Arroyo Seco Watershed Ecosystem Restoration Study

Watershed Breakfast

January 25, 2012

University Club of Pasadena

Feasibility Scoping Meeting Agenda

- Introductions
  - USACE South Pacific Division
  - USACE Los Angeles District
  - Los Angeles County Department of Public Works
- Opening Remarks
- Study Overview
- Findings and Recommendations
- Action Items
- Closing Remarks

Study Location

Arroyo Seco Watershed
Ecosystem Restoration Study

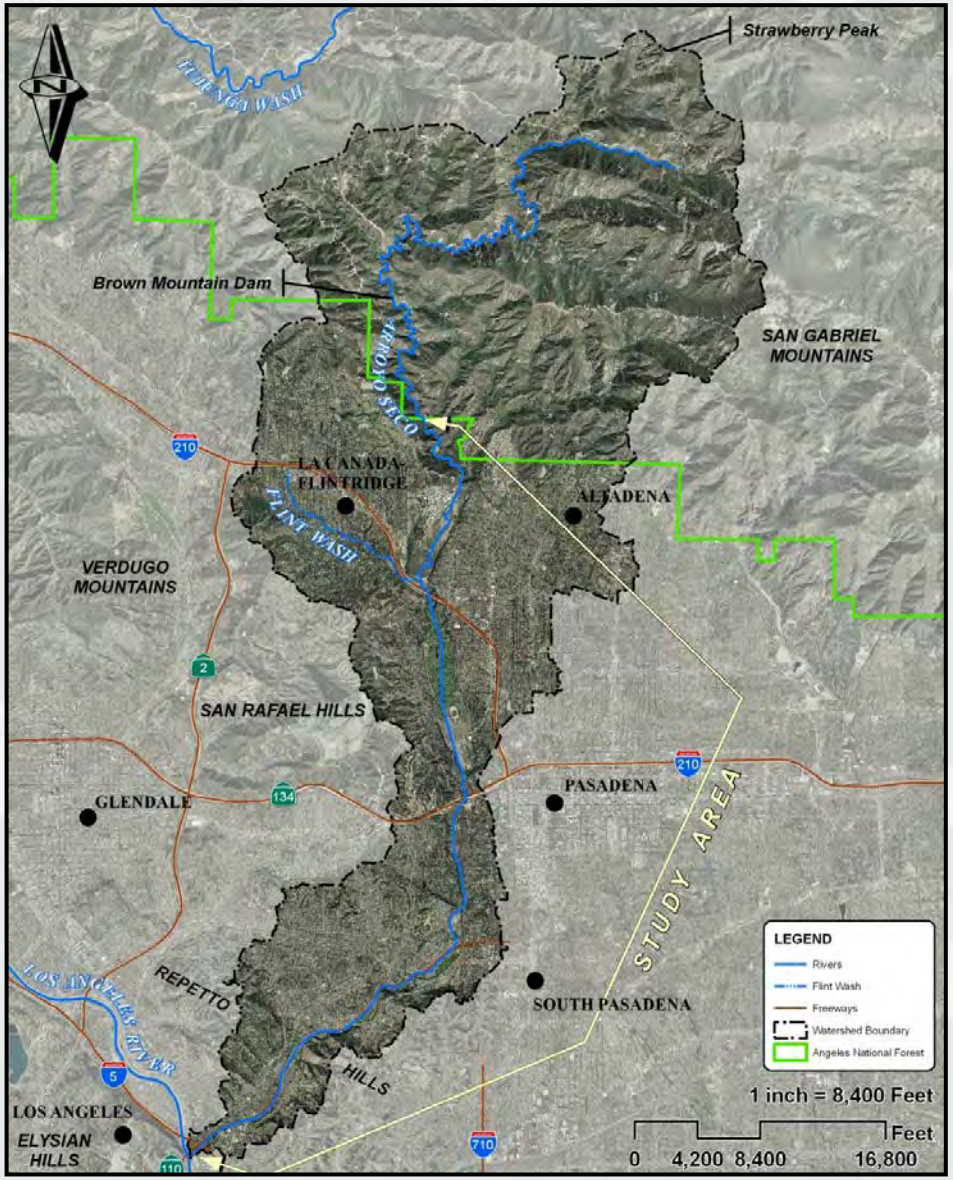
- **Purpose of Today's Conference:**
  - Present existing and future-without project conditions
  - Identify planning objectives and constraints
  - Summarize preliminary plan formulation for ecosystem restoration in the watershed
  - Present the course of action for study completion

Study Authority

This report is being prepared in response to the Senate Resolution approved on June 25, 1969, which reads as follows:

"Resolved by the Committee on Public Works of the United States Senate, that the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby requested to review the report of the Chief of Engineers on the Los Angeles and San Gabriel Rivers and Ballona Creek, California, published as House Document Numbered 838, Seventy-sixth Congress, and other pertinent reports, with a view to determining whether any modifications contained herein are advisable at the present time, in the resources in the Los Angeles County Drainage Area."

Study Area


Strawberry Peak
HAHAMONGA WASH
Brown Mountain Dam
SAN GABRIEL MOUNTAINS
ARROYO SECO
LA CANADA FLINTRIDGE
ALTADENA
FLINT WASH
VERDUGO MOUNTAINS
SAN RAFAEL HILLS
GLENDALE
PASADENA
STUDY AREA
LEGEND
Rivers
Flint Wash
Freeways
Watershed Boundary
Angeles National Forest
REPETTO HILLS
SOUTH PASADENA
LOS ANGELES RIVER
LOS ANGELES
ELYSIAN HILLS
1 inch = 8,400 Feet
Feet
0 4,200 8,400 16,800

Background

2002 Reconnaissance Study

Determined that multiple water resources issues are present with a federal interest to proceed into a cost shared feasibility study

Potential Outputs Identified in Reconnaissance

- Environmental Restoration
- Water Quality
- Flood Risk Management
- Water Conservation
- Recreation

Arroyo Seco Watershed
Supporting Agencies

City of Pasadena

City of Los Angeles

City of La Cañada Flintridge

Raymond Basin Management Board

City of South Pasadena

Study Timeline

August 2005 FCSA executed with Los Angeles County Department of Public Works

October 2005 F2 (public meeting) held

May 2009 Initiated preparation of draft F3 report

April 2011 Preliminary draft F3 report completed

August 2011 F3 Baseline Conditions and Future Without Project Report district quality control review and revisions completed

F2 Workshop
Public Concerns

- Urbanization of the watershed and engineered channels have reduced or eliminated aquatic habitat and restricted access for wildlife
- Urban runoff has affected water quality and altered the hydrology of Arroyo Seco
- Recreational opportunities and public access to Arroyo Seco are limited

Problems and Opportunities

Problems

- Fragmented riparian habitat
- Disturbed hydrologic regime by impervious surfaces and engineered drainage
- Reduced ground-water recharge decreases base flow
- Hard stream bottom has eliminated habitat and disconnected the floodplain
- Debris flow and flood risk management issues
- Lack of open space and public access

Opportunities

- Link habitat fragments
- Provide for fish passage
- Invasive species eradication
- Create alternative stream channels (non-flood conveyance)
- Alter channel banks to accommodate habitat
- Improve water quality through wetland restoration
- Improve access and recreation features

Planning Objectives

- To reduce further ecosystem degradation by restoring water-related habitats
- Restore connectivity of habitats and provide wildlife corridors
- To restore water quality to support aquatic habitat and wildlife
- To design restoration features that mitigate or avoid increased risk of flood damages and channel erosion
- To provide recreational opportunities and aesthetics within the watershed

Planning Constraints / Considerations

- Maintenance of flood damage risk reduction
- Real estate considerations/existing land uses
- Availability of water to support habitat
- Maintain flood storage capacity behind Devil's Gate Dam
- Existing recreational access and uses
- Avoidance of HTRW
- Avoidance of impacts to endangered species
- Public support and acceptability
- Avoidance of cultural resource impacts

