

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



Strategic Planning for Groundwater Recharge Using Stormwater

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Council for Watershed Health



The region's hub for watershed research and analysis

- Working at the intersection of research and policy
- Driving applied research to improve policy and practice
- Connecting diverse perspectives to address timely issues

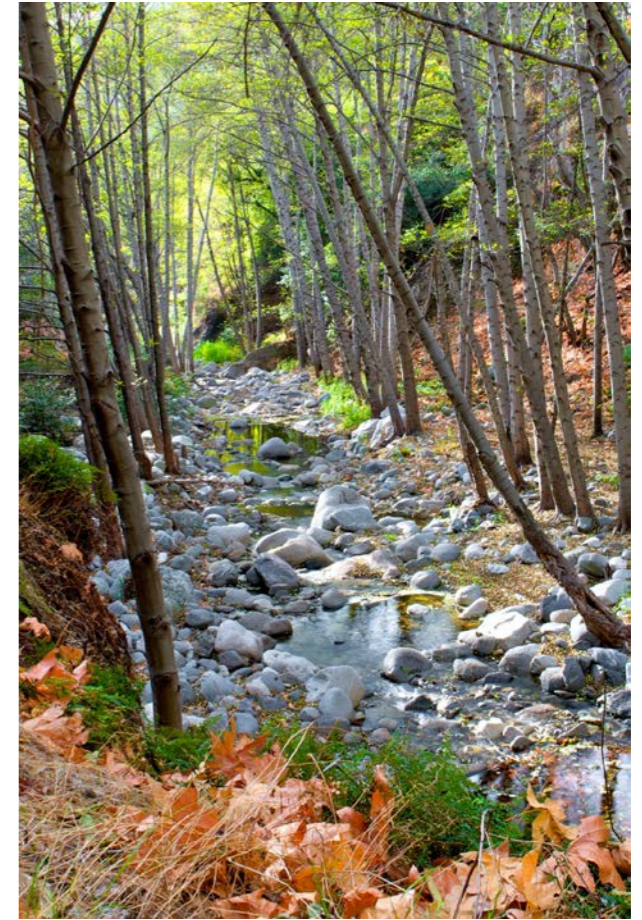


A Vision for 2025:

Sustainable Southern California

Managing at the watershed scale for economic vitality, social and environmental health

- Clean waters
- Reliable local water supplies
- Restored native habitats
- Ample parks & open spaces
- Integrated flood protection
- Revitalized rivers & communities



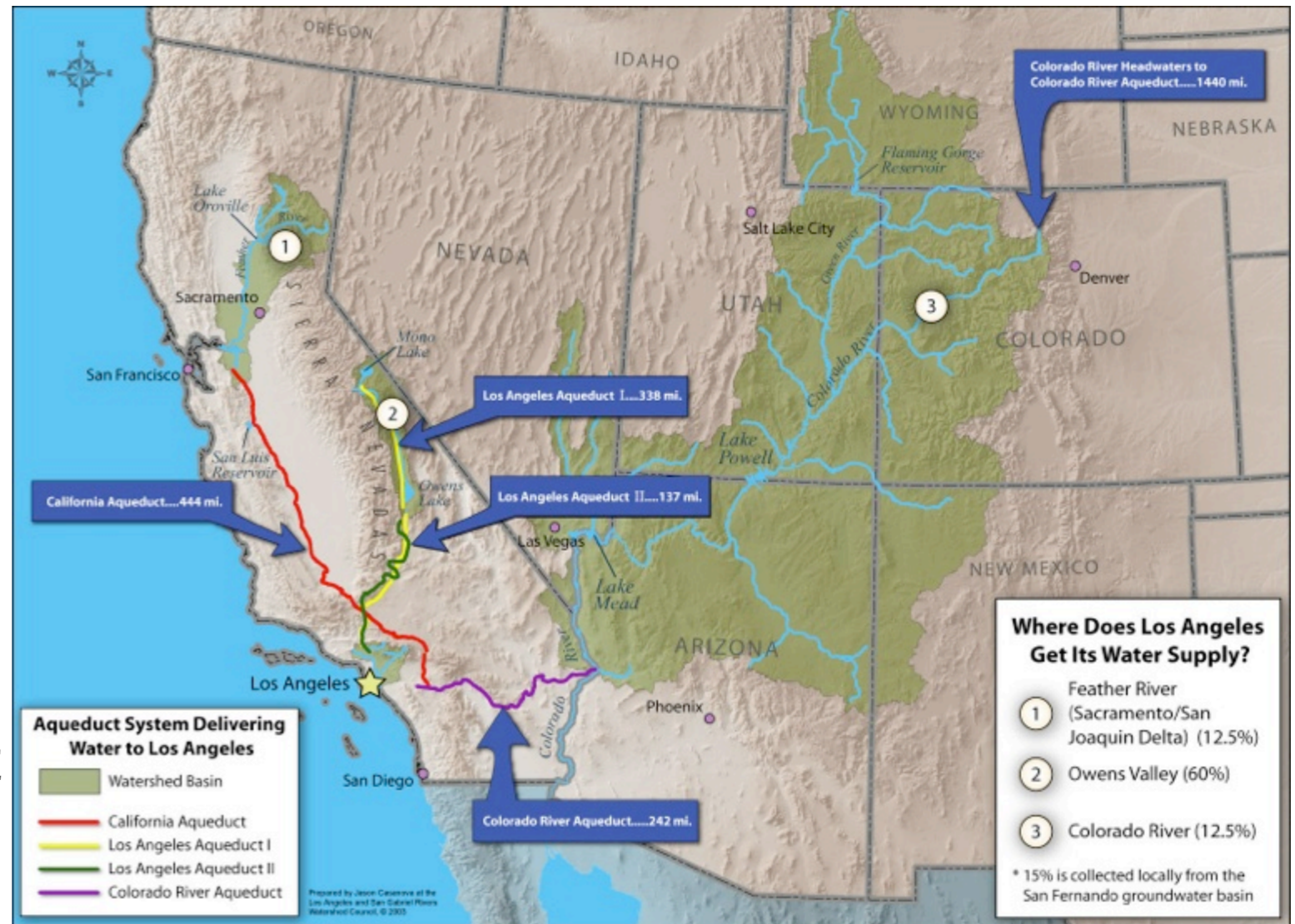
What we know:

- **Our water comes from:**

- Sierra Nevada Mountains
- Colorado River Watershed
- Groundwater

- **Stress on these systems**

- Changes in management
- Changes in climate



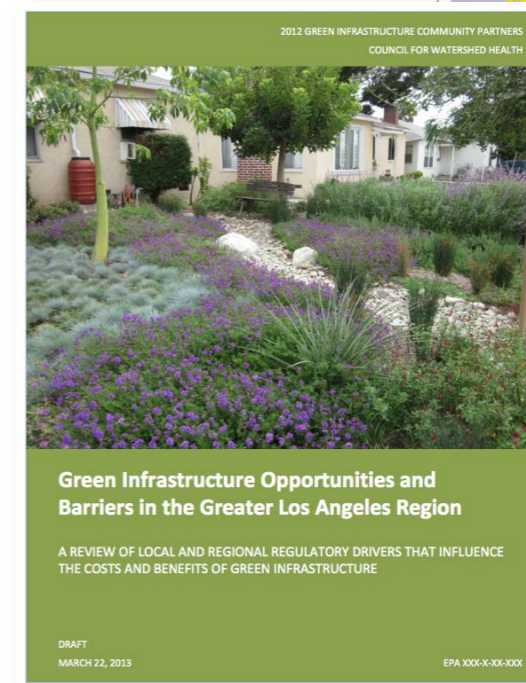
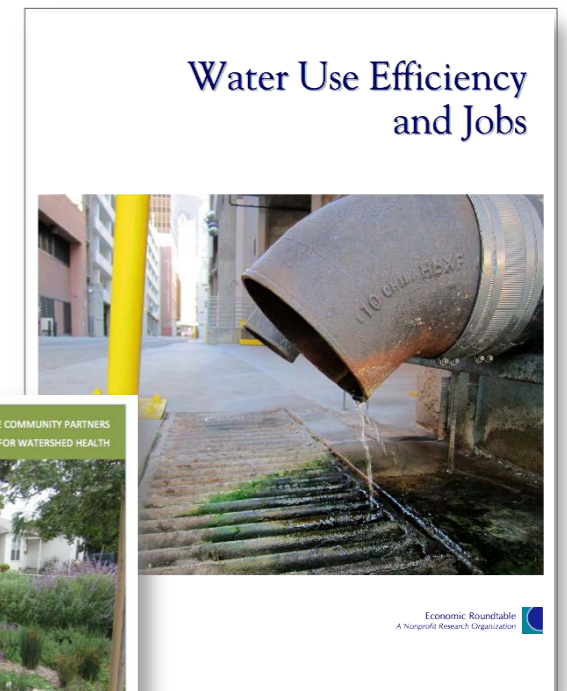
What we know:

- **Urban stormwater runoff is:**
 - An underutilized resource
 - A cause of pollution in waterways and the ocean
- **Dealing with this can:**
 - Provide a locally-controlled resource
 - Enhance our neighborhoods, recreational spaces, habitats
 - Create jobs
 - Speed the economy



How we know:

- The Los Angeles Basin Water Augmentation Study
 - The Elmer Avenue Projects
 - West Coast & Central Basin Stormwater Recharge Feasibility Study
- Green Infrastructure Opportunities and Barriers in the Greater Los Angeles Region
- Water Use Efficiency & Jobs - 2011 Report from the Economic Roundtable



The Los Angeles Basin Water Augmentation Study

- Initiated in 2000
 - Led by CWH (then LASGRWC)
 - Multi-partner funding
 - Technical Advisory Committee



Can we safely and effectively infiltrate urban stormwater to augment our groundwater?



