habitats, the L.A. River Natural Park would use a "Green Solution" approach to naturally capture and clean polluted runoff from the surrounding urban area.

BACKGROUND

Why Water Quality Improvements are Important in the L.A. River

Polluted urban runoff is a serious problem in the heavily-paved San Fernando Valley. Additionally, the area around the project site has no storm drains, so dry weather runoff (from landscaping and other daily uses) and stormwater flow off these paved surfaces and directly into the L.A. River. Polluted runoff contaminates all 51 miles of the Los Angeles River, most of its tributaries, San Pedro Bay, beaches north and south of the L.A. River's mouth, and ocean waters.

All of the L.A. River and most of its' contributing waters are in violation of the U.S. Clean Water Act, with pollutant loads above state and federal standards developed to protect human health and marine and aquatic life. Local governments are under increasing pressure from the L.A. Regional Water Quality Control Board (Regional Board) to improve water quality in these water bodies. Pollutants in the L.A. River in violation of the U.S. Clean Water Act include: fecal coliform bacteria, nutrients, toxic substances, trash and metals, including copper, lead and selenium. The Regional Board has established Total Maximum Daily Loads (TMDLs) for trash, nutrients and metals, and is in the process of developing additional TMDLs for other pollutants. The anticipated pollutants of concern from the tributary area that would be treated by the L.A. River Natural Park include trash and debris, nutrients, oil and grease, suspended solids, heavy metals, and pesticides.



Polluted Waters of the L.A. River Watershed. Polluted runoff from urban areas flows directly into the L.A. River and to the ocean, without treatment of any kind.

Why Regional Public Access to the L.A. River is Necessary

In the densely-developed San Fernando Valley, there are few places where the public can easily access the L.A. River, and extremely limited opportunities to create a centralized gateway to the river that can serve communities throughout the Valley. In most of the Valley, buildings exist up to the river right-of-way for nearly its entire length, severely limiting opportunities for high-capacity public access. Existing public access to the L.A. River in the Valley is largely along busy streets, with very limited parking and no improved crossings or other visitor-serving amenities that would encourage use of the L.A. River Trail.

How the L.A. River Natural Park Contributes to Regional Bicycle Transportation Networks

To help ensure that planned regional bicycle transportation networks succeed, there is a need for a regional bicycle hub and staging area that provides easy access to the L.A. River Trail, nearby visitor destinations and commercial areas, and safe connections to planned bicycle routes along surrounding streets. By providing bicycle-friendly parking, bicycle rental and related bicycle amenities at the public parking garage, the L.A. River Natural Park would help encourage regional bicycle use and reduction of car trips. Extensions of the L.A. River Trail would help create a contiguous, off-street bicycle path for riders of all ages.

ABOUT THE L.A. RIVER NATURAL PARK

The L.A. River Natural Park project site includes these three key components:

- 16 acres of L.A. riverfront land
- Adjacent 391-space public parking garage
- L.A. River Trail improvements

The site is located on the L.A. River in Studio City, and a county-owned and operated 20 to 40 foot right-of-way along the river is adjacent to the site. A 391-space public parking garage owned by the City of Los Angeles is located 500 yards downstream, and connects to the L.A. River Trail via an ADA-compliant ramp and pedestrian bridge. The garage connects to 1.5 miles of improved L.A. River Trail. The site is currently privately-owned and occupied by the Weddington Golf and Tennis facility. There is easy pedestrian access to many visitor-serving amenities along nearby Ventura Boulevard.



L.A. River Natural Park site, adjacent 391-car public parking garage, pedestrian/bicycle bridge and planned L.A. River Trail.

HYDROLOGY, HYDRAULIC & WATER QUALITY COMPONENTS



Tributary Area. The L.A. River Natural park site can capture stormwater and dry weather runoff from over 200 acres of surrounding urban area.

Using a "Green Solution" system of natural treatment, the L.A. River Natural Park could divert and treat 11.4 acre-feet (or 3.7 million gallons) of runoff from over 200 acres of its surrounding tributary area. There would be cumulative storage of 11.4 acre-feet, including underground storage, which would provide 8 acre-feet for reuse for irrigation. In addition, during the dry season the project would draw up to 5,000 gallons per day of water from the L.A. River to sustain the wetlands, providing filtration and cleaning before discharging the treated water back into the L.A. River.

Because no storm drains currently exist in the surrounding area between the project site and Moorpark Avenue, diversion of stormwater to the L.A. River Natural Park would help provide needed flood control improvements.

Water Quality Improvements

The Green Solution water treatment strategy would consist of a series of urban runoff Best Management Practices (BMPs) that use a system of natural habitats to treat urban runoff on the project site prior to infiltration, detention and/or release into the Los Angeles River. A wetlands habitat complex would be created to provide open water, marsh, riparian and upland habitats, which would remove sediment, trash, metals,

bacteria, oil & grease and organics from runoff flowing through the system. Removal of these pollutants would provide a significant water quality improvement to the L.A. River.

The treatment components consist of the following four stages:

- **Pre-Treatment**

Structural pre-treatment using separators and vegetated pre-treatment basin to remove trash, debris, sediments, oil and grease.

- **Constructed Wetlands and Underground Storage**

A series of natural wetland habitats over much of the site to allow dry weather and stormwater runoff to spread out, providing infiltration, absorption, evapotranspiration and storage. A subsurface detention tank under the driving range and an overflow detention/retention basin would provide water storage.

- **Conveyance**

Vegetated swales promote sedimentation, infiltration and absorption, and mitigate peak runoff during storm events.

- **Polishing**

A wet pond provides final treatment and additional habitat before water is discharged to the L.A. River.

Solar Power Potential

The site would be grid-neutral by using on-site solar panels to generate electricity to offset the park's electrical needs. Rooftop panels, free-standing panels on the site and along the L.A. River Trail, and shade-structure panels over on-site parking could provide approximately 37,000 square feet of solar panel coverage. Installation of energy-saving lighting and other energy conservation measures could further reduce electrical demand.



L.A. River Natural Park: Water Quality Improvement Components Concept Plan. Developed by PSOMAS

L.A. RIVER REGIONAL PUBLIC ACCESS COMPONENTS

With a combination of improvements to the site, the nearby public parking garage and the adjacent L.A. River Trail, the L.A. River Natural Park would provide centrally located regional public access to the L.A. River for people from throughout the region. With its unique riverfront location and connection via river trail to ample and easily accessible parking, the L.A. River Natural Park can become an exciting, user-friendly Gateway to the L.A. River in the San Fernando Valley, and can provide vital bicycle amenities that will link the site to regional bicycle networks.

The L.A. River Regional Public Access components include:

■ L.A. River Gateway

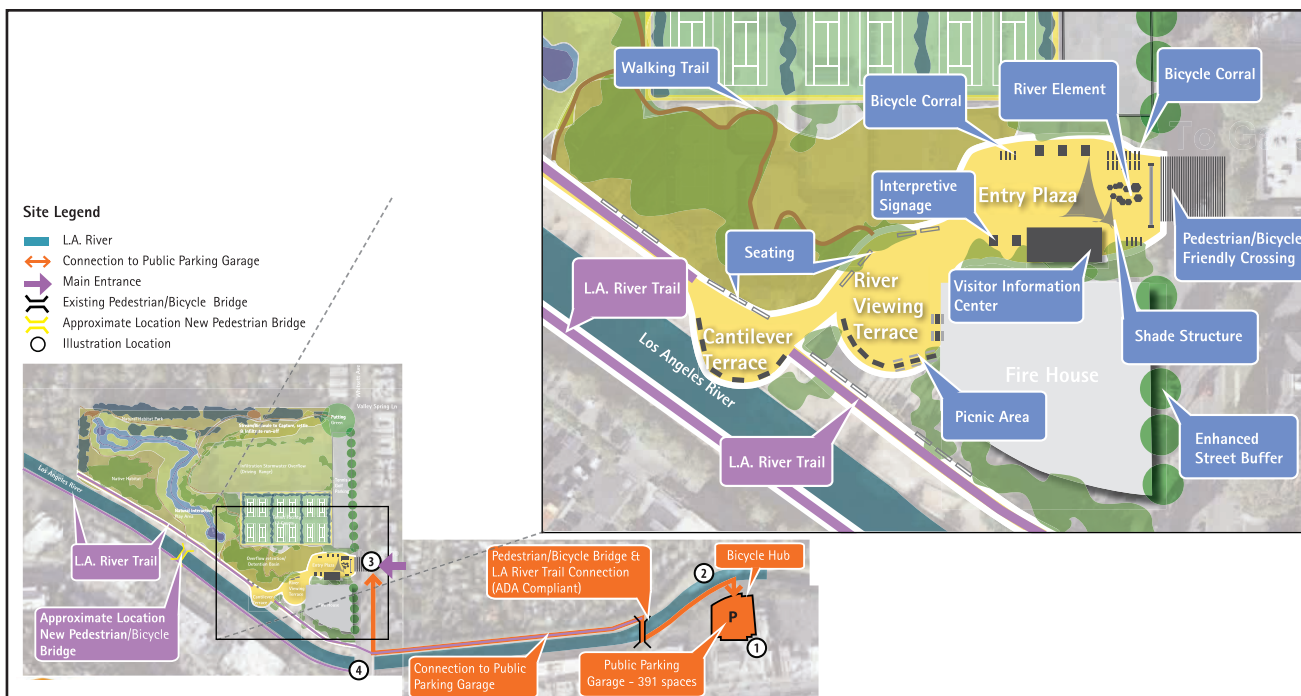
Entrance to L.A. River Natural Park linking to L.A. River Trail, with a public greeting area, information and interpretive kiosks, visitor information center, bicycle access, picnic areas, river observation decks, seating, walking paths and native landscaping.

■ L.A. River Public Parking Garage And Bicycle Hub

Off-site parking in the existing public garage on the L.A. River 500 yards downstream linked via the L.A. River Trail to the L.A. River Natural Park site; bicycle rental, repair, and parking/storage; a bicycle-friendly ramp and a pedestrian/bicycle bridge linking to the L.A. River Trail.

■ L.A. River Trail Improvements

Extension of the L.A. River Trail from the parking garage to Coldwater Canyon, native landscaping, and a new pedestrian/bicycle bridge across the river at the project site to connect to Ventura Boulevard.



L.A. River Natural Park: L.A. River Regional Public Access Components Concept Plan. Developed by Mia Lehrer + Associates

The project site offers all of the attributes needed to create a regional public access hub to the L.A. River and a key trailhead staging area, including:

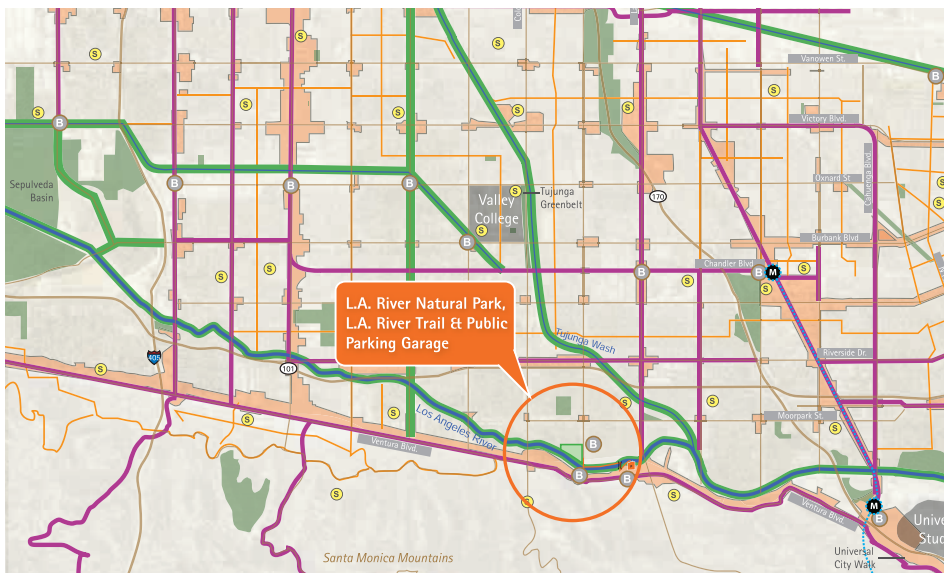
- Easy access to the L.A. River
- Centrally located
- Has ample parking readily available
- Bicycle-friendly and connects to a regional bikeway network
- Easily accessible by public transit
- Regional destination that can attract visitors
- Adjacent to visitor-serving infrastructure and amenities
- Potential for connection to other river trails
- Accessible via multiple modes of transportation, including mass transit, bicycle and walking



L.A. River Public Parking and Bicycle Hub. Located on the L.A. River 500 yards downstream from the project site, the existing garage can provide off-site parking and bicycle amenities.

Linking to Regional Bicycle Networks and Helping Improve Air Quality

The development of the L.A. River Natural Park as a regional access point to the L.A. River - and as a hub that links river trails, public transit, bicycle networks, commercial areas, schools and other visitor destinations to the L.A. River - will further local and state efforts to promote alternative forms of movement and build healthy communities. The L.A. River Natural Park will contribute to implementing the City of Los Angeles L.A. River Revitalization Master Plan, regional transportation alternative plans, and the Los Angeles City 2010 Bicycle Plan. By re-purposing the public garage as a regional bicycle hub and staging site, the project will encourage bicycle use and will help the City of Los Angeles meet state-mandated air quality improvement and sustainability goals.



Encouraging Bicycle Use: The L.A. River Natural Park connects to existing and planned regional bicycle networks, and can provide easy access to commercial areas, parks, schools and other visitor destinations.

ESTIMATED COSTS

A concept level engineer's estimate of probable construction costs for the water quality improvement components was prepared by Psomas based on projects of similar size and scope; the cost estimate for these components is \$17.1 million. A landscape architect's opinion of probable cost was prepared by Mia Lehrer and Associates for the regional public access components; the cost estimate for these components is \$9.5 million. These figures do not include costs for property acquisition. An additional \$350,000-\$600,000 is needed for project planning and design, community outreach and involvement, geotechnical and structural analyses, and environmental studies.

CONCLUSION

The L.A. River Natural Park can serve as a showcase Green Solution project on the L.A. River that sets a precedent for integrating the following important multiple benefits for both people and the environment:

Water Quality Improvements & Water Reuse

- Capture and treat polluted runoff from surrounding area
- Create wetland habitat and use soil and plants to naturally remove pollutants
- Store and reuse treated water for irrigation
- Use L.A. River water during dry season

L.A. River Regional Public Access

- Create a central "L.A. River Gateway" in the San Fernando Valley
- Provide easy visitor access to the L.A. River Trail
- Connect to high-capacity off-site public parking garage
- Build river observation decks, visitor center, walking paths and picnic areas
- Connect to other river trails, public transit and bicycle networks
- Install bicycle-friendly parking and links to bike paths

Habitat & Open Space

- Preserve unique L.A. riverfront land
- Create ecosystem complex of natural habitat types
- Preserve natural green space in heavily urbanized area

L.A. River Trail Improvements

- Extend L.A. River trail between garage and Coldwater Canyon
- Build new pedestrian bridge linking park site to Ventura Blvd.
- Create pedestrian and bicycle trails
- Integrate wayfinding signage
- Use native landscaping

Energy Efficiency

- Use solar power to be "grid-neutral"
- Install solar panels as shade structures along L.A. River Trail

Link to Regional Bicycle Transportation Networks

- Re-purpose parking garage to include bicycle hub
- Provide bicycle rental, storage and repair
- Link to regional bicycle paths and routes
- Connect to visitor destinations, commercial areas, parks and schools

Regional Recreation

- Integrate underground water storage with driving range
- Retain putting green and regional tennis facilities
- Preserve historic clubhouse

ABOUT The Project Team



COMMUNITY CONSERVATION SOLUTIONS

Community Conservation Solution's mission is to tackle the most complex and challenging problems created when people and nature intersect. CCS does this by developing creative, practical and lasting solutions that unite diverse communities and interests and leverage investments of public funds. CCS has successfully crafted innovative solutions to serious environmental problems affecting California's natural and human communities, by integrating the protection and restoration of natural lands and waters with compatible community uses, economic benefits and permanent public benefits.