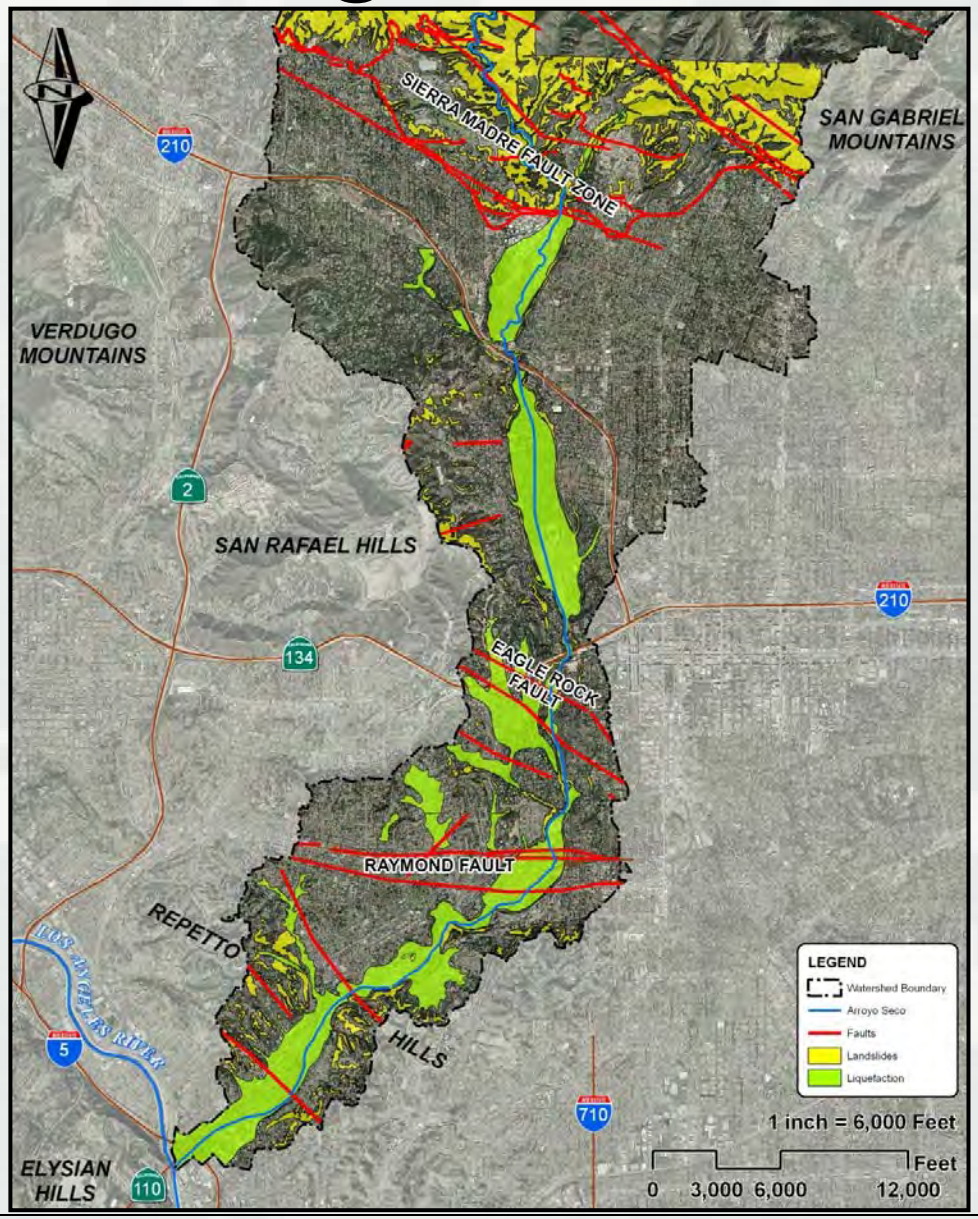
Existing Conditions

Environment

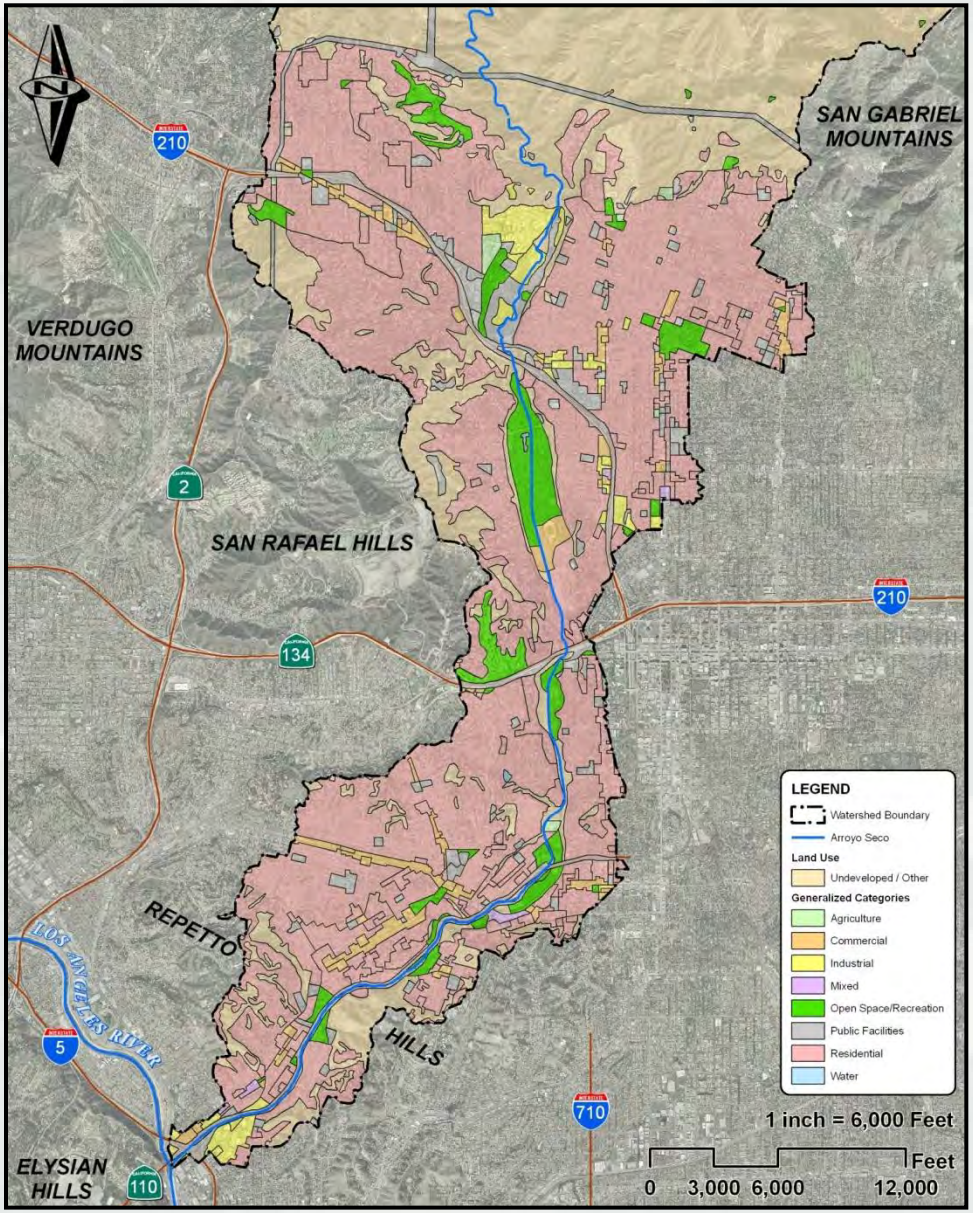
Environmental Conditions

- Geologic Hazards and Land Use
- Hydrology and Hydraulics
- Water Quality
- Groundwater
- Vegetation
- Habitats
- Special Status Species

Geologic Hazards



Land Use

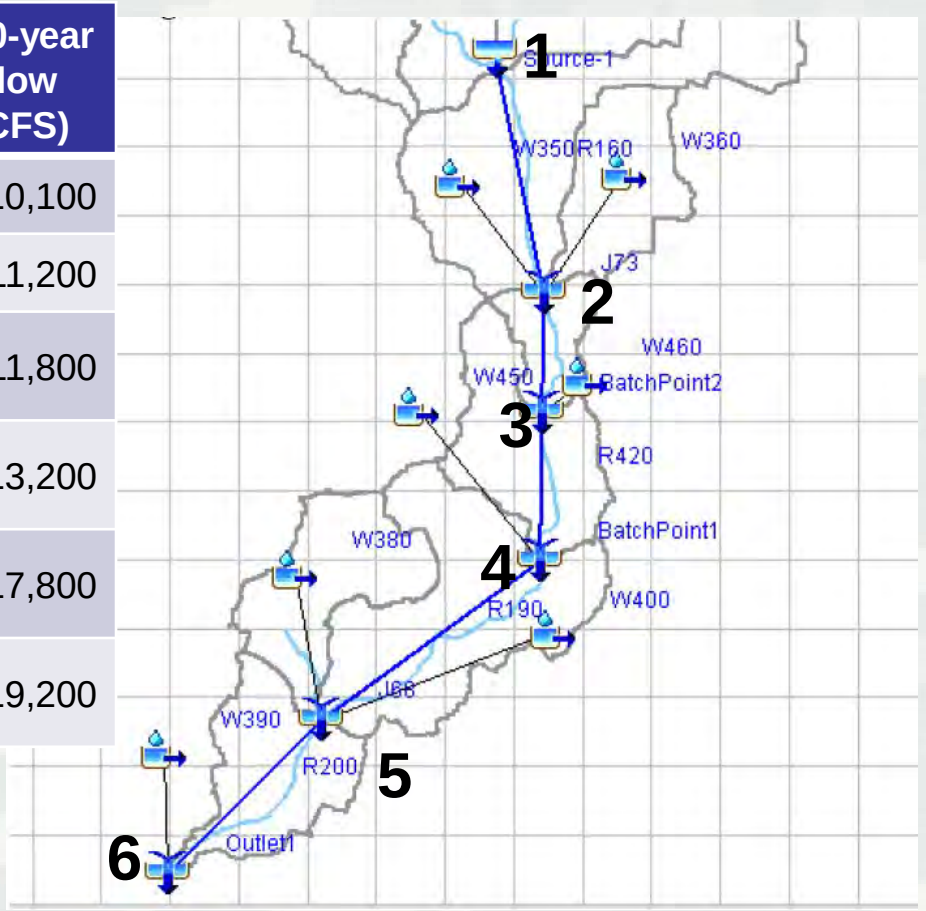

SAN GABRIEL MOUNTAINS
VERDUGO MOUNTAINS
SAN RAFAEL HILLS
REPETTO HILLS
ELYSIAN HILLS
LOS ANGELES RIVER
210
2
134
5
110
710
LEGEND
Watershed Boundary
Arroyo Seco
Land Use
Undeveloped / Other
Generalized Categories
Agriculture
Commercial
Industrial
Mixed
Open Space/Recreation
Public Facilities
Residential
Water
1 inch = 6,000 Feet
Feet
0 3,000 6,000 12,000

