

A high-speed photograph of water splashing, creating a crown-like shape with many droplets, set against a light blue background. The water is a deep blue color.

Kennedy/Jenks Consultants

**Two Approaches to Harnessing Stormwater
for Groundwater Recharge and Water Supply**

California Stormwater Quality Association

Sachi Itagaki, P.E. and Rachel Morgan, EIT

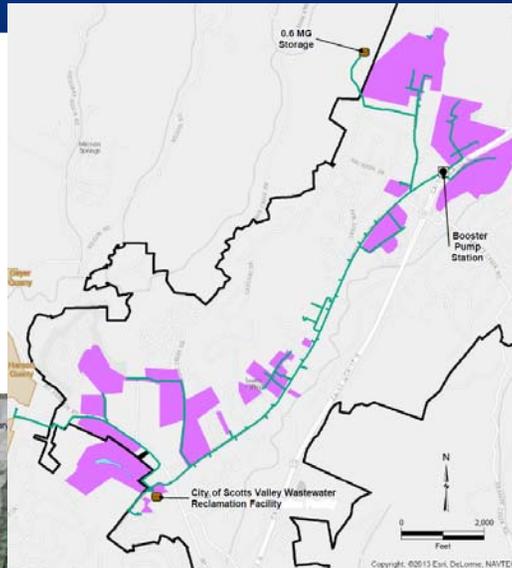
17 October 2018

Wastewater and Stormwater as a Water Resource – Local and Regional Approaches

- **Scotts Valley Water District, Santa Cruz County, California**
 - Groundwater and Recycled Water Resources
 - Recharge Opportunities
 - » Advanced Purified Water
 - » Stormwater

- **Las Virgenes Municipal Water District, Los Angeles County, California**
 - Imported Water and Recycled Water Resources
 - Evaluation of Stormwater to Supplement Wastewater