CCS' successful project solutions include: the two-square mile Baldwin Hills Park in the heart of urban Los Angeles; wetland restoration in Upper Newport Bay; acquisition of the Spring Street Center for the Los Angeles Conservation Corps; the Los Angeles River Natural Park to naturally treat urban runoff while creating a regional river public access gateway; and developing new, quantified approaches to improving water quality through the Green Solution Project.

Community Conservation Solution works on diverse projects in urban and rural areas that help both natural habitats and people. Our projects range from parks and beaches to wilderness and watersheds, and from recreational sites to mixed-use developments. CCS is a non-profit, 501(c)(3) organization.



PSOMAS

Psomas is a leading consulting engineering firm serving clients in the water/wastewater; transportation; and public, institutional and private land development markets. Ranked as one of Engineering News Record (ENR) magazine's Top 100 Pure Design Firms in the United States, Psomas offers civil engineering, land surveying, planning and entitlements, program/construction management, natural resources, GIS consulting, and Special District Financing services to the public and private sector. Founded over 60 years ago, Psomas provides services from offices throughout California, Arizona, and Utah.

Psomas specializes in delivery of sustainable storm water management consulting and design solutions to municipalities, public and quasi-public organizations, and private sector clients. Psomas' projects range from studies to constructed solutions; challenging infill development to city and county-wide initiatives; and from integrated low impact development measures to purpose-built treatment wetland systems.



MIA LEHRER & ASSOCIATES

Mia Lehrer + Associates is a full service, international landscape architecture practice located in Los Angeles, California. Under the leadership of Mia Lehrer, FASLA, the firm has been responsible for the design and development of a diverse range of public and private projects. The firm applies a comprehensive and intensely creative approach to all projects, which vary in scale from large urban projects engaging community members and public agency stakeholders, to intimate gardens where collaboration and coordination of architecture and site are the primary objective.

We work closely with local communities and public agencies to create parks, open spaces and streetscapes that meet the



diverse needs of the people who will visit them. Our firm has been responsible for master planning and concept development for both large, regional and small pocket parks that have been developed with funding from grants, infrastructure programs and public private partnerships. Our experienced staff, with seven licensed landscape architects, includes world class designers and senior technical staff who deliver comprehensive construction documents and provide comprehensive construction administration services.

Mia Lehrer + Associates is a recognized leader in the field of sustainable design, and approach sustainable design as a tool to improve our environment and achieve higher and healthier levels of integration with natural systems. We believe that all projects, whether large parks or urban courtyards, deserve innovative design matched by intelligent, sustainable practices. Our primary focus is on envisioning and creating exceptional urban environments. We do not begin any of our projects with a preconceived notion; rather, we ask questions of ourselves, our client, and our team, which informs the design and development process. Regardless of scale or level of complexity, we remain committed to innovative design, quality service, the process of collaboration, and the belief that landscape has the power to enhance the livability of a city and heal the land.

Los Angeles River Natural Park

Studio City – San Fernando Valley, CA

Technical Memorandum

Prepared For:



April 2010

Psomas Project No.
1CCI010102





Los Angeles River Natural Park
Studio City, California
Illustrative Representation

DRIVING RANGE FENCING HAS
BEEN OMITTED FOR CLARITY.

EXECUTIVE SUMMARY

The Los Angeles River Natural Park project proposes to improve water quality within and discharging to the Los Angeles River by creating native habitat and constructing multiple Best Management Practices (BMPs). The 16-acre project site would divert runoff (both dry and wet weather) from approximately 200 acres of the surrounding tributary area, bordered by Coldwater Canyon, Landale Street and Laurel Grove Avenue, and treat it through a series of BMPs, referred to as a “treatment train.” This treatment train would include a vegetated pre-treatment basin, subsurface detention/retention facility, constructed wetland, vegetated swales, detention/retention tank and basin, and a wet pond. The detention/retention tank is also planned as storage for reuse water for irrigation purposes. The primary BMP would be the constructed wetland, which is effective at removing multiple pollutants and provides habitat for many species of native plants and birds. Diverted surface runoff would be treated and would be used to sustain the wetland areas and native habitats during the wet season. During the dry season normally untreated water would be drawn from the Los Angeles River for treatment via the constructed wetland prior to release back into the Los Angeles River. Based on the Los Angeles County Department of Public Works Manual for the Standard Urban Stormwater Management Plan the project would provide enough treatment volume to capture dry weather runoff and to treat the “first flush” (first 0.75” of a rainfall event) for +/-250 acres, which exceeds the 200 acres anticipated to be delivered to the site. The project also proposes to be grid neutral, in that, solar power generated on site would offset the normal site electricity usage. The project would integrate the runoff treatment capabilities of the site with habitat creation, open space and recreational uses. The project will include trails and pathways connecting to the Los Angeles River network of trails, walking paths, tennis courts and driving range. Overall, the Los Angeles River Natural Park would serve as a showcase multi-benefit project that demonstrates how to significantly improve the quality of urban runoff, reuse and recycle runoff, create native habitat, and provide regional recreational facilities and regional public access to the Los Angeles River.

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3. Site Schematic
4. Regional Connectivity/Regional Access
5. Overall Project Concept

APPENDICES

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- B. California Stormwater Quality Association (CASQA) Best Management Practices (BMP) Reference

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A. INTRODUCTION

This technical memorandum is focused on further developing the **hydrologic and water quality elements** to support the proposed Los Angeles River Natural Park in Studio City, California. The project as a whole has multiple objectives and sustainable features which will be touched on in this memorandum; however the focus of this memorandum is the hydrologic and hydraulic aspects, and the urban runoff treatment and water quality improvement potential of the park. The analysis included in this memorandum is limited to publicly available data. Opportunities and constraints of the conceptual site design are discussed, as is habitat creation potential. Estimates are presented for component sizes, potential water quality improvements, as well as a concept-level engineer's estimate of construction costs and preliminary investigations. Urban runoff as described in this report includes dry and wet weather flows.

B. SITE DESCRIPTION

The 16-acre project site is located in the Studio City area of Los Angeles, California between Whitsett Avenue and Bellaire Avenue. The site is bounded on the north by Valley Spring Lane and by the Los Angeles River on the south. It is currently occupied by the Weddington Golf and Tennis facility, including a nine-hole golf course, driving range, 16 tennis courts, clubhouse, and associated parking lots. The site is somewhat undulated due to the golf course grading but generally slopes to the south and has a 10 to 15 foot grade differential to the County access road adjacent to the Los Angeles River. The site contains mature trees as well as shrubs, ground cover, turf and hardscape.

C. PROJECT OVERVIEW

The vision and concept design prepared by Community Conservation Solutions and BlueGreen Consulting for the project indicated a desire to improve water quality by integrating natural treatment of urban runoff, creating native habitat, and meeting regional water quality improvement goals. The treatment strategy would include a series of urban runoff best management practices (BMPs) to improve the quality of runoff water diverted through the project site prior to infiltration or detention and/or release into the Los Angeles River. The anticipated pollutants of concern from the tributary area include trash and debris, oil and grease, suspended solids, heavy metals, and pesticides. More discussion on pollutants of concern can be found in Section H of this memorandum. BMPs that target these anticipated pollutants include: structural and vegetated pre-treatment; underground retention/detention; a storm water treatment wetland; and vegetated swales. As shown on Exhibit 3, the project includes a combination of these BMPs which could cumulatively provide a treatment volume of approximately 11.4 acre-feet. Wet weather and dry weather runoff would be collected and treated by the treatment train from the +/-200-acre tributary portion of the sub-watershed.

The 200-acre tributary area can be generally described as the area bounded by Coldwater Canyon on the west, Landale Street on the north, Laurel Grove Avenue on the east, and

the Los Angeles River on the south. Please refer to Exhibit 1 for the Tributary Sub-Watershed exhibit.

Based on our experience with projects of this nature within the City of Los Angeles, diverted dry weather surface runoff from the tributary watershed would not on its own be sufficient to sustain the wetland habitat. In order to minimize potable water usage and promote water reuse and recycling, the project proposes to draw water from the Los Angeles River for treatment and to sustain the proposed habitat during normally dry periods. The diverted water would be pumped to the wetland area and travel through the BMP treatment train for filtration and treatment before being discharged again to the river.

D. SITE OPPORTUNITIES AND CONSTRAINTS

The site's location immediately adjacent to the Los Angeles River provides a unique opportunity to draw impaired water from the river, treat it, and then return the treated water to the river, while sustaining wetland and riparian habitat. This process can help address pollutant loading issues in the river. Furthermore, since the site is adjacent to the river, the tributary area intercepted can be maximized. Some of the site constraints include the existing recreational uses and the potential grading limitations caused by the presence of existing mature trees located throughout the site.

E. CONTRIBUTING DRAINAGE AREA

A concept-level analysis was completed to confirm the contributing drainage areas previously identified and to refine the area that could be feasibly intercepted and treated on the project site. During our analysis a potential, but inconclusive, contributing area north of Moorpark Avenue was identified for further investigation in a future phase. Exhibit 1 shows the tributary areas for the surrounding sub-watershed. Drainage Basins 1B and 1C could be collected and routed to the project site with the construction of a local storm drain collection system, as shown on Exhibit 2. Drainage Basins 2A and 2C surface flow by the site and could be collected via parkway drains and/or other surface types of drainage facilities. The project site itself is comprised of Drainage Basin 2B. Drainage Basins 3A, 3B, and 3C are not hydrologically or hydraulically connected to the project site. Therefore, an extensive collection and distribution system including pumps would be required for collection and treatment of runoff from these areas. Existing collection systems at the end of Rhodes Avenue and Laurel Canyon Avenue should allow for diversion structures to be installed so that dry weather and first flush events could be pumped to the site for treatment from these sub-areas.

The project proposes to accept dry weather and first flush runoff from all of the tributary areas indicated in this report as well as accepting larger storm events from some tributary areas. Exhibit 2 shows that the project accepts runoff from Drainage Basins 1A, 1B, 1C, and the westerly portion of 2A through diversion structures. Similarly, Drainage Basins 3A, 3B, and 3C would utilize diversion structures but would also utilize pump facilities to

deliver the diverted runoff to the wetland headworks. This configuration allows the “first flush” storm events to be diverted to the site while larger storm events continue to drain to the Los Angeles River as they do currently. Conversely, the middle and eastern portions of 2A, all of 2C and 2B do not use diversion structures. Rather the project site could accept larger portions of runoff from these basins at the indicated locations. This arrangement allows the project site to treat the “first flush” storm event, but it also allows it to detain, thereby treat, larger storm events before discharging to the Los Angeles River.

F. URBAN RUNOFF TREATMENT

Runoff that is currently un-treated from the tributary area can be treated on-site through a treatment train approach, which utilizes a series of BMPs. Since multiple BMPs will be implemented in series the treatment efficiency of each BMP is maximized. The train for this site would consist of four stages: pre-treatment, treatment, conveyance and polishing. Each stage can include a single BMP or multiple BMPs. See Exhibit 3 for a complete site schematic. The four stages are detailed below:

1. The initial **pre-treatment** stage includes two different BMPs proposed at different locations on the site. Structural pre-treatment via hydrodynamic separation or continuous deflective separation would be located in the southwesterly area of the site. The separator would remove trash, debris, sediments, oil and grease prior to runoff entering the subsurface detention facility. Detention allows fine particles to settle out of runoff as well as aid in attenuating peak runoff flow rates. Surface runoff entering the site in the northwesterly, northerly, and northeasterly areas would pass through a vegetated pre-treatment basin. The basin would also remove trash, debris and sediment, as well as provide a small amount of in-line detention. These initial BMPs efficiently remove sediment, trash & debris thereby reducing the potential for clogging in downstream BMPs.
2. The second **treatment** stage utilizes multiple BMPs to accomplish infiltration, absorption, evapotranspiration, and storage. By employing appropriate vegetation and necessary ponding depths, the constructed wetland can accomplish all of these goals. The wetland area spreads out in the northwesterly area of the site, and then becomes more linear as it passes through the site toward the wet pond located in the south-central area of the site. Additional storage would also be provided by a subsurface detention tank under the driving range as well as an overflow detention/retention basin adjacent to the wet pond.
3. The third stage, consisting of **conveyance**, utilizes vegetated swales to promote sedimentation, infiltration and absorption as well as mitigate peak runoff during storm events. The vegetated swales employed for the project would intercept runoff from the northeasterly and north-central areas of the site and carry runoff south toward the driving range detention tank and the wet pond.

4. The final stage, **polishing**, would be accomplished by the wet pond located in the south-central area of the site. The wet pond provides additional habitat and beneficial uses prior to discharging treated runoff to the Los Angeles River.

The project site as programmed consists of normally wet zones and normally dry zones. As shown on Exhibit 3, the areas indicated in blue, primarily on the western and southern portions of the site, would be kept wet year round to sustain the appropriate habitat areas. The riparian transitional habitat (light green) would be inundated by large storm events during the rainy season and might require supplemental irrigation water to sustain this habitat during the dry season. Ideally supplemental irrigation water would be drawn from the reuse tank located underneath the driving range. For more discussion regarding irrigation water see section L.

During the dry season diverted flow would be drawn from the Los Angeles River utilizing a sub-surface supply pump system, located adjacent to the subsurface detention facility on the western portion of the site. The system would be utilized to distribute water from the wet well to the headworks of the wetland.

The northern and eastern areas of the site indicated as dark green would be upland type habitats that are normally dry and drought-resistant. The mustard and brown colored areas are also normally dry areas and would be utilized as storage and conveyance facilities during the rainy season but would not be kept wet year round. Depending on the plant palette chosen for these areas, some supplemental irrigation may be required, particularly as this habitat type is becoming established. Supplemental water would be provided by diverted Los Angeles River water, as discussed above. See Section J for a discussion of proposed habitat creation.

The overall treatment volume necessary to handle the tributary area was determined using the Los Angeles County Department of Public Works (LADPW) Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP). The plan requires that the BMPs treat the volume of runoff produced from a 0.75-inch storm event. Exhibit 1 shows the tributary areas surrounding the project site. Based on the topography of the area, sub-area 1B and 1C can be intercepted by a storm drain system and directed to the subsurface detention facility. Sub-area 2A would enter the project site at 3 different locations and sub-area 2C would enter at the northeast corner of the site. The project site itself is identified as sub-area 2B. Tributary areas 3A, 3B and 3C would be intercepted by a storm drain system and the targeted treatment amount would be pumped to the project headwaters for treatment. Based on these tributary areas and the required rainfall depth the project must provide for approximately 8.8 ac-ft of treatment volume in order to satisfy the SUSMP requirements. However, the project proposes to exceed this minimum treatment volume by providing a cumulative storage volume of nearly 11.4 ac-ft. This additional storage volume would allow the site to treat the first 1-inch of rainfall versus the minimum of 0.75-inch required by the SUSMP. The treatment volume calculations can be found in Appendix A.