Hydrology

Channel Morphology Prior to LACDA (1938)

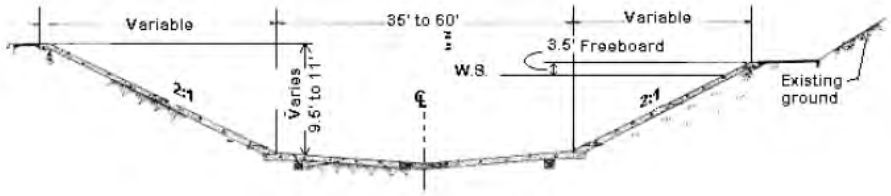
Hydrology
(HEC-HMS Return Flows)

Location	Drainage Area (sq mi)	2-year flow (CFS)	100-year flow (CFS)
1. Devil's Gate Dam	31.6	399	10,100
2. Brookside Park	36.8	678	11,200
3. Lower Arroyo Seco Park	37.5	791	11,800
4. South Pasadena Island	39.4	1,060	13,200
5. Sycamore Creek Park	44.5	2,110	17,800
6. Upstream of LA River Confluence	46.2	2,430	19,200



Hydraulics

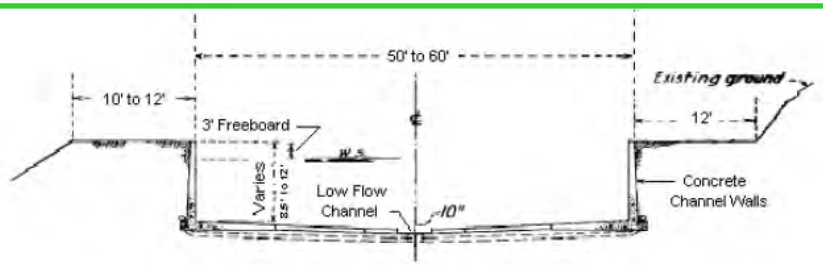
ARROYO SECO CHANNEL
CROSS-SECTION



TYPICAL SECTION
(TRAPEZOID)

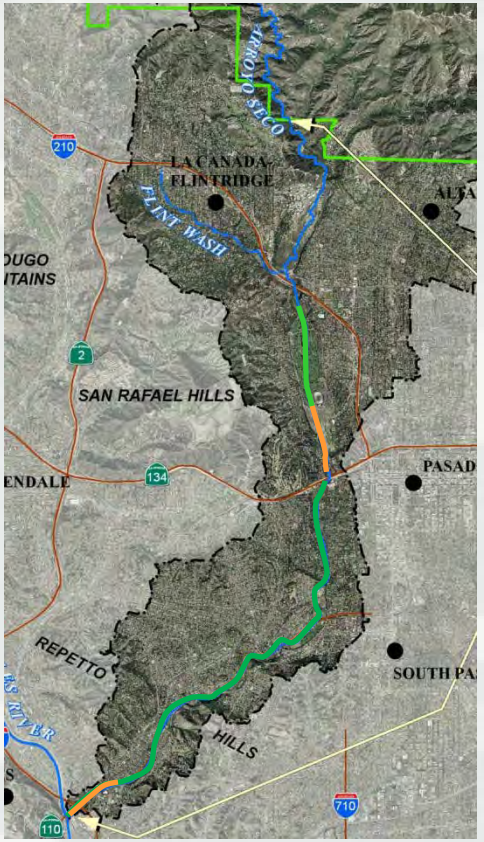
River STA.	10 (L.A.R.)	to	River STA.	1850.738 (Marmion Way)
River STA.	2982.98 (Seco St.)	to	River STA.	3108.139 (530' from ℄ of Dam & Crest)

SCALE: NONE



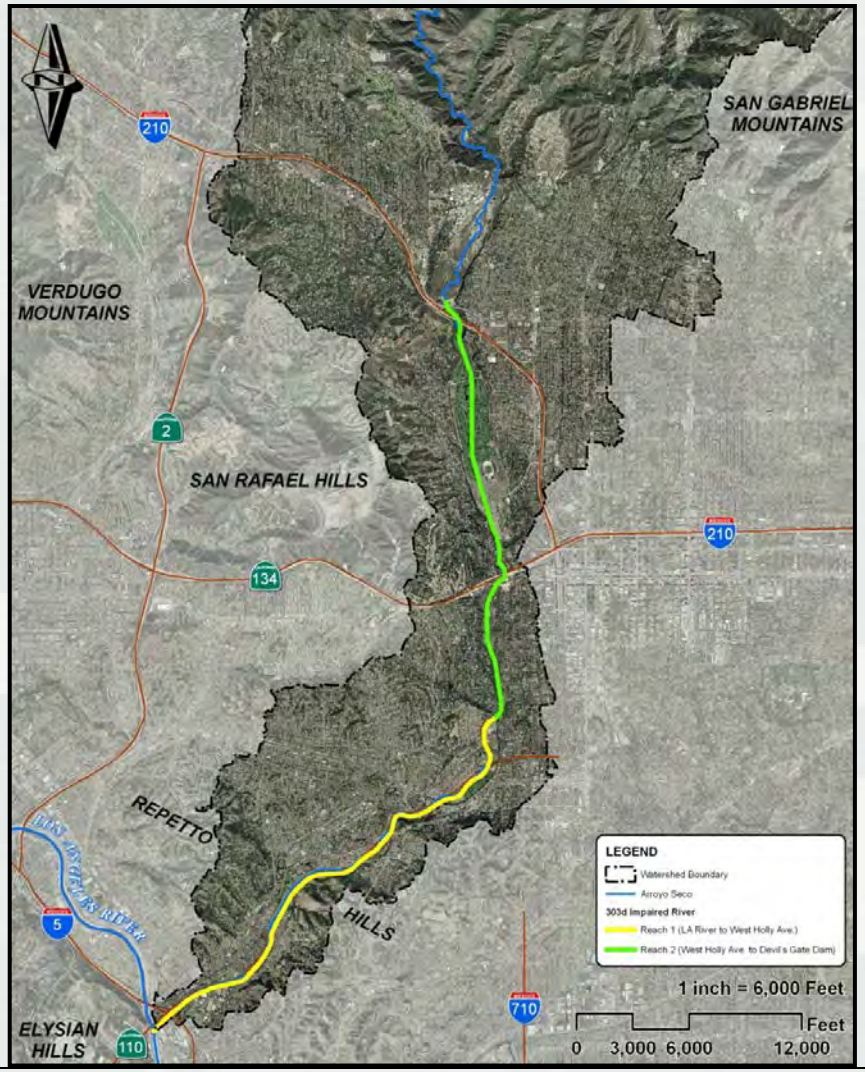
TYPICAL SECTION
(RECTANGLE)

River STA.	1850.738 (Marmion Way)	to	River STA.	2798.759 (Colorado Bl. Landmark Bridge)
River STA.	2859.714 (450' below Holly St.)	to	River STA.	2989.628 (Seco St.)