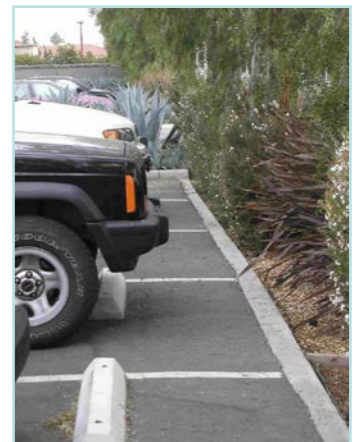
WAS Partners and Funding

- City of Los Angeles Department of Water & Power
- City of Los Angeles Watershed Protection Division
- City of Santa Monica Environmental Programs
- County of Los Angeles Department of Public Works
- California Department of Water Resources
- Metropolitan Water District of Southern California
- Regional Water Quality Control Board, LA Region
- TreePeople
- University of California, Riverside
- Bureau of Reclamation, Department of the Interior
- Water Replenishment District of Southern California
- State grants: Prop 13 SWRCB, CalFed, Prop 50 DWR



Monitoring Program

- It is safe to infiltrate urban stormwater to increase groundwater supplies
- Pollutants generally occur at low concentrations or are “non-detect” in stormwater runoff
- No clear evidence linking stormwater quality to groundwater quality at any of the monitored locations
- No evidence of metals accumulation in post-project soil samples



Elmer Avenue Neighborhood Retrofit Demonstration Project



2005

2010



Elmer Avenue: Elmer Paseo Stormwater Improvements



ELMER PASEO STORMWATER IMPROVEMENTS



A PROJECT OF THE

**Council for
Watershed Health**



Another Urban Greening project funded by Proposition 84 to Improve the Sustainability and Livability of California's Communities

EDMUND G. BROWN, JR.,
GOVERNOR
Strategic Growth Council

ADDITIONAL PROJECT FUNDING PROVIDED BY



Santa Monica Mountains Conservancy



Los Angeles Proposition O, Clean Water Bond

ANTONIO R. VILLARAIGOSA
MAYOR, City of Los Angeles

TONY CÁRDENAS
COUNCILMEMBER, 6th District

ANDREA ALARCÓN
PRESIDENT, Los Angeles Board of Public Works

For questions, please call the Council for Watershed Health at (213) 229-9945 or visit www.watershedhealth.org



Central and West Coast Basins Regional & Distributed Stormwater Recharge Feasibility Study



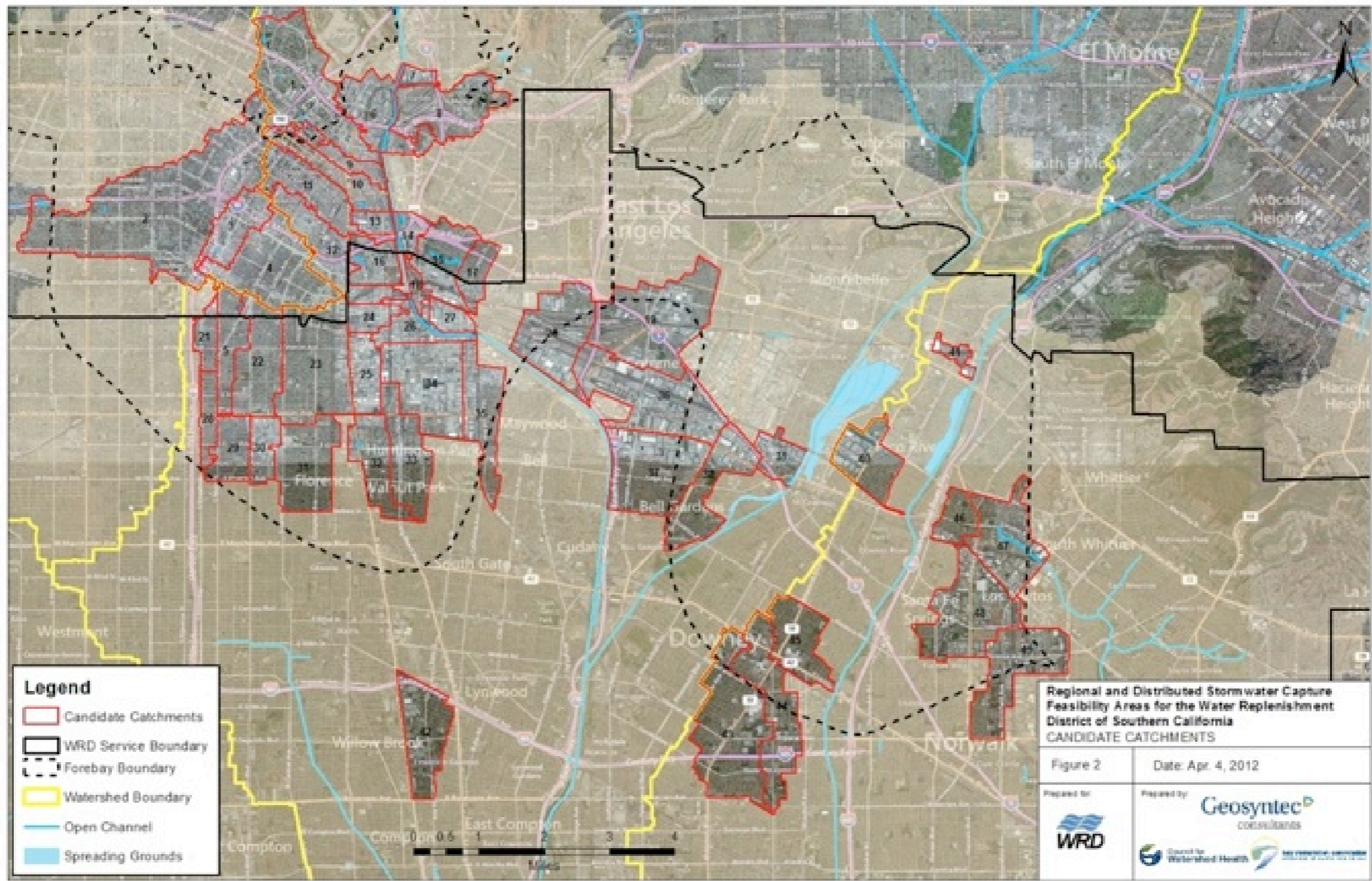
Main Objectives:

- Develop a prioritized list of locations for stormwater capture and recharge.
- Develop a model pilot project to assess recharge contribution

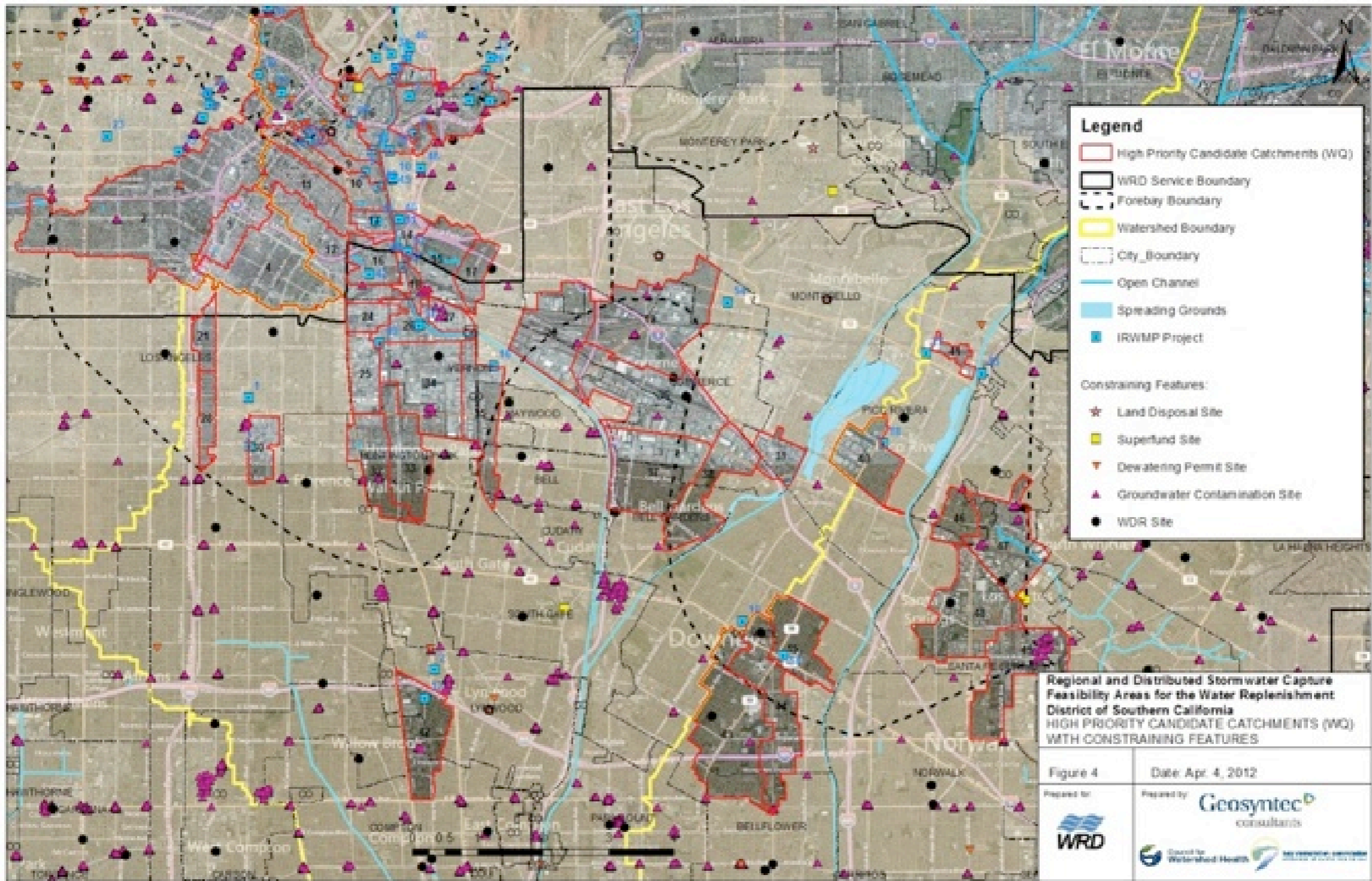
Key Question:

- Can distributed stormwater infiltration be implemented cost-effectively for recharge purposes?

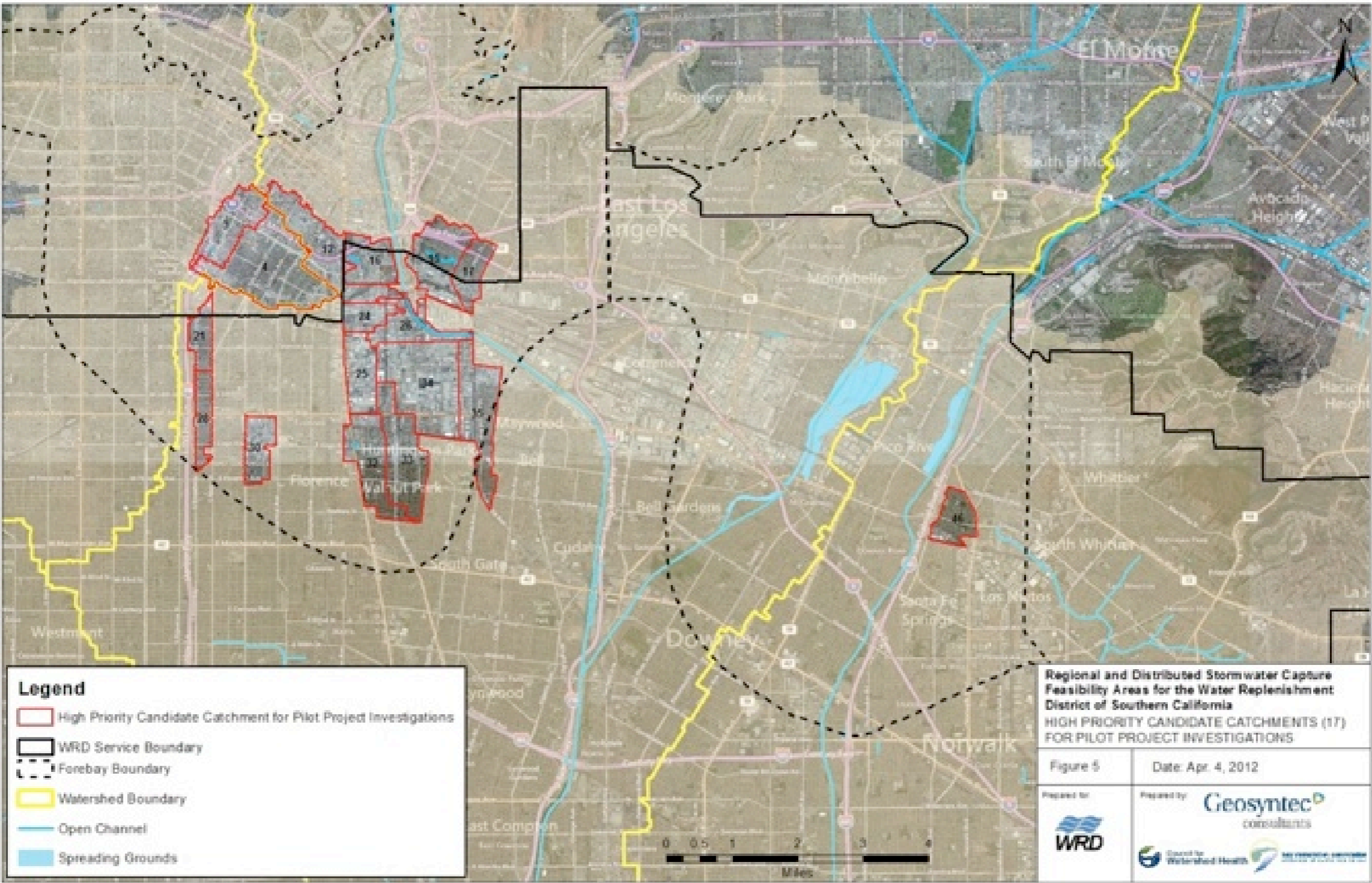
Findings: 49 Candidate Catchments



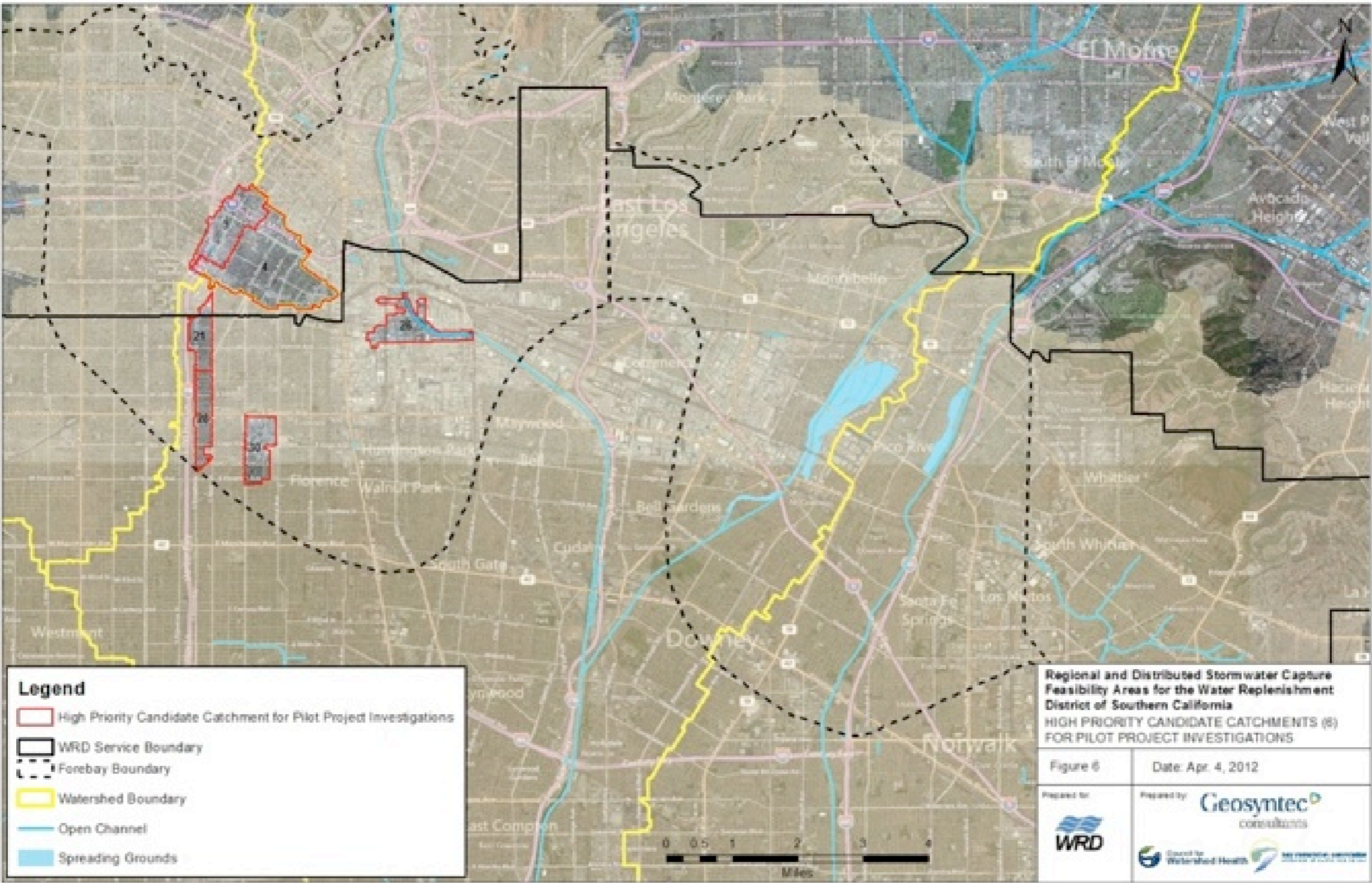
Findings: Constraints Analysis



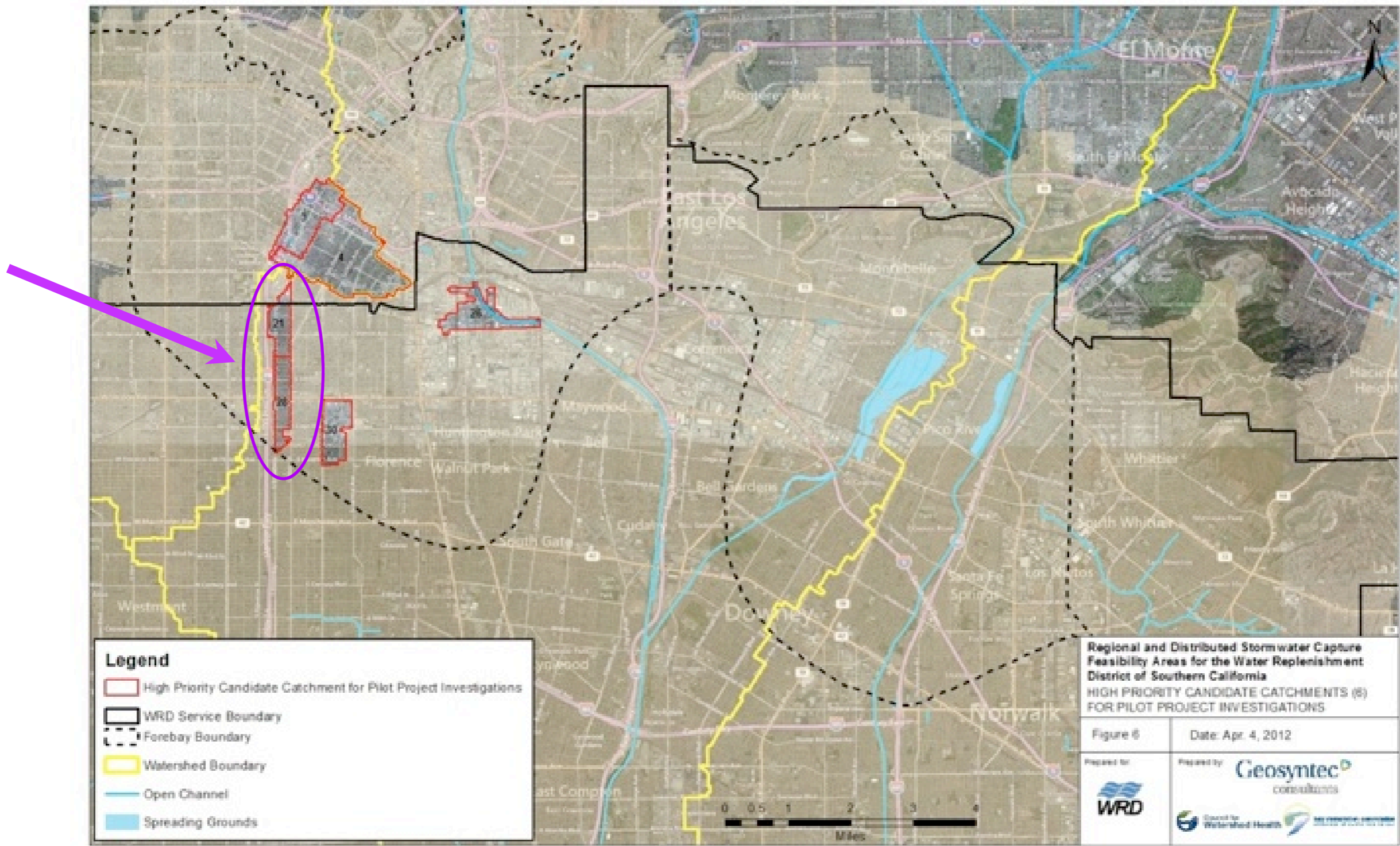
Findings: 17 High-Priority Catchments



Findings: Pilot Project Candidates



Findings: Choosing a pilot location

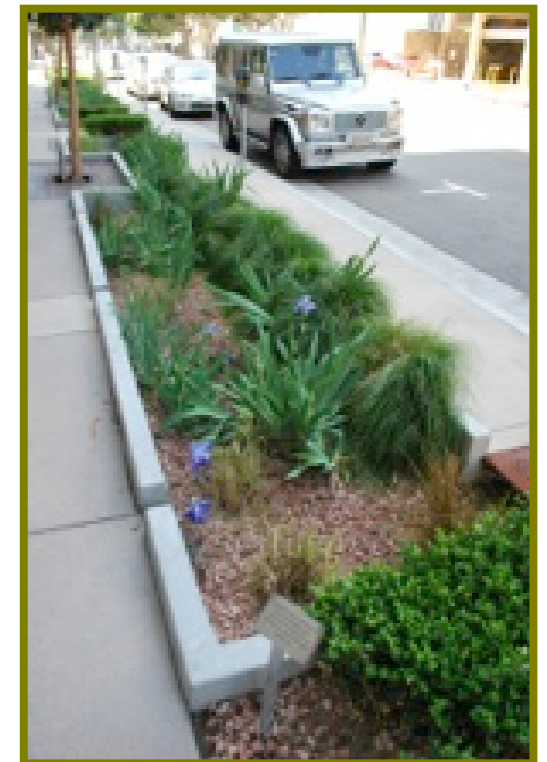
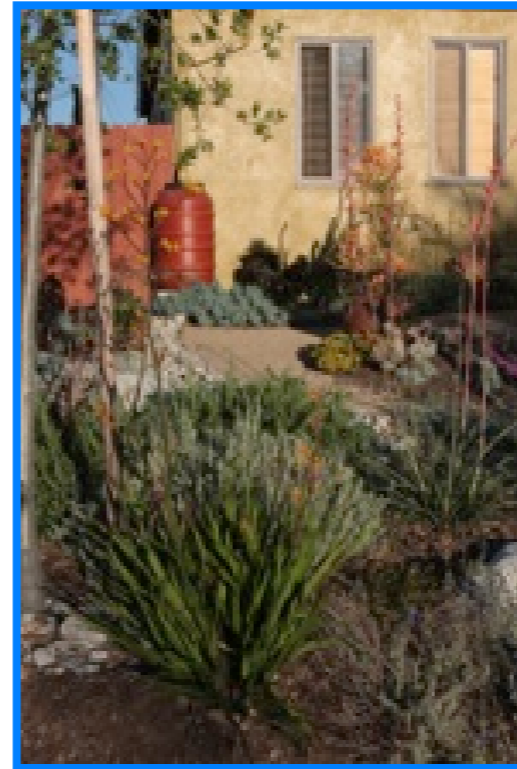


Findings: Pilot Project Concept



Design Criteria

- Four BMP Locations
 - Residential Property
(capture 3/4" storms)
 - Residential Streets
(capture 3/4" storms)
 - Commercial Street
(capture 3/4" storms)
 - Subregional Infiltration
(capture 2" storms)



A theory of Phased Implementation

- Design reflects catchment-wide system of component green infrastructure elements
- Single elements can be implemented alone without fear of degradation
- System tuned to theoretical full-implementation
- Implementation can be opportunistic
- Full-implementation realizes peak efficiency of all included elements



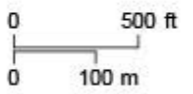


PROPOSED BMP PROJECTS

-  Commercial Green Street
-  Subregional Infiltration
-  Residential Street Infiltration
-  Residential Property BMPs