G. TREATMENT COMPONENTS

As shown on Exhibit 3, the project consists of the following six main treatment components:

1. Vegetated Pre-treatment Basin – Vegetated pre-treatment areas must be large enough to allow for maintenance and to dissipate energy from the surface inflow prior to discharging to the wetland or vegetated swale system. Where feasible a sub-drain system may be utilized underneath the pre-treatment basin.

2. Subsurface Detention Facility – A tank with approximate dimensions of 150' x 60' x 3' would provide about 27,000 ft³ (0.62 ac-ft) of storage. This size tank would provide ample storage for dry season water drawn from the Los Angeles River as well as flow rate attenuation from sub-areas 1B and 1C, as shown on Exhibit 3, during the rainy season.

3. Constructed Wetland – The primary wetland as depicted can provide about 65,000 ft³ (1.5 ac-ft) of storage. This wetland configuration provides an approximate length to width ratio of 3.4 which exceeds the recommended minimum of 1.5. As shown on Exhibit 3 after runoff passes through the primary treatment area the wetland takes on a more linear shape and provides 500-feet of additional length.

Based on the natural ecosystem characteristics of wetland, riparian and upland habitats of Southern California, the following habitat regions for the constructed wetland are proposed: Open Water Habitat, Marsh Habitat, Riparian Transitional Habitat, and Upland Habitat. Each habitat region is described below:

- a) **Open Water Habitats** include the forebay and all channels and deep pools. Water depth should be up to 4 feet in channels and up to 6 feet in the forebay and pools. Water depths greater than 3 to 4 feet may be required to reduce the proliferation of emergent vegetation. A water depth greater than 5 feet in some Open Water habitat throughout the wetland system is important because deep water zones:
- Promote downstream flow by mixing and redistributing water flowing from marsh areas where short-circuiting may occur,
 - Enhance wind-driven oxygenation of water,
 - Limit the area in the wetland colonized by emergent vegetation,
 - Provide a sump for particulate matter, and
 - Create conditions that are less conducive for mosquito production (UC ANR 2003).

Wind disturbance at the water surface in Open Water areas can disrupt mosquito egg laying and can drown immature mosquitoes. Open Water zones also enhance predation by mosquito fish (*Gambusia affinis*) and other fauna on mosquito larvae and pupae (UC ANR 2003). Furthermore, deep water areas promote the development of anaerobic conditions in wetland sediments, which is essential for sequestration of heavy metals. Anaerobic areas are critical for denitrification (conversion of nitrate to nitrogen gas), which is the most important mechanism for the permanent removal of nitrogen (Reddy et al 1989).

- b) **Marsh habitat** is permanently inundated with water at depths of approximately 0.5 to 3 feet. The marsh habitat is the primary region where the water column interacts with the sediments, biota (algae, macrophytes, bacteria, fungi), and the water/air interface. Mechanisms of water treatment in this habitat include settling and filtration of suspended matter, volatilization of compounds, adsorption and desorption of compounds from particles, biological uptake and transformation, and photolysis of pathogens.
- c) **Riparian habitats** are transitional areas between terrestrial and aquatic ecosystems that have a high water table and are subject to periodic flooding (USEPA 2001, NRC 2002). Riparian habitat occurs around the perimeter of the proposed wetland.
- d) The **Upland habitat** occurs above the riparian habitat and outside of the wetland footprint. Many of the characteristic vegetation species of upland habitat are trees that can grow to large sizes with correspondingly large root zones. The upland habitat areas will likely require some supplemental irrigation until established.

4. Vegetated Swales –A vegetated swale system with a bottom width of 10-feet, side slopes of 5:1, a longitudinal slope of 1%, and an assumed Manning’s coefficient of 0.025 will provide conveyance and treatment. A swale that fits these design criteria should maintain velocities below 3 fps and depths below 5-inches which meet the CASQA recommendations. Vegetated swales are effective in reducing flow velocities, promoting infiltration, and allowing particulates to attach to vegetation or other suspended solids.

5. Sub-surface Detention/Retention Basin – It is yet to be determined if the basins located within the project will be detention basins, retention basins, or a combination. Retention/Infiltration basins are more effective BMPs than detention, but the infiltration potential of the site can not be determined at this time; therefore, we shall assume that they would be detention facilities. The detention facility underneath the driving range has an approximate footprint of 2.7-acres and a depth of 3-feet, providing +-350,000 ft³ (8.0 acre-ft) of storage. The subsurface driving range detention facility will also allow the reuse of detained water for irrigation purposes. See Section L for further discussion

on water reuse. The second detention facility located adjacent to the wet pond could have an approximate footprint of 250' x 120' x 1', providing +30,000 ft³ (0.7 ac-ft) of storage.

6. Wet Pond – The permanent pond area could be of any configuration but should provide approximately 11,000 ft² of surface area with an additional 1-foot of storage, thus providing 11,000 ft³ (0.25 ac-ft) of storage. The permanent pond depth should be at least 6-feet in order to provide adequate habitat that was discussed in previous sections. The wet pond located downstream of the constructed wetlands offers some of the same advantages listed under the Open Water habitat section of the Constructed Wetland.

All treatment areas will be separated from public viewing areas with fencing or appropriate planting in order to prevent contact with surface water as well as to prevent habitat degradation.

H. WATER QUALITY IMPROVEMENT ASSESSMENT

The treatment train approach proposed for the Natural Park will be effective in removing different types of pollutants. Efficiencies for each BMP will vary depending on its location within the treatment train. Efficiencies should not be added together in the treatment train; however some BMPs provide redundancy to improve the overall water quality. Below is a table of individual BMP's efficiencies.

Table 1 – BMP Efficiencies

	Targeted Pollutants						
	Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics
BMP Type	Efficiency						
Constructed Wetlands	H	M	H	H	H	H	H
Extended Detention Basin	M	L	H	M	M	M	M
Infiltration Basin	H	H	H	H	H	H	H
Vegetated Swale	M	L	L	M	L	M	M

H = high, M = medium, L = low

The Pollutant Load Removal table below presents removal estimates as calculated by the City of Los Angeles BMP Planning Application for a wetland BMP with pre-treatment and summarizes anticipated pollutant removal efficiencies for the constructed wetland BMP. The removal rates utilized by the BMP Planning Application are from published values from the Caltrans BMP Retrofit Pilot Program, the U.S. EPA, and the Center for Watershed Protection, and the American Society of Civil Engineers. Most of the removal data were taken from the references used in the Planning Application. In the cases where the City's Planning Application did not provide a reference for percent removal of a pollutant, values were taken from the Ballona Freshwater Marsh Annual Monitoring Report – Year 4 (Section 8.4.2) based on its similarity in runoff quality and function. Removal in the table is in pounds (lbs) unless specified otherwise.

Table 2 - Pollutant Load Removal

Constituent	Influent Load (lbs)	Total Removed (lbs)	Effluent Total (lbs)	Percent Removal
Total Petroleum Hydrocarbons	0.15	0	0.15	0%
Total Coliforms*	399088	299317	99771	75%
Fecal Coliforms*	245756	184317	61439	75%
Fecal Enterococcus*	124970	93728	31242	75%
Total Suspended Solids	10318	9930	388	96%
Oil & Grease	153.33	153.33	0	100% ¹
Total Aluminum	164.42	65.77	98.65	40%
Total Cadmium	0.02	0.01	0.01	50%
Total Copper	2.49	1.25	1.24	50%
Total Lead	1.27	0.76	0.51	60%
Total Mercury	0.06 ug/L	0	0.03 ug/L	50% ²
Total Nickel	0.53	0.21	0.32	40%
Total Zinc	21.1	10.55	10.55	50%
Dissolved Copper	1.23	0.43	0.80	35% ²
Dissolved Lead	1.22 ug/L	0	0.52 ug/L	57% ²
Dissolved Zinc	12.97	6.61	6.36	51% ²
Nitrate as Nitrogen	71.2	29.19	42.01	41% ²
Total Kjeldahl Nitrogen	291.2	34.94	256.26	12% ²
Total Phosphorous	0.32 mg/L	0	0.21 mg/L	34% ²

* = MPN

1 = Hydrodynamic separator unit

2 = Ballona Freshwater Marsh

Based on the expected removal efficiencies listed, a significant water quality improvement could be anticipated to the urban runoff being diverted to and treated at the site, as well as to the diverted flow from the Los Angeles River.

I. WATER BALANCE

Since the project includes a wetland system; pool and channel water depths must be sustained throughout the year. Therefore a concept-level analysis was completed to determine the annual balance of water in the system. The potential evapotranspiration rate is assumed to equal 85% of the pan evaporation rate. The pan evaporation rate data was estimated for the Los Angeles airport using a form of the Penman equation (Source:http://www.ocs.oregonstate.edu/page_links/comparative_climate/California/california.html). Assuming an average monthly pan evaporation rate during the dry season of 6.8-inches we arrive at an average monthly evapotranspiration of 5.8-inches. Approximately 80,000 gallons/month (2,700 gpd) during the dry season would need to be drawn from the Los Angeles River to replace water lost purely to evapotranspiration. More precise percolation tests along with other soil testing must be completed prior to design in order to confirm loss due to infiltration. For planning purposes it can be

assumed that up to 4,000 – 5,000 gpd may need to be drawn from the Los Angeles River during the dry season to maintain the appropriate water requirements of the created habitat.

J. POTENTIAL HABITAT CREATION

During the design phase, Upland, Riparian and Wetland Planting Plans will be prepared that will address the specific species to be planted in each of the habitat areas of the project. Subsequent phases will require monitoring and possible replacement planting during the establishment period, as well as potential supplemental irrigation. The lists below provide a range of potential plant species that could be used. The targeted vegetation listed below has been compiled from similar types of projects in Southern California.

Table 3 - Targeted Vegetation

Species	Growth Form	Wetland Indicator
Open Water		
Water Cress <i>Rorippa nasturtium-aquaticum</i>	Perennial herb (aquatic)	OBL
Water Plantain <i>Alisma plantago-aquatica</i>	Perennial herb (aquatic)	OBL
Duckweed <i>Lemna minor</i>	Perennial herb	OBL
Marsh		
Santa Barbara Sedge <i>Carex barbarae</i>	Perennial herb	FACW
San Diego Sedge <i>Carex spissa</i>	Perennial herb	FAC
Common Rush <i>Juncus patens</i>	Perennial herb	FAC
Irisleaf Rush <i>Juncus xiphioides</i>	Perennial herb	OBL
Mexican Rush <i>Juncus mexicanus</i>	Perennial herb	FACW
California Tule <i>Scirpus californicus</i>	Perennial herb	OBL
Hardstem Bulrush <i>Scirpus acutus var. occidentalis</i>	Perennial herb	OBL
Big Bulrush <i>Scirpus robustus</i>	Perennial herb	OBL
Arrow Weed <i>Pluchea sericea</i>	Shrub	FACW
Smooth Flatsedge <i>Cyperus laevigatus</i>	Perennial herb	FACW+
Black Flatsedge <i>Cyperus niger</i>	Perennial herb	FACW+
Common Spikerush <i>Eleocharis macrostachya</i>	Perennial herb	OBL
California Sunflower <i>Helianthus californicus</i>	Perennial herb	OBL

Table 3 - Targeted Vegetation

Species	Growth Form	Wetland Indicator
Wild Mint <i>Mentha arvensis</i>	Perennial herb	FACW
Meadow Barley <i>Hordeus brachyantherum</i>	Perennial herb	FACW
Spike Bentgrass <i>Agrostis exarata</i>	Perennial herb	FACW
Water Foxtail <i>Alopecurus aequalis</i>	Perennial herb	OBL
Riparian		
Arroyo Willow <i>Salix lasiolepis</i>	Tree, Shrub	FACW
Sand Bar Willow <i>Salix exigua</i>	Tree, Shrub	FACW
Red Willow <i>Salix laevigata</i>	Tree, Shrub	FACW+
White Alder <i>Alnus rhombifolia</i>	Tree	FACW
Blue Elderberry <i>Sambucus mexicana</i>	Shrub	FACU
Red Twig Dogwood <i>Cornus sericea occidentalis</i>	Shrub	FACW
California Rose <i>Rosa californica</i>	Shrub	FAC+
California Blackberry <i>Rubus ursinus</i>	Vine, Shrub	FAC+
Mulefat <i>Baccharis salicifolia</i>	Shrub	FACW
Riparian Woodland		
California Sycamore <i>Platanus racemosa</i>	Tree	FACW
Velvet Ash <i>Fraxinus velutina</i>	Tree	FACW
Black Cottonwood <i>Populus balsamifera ssp. trichocarpa</i>	Tree	FACW
Box Elder <i>Acer negundo var. californicum</i>	Tree	FACW
Upland		
California Black Walnut <i>Juglans californica</i>	Tree	FAC
Fremont Cottonwood <i>Populus fremontii</i>	Tree	FAC+
Bigleaf Maple <i>Acer macrophyllum</i>	Tree	FAC
California Laurel <i>Umbellularia californica</i>	Tree	FAC
Spreading Gooseberry <i>Ribes divaricatum</i>	Shrub	FACW
Coast Live Oak <i>Quercus agrifolia</i>	Tree	NL
Interior Live Oak <i>Quercus wislizeni</i>	Tree	NL

Table 3 - Targeted Vegetation

Species	Growth Form	Wetland Indicator
Valley Oak <i>Quercus lobata</i>	Tree	FACU
Black Sage <i>Salvia mellifera</i>	Shrub	NL
Purple Sage <i>Salvia leucophylla</i>	Shrub	NL
Coyote Bush <i>Baccharis pilularis</i>	Shrub	NL
Blue Wildrye <i>Elymus glaucus</i>	Grass	FACU

Wetland Indicator:

OBL: Obligate Wetland - occurs almost always under natural wetland conditions.

FACW: Facultative Wetland - usually occurs in wetlands, but occasionally found in non-wetlands.

FAC: Facultative - equally likely to occur in wetlands and non-wetlands.

FACU: Facultative Upland - usually occurs in non-wetlands, but occasionally found in wetlands.

UPL: Obligate Wetland - occur in wetlands in another region, but occur almost always under natural conditions in non-wetlands in the region specified.

NL: Not Listed - always occurs in non-wetlands.

Dense planting of certain species relative to others, at certain locations, may be desirable in the final design and therefore affect cost. For example, strategic planting of California rose along pathways provides a spreading and dense thorny habitat that can provide a natural barrier to human intrusion in lieu of fences. Coyote bush, a species with lower water consumption requirements than California rose, could also provide such a natural barrier if kept pruned as a hedge to maintain public views of the wetlands and open water. Further detailed site and habitat planning and design, as well as soil and light analysis, is required to determine specific plant locations and combinations.

K. SOLAR POWER POTENTIAL

The project site proposes to strive toward a goal of grid neutrality, which means that throughout the entire year the site would use on-site solar panels to generate enough electricity and give it back to the grid to offset the site's annual power usage. Utilizing solar panel shade structures over parking stalls, conventional roof panels on top of the clubhouse and driving range tee area, and conventional solar panels placed along the slope adjacent to the river, the site could provide approximately 37,000 ft² of solar panel coverage. Assuming average sun exposure and generation rates the site could generate approximately 1500 kWh/day or 550 mWh/year. Due to weather patterns and the solar cycle solar generation is not constant throughout the year, which is why grid neutrality is evaluated on a yearly basis. The table below indicates the potential electricity generated by the site throughout the year as well as the electricity savings and/or costs associated with generating electricity for the grid.