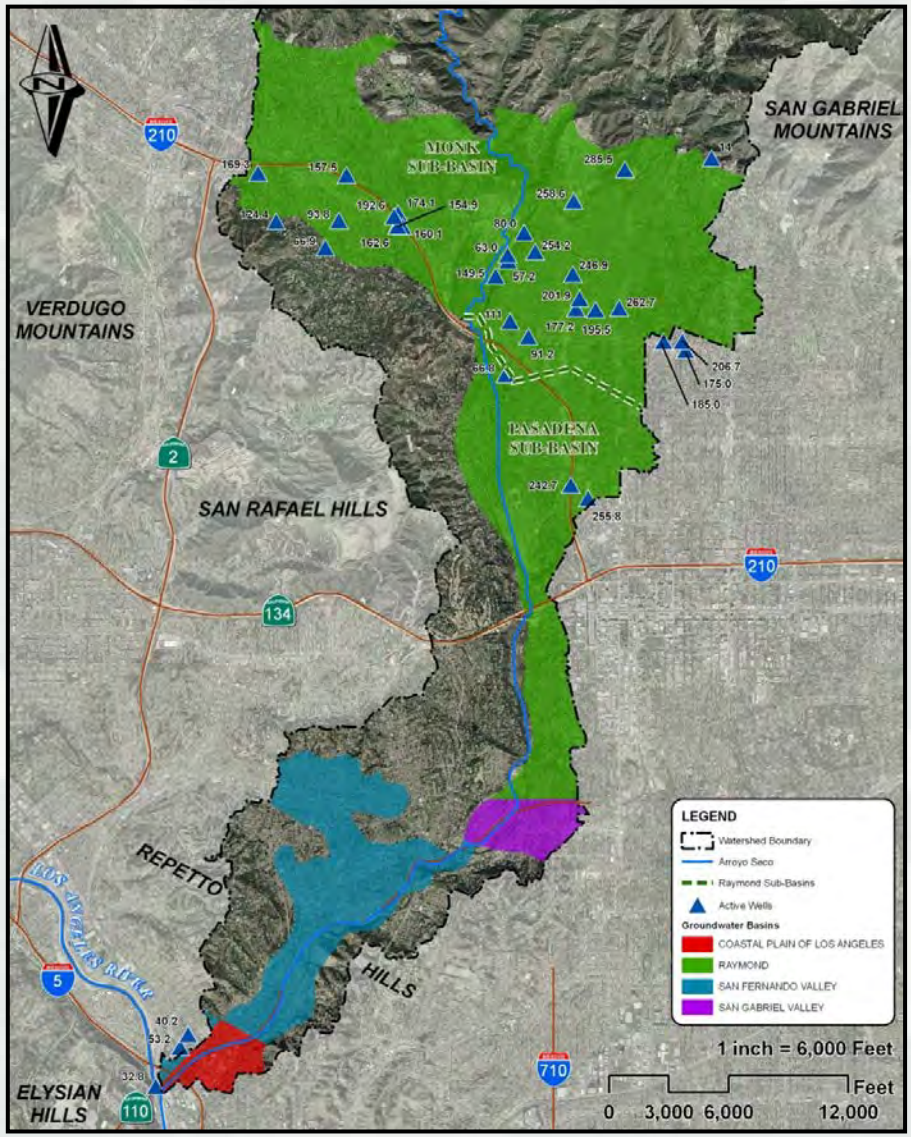


Hydraulics

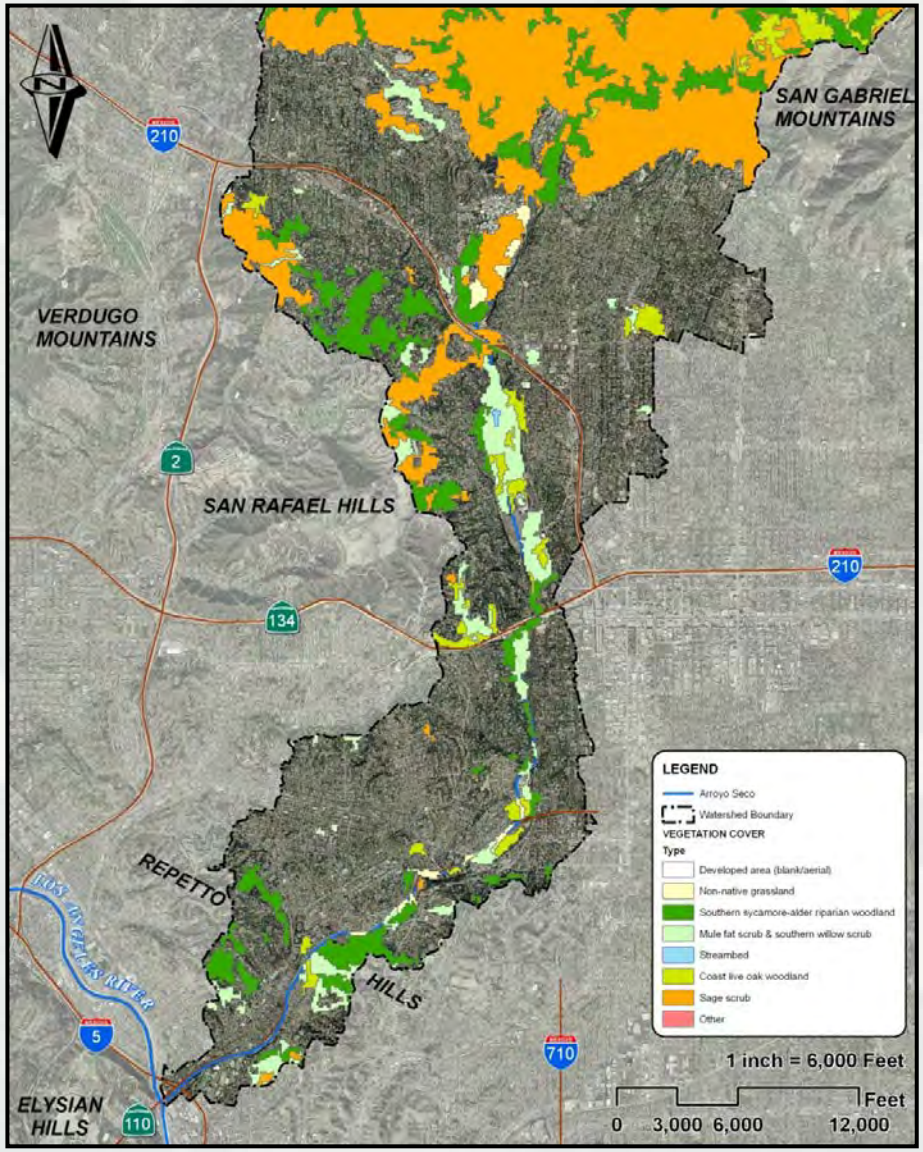
Water Quality
303(d) Impaired Waters



Groundwater



Vegetation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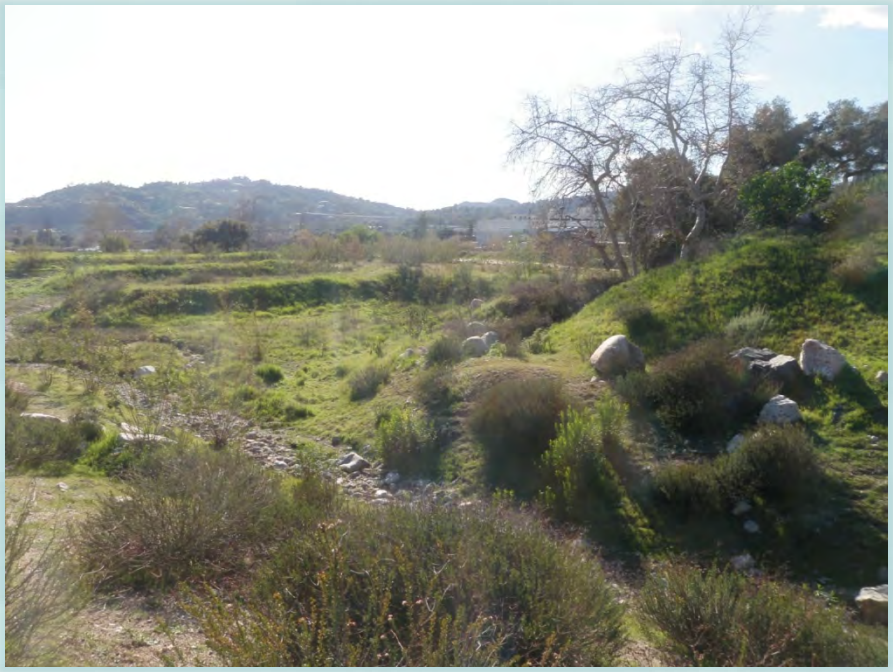
ELYSIAN HILLS
LOS ANGELES RIVER
210
2
134
5
110
710
LEGEND
Arroyo Seco
Watershed Boundary
VEGETATION COVER
Type
Developed area (blank/aerial)
Non-native grassland
Southern sycamore-alder riparian woodland
Mule fat scrub & southern willow scrub
Streambed
Coast live oak woodland
Sage scrub
Other
1 inch = 6,000 Feet
0 3,000 6,000 12,000 Feet

Habitats



Riversidian Alluvial Fan Sage Scrub
(in Hahamongna)

Coastal Scrub
(upstream of JPL)

Habitats

Southern Sycamore Alder
Riverine Woodland
(downstream of Devil's Gate Dam)

Mulefat Scrub
(edge of Hahamongna reach)

Habitats

Southern Willow Scrub
(confluence of Arroyo Seco and Flint Wash)

Landscaped Vegetation
(at Sycamore Grove Park)

Habitats

Coast Live Oak Forest
And Woodland
(Oak Grove area of Hahamongna)