CONTRIBUTING LAND USES

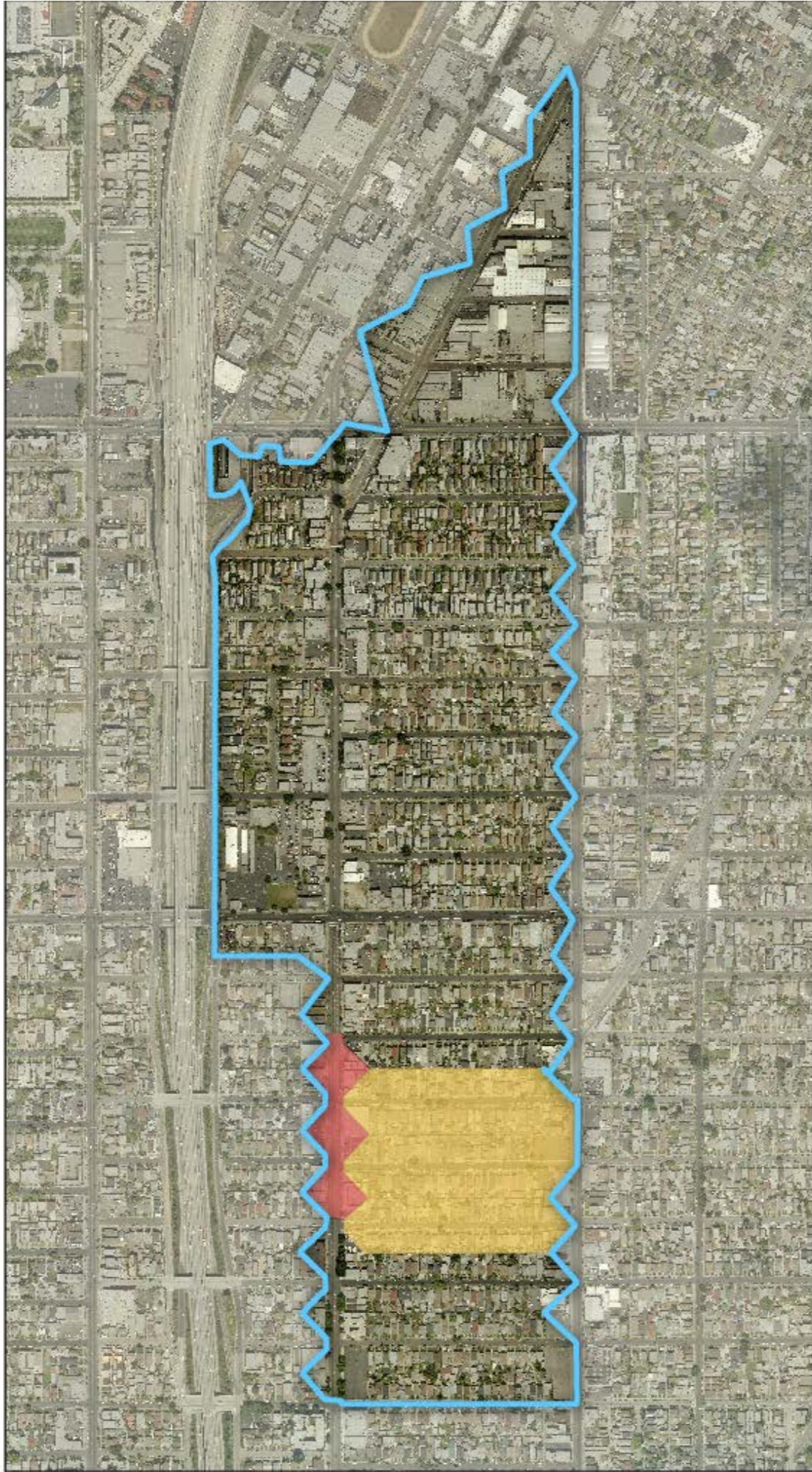
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-  Residential



BMPs not drawn to scale. Exact locations is dependant on homeowner participation.



bay restoration commission
STEWARDS OF SANTA MONICA BAY



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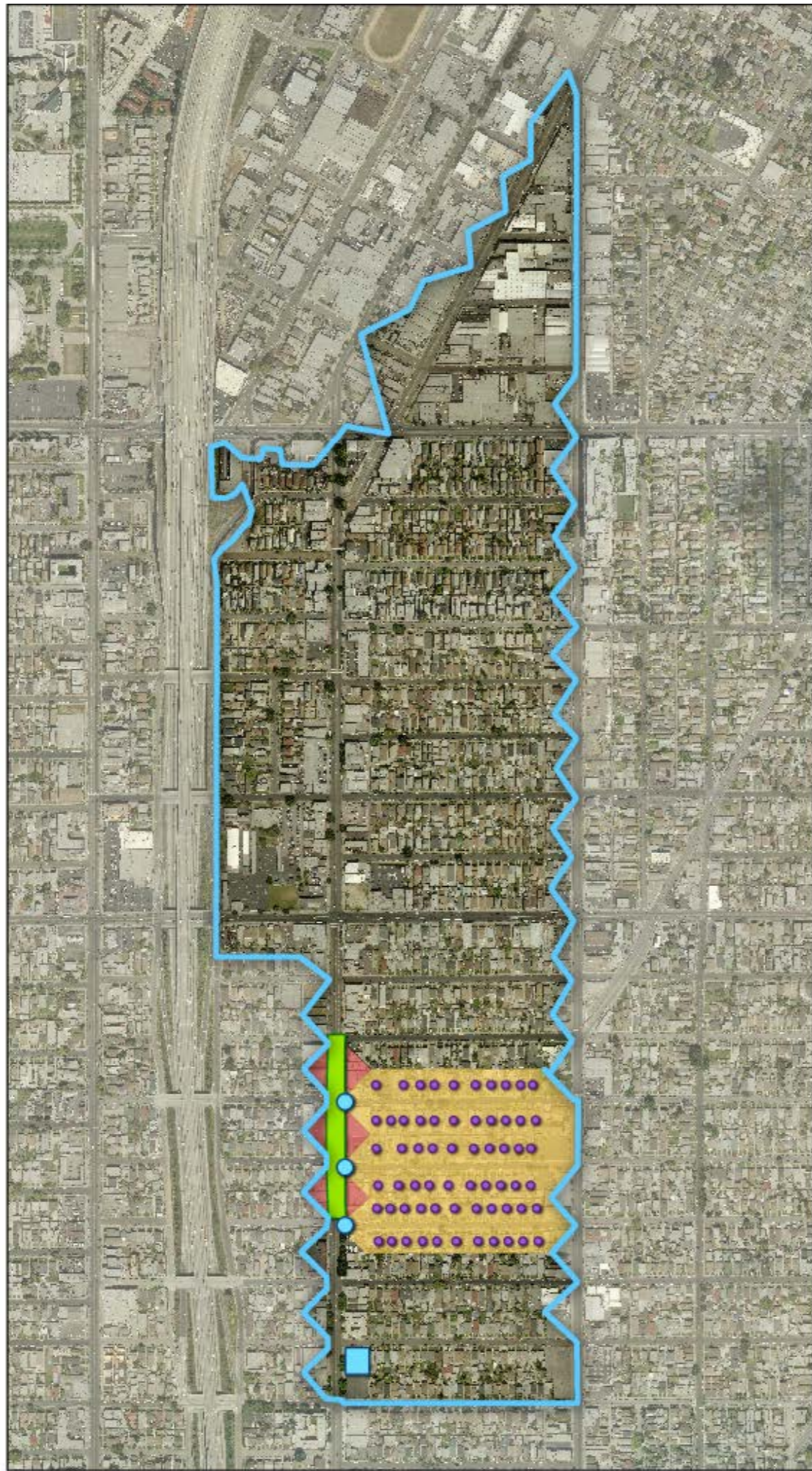
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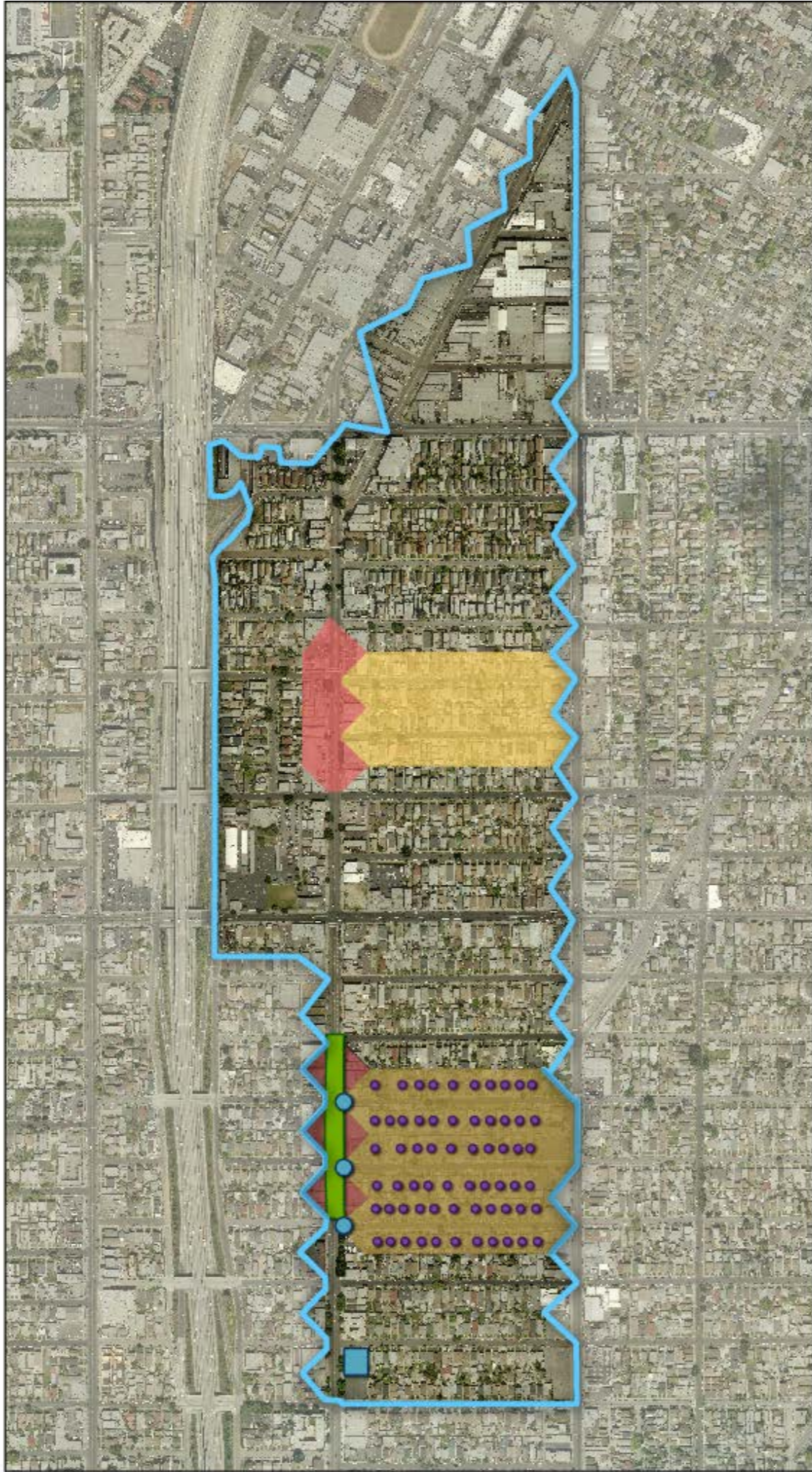
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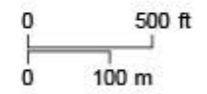