Table 4 - Potential Solar Generation

*assumed electricity cost = \$0.119/kWh			
	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value
Jan	3.93	31,586	\$3,804.24
Feb	4.60	33,992	\$4,059.32
Mar	5.63	45,803	\$5,469.79
Apr	6.38	49,477	\$5,908.54
May	7.05	56,368	\$6,731.47
Jun	7.19	54,710	\$6,533.47
Jul	7.09	55,137	\$6,584.46
Aug	6.94	53,596	\$6,400.43
Sep	6.11	45,691	\$5,456.42
Oct	4.96	39,121	\$4,671.83
Nov	4.31	33,623	\$4,015.26
Dec	3.66	29,529	\$3,526.35
Yearly total	5.66	548,904	\$63,161.72

The site proposes to use electricity for:

- driving range, tennis court and parking lot lighting
- clubhouse amenities
- multiple storm water pump stations for runoff delivery
- re-circulation and application of stored water
- site lighting and irrigation

Based on these typical uses we can estimate that the project site will need approximately 550 to 730 mWh/year of electricity. The programming for the site including the driving range and tennis courts hours of operation would have the largest effect on the electricity demands due to the necessary lighting. Future planning phases of the project would need

to develop the site programming further in order to progress towards the project goal of grid neutrality. However, based on the estimates included in this memorandum it can be concluded that grid neutrality is possible. Installation of energy-saving lighting and other energy conservation measures can further reduce electrical demand.

L. URBAN RUNOFF REUSE POTENTIAL

The subsurface detention under the driving range proposes to detain approximately 2.6 MG of runoff. In order to advance toward the project's goal of potable irrigation water independence, a portion of the driving range detention could be set aside for storage and treatment of runoff for reuse as irrigation water. A more detailed analysis is required to determine the size of the reuse storage based on expected irrigation demands for the project. However, for planning purposes we can assume that the reuse storage would be half of the total driving range detention, 1.3 MG. Recirculation pumps would be required to circulate the stored water to enhance the quality and reduce the potential for stagnation and odor issues. The pump outputs would be directly related to the overall storage volume and should be sized to recirculate the entire volume in a 48-hour period. The recirculation system would also include a disinfection component that would lessen the chance of bacteria and virus problems as well as vector issues. The circulation pumps would generally operate continually unless the reuse tank is empty, in which case a low level signal could turn the pumps off.

The irrigation distribution system would be a packaged booster irrigation system with a hydro-pneumatic tank.

Storm water reuse for irrigation is relatively new to the Southern California area and all of the issues associated with this reuse have not been completely addressed yet. Some of the issues include:

- Determining whether the water should be treated to Title 22 standards¹
- If not to Title 22 standards, what level of treatment is adequate?
- What water quality testing procedures are needed?
- How often should the influent and effluent be tested and monitored?

Under the current regulatory setting it is recommended that the reuse irrigation water only be applied in landscape areas using either drip irrigation systems or sub-surface distribution systems. Areas that need spray irrigation application may need to utilize potable water for irrigation until some of the issues associated with storm water reuse have been evaluated.

¹ Title 22 of the Official California Code of Regulations (also known as the Health and Safety Code)

M. COST ANALYSIS

A concept level engineer's estimate of probable construction costs was prepared based on projects of similar size and scope.

Table 5 – Cost Estimate

Description	Total
Site Demolition	\$250,000
Earthwork	\$1,600,000
Diversion, Collection & Pump Works	\$2,380,000
Surface Inflow, Normal Dry Conveyance & Outfalls	\$120,000
Subsurface Detention	\$200,000
Sub-Surface Driving Range Detention ¹	\$865,000
Wetland, Wet Pond & Habitat Creation	\$770,000
Upland landscaping and park elements	\$1,900,000
Re-use water treatment & irrigation	\$350,000
Public Access & Off-site Trails	\$50,000
Solar panels and equipment	\$2,000,000
Sub-Total (1)	\$10,485,000
Estimating Contingency - 30% of Subtotal (1)	\$3,145,500
Subtotal (2)	\$13,630,500
Mobilization - 7% of Subtotal (2)	\$954,135
Permits - 2% of Subtotal (2)	\$272,610
Allowances - 5% of Subtotal (2)	\$681,525
Subtotal (3)	\$15,538,770
Construction Contingency - 10% of Subtotal (3)	\$1,553,877
Cost to Construct	\$17,092,647

¹Earthwork for tank included in separate line item

N. ADDITIONAL INVESTIGATION

A geotechnical analysis or investigation must be completed for the project site in order to identify the expected percolation rates, pH levels, corrosion potential, etc. of on-site soil, as well as overall performance expectations for a constructed wetland. Approximately \$60,000 should be anticipated for preliminary geotechnical investigations and analysis. An historical environmental review of the area should be completed in order to identify appropriate habitats to be created in the natural park. Migratory bird patterns as well as existing nearby regional habitat connectivity should also be investigated. Comprehensive survey data also must be collected for the project site as well as potential tributary areas located upstream of the site. Further analysis of the area north of Moorpark Avenue could be completed with additional topographic information. Approximately \$30,000

should be anticipated for these additional survey investigations. Depending on the outcome of such an analysis, additional runoff from this area could also potentially be captured and treated by the project site, providing additional water quality improvement benefits.

O. NEXT STEPS

A Preliminary Design Report (PDR) should be prepared for the project. The PDR would include detailed data collection such as site reconnaissance, boundary mapping and utility base mapping. Permit requirements will be reviewed and preliminary investigations regarding necessary environmental compliance would be completed. Further review, validation, and updates of the concepts set forth in this document would also be included. The PDR would include design and planning coordination for public day use, public access, recreational facilities, trail/path connections, solar capabilities, coordination with public agencies (Santa Monica Mountains Conservancy, City of Los Angeles, County of Los Angeles, U.S. Army Corps of Engineers, California Department of Fish & Game), regional community planning workshops, and public outreach. The PDR budget should range from \$300,000 to \$450,000 depending on the levels of detailed field investigation and outreach required.

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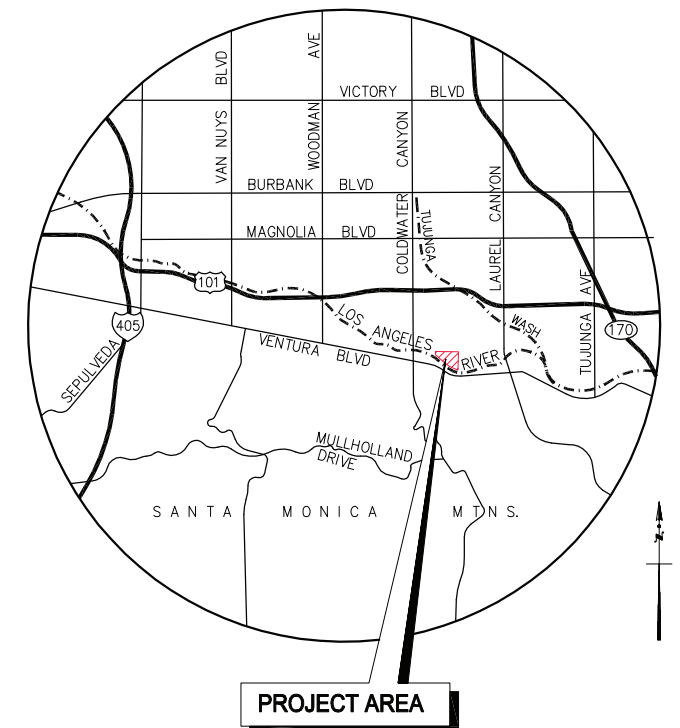
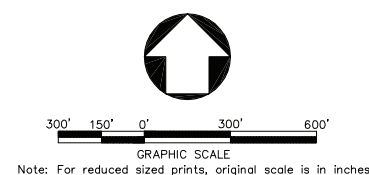
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- LEGEND**
- TRIBUTARY AREA
 - EXISTING CATCH BASIN
 - SUB-AREA
 - SUB-AREA ACREAGE
 - INTERCEPTION IDENTIFIED FOR TREATMENT VIA PUMP STATION
 - INTERCEPTION IDENTIFIED FOR TREATMENT
 - INTERCEPTION IDENTIFIED FOR TREATMENT VIA LOCAL STORM DRAIN ADDITION

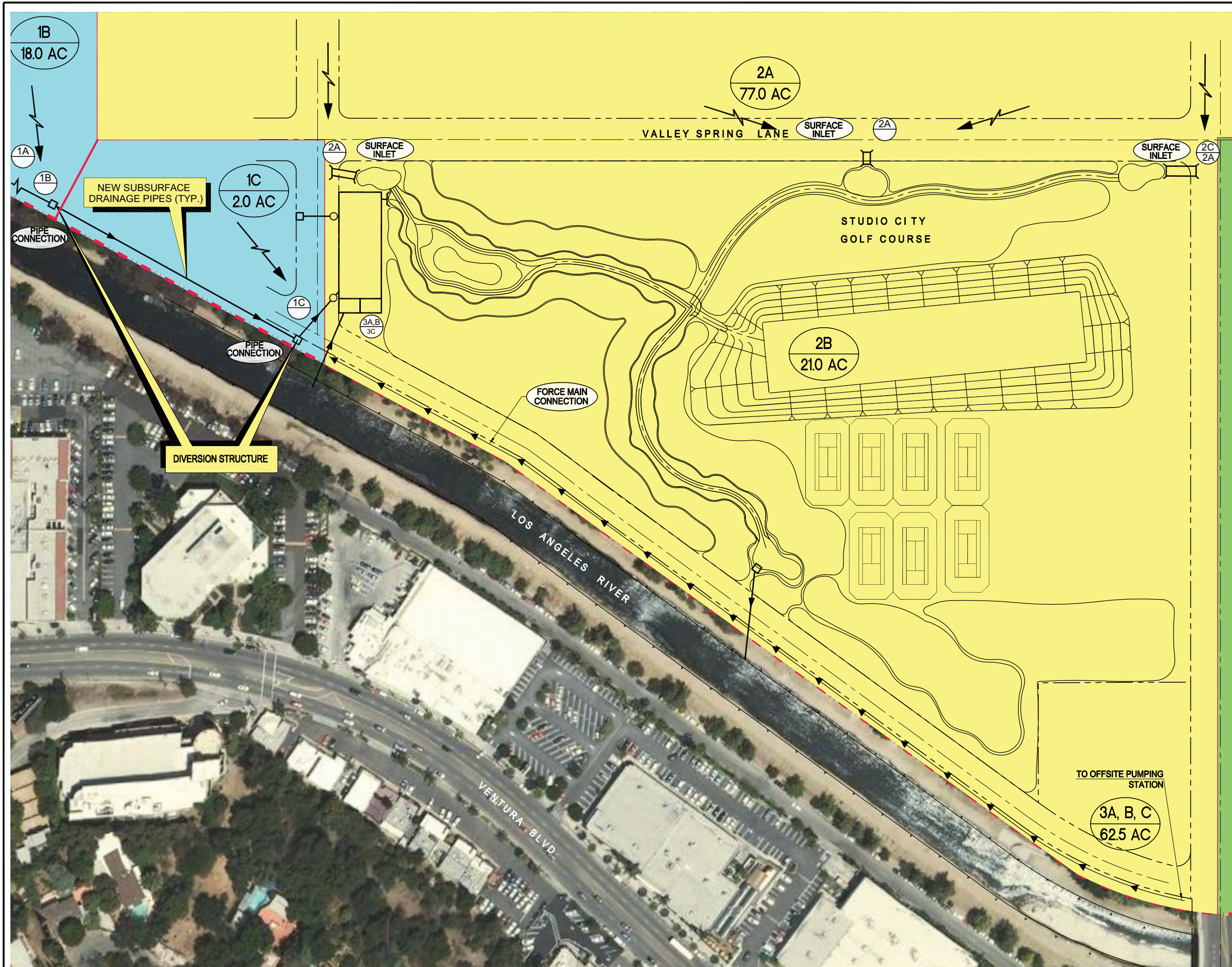
Exhibit 1 Tributary Sub-Watershed Treatment Area Exhibit Los Angeles River, Natural Park Studio City, San Fernando Valley



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SHEET 4 OF 4
LARNP-05



LEGEND

- FLOW DIRECTION
- TRIBUTARY BASINS
- SURFACE INLET WILL INTERCEPT GUTTER FLOWS AND DIRECT THEM ONSITE FOR TREATMENT UNTIL TREATMENT VOLUME IS CAPTURED. FLOWS IN EXCESS OF TREATMENT VOLUME WILL CONTINUE AS GUTTER FLOW.
- PIPE CONNECTIONS WILL INTERCEPT EXISTING RIVER INLETS AND DIVERT THESE FLOWS VIA SUBSURFACE PIPE NETWORK TO ONSITE DETENTION UNTIL TREATMENT VOLUME IS CAPTURED. FLOWS IN EXCESS OF TREATMENT VOLUME WILL CONTINUE TO EXISTING RIVER INLET.
- FORCE MAIN CONNECTIONS WILL OPERATE IN A SIMILAR FASHION AS PIPE CONNECTIONS, BUT WILL REQUIRE PUMPING TO DELIVER THE FLOWS TO THE SITE.

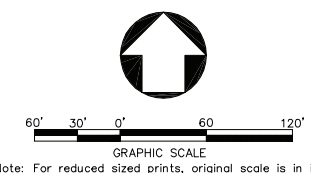


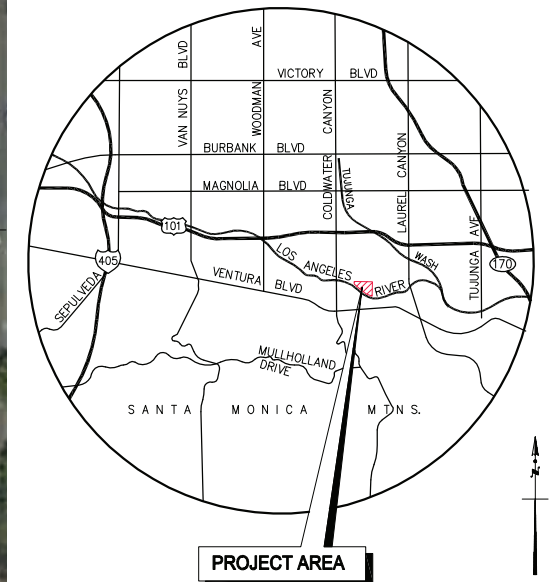
Exhibit 2 Site Catchment Locations Los Angeles River Natural Park; Studio City, San Fernando Valley



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SHEET 1 OF 1
LARNP-06



LEGEND

- OPEN WATER HABITAT
- MARSH HABITAT
- RIPARIAN TRANSITIONAL HABITAT
- VEGETATED SWALE / OVERFLOW BASIN
- OTHER HABITAT
- VEGETATED PRE-TREATMENT
- TRIBUTARY BASINS
- P - PARKING AREA
- PUBLIC ACCESS: PEDESTRIAN ENTRANCE



GRAPHIC SCALE
Note: For reduced sized prints, original scale is in inches

Exhibit 3
Site Schematic for:
Los Angeles River
Natural Park; Studio City,
San Fernando Valley



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DATE: 10/13/2009 REVISED ON: 4/5/10
JOB No: 1CC1010102 SHEET 1 OF 1

LARNP-04

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APPENDIX A

Runoff-Area-Volume Calculations

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RUNOFF-AREA-VOLUME CALCULATIONS

1CCI010102

Studio City Golf Course / Los Angeles River Park

15-Oct-09 cmoran/dbeck

rev Feb 22, 2010

Hydrology Map 1-H1.27**Soil Types** 15

16

Impervious Area 0.74 Assumed Mixed Multi Family Residential per Los Angeles County Hydrology Manual**Tc** 30 Min Assumed per Los Angeles County Hydrology Manual**Intensity (Ix)** 0.193 Per Los Angeles County SUSMP**Cu** 0.1 Per Los Angeles County Hydrology Manual

$$Vm = (0.75in) * [((At * impervious\%) * 0.9) + (At * pervious\%) * Cu] * (1ft/12in) * (43560sf/1ac)$$

Sub Area	Area (Ac.)	Vm (ft^3)	Vm (Ac-ft)
1A	16.50	31085.51	0.71
1B	18.00	33911.46	0.78
1C	2.00	3767.94	0.09
	36.50		
2A	77.00	145065.69	3.33
2B	21.00	39563.37	0.91
2C	5.50	10361.84	0.24
	103.50		
3A	4.50	8477.87	0.19
3B	26.00	48983.22	1.12
3C	32.00	60287.04	1.38
	62.50		

Min volume required

Total Area (Ac.)	202.50	381503.93	8.76
------------------	--------	-----------	------

	Max. Treatable Area (Ac.)	Vm provided (ft^3)	Vm provided (Ac-ft)
treatment volume provided by project	263.00	495484.11	11.37

Impervious Ia (Ac.)	Pervious Pa (Ac.)
------------------------	----------------------

12.21	4.29
13.32	4.68
1.48	0.52

56.98	20.02
15.54	5.46
4.07	1.43

3.33	1.17
19.24	6.76
23.68	8.32

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APPENDIX B

California Stormwater Quality Association Best Management Practices Reference

California Stormwater Quality Association (CASQA) Best Management Practices (BMPs) are techniques, measures or structural controls to manage and improve the quality of stormwater runoff.