Streambed
(between Devil's Gate and Highway 134)

Special Status Species

COMMON NAME (*Scientific Name*)	FEDERAL STATUS	CA STATE STATUS	CNPS STATUS	POTENTIAL FOR OCCURRENCE
Plants				
Nevin's barberry (*Berberis nevinii*)	Endangered	Endangered	1B.1	Present
Slender-horned spineflower (*Dodecahema leptoceras*)	Endangered	Endangered	1B.1	Unlikely
Amphibians				
Arroyo toad (*Bufo californicus*)	Endangered	None	NA	Possible
California red-legged frog (*Rana aurora draytonii*)	Threatened	None	NA	Unlikely
Birds				
Coastal California gnatcatcher (*Polioptila californica californica*)	Threatened	None	NA	Unlikely
Least Bell's vireo (*Vireo bellii pusillus*)	Endangered	Endangered	NA	Possible
Southwestern willow flycatcher (*Empidonax traillii extimus*)	Endangered	Endangered	NA	Possible

Existing Conditions

Socioeconomics

Socioeconomic Conditions

Population Change and Density

LOCATION	2001	2010	CHANGE (%)	AREA (sq. mi.)	POPULATION DENSITY (sq. mi.)
Pasadena	135,587	151,576	11.79	23.2	6,533
La Cañada Flintridge	20,621	21,261	3.10	8.65	2,457
Altadena	NA [1]	43,887	NA	8.70	5,044
South Pasadena	24,676	25,881	4.88	3.44	7,523
City of Los Angeles	3,748,362	4,094,764	9.24	498.3	8,217
County of Los Angeles	9,656,730	10,514,663	8.88	4,752	2,212
Source: U.S. Census					

Socioeconomic Conditions

Income Data				
AREA	MEDIAN FAMILY INCOME	MEDIAN PER CAPITA INCOME	PERCENTAGE OF FAMILIES BELOW POVERTY LINE	PERCENTAGE OF INDIVIDUALS BELOW POVERTY LINE
Pasadena	78,600	39,190	10.5	13.6
La Cañada Flintridge	157,511	71,221	2.1	2.9
Altadena	93,277	37,880	5.5	8.1
South Pasadena	97,437	49,691	4.5	5.6
Los Angeles	39,942	20,671	18.3	22.1
Los Angeles County	46,452	20,683	14.4	17.9
California	53,025	22,711	10.6	14.4

Future Without Project Conditions

Expected Future Conditions

- Future land use is expected be similar to current conditions:
  - Extensive urbanization means little new development or ground disturbance
  - Open land is publicly held or restricted from development

- Climate change will contribute to more variable conditions
  - Increased intensity of storm events
  - Increased duration of droughts and fire risk in the upper watershed

Plan Formulation

Study Focus

- Initial PMP preparation in 2005 focused on the comprehensive watershed approach: identify potential projects and management strategies
- LACDPW and supporting agencies requested the study to focus on identifying ecosystem restoration projects that could be implemented within a watershed framework

Management Measures

- **Habitat Restoration**
  - In-channel vegetation
  - Riparian-fringe vegetation
  - In-stream habitat improvement
  - Invasive species eradication
  - Low-flow channel modification
  - Flow pattern modification (including dam operation)
  - Fish ladder or passage structures
  - Wetland restoration, including open water
  - Terracing
  - Island creation
  - Concrete removal
  - Stream daylighting of existing culverts
  - Sediment redistribution

Management Measures

- **Flood Risk Management and Erosion Control (ancillary to ecosystem restoration)**
  - **Stream meanders**
  - **Bank stabilization**
  - **Modification of existing channel banks**
  - **Drop structures/weirs**
  - **Grade control structures**
  - **Storm water retention upstream of channels**

Management Measures

- **Recreation**
  - **Recreational Corridor/Trails**
  - **Access Points**
- **Water Quality and Water Conservation (ancillary to ecosystem restoration)**
  - **Stormwater best management practices**
  - **Treatment wetlands**
  - **Retention/infiltration basins**
  - **Riparian buffers**

Management Measures

Non-structural Measures

- Coordination of policies and strategies with CASA stakeholders
- Stormwater-sensitive site planning and design
- Watershed education plan
- Street sweeping
- Citizen monitoring program
- Local government ordinances and policies
- Reduce areas of impervious surfaces
- Storm drain disconnections
- Open land acquisition

Alternatives For Consideration

- **No Action**
  - Continued operation and maintenance of flood damage risk reduction project for Arroyo Seco
  - Basis for future without conditions for period of analysis

Alternatives For Consideration

❖ Floodplain Reconnection

- Diversion of water from Arroyo Seco into previously established side channels.
- Allow sediment to pass beyond the dam and accumulate in the channel.
- Excavation of off-stream channels or backwaters and removing non-native plant species.
- Creating terraces above the existing channel invert and revegetating with native plant species.
- Restoring wetlands in the floodplains to enhance off-channel habitat.
- Stream daylighting of tributaries.
- Modifying bank slopes for establishment of riparian buffers.

Alternatives For Consideration

- **Invasive Plant Eradication/Revegetation**
  - In-channel vegetation plantings.
  - Flow modification to favor native species over non-native species.
  - Sediment redistribution to enhance substrate conditions for revegetation.
  - Invasive non-native species removal.
  - Establishment of riparian-fringe vegetation and riparian buffers.

Alternatives For Consideration

❖ Wetland Restoration/Enhancement

- Modify flow to support off-channel habitat
- Provide low-flow channels to divert water to the lower reach
- Construct stormwater treatment wetlands to support habitat in the floodplain and downstream water quality
- Install retention basins to reduce bed and bank erosion
- Include recreational and educational features at wetland areas.

Alternatives For Consideration

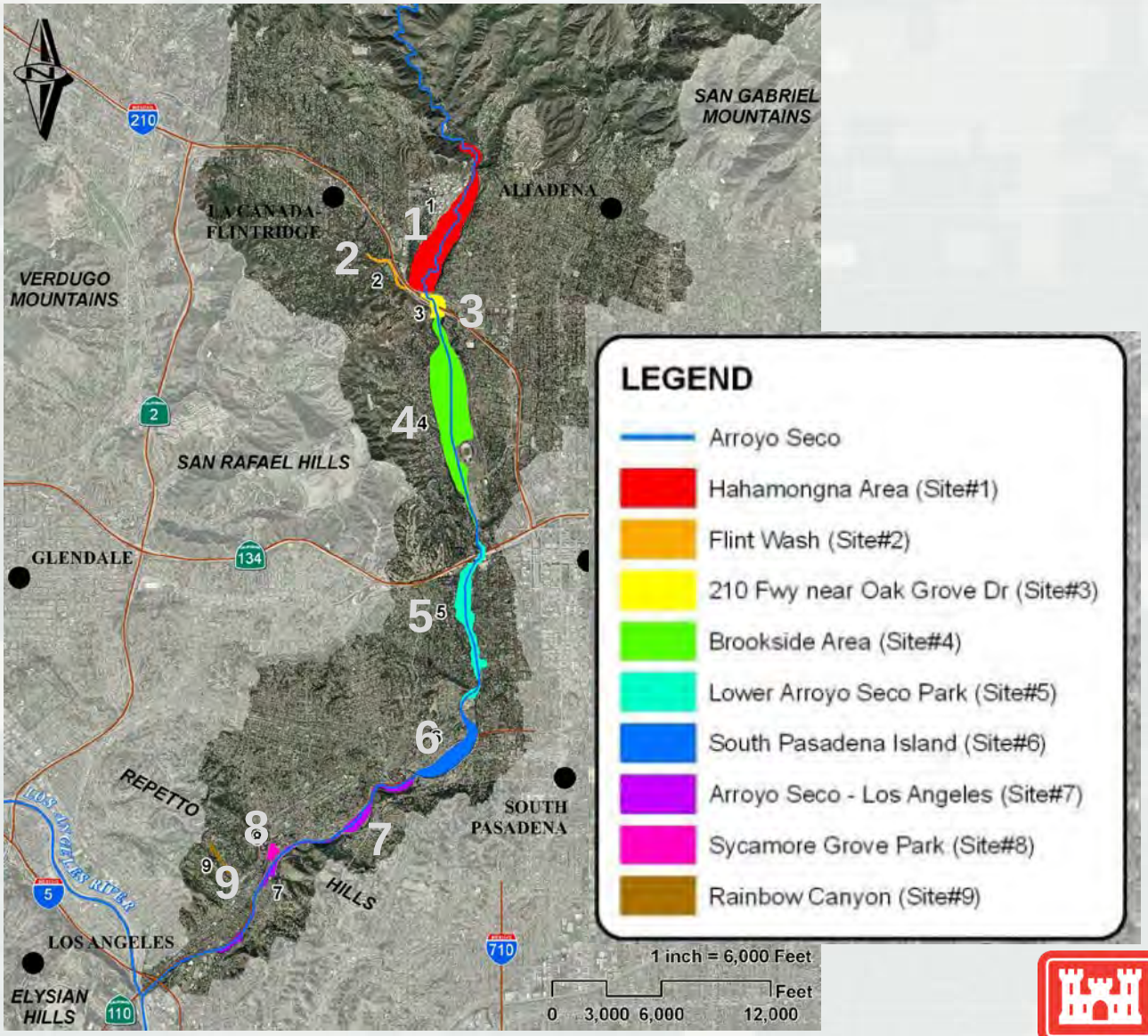
❖Fish Passage, Rearing and Forage

- Fish ladder/passage systems
- Reconnection of the main channel to small tributaries
- Reestablishing riparian forest at the stream's edge to provide organic input and shade
- Implementing stormwater management BMPs to reduce turbidity
- In-channel restoration to provide habitat and complexity.