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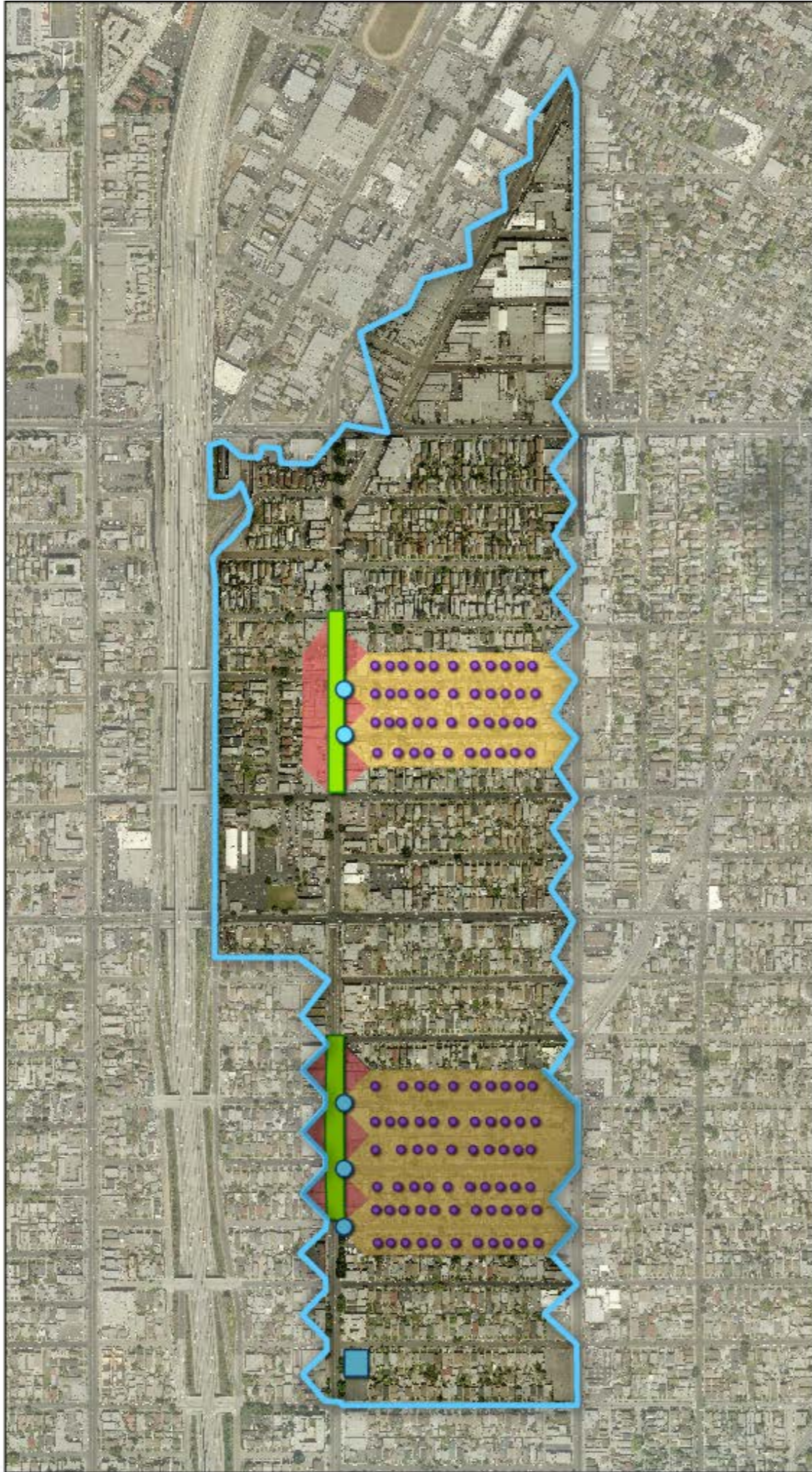
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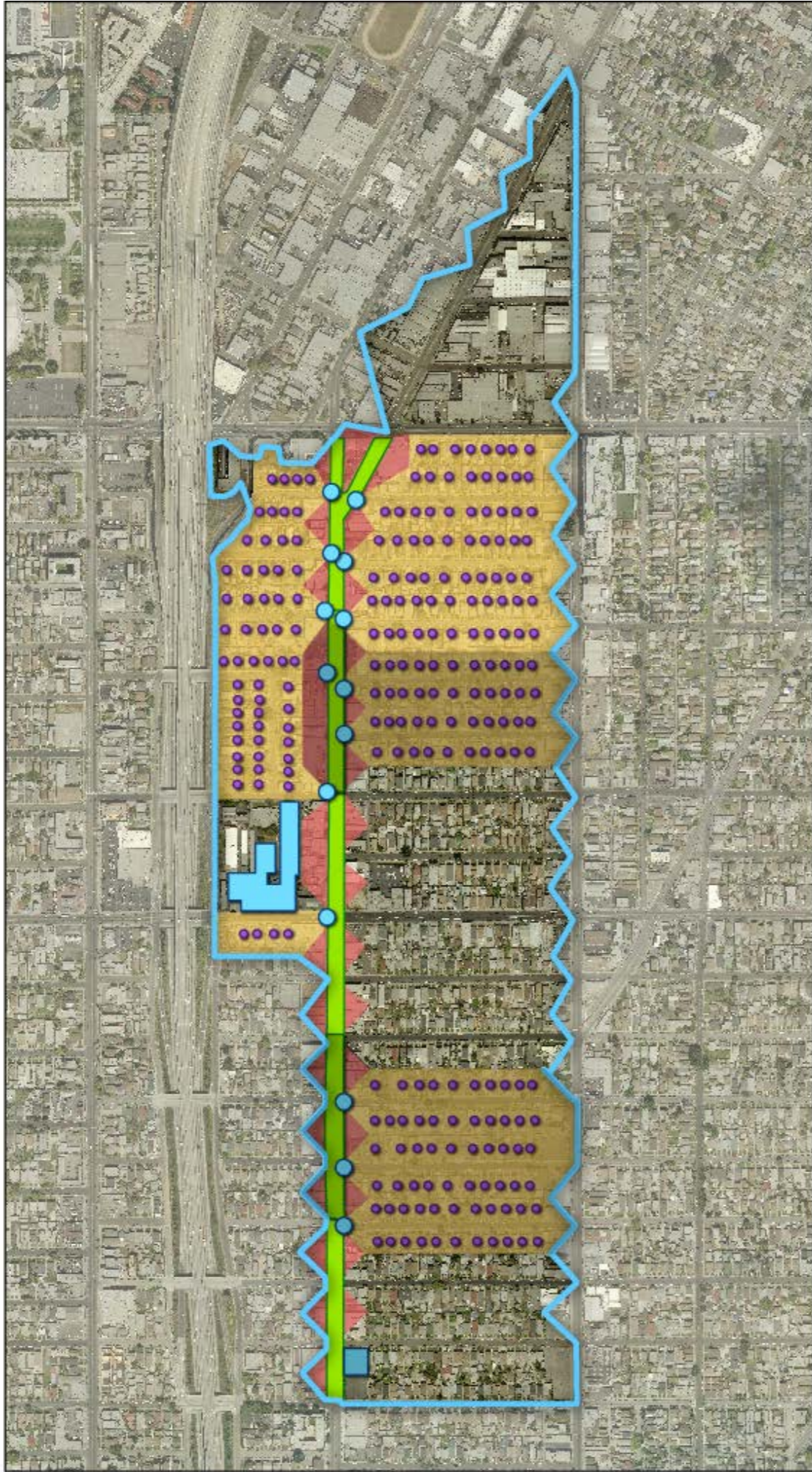
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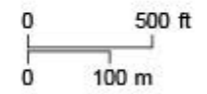