Links to the CASQA BMPs referenced in this report are listed below:

Wet Ponds

<http://www.cabmphandbooks.com/Documents/Development/TC-20.pdf>

Infiltration Basin

<http://www.cabmphandbooks.com/Documents/Development/TC-11.pdf>

Extended Detention Basin

<http://www.cabmphandbooks.com/Documents/Development/TC-22.pdf>

Vegetated Swale

<http://www.cabmphandbooks.com/Documents/Development/TC-30.pdf>

Constructed Wetlands

<http://www.cabmphandbooks.com/Documents/Development/TC-21.pdf>



LOS ANGELES RIVER REGIONAL PUBLIC ACCESS FEASIBILITY ANALYSIS

STUDIO CITY, SAN FERNANDO VALLEY

PREPARED FOR:



FUNDED BY:

SANTA MONICA MOUNTAINS CONSERVANCY & SAVE L.A. RIVER OPEN SPACE

MIA LEHRER + ASSOCIATES
LANDSCAPE ARCHITECTURE

3780 WILSHIRE BOULEVARD, SUITE 250 LOS ANGELES, CA 90010
WWW.MLAGREEN.COM

SUMMARY

The Los Angeles River Natural Park site is located in Studio City, CA and has tremendous potential to become a multi-benefit, precedent-setting project with an emphasis on water quality improvements and regional public access to the Los Angeles River. Known as the Weddington Golf and Tennis facility, the 16-acres site abuts the Los Angeles River. A nearby public parking garage and improvements on the Los Angeles River trail are an integral part of the vision for the park, and have been incorporated into the definition of the project site.

This Los Angeles River Regional Public Access Feasibility Analysis evaluates the site's potential as a regional staging area and public access point for the Los Angeles River. This study identifies the river-related public access elements as well as the opportunity for connecting to existing and future bicycle networks to provide an opportunity for alternate methods of transportation. This study integrates the creation of regional public access with "Green Solution" water quality improvements and native habitat creation, as analyzed by Psomas, with planned improvements to the L.A. River and with links to a regional bicycle transportation network.

Detailed regional and site analysis led to findings that support this site's suitability as a Regional River Access Hub which offers ample public parking, easy access via public transportation or bicycle, a direct connection to the Los Angeles River and many other project benefits. The project furthers the goals of the Los Angeles River Revitalization Master Plan as well as the City of Los Angeles 2010 Bicycle Plan and other regional plans to encourage multi-modal transportation alternatives.

A regional public access concept plan was developed for the L.A. River Natural Park to include the following multiple benefits. Off-site parking at the existing Public Parking Garage 500 yards downstream will allow visitors to easily reach the site via a short walk along an improved L.A. River Trail, while bicycle rentals and other bicycle amenities at the parking garage will provide easy bicycle access to the river trail and encourage bicycle usage. Visitors will be greeted at the project site with a signature gateway that clearly marks the Park entry and a river-themed Visitor Information Center. Cantilevered river terraces will provide views of the L.A. River, while bicycle corral and trail entrances will lead visitors both to the L.A. River Trail and into the site's natural habitat environment. Interpretive kiosks, signage and pedestrian paths through the site will allow visitors to experience the site's natural, habitat-oriented water quality improvement features. Signage and way finding will ensure a friendly and safe experience for visitors.

The public parking garage will be improved to be clearly visible and accessible from both Ventura Boulevard and the L.A. River, and the L.A. River Trail will be extended from the garage to Coldwater Canyon. A new pedestrian bridge crossing the L.A. River from the site will connect the L.A. River Natural Park to Ventura Boulevard and its many visitor-serving amenities.

As this Regional Public Access Feasibility Analysis demonstrates, the features and conditions existing at the Los Angeles River Natural Park site make it an ideal location for a regional hub and trailhead providing public access for people throughout the region to the Los Angeles River and its tributaries, as well as an ideal location for linking to regional bicycle networks.

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PROJECT DESCRIPTION

NEED FOR REGIONAL PUBLIC ACCESS TO THE L.A. RIVER

The L.A. River Natural Park is a grand opportunity to provide a much needed regional gateway to the L.A. River. The lack of other such gateways has created a vast disconnect between the L.A. River and the City. This site has a unique potential to fill in that gap through a variety of different ways. Its close proximity to the public parking garage/bicycle hub, connections to numerous bus and Metro lines provides easy accessibility for its visitors. It will also have a positive impact on the environment by its capacity to naturally capture and clean polluted runoff and improve water quality in the L.A. River.

The Los Angeles River Natural Park is an opportunity to create a precedent-setting "smart", multi-benefit, river-oriented park on this last remaining, unprotected open space along the L.A. River in the San Fernando Valley. It includes development of regional public access to the L.A. River, riverfront preservation, water quality improvement, recreational opportunities and linkage to both public transit and regional bicycle transportation networks.

The project includes the 16-acre L.A. River Natural Park site in Studio City, a nearby public parking garage, and trail improvements along the L.A. River from the parking garage to Coldwater Canyon Blvd.

This report evaluates the feasibility of using the L.A. River Natural Park as a regional public access hub for the L.A. River. A site analysis was undertaken that looked at the site in its regional and local contexts and examined existing conditions and qualities of the site as well as opportunities and constraints. The regional analysis included the site's relationship to existing open space, public transit, City and County public transportation corridors, the City and County bicycle and trail networks, including both existing and proposed routes, adjacent zoning and amenities, issues with neighborhood compatibilities, the L.A. River Revitalization Master Plan and the L.A. River watershed, water quality and habitat. Prior studies were also consulted, including BlueGreen's Vision and Concept Design study and analysis and recommendations developed by Psomas' Hydrology, Hydraulic & Water Quality Components technical memorandum.

The L.A. River Natural Park integrates the creation of regional public access and a staging area for the L.A. River in the San Fernando Valley with the L.A. River Trail, important water quality improvements, habitat restoration, open space protection, active recreation (tennis & golf) and links to a regional bicycle transportation network. The project site would provide regional public access to the L.A. River for communities throughout the Valley and beyond, connect to upstream and downstream existing and planned river parks and trails, provide a centralized bicycle staging area and help to fulfill the goals of the City of Los Angeles L.A. River Revitalization Master Plan & recently-approved L.A. 2010 Bicycle Plan. The riverfront location for the project site would be maximized, would link to the existing L.A. River Trail system, expand regional transportation opportunities, provide a regional bicycle hub, and emphasize education about the L.A. River, the L.A. River watershed, water quality and habitat.

The increase in vehicular use in Los Angeles - an increase of 6500% since 1950 - correlates to urban sprawl, obesity, impersonal communities and increased greenhouse gas emissions, according to the Metropolitan Transportation Authority (Metro). Metro is engaged in an L.A. County mission-shift and is promoting alternative forms of travel as a strategy for congestion relief and climate protection. Recent relevant legislative and policy changes include:

- The Intermodal Surface Transportation Efficiency Act of 1991 that established funding and encouraged multiple modes of transportation, including bicycles and pedestrians
- California Complete Streets Act of 2008 (AB 1358), that requires that transportation facilities must be designed, planned, operated, and maintained for all users: bicyclists, pedestrians, transit vehicles and motorists
- U.S. Department of Transportation Policy on Bicycle and Pedestrian Accommodation 2010, which requires transportation agencies to plan, fund and implement improvements to walking and bicycling networks, including linkages to transit
- SB 375, Redesigning Communities to Reduce Greenhouse Gases 2009, which sets emission-reducing goals to support the development of sustainable communities.

The development of the L.A. River Natural Park site as an access point to the L.A. River and a hub that links trails and bicycle networks supports local and state efforts to promote alternative forms of movement, maximize mobility and build healthy communities.

There is a need for regional access to the L.A. River. As this feasibility analysis demonstrated, features and conditions exist in the proposed L.A. River Natural Park site that make it ideal for a regional hub and trailhead for public access to the L.A. River and its tributaries.

THE REGIONAL CONTEXT

THE L.A. RIVER

The Los Angeles River flows approximately 51 miles from its origin in the San Fernando Valley to Long Beach Harbor and the Pacific Ocean. The L.A. River runs east/southeast for 22 miles through the San Fernando Valley in the City of Los Angeles, along the cities of Burbank and Glendale, and then heads southward, flowing through the cities of Vernon, Commerce, Maywood, Bell, Bell Gardens, South Gate, Lynwood, Compton, Paramount, Carson, and Long Beach, where it enters San Pedro Bay.

THE L.A. RIVER IN THE SAN FERNANDO VALLEY

The L.A. River is a regional asset because it flows through many communities on its way through the Valley to San Pedro Bay. The river's headwaters are in Canoga Park at the confluence of Bell and Calabasas Creeks. It then flows through Reseda-West Van Nuys, Encino, and Tarzana, and through the Sepulveda Dam Recreational Area and Flood Control Basin. It continues through Van Nuys, Sherman Oaks, and Studio City, and then along the southern border of the City of Burbank and the northern border of Griffith Park, and through Elysian Valley, Lincoln Heights, Boyle Heights, and Downtown before flowing out of the City of Los Angeles.

Key tributaries of the L.A. River that include existing or renewed trail systems in the San Fernando Valley and in immediately adjacent areas include the Tujunga Wash, Pacoima Wash and the Arroyo Seco.

See Figure 1: Regional Context

Regional Bikeway Network

The L.A. River Natural Park, and the L.A. River Trail and Public Parking Garage that connect to the site, are located contiguous to a diversity of bicycle-friendly streets, lanes, paths, routes and transit stations as identified in the City of Los Angeles' 2010 Bicycle Plan. The 2010 Bicycle Plan identifies a network of 1,633 miles of continuous bikeways throughout the city, which will provide bicycle-friendly access to parks, schools, commercial areas and other key visitor destinations. The bike network will be comprised of off-street paths, routes, bicycle lanes and bicycle-friendly streets. As called for in the L.A. River Revitalization Master Plan, a continuous bicycle path will be installed along the south/west sides of the L.A. River. The L.A. River Natural Park has a bus stop and is near a number of bus lines.

In the area surrounding the project site, the 2010 Bicycle Plan identifies Laurel Canyon Blvd., Ventura Blvd., Valley Vista Blvd., Moorpark St., Riverside Dr., Colfax Ave., Tujunga Wash, Bellaire Ave., Hazeltine Ave., and the L.A. River Trails as part of either an existing regional bicycle network or segments to be improved or created.



VIEW OF LOS ANGELES RIVER FACING WEST
SOUTH SIDE OF THE LOS ANGELES RIVER ACROSS FROM PROJECT SITE



The L.A. River Natural Park Site provides a unique opportunity to provide regional public access to the L.A. River Greenway because it provides all of these amenities:

Regional Access

- Central location in San Fernando Valley
- Capacity for high-volume public use
- Existing visitor-serving infrastructure: roads, parking, cafes, restaurants

L.A. River Access

- L.A. Riverfront access
- Connects to developed 1.5 miles of L.A. River trail
- Pedestrian & bicycle-friendly access to L.A. River
- Existing river access road

Public Parking Access

- Existing public parking garage (391 spaces)
- 5-7 minute walk to site (400 yards)
- Potential for bike rental
- Existing pedestrian & bicycle friendly bridge to parking garage
- Existing ADA, bicycle friendly ramp connects garage to L.A. River trail

Bicycle Access

- Connects to City Bicycle Network
- Existing bicycle path on L.A. River Trail separate from street
- Capacity for bicycle amenities and bicycle staging area consistent with L.A. City Bicycle Plan

Transportation Access

- Close to two 101 freeway exits
- Major streets provide access
- 14 bus stops within a half mile

Legend

- L.A. River Natural Park, L.A. River Trail & Public Parking Garage
- L.A. River + Tributaries
- Freeways + Major Streets
- River Adjacent Parks

L.A. RIVER NATURAL PARK
Figure 1: Regional Context

THE PROJECT SITE

KEY ELEMENTS

The project site includes these three key elements:

- **A 16-acre L.A. Riverfront parcel site**
- **An adjacent 391-space public parking garage and bicycle hub**
- **L.A. River Trail connections and improvements**

The project site is a 16-acre parcel immediately adjacent to the L.A. River in Studio City between Whitsett Avenue and Coldwater Canyon Boulevard and is bordered on two sides by single family residential, on one side by multi-family residential and on one side by the L.A. River. Across the L.A. River are commercial/retail businesses along Ventura Blvd.

Currently privately-owned, the site has a 9-hole golf course, putting green, driving range, 16 tennis courts and club house and is utilized as a golf and regional tennis facility. The Los Angeles County Flood Control District owns and maintains the wide, unpaved rights-of-way along the L.A. River's edge along the property and across the river and the concrete flood channel.

A public parking garage owned by the City of Los Angeles is located 500 yards from the site, and is connected to the site via an existing L.A. River Trail and pedestrian bridge along a 1.5-mile stretch of improved river trail.

EXISTING CONDITIONS

LIMITED L.A. RIVER REGIONAL PUBLIC ACCESS IN THE SAN FERNANDO VALLEY

In the densely-developed San Fernando Valley, there are few places where the public can access the L.A. River. Throughout the Valley, buildings exist up to the river right-of-way for nearly the entire length of the river, severely limiting opportunities for high-capacity public access. Adequate parking is necessary to create a trailhead and regional staging area for trails along the L.A. River; currently there are no available large areas adjacent to the river for an appropriately-sized parking area.

While L.A. River access for a large number of people could potentially be established at the Sepulveda Basin Recreation Area, this stretch of the L.A. River is soft-bottom and is surrounded by important native habitat, making this site less than optimal for establishing a regional public access point.

Existing public access to the L.A. River in the Valley is largely along busy streets, with no improved crossings, parking or other visitor-serving amenities. Two public parks do front the L.A. River but do not have features that are key for the development of a regional hub. Bette Davis Picnic Area, part of Griffith Park and operated by the City of Los Angeles, is located in Glendale on the upstream end of the Glendale Narrows where Riverside Drive, Victory and Sonora meet, and is not conjoined with Griffith Park. It is small, unstaffed, has only limited on-street parking, and adjoins a walking/equestrian trail where bicycles are prohibited. It is 7.5 miles east of the proposed site of the L.A. River Natural Park in a residential neighborhood with limited amenities and visitor-related services, and along with Griffith Park, services a different geographic sector.