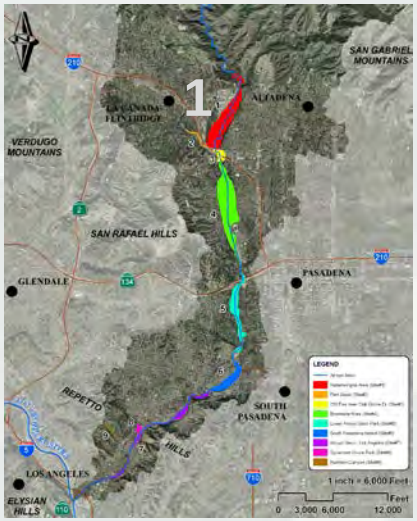
Identification of Candidate Restoration Sites

- Start with a consideration of the entire watershed
- Focus on major restoration opportunities and potential benefits
- Consider potential for connectivity and sustainability
- Avoid conflicts with planning constraints
- Consider input of the public and local agencies (incorporate outside expertise)

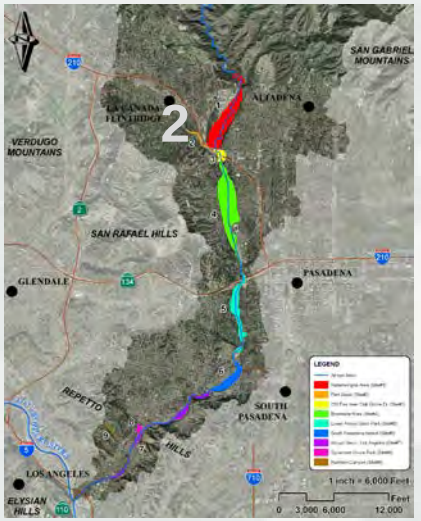
Candidate Restoration Sites



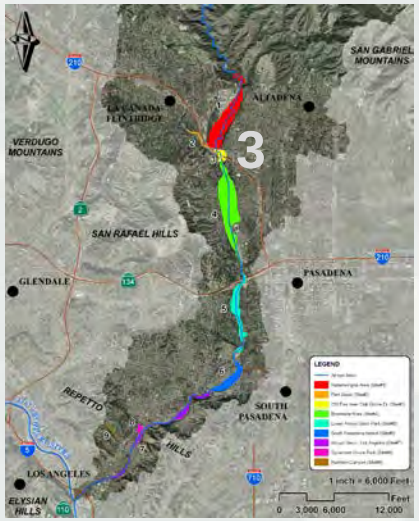
Restoration Site 1
Hahamongna (Devil's Gate Basin)



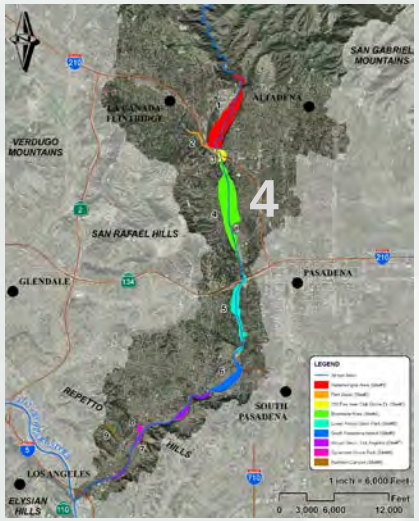
Restoration Site 2 Flint Wash



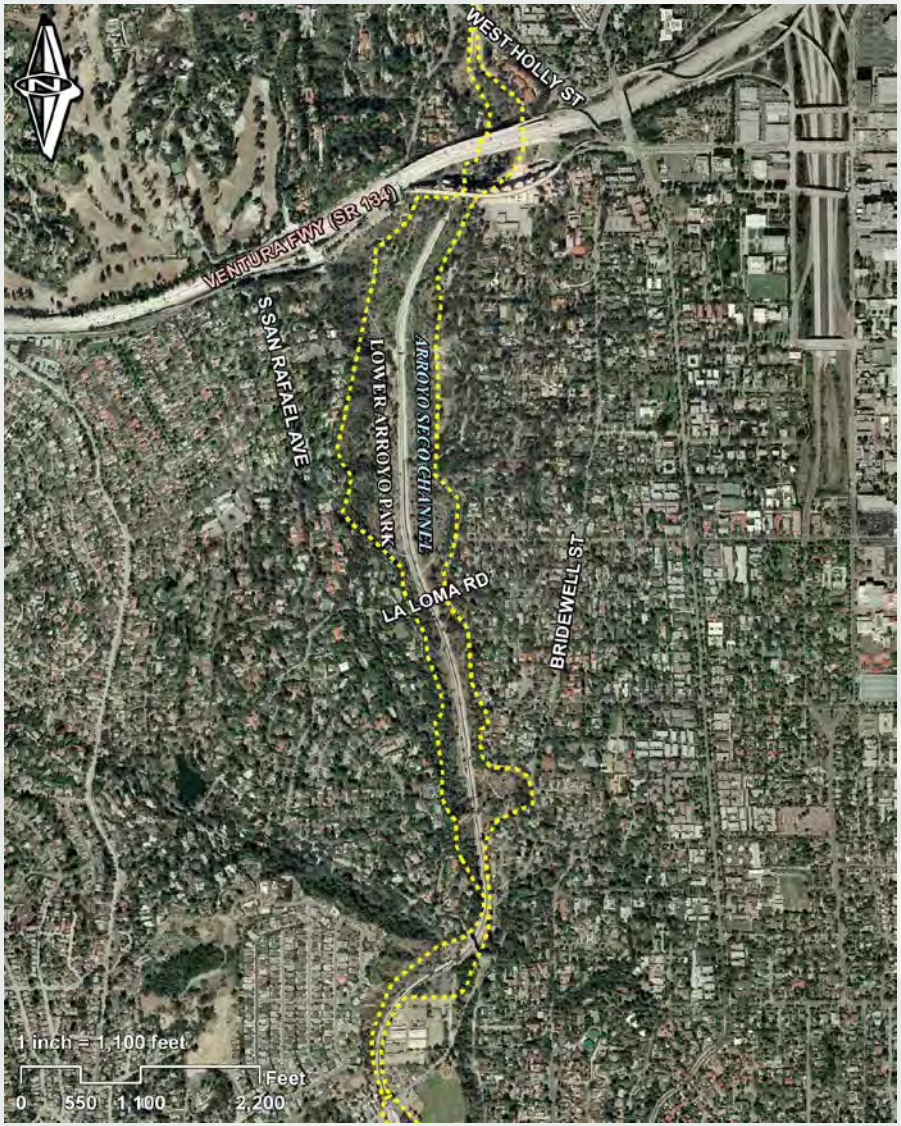
Restoration Site 3
210 Freeway Near Oak Grove