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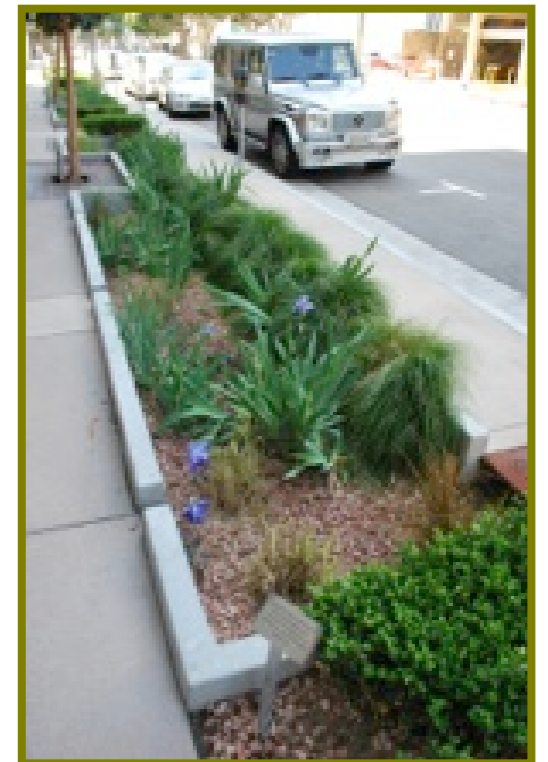
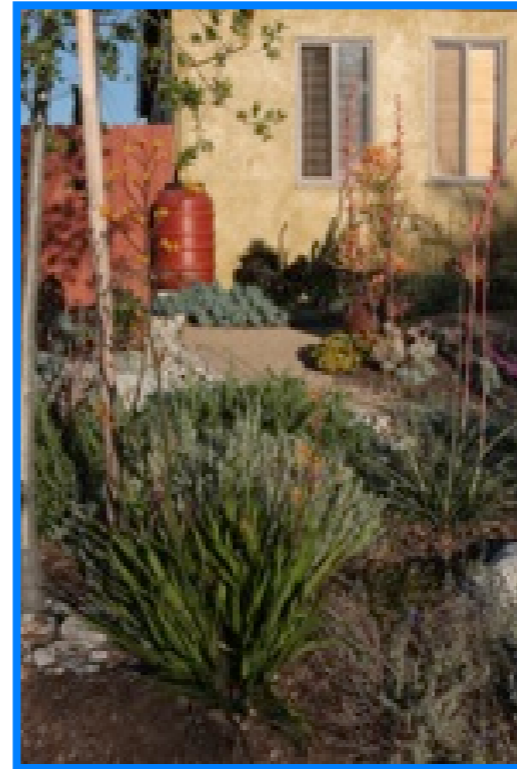
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Findings: Pilot Cost Estimation

BMP Location	BMP Type	Number of BMP' s installed within Pilot Area	Pilot Design & Construction Cost Estimation	Annual Infiltrated Volume (af/yr)	<i>Design & Construction Costs per AF over 30-year BMP life</i>
Residential Single & Multi-Family	Rain Garden	60	\$112,000	2.4	\$1,600
Residential Street	Intersection Catch-basin BMP	6	\$425,000	6.8	\$2,100
Commercial Green Street	<i>Multiple</i>	1	\$2,279,000	3.1	\$24,500
SubRegional BMP	Subsurface Infiltration	1	\$1,432,000	28.7	\$1,700

Report encourages cost-sharing with others who accrue benefits from these projects

Findings: Strategy for Water Supply Agencies

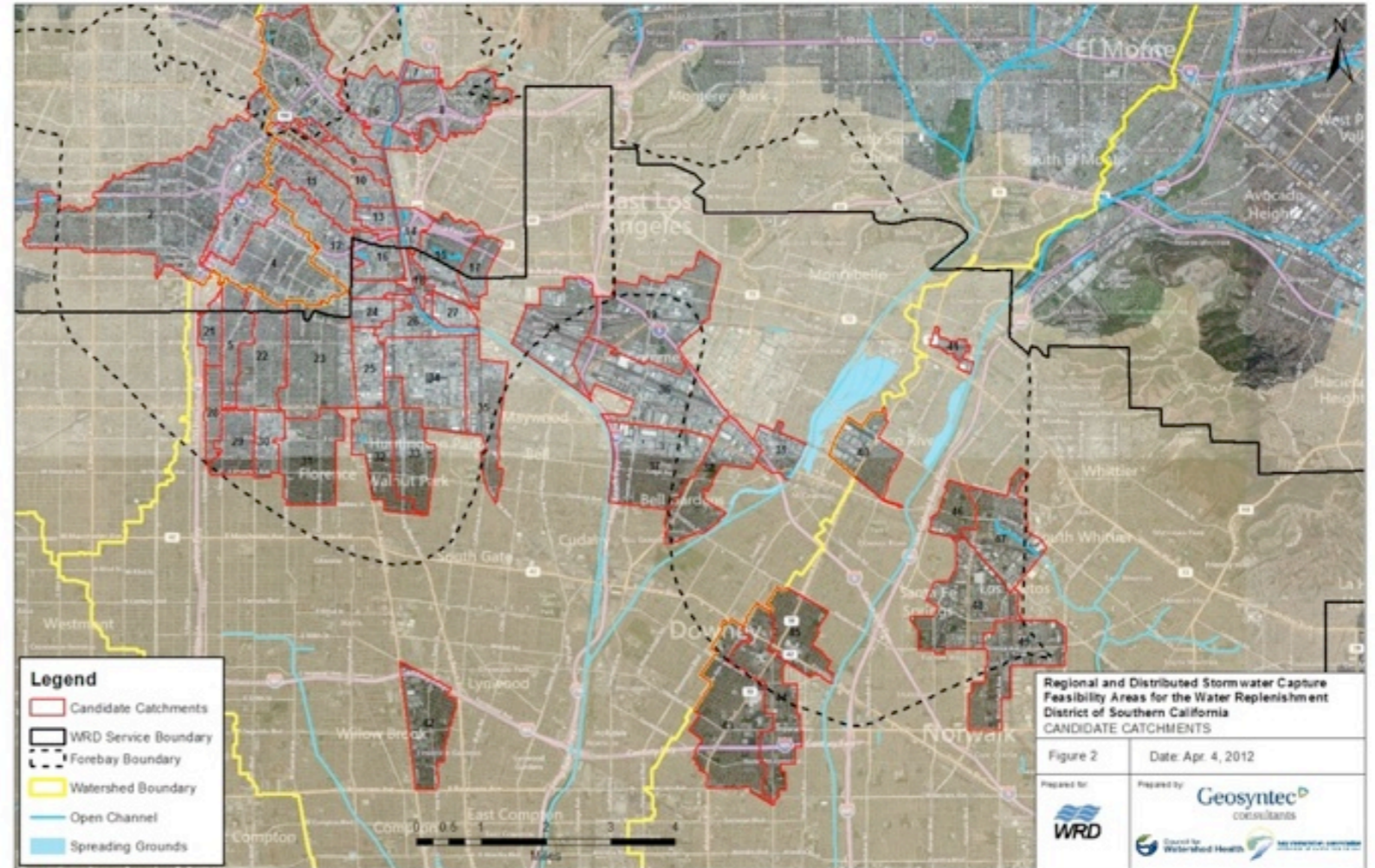
BMP Location	BMP Type	Number of BMP's installed within Pilot Area	Pilot Design & Construction Cost Estimation	Annual Infiltrated Volume (af)	Water Supply Cost-share, 30-yr BMP lifetime	Water Supply Cost Share of budget, @ imported water rate (\$677)
Residential Single & Multi-Family	Rain Garden	60	\$112,000	2.4 / yr	\$677 / AF	44%
Residential Street	Intersection Catch-basin BMP	6	\$425,000	6.8 / yr	\$677 / AF	32%
Commercial Green Street	<i>Multiple</i>	1	\$2,279,000	3.1 / yr	\$677 / AF	3%
SubRegional BMP	Subsurface Infiltration	1	\$1,432,000	28.7 / yr	\$677 / AF	41%

Findings: Supply & Avoided Treatment Rationale

BMP Location	BMP Type	Service Life of Project (Years)	Pilot Design & Construction Cost Estimate	Annual Infiltrated Volume (AF)	Service Life Value of Infiltrated (Supply)	Service Life Value of Infiltrated (Quality)	Total Service-life Value per acre-foot	Total Service-life Cost per acre-foot	Benefit - Cost Ratio
Residential Single & Multi-Family	Rain Garden	30	\$111,600	2.4	\$48,744	\$69,912	\$1,648	\$1,550	1.06
Residential Street	Intersection Catch-basin BMP	30	\$425,256	6.8	\$138,108	\$188,436	\$1,601	\$2,085	0.77
Commercial Green Street	Multiple	30	\$2,279,400	3.1	\$62,961	\$100,232	\$1,755	\$24,510	0.07
Sub-Regional BMP	Subsurface Infiltration	30	\$1,432,080	28.7	\$582,897	\$1,082,506	\$1,934	\$1,663	1.16

Feasibility Study Summary

- Potential for 17,000 AF/yr in opportunity catchments
 - Nearly 4,300 AF/yr in high feasibility catchments
- Most stormwater capture projects are too expensive for a water supply agency to fund alone*