[See Figure 2: L.A. River Public Access Constraints](#)

PARKING AND VEHICULAR ACCESS TO THE SITE

There are six freeways in the Valley (Interstate 405, U.S. Route 101, State Route 118, State Route 170, Interstate 210, and Interstate 5). Of these, the 101 (Hollywood/Ventura Freeway), 405 (San Diego Freeway) and 170 (Hollywood Freeway) are within a short distance of the project site, and two freeway exits are within one mile of the site.

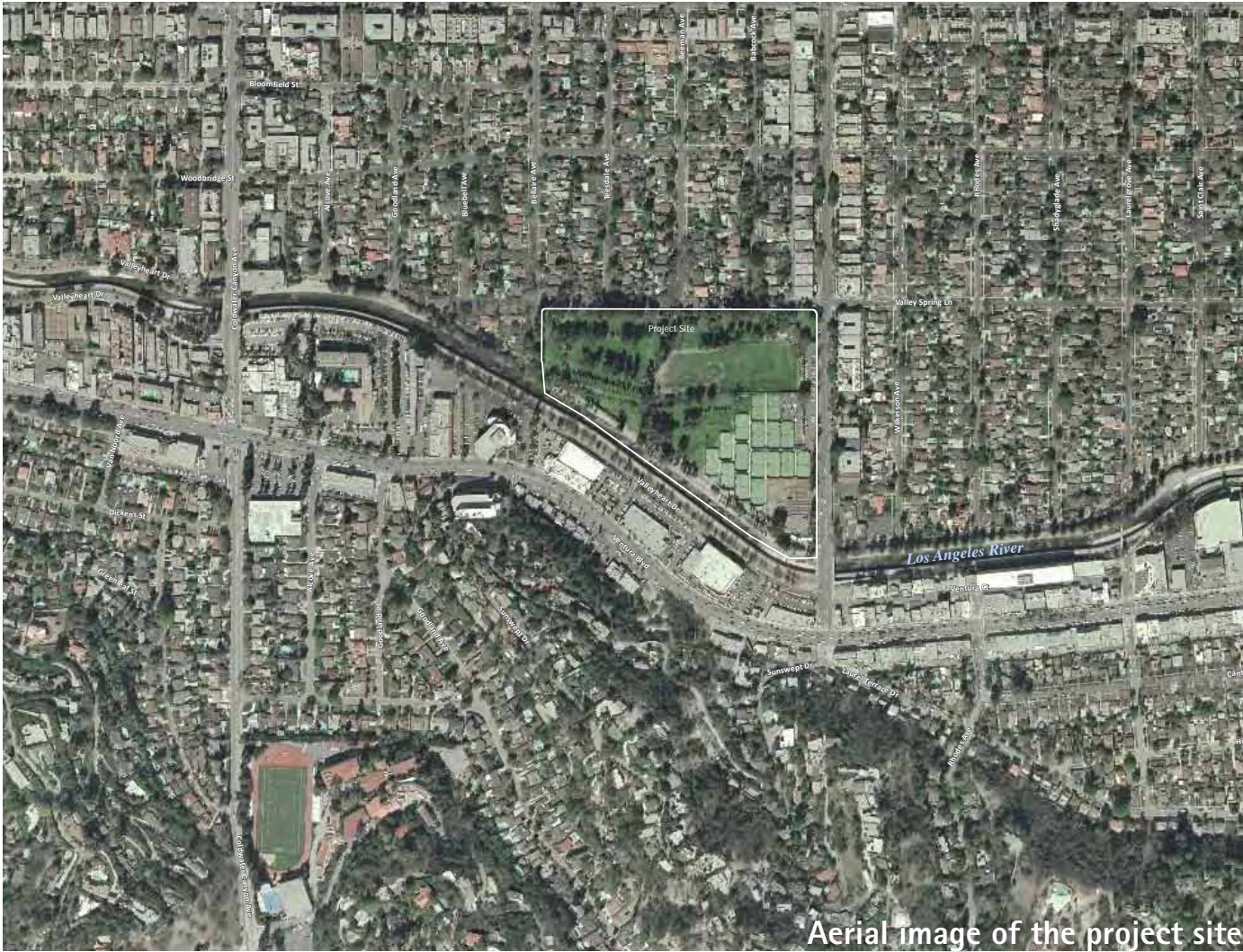
A public parking garage owned by the City of Los Angeles with parking for 391 vehicles is located 500 yards from the site, within easy walking distance, and is connected to the site via an existing L.A. River Trail and pedestrian bridge along a 1.5-mile stretch of improved river corridor. An existing trail is accessed from the rear of the parking structure via an ADA-compliant ramp that slopes down to the L.A. River trail.

Public Access Constraints Along
L.A. River in the San Fernando Valley

- Development to Edge of River
- Lack of Potential Space for Access Hub
- Lack of Potential Space for Parking
- Busy Streets
- River hidden from View
- Lack of Access to River
- Limited bicycle access
- Poor connectivity to bikeways
- No pedestrian/bicycle bridges

Public Access Constraints in
Existing L.A. River Adjacent parks

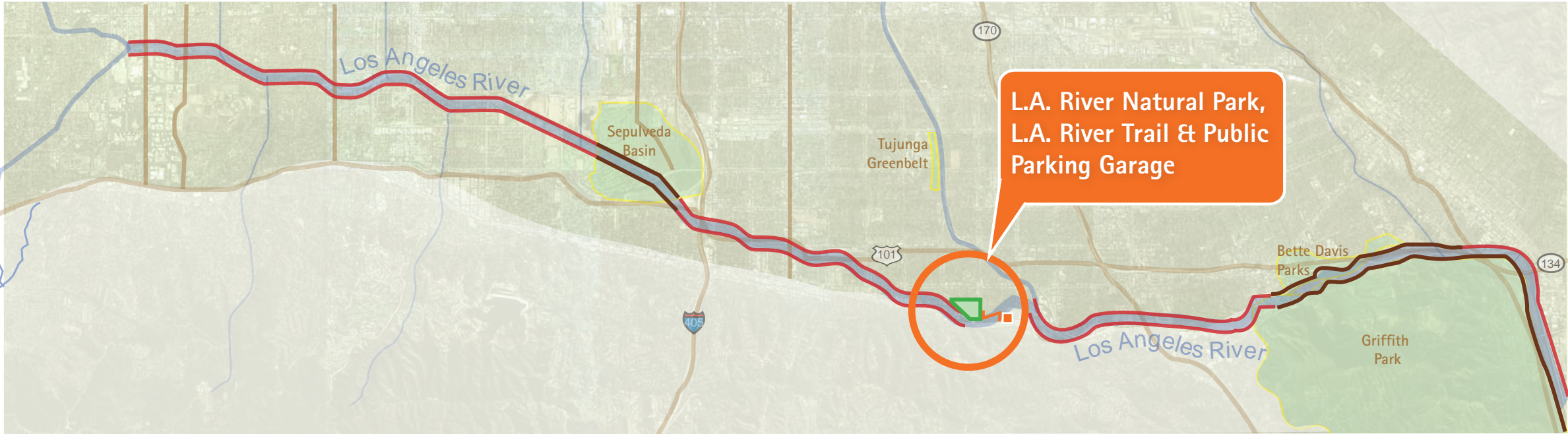
- Natural section of L.A. River
- Existing native habitat along L.A. River's edge
- Limited parking/ Parking not conveniently located
- Grade separation too great
- Freeway too close in some areas
- Limited capacity for high use public use



For 22 miles along the L.A. River in the San Fernando Valley, the L.A. River Natural park is the only area with elements of a public access hub including:

- Capacity for high-volume use
- Regional accessibility
- Ample public parking

Other areas along the L.A. River suffer from at least one of the built-out conditions outlined on this diagram.



L.A. RIVER NATURAL PARK

Figure 2: L.A. River Public Access Constraints

L.A. RIVER TRAIL ACCESS

The existing multi-purpose L.A. River Trail extends from Whitsett downstream for 1.5 miles to Laurel Canyon and is used by pedestrians and bicyclists. The western end of the trail terminates at the pedestrian bridge that crosses the Los Angeles River and connects to Valleyheart Drive on the north.

BICYCLE ACCESS

Bikeways and Bicycle Access

There is currently no bicycle access to the project site, and no river trail connecting to the project site. The existing multi-purpose L.A. River Trail described above is part of the citywide bicycle network, and is a segment of a planned 51-mile contiguous bicycle path along the L.A. River. The existing 1.5 mile trail provides a pleasant, bicycle-friendly path along the river, completely separated from surrounding streets. Bicyclists must dismount and walk across Laurelgrove Ave., Colfax Ave., Whitsett Ave., and Laurel Canyon Blvd. There are no crosswalks at these trail crossings, and the streets are very busy.

A bicycle-friendly, ADA compliant ramp is located at the rear of the parking garage. The ramp connects to a pedestrian/bicycle-only bridge, which crosses the L.A. River at Laurelgrove Ave. and connects to Valleyheart Dr. The parking garage & connection to the L.A. River are not visible from Ventura Blvd.

Bicycle lanes – painted lanes on existing streets – are located within one mile of the project site on Riverside Drive, and within two miles of the project site on Colfax Avenue and Chandler Blvd. A bicycle route along the MTA Orange Line exists within two miles of the site. No bicycle lanes or routes exist south of the site in the San Fernando Valley.

[See Figures 3-4: 3.5 Mile Radius Bicycle Network Study](#)
[5 Mile Radius Bicycle Network Study](#)

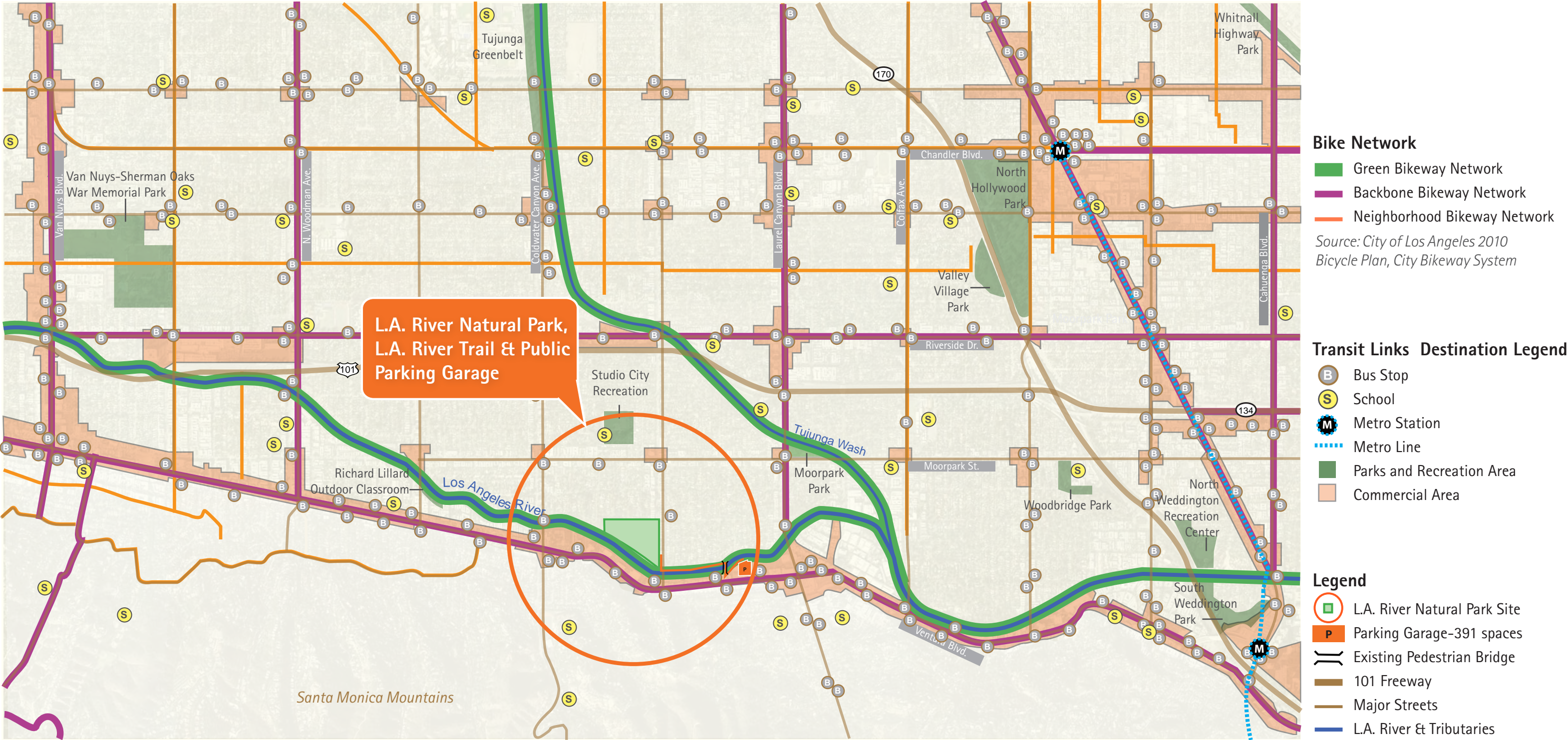
PUBLIC TRANSPORTATION AND PEDESTRIAN ACCESS

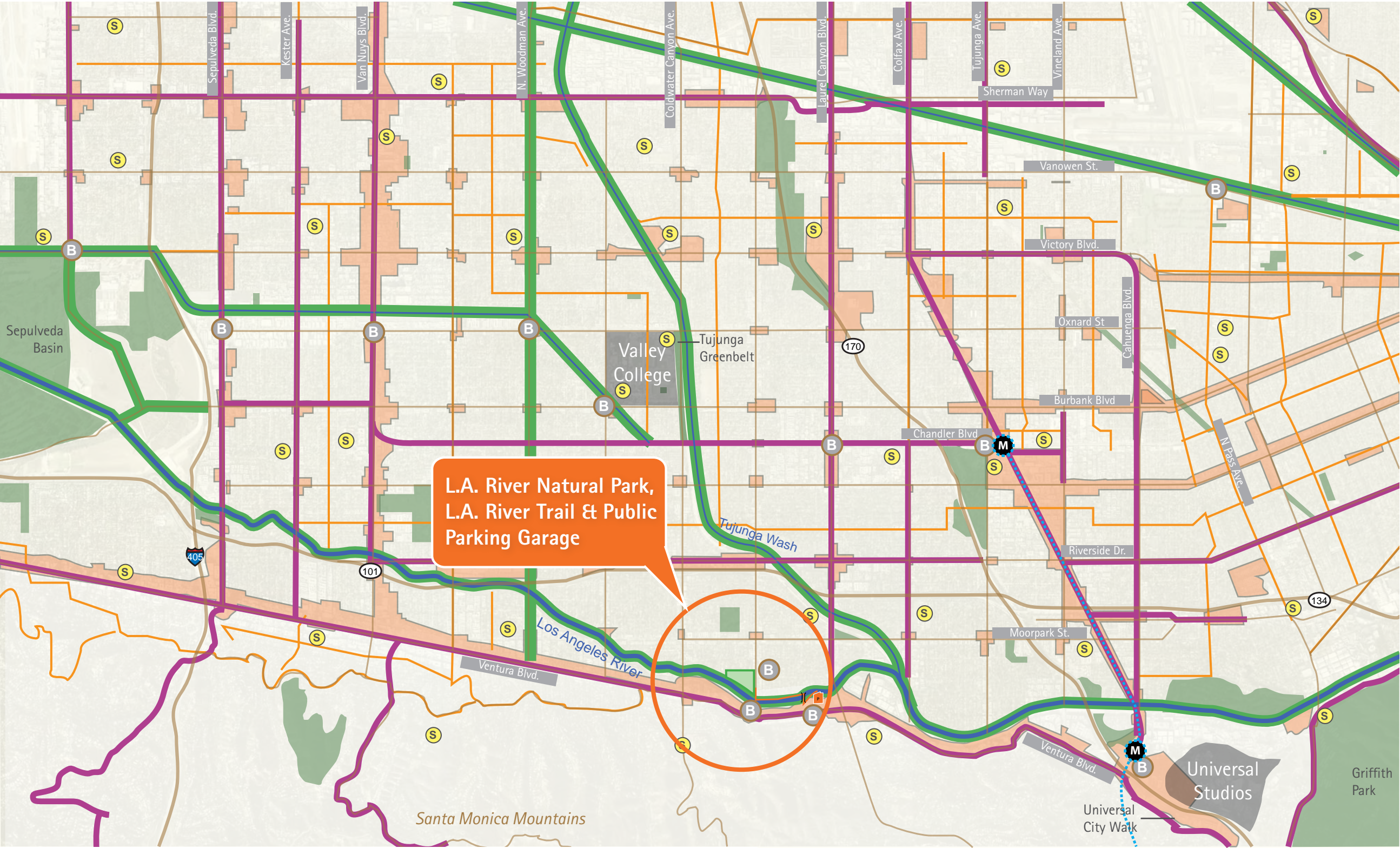
Public transportation is located in front of the project site and there is pedestrian access from Whitsett Avenue. Nearby, Ventura Blvd. provides visitor-serving amenities, including cafes, shops, dining, entertainment and farmers markets.