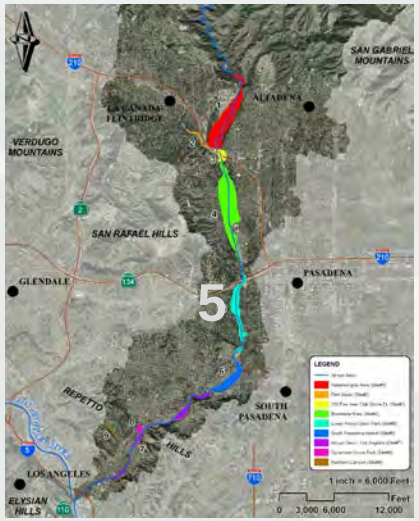


Restoration Site 4 Brookside Area

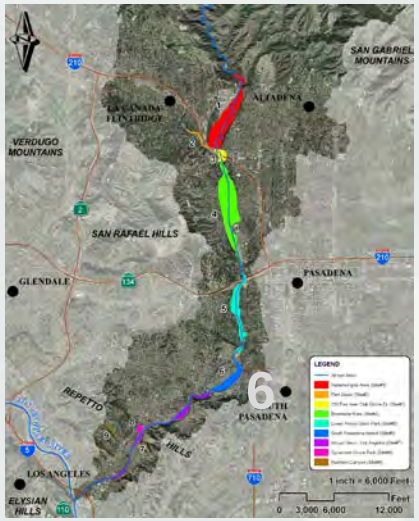


Restoration Site 5
Lower Arroyo Seco Park

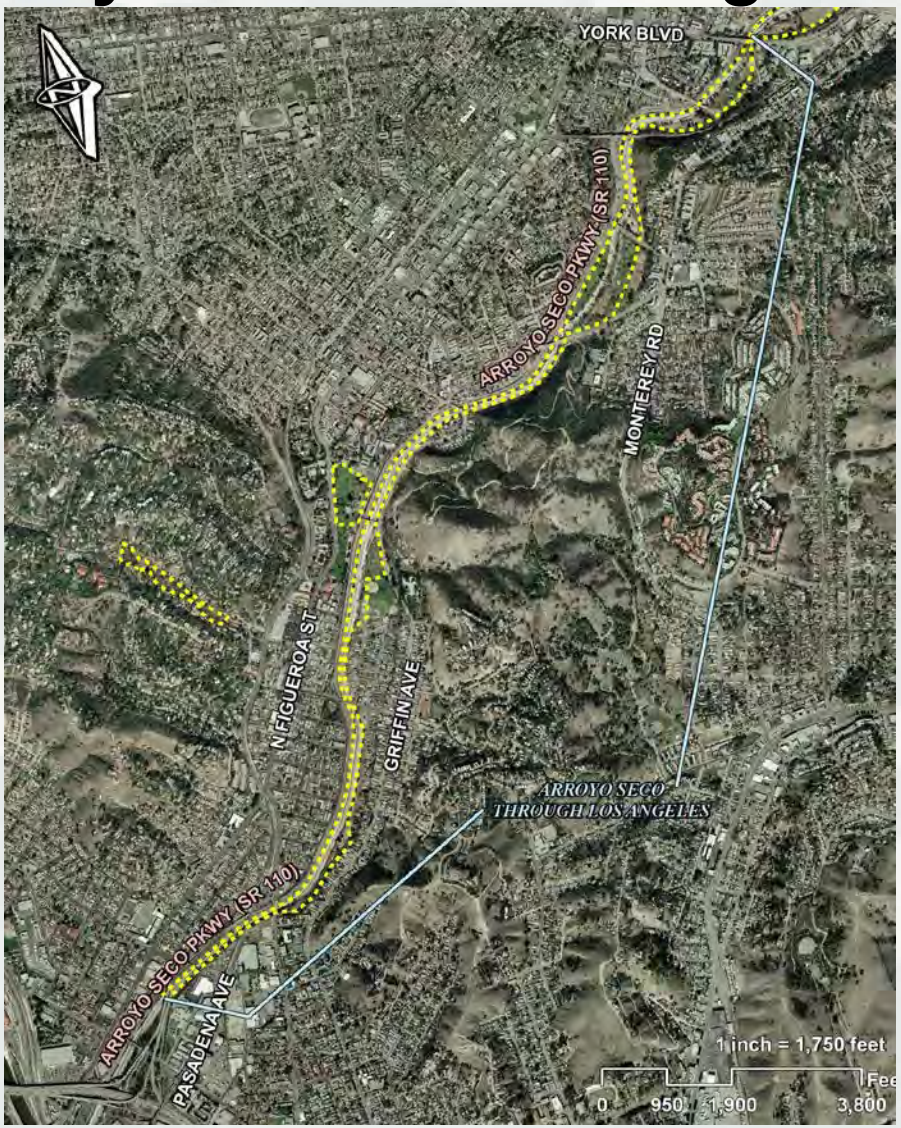


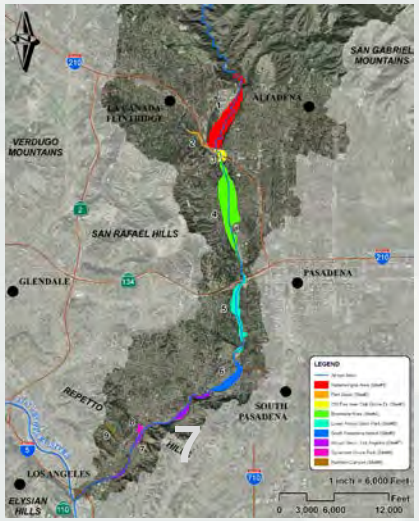


Restoration Site 6
South Pasadena Island

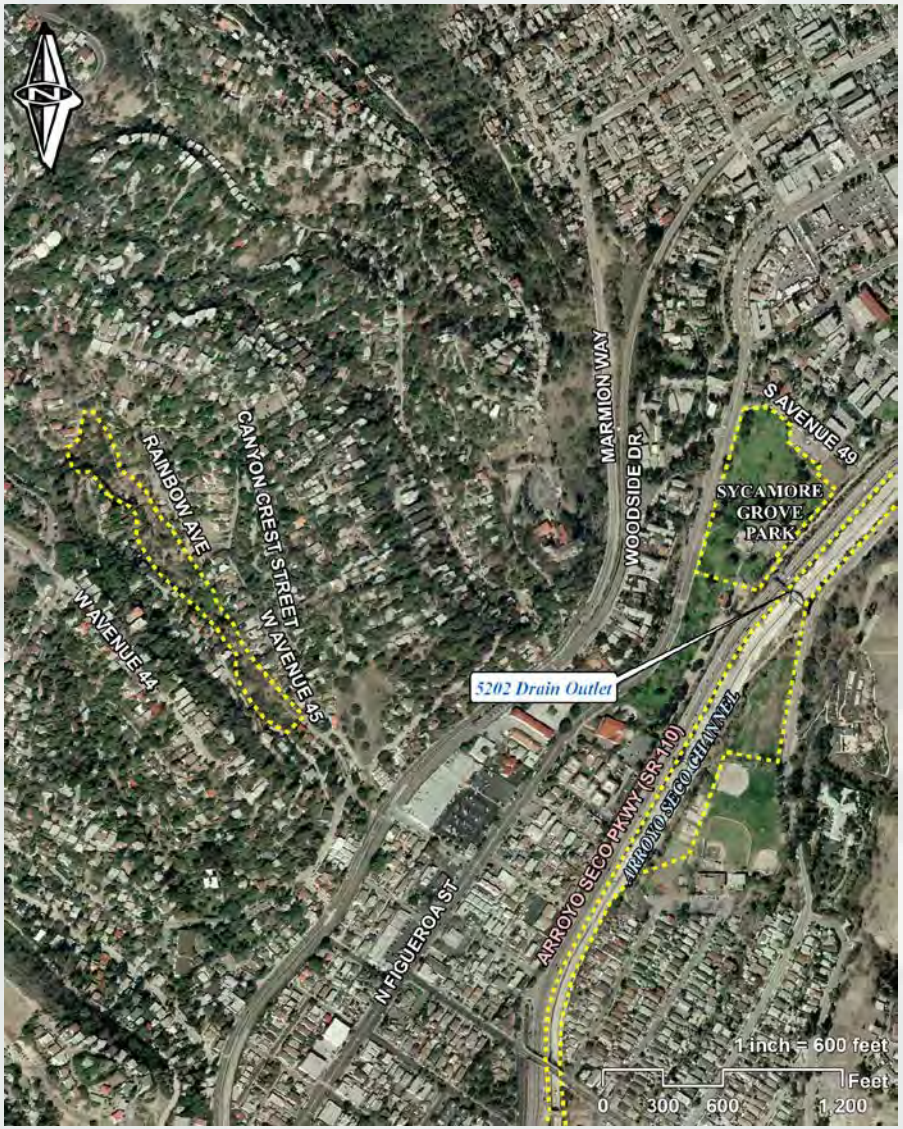


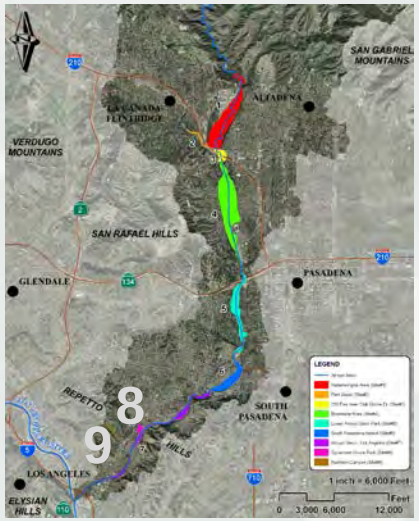
Restoration Site 7
Arroyo Seco – Los Angeles