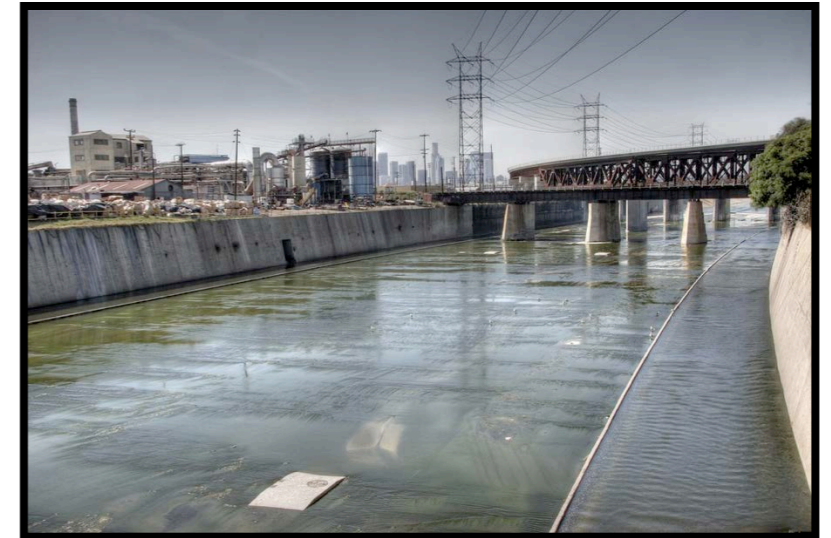
Green Infrastructure

Grey Infrastructure

Single-purpose

Single-managed / maintained

Cost calculation leverages 100+ years of investment

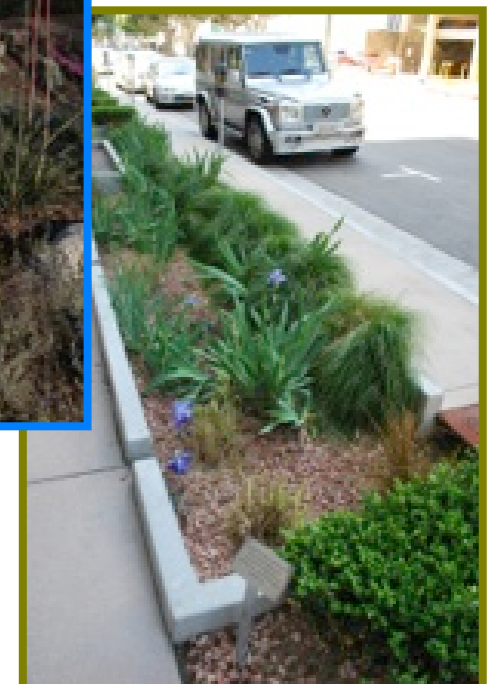
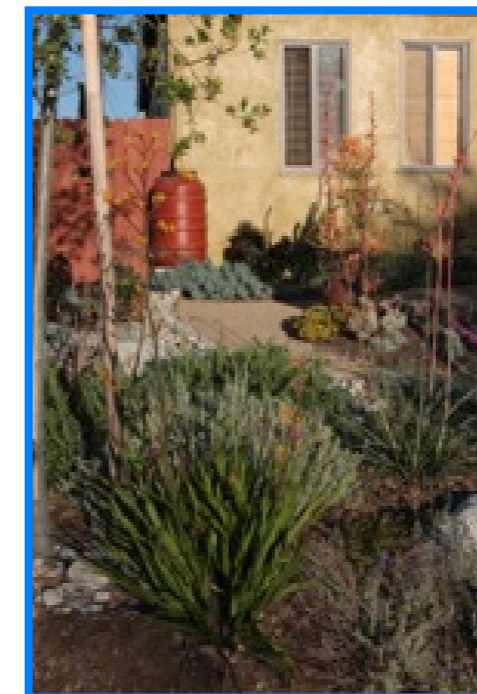


Green Infrastructure

Multi-purpose

Multi-managed / maintained

Internalizes historic externalities, raising *apparent costs*



Green Infrastructure

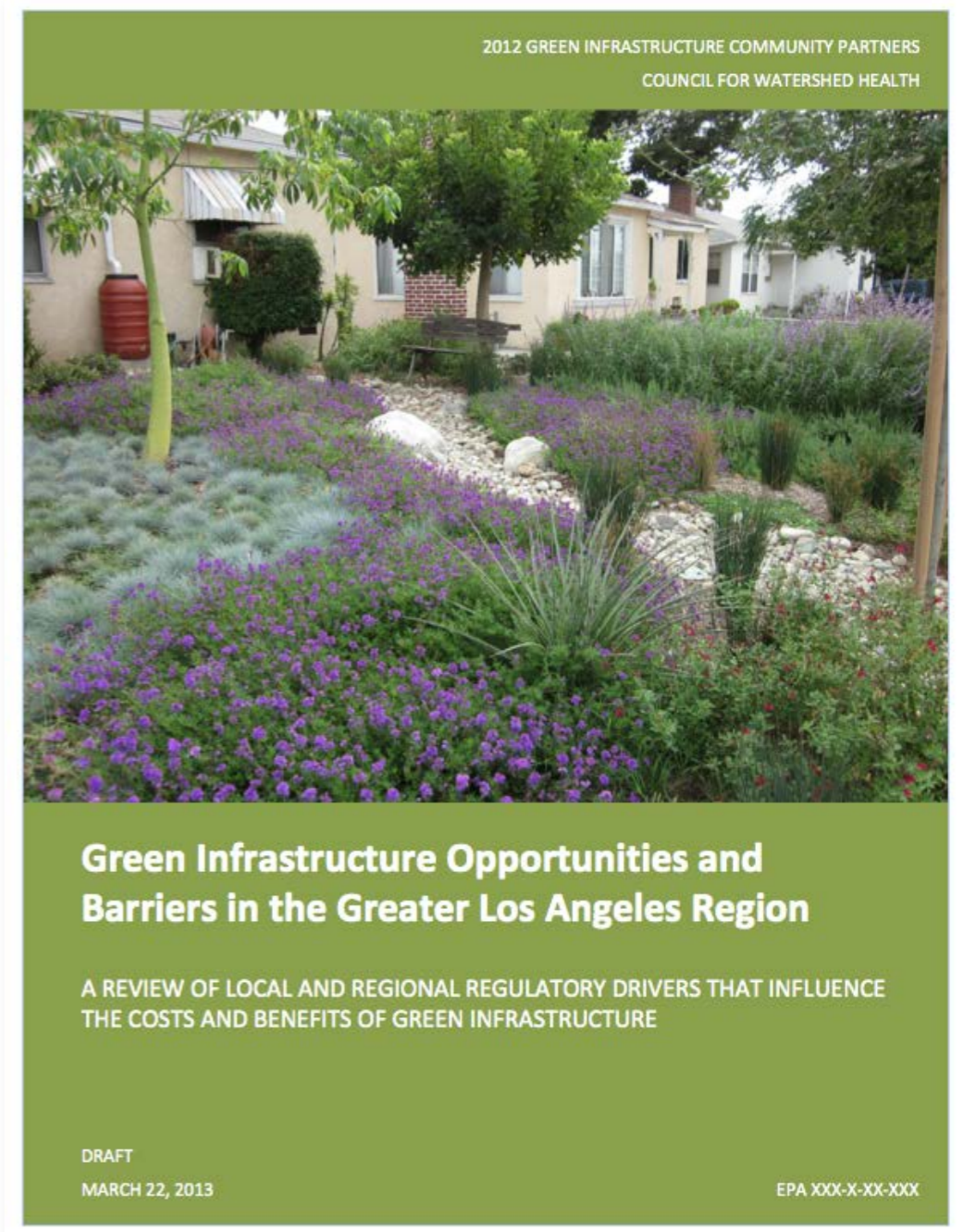
Uses vegetation, soils and natural processes to manage water and create healthier urban environments.

- Catch water for recharge
- Clean water that flows through
- More green space for respite & recreation
- Water conservation
- Economic development (beautification)
- Jobs (construction & operation)
- Energy savings
- Carbon benefits
- Habitat value



Green Infrastructure Solutions

- Global Warming Solutions Act (AB32)
- Sustainable Communities and Climate Protection Act of 2008 (SB375)
- Water Conservation Act of 2009 (SBx7-7)
- Water Efficient Landscape Ordinance (AB1881)
- Municipal Stormwater Permit for the Los Angeles Region
- Greater Los Angeles County Integrated Regional Water Management Plan
- Water Quality Control Plan for the Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties
- TMDL Implementation Plans
- Groundwater Adjudications in the Central and West Coast Basins



Water Jobs

- Studied \$1.2 billion of investments in water projects
- Stormwater, Water Conservation, Water Treatment, Groundwater Management / Remediation, Recycled Water
- Found:
 - \$2.4 billion in direct, indirect and induced economic activity
 - 16,579 person-years of direct, indirect and induced employment

Water Use Efficiency and Jobs



Economic Roundtable
A Nonprofit Research Organization



Water Jobs

- For every \$1 million spent on water projects:
- Stimulates \$1.9 - 2.1 million in total sales
- Creates 12.6-16.6 jobs
 - Wages between \$33,286 - \$52,828
- This exceeds the productivity of:
- Motion Picture & Video Production
- Housing Construction

Water Use Efficiency and Jobs



Economic Roundtable
A Nonprofit Research Organization



Thank you!



Mike Antos - Programs Director
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