[See Figure 5: Freeway, Streets, Transit + Walking Access](#)



VIEW TOWARDS EXISTING PEDESTRIAN BRIDGE
WEST OF PARKING STRUCTURE





Bike Network

- Green Bikeway Network
- Backbone Bikeway Network
- Neighborhood Bikeway Network

Source: City of Los Angeles 2010 Bicycle Plan, City Bikeway System

Transit Links Destination Legend

- B Key Bus Stop
- S School
- M Metro Station
- Metro Line
- Parks and Recreation Area
- Commercial Area

Legend

- L.A. River Natural Park Site
- P Parking Garage 391-spaces
- Existing Pedestrian Bridge
- 101 Freeway
- Major Streets
- L.A. River & Tributaries

L.A. RIVER NATURAL PARK

Figure 4: 5 Mile Radius Bicycle Network Study



The L.A. River Natural Park Site is centrally located and conveniently accessible by freeway, street, bike, foot and public transportation. A nearby public garage provides ample parking.

Legend

- L.A. River Natural Park Site
- P Parking Garage - 391 spaces
- Existing Pedestrian/Bicycle Bridge
- Freeway -ramp
- 101 Freeway
- Major Streets
- Bus Stop
- Existing River Trail
- L.A. River & Tributaries

L.A. RIVER NATURAL PARK

Figure 5: Freeway, Streets, Transit & Walking Access

THE VISION

L.A. RIVER REGIONAL PUBLIC ACCESS HUB & TRAILHEAD

WHAT IS AN L.A. RIVER ‘REGIONAL PUBLIC ACCESS’ HUB?

An L.A. River regional public access hub must include these characteristics:

- Have easy access to the L.A. River
- Be centrally located
- Have ample parking readily available
- Be bicycle-friendly and connect to a regional bikeway network
- Easily accessible by public transit
- Be a regional destination that attracts visitors
- Have established visitor-serving infrastructure and amenities
- Have potential for connection to other river trails
- Be accessible via multiple modes of transportation, including mass transit, bicycle and walking

The project site includes all of the above characteristics and is well-positioned to serve as a regional public access hub and trailhead for the L.A. River in the San Fernando Valley and to provide a key bicycle staging area linking to regional bicycle networks. Development of this project site will create a regional trailhead/staging area for public access to the entire 51-mile L.A. River Trail and other river parks and trails, including Tujunga, Pacoima and Arroyo Seco.

There is an opportunity to connect to river parks and trails on the 51-mile Los Angeles River and its tributaries, in particular to Coldwater Canyon Boulevard as part of this project and to the planned L.A. River Trail improvements that include trails on both sides of the river. Other L.A. River tributaries that already have river trails in place or are in planning stages and can be connected to the project site include the Tujunga Wash, Pacoima Wash and the Arroyo Seco.

OPPORTUNITIES

This project offers all of the attributes of an L.A. River Regional Public Access Hub and includes additional amenities that contribute to regional public access.

1. L.A. Riverfront location and central San Fernando Valley location

The project site is adjacent to the Los Angeles River and is centrally located in the San Fernando Valley with easy access from major streets and nearby freeways. In addition to vehicular access, there are multiple bus lines that stop either at or adjacent to the project site providing easy access via public transportation. There is also easy pedestrian and bike access. The site is located in an area with both residential and commercial land uses, and is one block from the Ventura Boulevard commercial corridor. Improving neighborhood walkability and wayfinding will

benefit both local neighborhoods and regional visitors. In addition to Ventura Blvd., there are multiple destination points that can be accessed from the L.A. River Natural Park site, including regional parks and recreation facilities, metro lines, bus stops and schools. Universal Studios is located on the L.A. River, three miles from the project site. The L.A. River Natural Park will serve as a hub linking visitors to all of these destinations.

2. Parking

The multi-level, L.A. City-owned public parking garage that can accommodate 391 vehicles is immediately adjacent to the improved L.A. River Trail and is 500 yards from the project site. There is an existing ADA-compliant ramp that connects the parking garage to the existing L.A. River Trail. The parking garage is easily accessed from Ventura Boulevard, Coldwater Canyon Boulevard, and Laurel Canyon Boulevard and is close to two freeway off-ramps. The garage connects to an existing pedestrian bridge which crosses the L.A. River, providing access to both sides of the L.A. River and to the project site. This high-capacity parking garage is also an excellent location for a centralized bicycle hub, storage, and bicycle rental program to serve this project site as well as the rest of the L.A. River Trail system. It can provide an essential staging area to enhance the viability of a regional bicycle transportation network and to encourage bicycle use.

3. Connections to L.A. River Trail

The existing adjacent 1.5 mile L.A. River Trail connects the project site to the parking garage via a pedestrian bridge that links to the river trail and adjoining commercial/retail destinations on Ventura Boulevard.

4. Potential for easy connection to other river trails, existing and planned, including Tujunga Wash, Pacoima Wash and the Arroyo Seco.

5. Access to numerous regional destinations and visitor-serving amenities, including regional parks, recreation facilities, metro lines, bus stops, schools and commercial corridors.

6. Bicycle access and link to Regional Bike Transportation Network

The project site can be an important link with regional bicycle transportation networks by providing bicycle staging, parking, storage and some bicycle services.

The project site is positioned to contribute substantially to the implementation of the City of Los Angeles 2010 Bicycle Plan, approved March 2011, given its adjacency to the Neighborhood Bikeway, Green Bikeway and Backbone Bikeway Networks as detailed in that plan. It also achieves multiple goals set forth by the Southern California Association of Governments (SCAG) Non-Motorized Transportation Plan and Metropolitan Transportation Authority's Bicycle Transportation Strategic Plan. Los Angeles County's Plan of Bikeways, a sub-element to the L.A. County General Plan, covers bicycling issues in unincorporated areas of the County of Los Angeles and studies the potential for new and improved bike paths along flood control facilities – rivers, creeks, arroyos, washes and drains. Unincorporated areas in L.A. County are commonly non-contiguous but comprise over 2,600 square miles; this is an opportunity to support both the City and County's efforts and would serve as a link and connector for both City and County bike networks.

The project site can provide a regional bicycle hub and can be an important component of providing safe,

accessible non-motorized opportunities to people throughout the San Fernando Valley and beyond. The site can contribute to a regional bicycle transportation network by providing bicycle-friendly access to the L.A. River, safe connections to planned bicycle routes along surrounding streets, and a regional bicycle staging area in the public parking garage. The parking garage can provide important bicycle amenities that facilitate bicycle access to the river and nearby visitor destinations, and that help encourage regional bicycle use and reduction of car trips.

Extensions to the L.A. River Trail can create a contiguous, off-street bicycle path for riders of all ages, providing recreation, commuting opportunities, and connections to parks, other cities, the commercial corridor along Ventura Blvd., and other regional destinations.

OTHER PROJECT BENEFITS

This project offers all of the attributes of an L.A. River Regional Public Access Hub and includes additional amenities that contribute to regional public access.

1. Further the goals of the L.A. River Revitalization Master Plan

The Los Angeles River Revitalization Master Plan, adopted by the City of Los Angeles in 2005, outlines a series of goals for the L.A. River, neighborhoods along the river and the region. These goals include water quality treatment, the development of the L.A. River as a linear greenway to serve the entire region, connecting neighborhoods to the river and making it a focus of activity, and value for the residents of greater Los Angeles.

2. Further the goals of the Los Angeles 2010 Bicycle Plan

The Los Angeles 2010 Bicycle Plan, adopted by the City of Los Angeles in March 2011, aims to "create an environment that increases, improves and enhances bicycling in the City as a safe, healthy, and enjoyable means of transportation and recreation for bicyclists..." The Plan's goals focus on making the City a bicycle-friendly community through creation of a citywide bikeway system that will encourage use of this healthy transportation alternative by all City residents; the Plan includes creating a wide diversity of bicycle-serving amenities, regional and neighborhood bikeways, and links with public transit and visitor-serving destinations. The City's 2010 Bicycle Plan is consistent with the L.A. City General Plan, the Southern California Association of Governments (SCAG) Non-Motorized Transportation Program, and Metropolitan Transportation Authority's Bicycle Transportation Strategic Plan.

The L.A. River Natural Park project will help further these goals by 1) providing a central, easily-accessible public garage for parking and bicycle staging that connects to the L.A. River Trail and to many miles of city bikeways around the project site, and which includes bicycle parking, bicycle rental, and other key bicycle services; 2) establishing a site for regional public access to the L.A. River Trail system; and 3) creating new bicycle trails along the L.A. River that connect to city streets and planned bikeways. All of these improvements will enhance public access to the L.A. River Trail and connecting bikeway networks for residents throughout the Valley and beyond, and will provide access to nearby commercial areas, parks, Valley College, and public transit.

The Los Angeles 2010 Bicycle Plan incorporates the recommendation of the L.A. River Revitalization Master Plan to provide a continuous bicycle path along the L.A. River.

The L.A. River Natural Park project's bicycle hub, bicycle-friendly features, trail linkages and connections to bikeway networks and surface transportation will forward regional goals for reducing car trips, maximizing mobility, encouraging use of bicycles to reach commercial, school, park and other visitor-serving destinations.

3. Help the City meet mandated air quality goals

By providing a regional bicycle hub and staging site, bicycle parking, new bike trails and links to a regional bikeway network, the project will encourage bicycle use and will help reduce the number of vehicle trips. This will help the City meet state-mandated air quality improvement and sustainability goals outlined by Assembly Bill 32, the Global Warming Solutions Act, Senate Bill 375 (aimed at reducing greenhouse gas emissions), and the Complete Streets Act of 2008.

4. Environmental and water quality improvement

Environmental benefits include natural treatment of stormwater and urban runoff to improve water quality in the L.A. River, using creation of a complex of riparian and related native habitats. Polluted runoff will be captured from 200 acres of surrounding urban areas and naturally treated on-site. Stored water will be reused for irrigation. Restored habitat will provide nesting and foraging sites for numerous resident and migratory bird species.

5. Preserve L.A. Riverfront open space

The Los Angeles Neighborhood Land Trusts reports that L.A. ranks last among major cities in per capita open space. The project will preserve the last remaining unprotected open space along 22 miles of the L.A. River in the San Fernando Valley.

6. Improved signage and wayfinding

Development of way-finding and signage will benefit both local and regional visitors.

7. Community benefits

Community benefits include preserving and enhancing precious open space, the potential to incorporate mature trees, traffic calming and control, enhancing site and neighborhood security with perimeter fencing, addressing local flooding problems and improving drainage, preserving historic recreation, developing off-site parking, bike parking and public access, improving walking opportunities,

strengthening connectivity to Ventura Boulevard, other commercial corridors, schools, parks, bus stops and metro lines, developing an educational/interpretive component and improving health and the quality of life in the San Fernando Valley.

The project will help address the open space deficit in the Valley, and will provide a critically-needed public access point to the L.A. River to serve residents from communities throughout the San Fernando Valley. Links to public transit will make the L.A. River easily accessible to a wide diversity of visitors. The site will provide a vital link that over time will connect to other river greenways, trails and parks in the Valley and beyond.

CONSTRAINTS

1. Lack of project site visibility

The project site is screened from view from the site entrance on Whitsett Avenue. An existing berm and numerous palm trees prevent views of the site from the L.A. River.

2. Limited project site access and entry

The entrance to the site is limited to Whitsett Avenue, and is constrained by the existing fire station at the southern corner. Neighborhoods on Valley Spring Lane and Bellaire Avenue preclude public access from these streets. There is currently no access from the L.A. River to the project site and there is a grade differential. However, there is a current plan sponsored and funded by the County that will develop the trail system.

3. No access between project site and Ventura Boulevard.

There is no direct connection across the L.A. River to the adjacent commercial corridor located on Ventura Boulevard.

4. Traffic

Whitsett Avenue is a busy street with no pedestrian crossings near the project entry, which is located mid-block, and no pedestrian crossing connecting to the L.A. River.

5. The parking garage is not visible from Ventura Boulevard nor from L.A. River

The public parking garage is set back from Ventura Boulevard and there is no signage to properly identify the garage and clearly define the entrance, both from Ventura Boulevard and the L.A. River. The garage is not visually connected to the river because of the grade change between the garage and the river.

6. L.A. River Trail connectivity

There is currently no existing L.A. River Trail at the project site. Connection to the existing L.A. River Trail immediately downstream is via Valleyheart. Limited space would make a crossing under-grade below Whitsett Avenue difficult. Connecting from the planned L.A. River Trail extension to the project site would require coming up to street level and crossing Whitsett. The existing pedestrian bridge which connects the public parking garage to the existing L.A. River Trail crosses the river and connects to Valleyheart.

7. No bicycle amenities

The project site and L.A. River Trail connections are not bicycle-friendly. There are major gaps in the L.A. River Trail and in existing bicycle networks (bike lanes and streets) around the project site. No current bicycle connections to public transit or arterial streets exist at the project site, so Valley College and the heavily-used visitor destinations along Ventura Blvd. are not easily or safely accessible by bike. There is no place to park and unload bicycles in order to access the existing bike trail along the L.A. River. There are no bicycle crosswalks where the L.A. River Trail crosses the busy streets of Laurelgrove Ave. and Colfax Ave., nor at Whitsett Ave. where the project site is located.

CONCEPT PLAN

A REGIONAL GATEWAY TO THE L.A. RIVER

A natural, L.A. River-oriented park that is a regional gateway to the L.A. River, providing easy access for people through the region to the L.A. River Trail and to regional bicycle transportation networks.

A natural, L.A. River-oriented park that is a regional gateway to the L.A. River, providing easy access for people through the region to the L.A. River Trail and to regional bicycle transportation networks.