Restoration Sites 8 and 9
Sycamore Grove and Rainbow Canyon

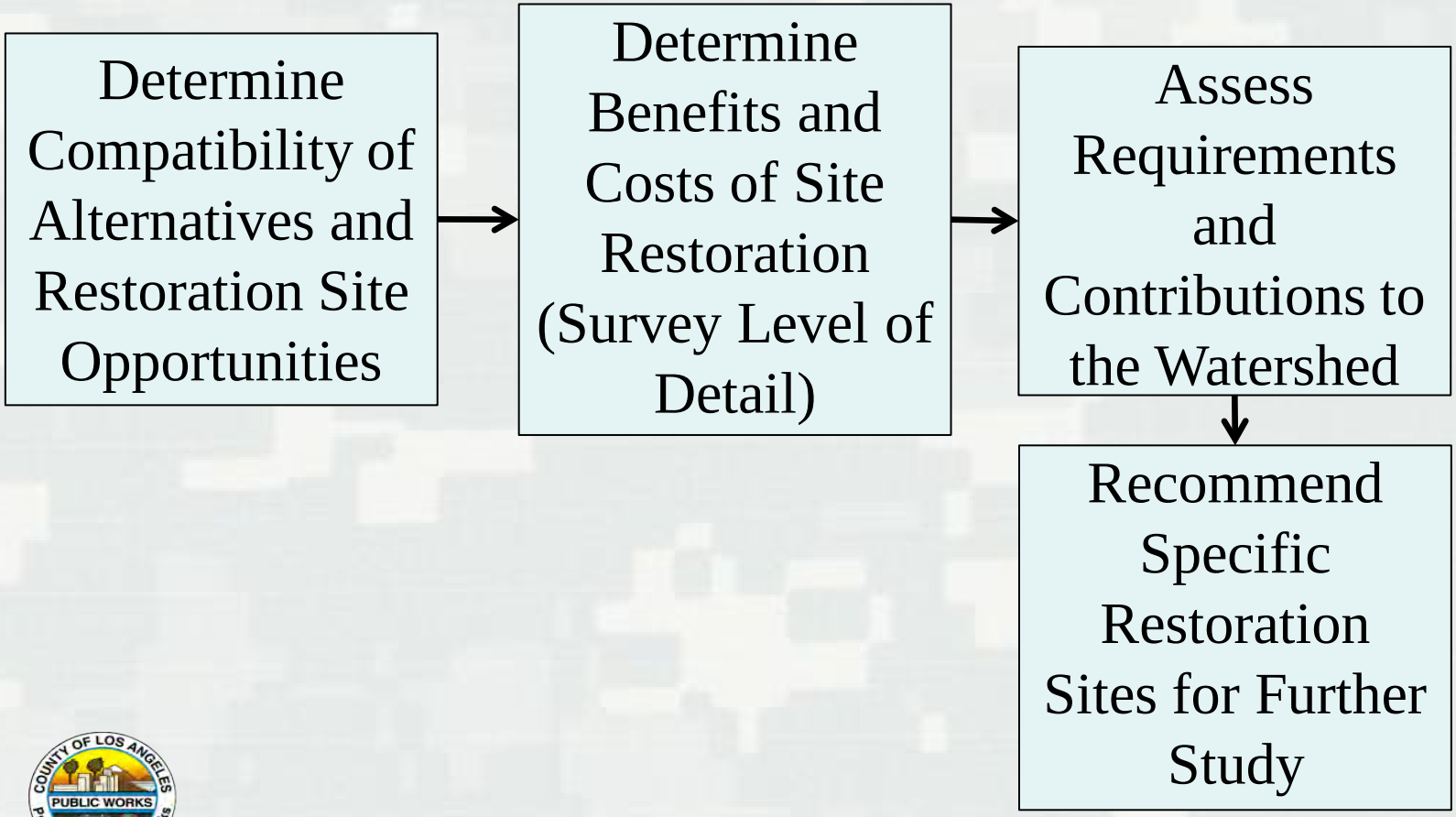




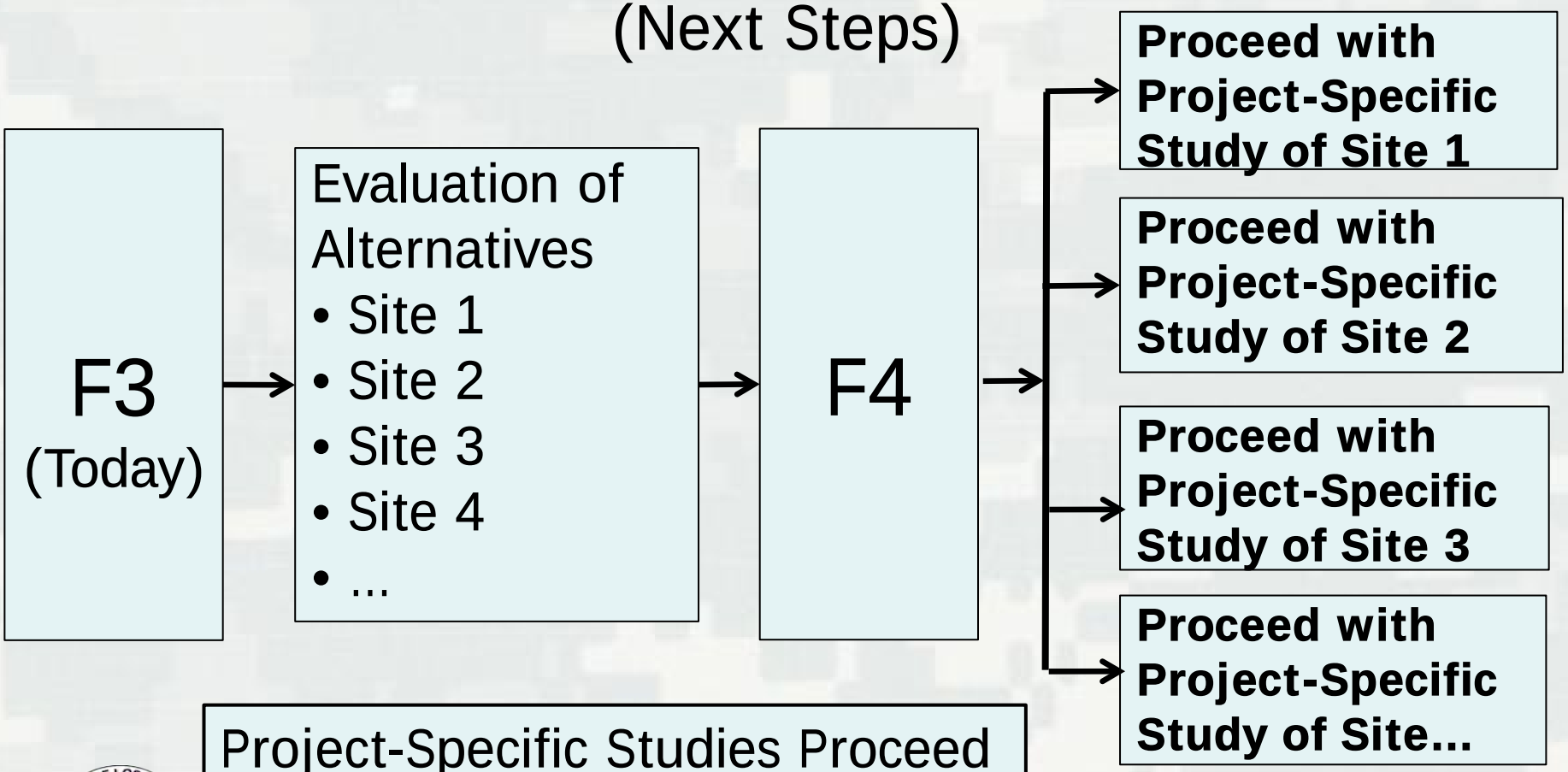
What's Next

- Model Certification (CHAP: for multiple projects)
- Alternatives Analyses
- Recommendations: Specific restoration projects within the watershed
- Partnership for next phase (project-specific feasibility evaluations)

Plan Formulation
Integration of Alternatives And Restoration Sites
(Next Steps)



Plan Formulation
Integration of Alternatives
And Restoration Sites
(Next Steps)



Project-Specific Studies Proceed with LADPW and Co-Sponsors

Study Schedule

Activity Name	Baseline Schedule	Current Schedule
Project Initiation	28-Jul-05	Complete
Public Workshop (F2)	26-Oct-05	Complete
Baseline Conditions (F3)	31-May-11	23-Sep-11
Alternatives Analysis (F4)	25-Oct-13	TBD
Alternative Formulation Briefing (F4A)	TBD	TBD
Draft Feasibility Report (F5)	TBD	TBD
Final Public Meeting (F6)	TBD	TBD
Feasibility Report with NEPA to SPD (F8)	TBD	TBD
MSC Commander's Report Notice (F9)	TBD	TBD
Chief's Report	TBD	TBD

Arroyo Seco
Feasibility Scoping Meeting
Findings and Recommendations

- An array of viable management measures have been developed and combined into preliminary alternatives
- Candidate restoration sites have been identified throughout the study area
- Identify individual projects for study based on their cost-effectiveness and contribution to the watershed

Arroyo Seco
Feasibility Scoping Meeting
Future Actions

- Complete formulation and evaluation of alternatives under the watershed approach
- Selection of projects for feasibility study
- Pathway for future study efforts
  - Reformulate study to proceed with specific projects upon completion of F4 with participation of co-sponsors

Arroyo Seco
Feasibility Scoping Meeting

- Closing Remarks