See Figure 6: L.A. River Regional Public Access Concept Plan

THE VISION: L.A. RIVER REGIONAL PUBLIC ACCESS & BICYCLE HUB

The L.A. River Natural Park will be a regional gateway to the L.A. River that provides easy access, welcoming visitors from throughout the region. The nearby public parking garage/bicycle hub links visitors to the site via the L.A. River Trail, provides ample parking as well as bicycle staging, storage, repairs and rentals to connect to a regional bicycle network and increases non-motorized mobility. Connections to numerous bus lines and nearby Metro lines make the site easily accessible by public transit. Trail improvements along the L.A. River will extend the river trail to Coldwater Canyon Boulevard along both sides of the river from the parking garage and bicycle hub on Ventura Boulevard. A system of constructed, designed wetlands and natural habitat will naturally capture and clean polluted runoff, improving water quality in the L.A. River and creating a green oasis in the heart of the San Fernando Valley. Regional tennis courts, a driving range and putting green will be part of the park.

CONCEPT PLAN: A REGIONAL GATEWAY TO THE L.A. RIVER

This concept vision for the L.A. River Natural Park focuses on the proposed regional public access, regional bicycle network and public transit connection components of the project site, public parking garage and adjacent L.A. River Trails. The overall concept for the site also includes creation of habitat and green space to help naturally capture and treat urban runoff to improve water quality, related water storage, and active recreation (regional tennis, driving range and putting green).

The L.A. River Natural Park will be a regional hub for public access to the L.A. River, drawing visitors in and easily connecting to the nearby public parking garage and bicycle hub, public transit, river trails, citywide and neighborhood bicycle networks, schools, Valley College and the commercial corridor along Ventura Blvd.

1. PROJECT SITE

The site will feature an L.A. River Entry Plaza, Visitor Information Center, picnic areas and ample bicycle parking. The Entry Plaza fronts Whitsett Avenue with a signature gateway that clearly marks the L.A. River Natural Park entrance and invites visitors into the project site. A pedestrian crosswalk along Whitsett reinforces the entrance and promotes visitor safety. Through the gateway, the visitor is drawn in by a river-themed water feature, shade structure with interpretive kiosks integrated with the Visitor Information Center and bicycle parking. The Visitor Information Center sets the tone for the L.A. River Natural Park as an L.A. River regional public access hub and trailhead integrated with the site's showcase water quality improvement features, natural habitat, walking trails, links to regional bicycle networks and active recreation.

The public interface at the street transitions to an L.A. River Viewing Terrace, which features an observation deck and views of the L.A. River, picnic areas, seating and an entrance to the L.A. River Natural Park's walking trails. A walkway from the L.A. River Viewing Terrace brings visitors to a cantilevered deck over the L.A. River and connects to the L.A. River's bicycle and pedestrian trails. These L.A. River Trails connect visitors to the parking garage 500 yards downstream, and, via a new pedestrian/bicycle-only bridge upstream of the site, to cafes, restaurants and shopping on Ventura Boulevard.

2. L.A. RIVER PARKING GARAGE AND BIKE RENTAL

The L.A. City-owned and operated existing multi-level parking garage with 391 parking spaces that is located within 500 yards of the project site gives the site great advantage, and provides an opportunity to develop a regional bicycle hub with various visitor-serving bicycle amenities. The parking garage connects to the project site via an existing L.A. River Trail and pedestrian/bicycle bridge. The L.A. River Trail is accessed from the rear of the structure with an ADA-compliant ramp that slopes down to the trail. There is ample space to develop and house bicycle rental, storage and repair.

3. L.A. RIVER TRAIL IMPROVEMENTS: PARKING GARAGE TO COLDWATER CANYON

The access road along the north side of the L.A. River from the existing pedestrian/bicycle bridge to Coldwater Canyon would be improved to provide a continuous pedestrian and bicycle trail. This L.A. River Trail would include landscaping with native plants, signage, seating and solar panels to offset electrical usage at the site. The City of Los Angeles is currently developing L.A. River Trail improvements on the south side of the river from Whitsett Blvd. to Coldwater Canyon, including trail enhancements, seating, slope stabilization and landscaping.

What is an L.A. River "Regional Public Access Hub"?

An L.A. River regional public access hub must include these characteristics:

- 1. Have easy access to the L.A. River
- 2. Be centrally located
- 3. Have ample parking readily available
- 4. Be bicycle-friendly and connect to a regional bikeway network
- 5. Easily accessible by public transit
- 6. Be a regional destination that attracts visitors
- 7. Have established visitor-serving infrastructure and amenities
- 8. Have potential for connection to other river trails
- 9. Be accessible via multiple modes of transportation, including mass transit, bicycle and walking

Site Legend

- L.A. River
- Connection to Public Parking Garage
- Main Entrance
- Existing Pedestrian/Bicycle Bridge
- Approximate Location New Pedestrian Bridge
- Illustration Location



L.A. RIVER NATURAL PARK
Figure 6: L.A. River Regional Public Access Concept Plan

L.A. RIVER REGIONAL PUBLIC ACCESS CONCEPT VISION

The Los Angeles River Natural Park features the following program components:

1. **L.A. RIVER GATEWAY**
 - Crosswalk and traffic calming at entrance access point
 - Enhanced street buffer along Whitsett Avenue
 - Entry Plaza: Public greeting area
 - Visitor information center
 - Shade structure
 - Information and interpretive kiosks
 - Bicycle corral
 - River-themed water feature
 - L.A. River Viewing Terrace
 - Picnic areas
 - Observation deck
 - Seating
 - Trailhead to site Natural Park walking paths
 - L.A. River Terrace at river's edge
 - Seating, observation
2. **L.A. RIVER PUBLIC PARKING GARAGE AND BICYCLE RENTAL**
 - Off-site parking in existing public garage on the L.A. River 500 yards downstream
 - Easy connection to L.A. River Trail and pedestrian/bicycle bridge (existing)
 - Development of bicycle hub with bicycle amenities linked to regional bicycle network
 - Wayfinding signage to L.A. River Trail, regional bicycle network and destinations
 - Bicycle rental signage
 - Bicycle staging, parking and storage
 - Bicycle rental program
 - Light bicycle repair
3. **L.A. RIVER TRAIL IMPROVEMENTS**
 - Multi-use river trail, fencing and native landscaping from parking garage/bicycle hub to Coldwater Canyon
 - Pedestrian/bicycle bridge at parking garage/bicycle hub
 - L.A. River Trail improved from parking garage/bicycle hub, across Whitsett Avenue to Coldwater Canyon Boulevard, including linkages to project site
 - L.A. River Trail improved from Whitsett Avenue to Coldwater Canyon Boulevard across river from site
 - New pedestrian bridge from project site to connect to Ventura Boulevard

See Figures 7–10: Illustration #1: L.A. River Parking Garage & Bicycle Hub

Illustration #2: Parking Garage, L.A. River Trail & L.A. River Access

Illustration #3: L.A. River Gateway & Entry Plaza

Illustration #4: L.A. River Viewing Terrace & River Trail

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L.A. RIVER NATURAL PARK

Figure 7: Illustration #1: L.A River Parking Garage & Bicycle Hub



Figure 8: Illustration #2: Parking Garage, L.A. River Trail & L.A. River Access



L.A. RIVER NATURAL PARK

Figure 9: Illustration #3: L.A. River Gateway & Entry Plaza



Figure 10: Illustration #4: L.A. River Viewing Terraces & River Trail

RECOMMENDATIONS

1. **DEVELOP PROJECT SITE AS L.A. RIVER REGIONAL PUBLIC ACCESS PROTOTYPE**

The L.A. River Natural Park site has unique features that make it particularly suitable as a regional access hub, but it can be developed as a prototype that showcases how to provide a centralized, easily accessible regional public gateway to the L.A. River Trail system and to a regional bicycle transportation network. Elements of this project can be applied to other sites along the L.A. River and in other cities looking to make similar connections to their rivers. Prototype elements include parking facilities, links to river trails and bicycle networks, linkages to heavily-used commercial/restaurant areas, the bike rental program, educational components, water management, and solutions for issues of compatibility with adjacent neighborhoods.

2. **DEVELOP PEDESTRIAN AND BICYCLE-FRIENDLY CROSSING AND TRAFFIC CALMING STRATEGIES**

Access from the L.A. River Trail to the project site entrance requires a pedestrian crosswalk and traffic calming, as Whitsett Avenue is a busy street and crossing Whitsett either on foot or on bicycle can be dangerous. Traffic calming measures such as a stop light or stop sign, bulb outs, and enhanced paving are all methods of slowing or stopping traffic to allow for safe crossing.

3. **DEVELOP SITE SIGNAGE AND WAYFINDING**

Signage and improved wayfinding can be developed to ensure park visitors a friendly and safe experience. Directional signage and wayfinding should clearly identify the public parking garage/bicycle hub and link it to the L.A. River Trail and to the project site. Signage along the L.A. River Trail should easily guide visitors to the site and to nearby visitor-serving amenities.

4. **IMPROVE CONNECTIONS TO PARKING GARAGE/BICYCLE HUB**

Physical and visual connections to the parking garage from Ventura Boulevard need to be developed. Signage needs to be improved and a visual connection made to draw people in from the street. This parking garage can serve as a connection to the L.A. River Trail and from the River Trail to the garage, and from the site to the parking garage.

5. DEVELOP L.A. RIVER BICYCLE STAGING AND RENTAL PROGRAM

Develop a user-friendly bicycle rental and storage program in the parking garage, and enhance connections to the existing multi-purpose L.A. River Trail. Improvements include signage, parking and off-loading for cars with bikes, development of the garage as a regional bicycle hub with services that cyclists would appreciate (e.g., maps, tire repair).

There is an opportunity to provide bicycle rental, storage and repairs in the parking structure as it adjoins the existing multi-purpose L.A. River Trail. In addition to existing river trails, many trails are in the planning stages for the L.A. River throughout the San Fernando Valley and beyond. The ability to connect to existing Los Angeles River trails and to provide this much parking is unique to this site. In the San Fernando Valley buildings were constructed almost up to the river right of way for most of the length of the river. While access for a large number of people can be found at the Sepulveda Basin Recreation Area the river is in its natural state there and direct access to the river or the creation of trails immediately adjacent to the river will endanger habitat.

6. DEVELOP LINK TO REGIONAL BICYCLE NETWORK

Develop site and parking garage as a key regional access node in regional bicycle networks to maximize mobility throughout the San Fernando Valley. Develop wayfinding and signage that links bicycle routes and paths and other elements of the regional bicycle network throughout the San Fernando Valley to the parking garage/bicycle hub, the project site, the L.A. River Trail and surrounding destinations. Utilize the L.A. River Natural Park and parking garage/bicycle hub to encourage bicycle access to Ventura Boulevard and other commercial areas, schools, parks and visitor-serving destinations. River trails and bicycle routes exist and are being planned for key tributaries that connect to the project site and the L.A. River Trail, including the Tujunga Wash, Pacoima Wash, and the Arroyo Seco. The L.A. River Natural Park and parking garage/bicycle hub should be improved to maximize these regional connections for bicycle use, and to provide linkages to existing and planned elements of a regional bikeway network.

7. ENHANCE SECURITY

Develop wayfinding to the project site as well as to river trails and other local destinations. Develop environmentally-sensitive site lighting along the L.A. River Trail and at the parking garage/bicycle hub. Increase visibility into the site. Address security and public safety through the CEPTED (Crime Prevention Through Environmental Design) approach: perimeter fencing that secures the project site night, screening areas with active recreation protects the privacy of adjacent homes.

8. DEVELOP EDUCATIONAL AND INTERPRETIVE COMPONENTS

Provide educational and interpretive information on the L.A. River watershed, habitat, native plants, water management and water quality improvements.

9. UNDERTAKE ADDITIONAL TECHNICAL STUDIES AND ANALYSIS

NEXT DESIGN/PROCESS STEPS

- Move forward with site design
 - Contract with landscape architect to develop a site plan
 - Develop signage program with graphic designer
 - Develop site lighting with lighting consultant
 - Develop visitor center with architect
 - Develop bike staging/rental program
 - Develop connection to parking garage/bicycle hub

RECOMMENDED TECHNICAL STUDIES

The following technical studies and/or analyses should be undertaken during the pre-design phase for integration of hydrologic and habitat restoration elements with public access design goals:

- Topographic/civil survey
- Structural evaluation for wall and cantilevered deck over river
- Geotechnical reports for soil structure and fertility
- Arborist evaluation of health of trees
- Biological assessment and plant community mapping
- Detailed vegetation plan for native habitat restoration/creation
- Bicycle amenities planning for parking garage
 - Rental
 - Storage
- Design of improvements to parking garage
- River Trail Planning:
 - Survey
 - Right-of-Way evaluation
 - Trail width evaluation
 - Signage and connections to existing trails and destinations
- Street crossings

Agency coordination will be required with the U.S. Army Corps of Engineers, Los Angeles County Flood Control District and the City of Los Angeles Bureau of Engineering, River Office

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OPINION OF PROBABLE COSTS

LA River Natural Park

Opinion of Probable Costs

ITEM	QTY	unit price	unit	TOTAL
Site Demolition	3,970	\$40.00	sf	\$158,800.00
Earthwork	3,970	\$10.00	sf	\$39,700.00
Pedestrian Trail	430	\$6.00	sf	\$2,580.00
Multi Purpose Trail	1240	\$25.00	lf	\$31,000.00
Seating	10	\$1,500.00	ea	\$15,000.00
Bike Corral	24	\$500.00	lf	\$12,000.00
Interpretive Signage	12	\$1,500.00	ea	\$9,000.00
Visitor Center	1	\$2,000,000.00	ea	\$2,000,000.00
Picnic Tables	5	\$1,200.00	sf	\$6,000.00
Traffic Calming Crossing	3700	\$3.00	sf	\$11,100.00
River Element	1	\$150,000.00	ea	\$150,000.00
Signage at Public Parking	1	\$35,000.00	ea	\$35,000.00
Pedestrian Bridge	1	\$1,000,000.00	ea	\$1,000,000.00
River Viewing Terrace	15000	\$15.00	sf	\$225,000.00
River Cantilever Terrace	6200	\$40.00	sf	\$248,000.00
Shade Structure	1	\$100,000.00	lf	\$100,000.00
Enhanced Street Buffer	4000	\$5.00	sf	\$20,000.00
Irrigation	63500	\$2.00	ls	\$127,000.00
River Trail Improvements	1	\$500,000.00	ea	\$500,000.00
Parking Garage Improvements	1	\$500,000.00	ea	\$500,000.00
Planting	63500	\$1.50	ea	\$95,250.00
<i>subtotal 1</i>				\$5,285,430.00
Estimating Contingency - 20% of subtotal 1	20%			\$1,057,086.00
<i>subtotal 2</i>				\$6,342,516.00
Mobilization - 7% of subtotal 2	7%			\$443,976.12
Permits - 2% of Subtotal 2	2%			\$126,850.32
Allowances - 5% of Subtotal 2	5%			\$317,125.80
<i>subtotal 3</i>				\$7,230,468.24
Construction Contingency - 10% of subtotal 3	10%			\$723,046.82
TOTAL, HARD COSTS				\$7,953,515.06

SOFT COSTS

Design Fees Entry Area and River Edge	\$1,184,140.00
Topographical Survey	\$10,000.00
Structural evaluation	\$20,000.00
Arborist Report	\$5,000.00
Biological Assessment	\$15,000.00
Vegetation Plan	\$5,000.00
Parking Garage Improvements Design	\$125,000.00
Structural engineering bridge and terraces	\$175,000.00
TOTAL, SOFT COSTS	\$1,539,140.00

TOTAL, ALL **\$9,492,655.06**



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