Scotts Valley Water District – A Tale of Two (or more) Waters

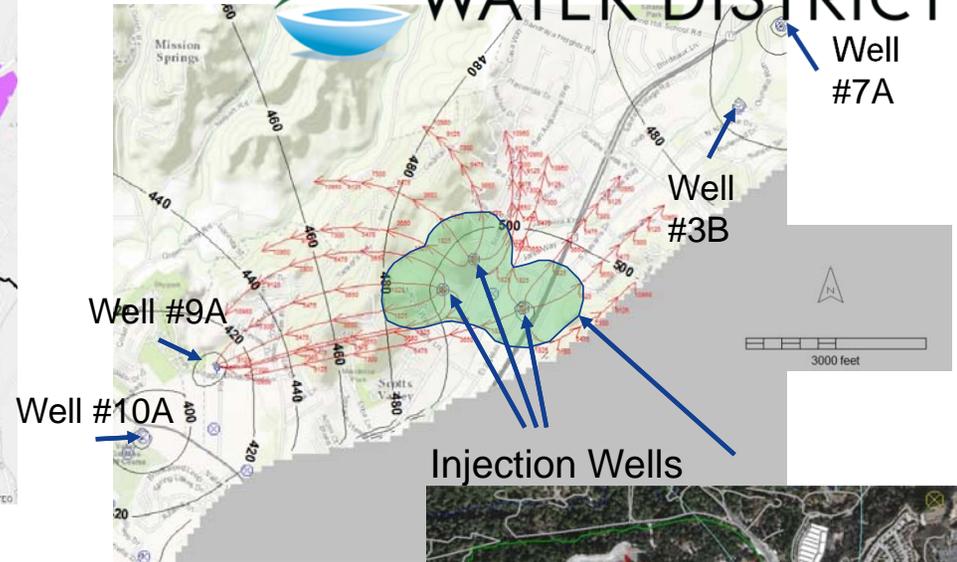


SVWD Recycled Water Irrigation System

Groundwater in Scotts Valley

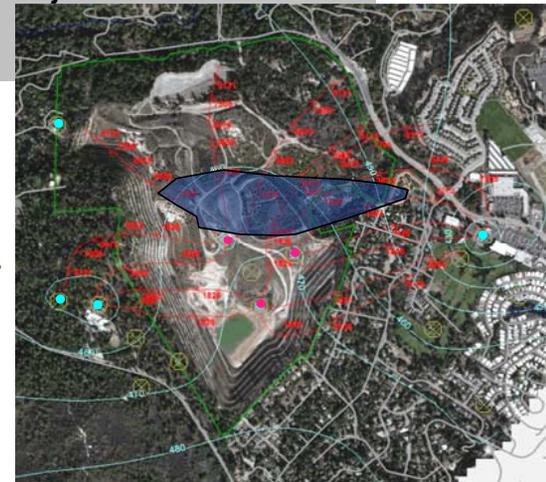


SCOTTS VALLEY WATER DISTRICT



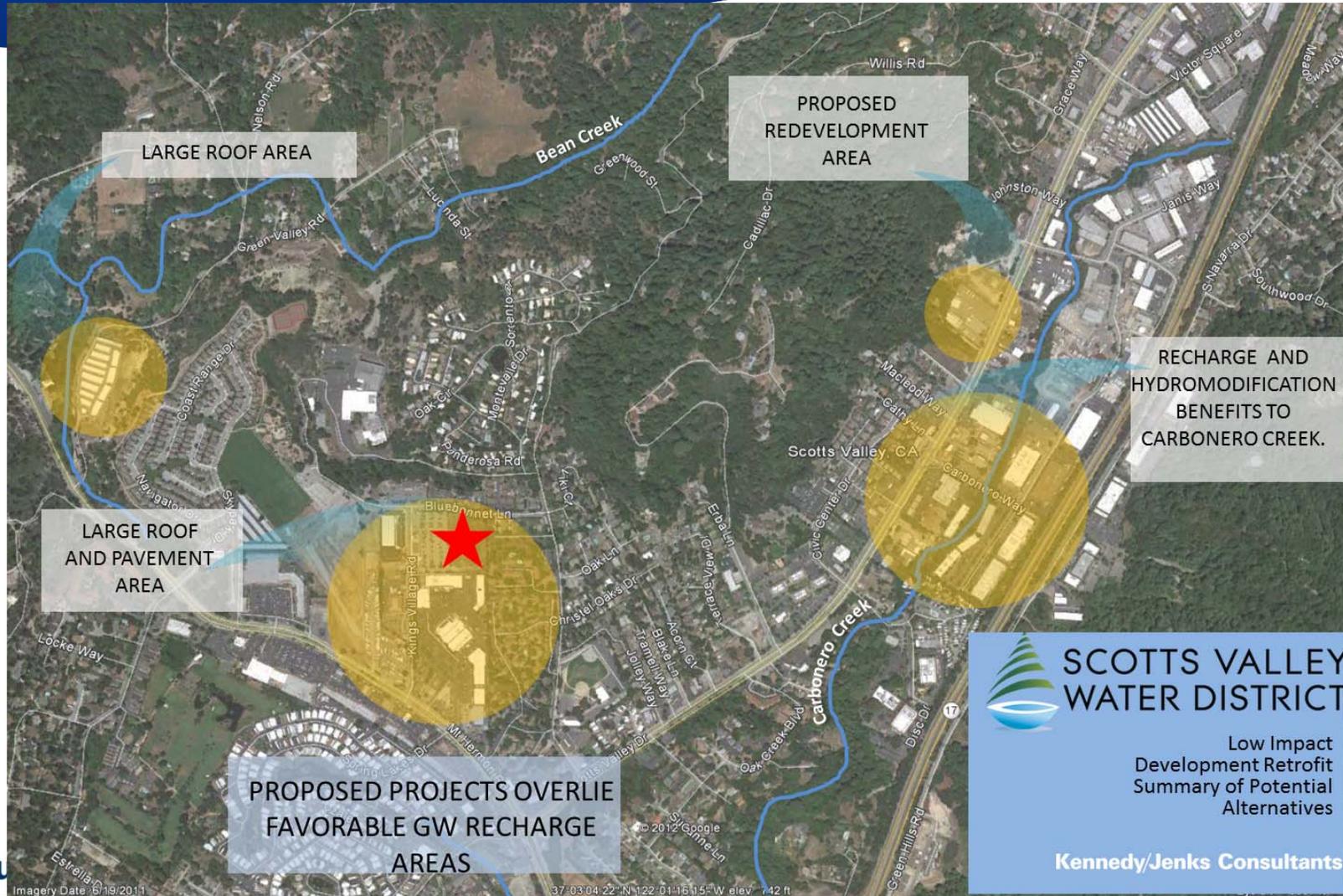
Injection Wells

Advanced Water Treatment of RW for GW Injection



Stormwater Recharge Site selection

Urbanization has contributed to loss of groundwater recharge

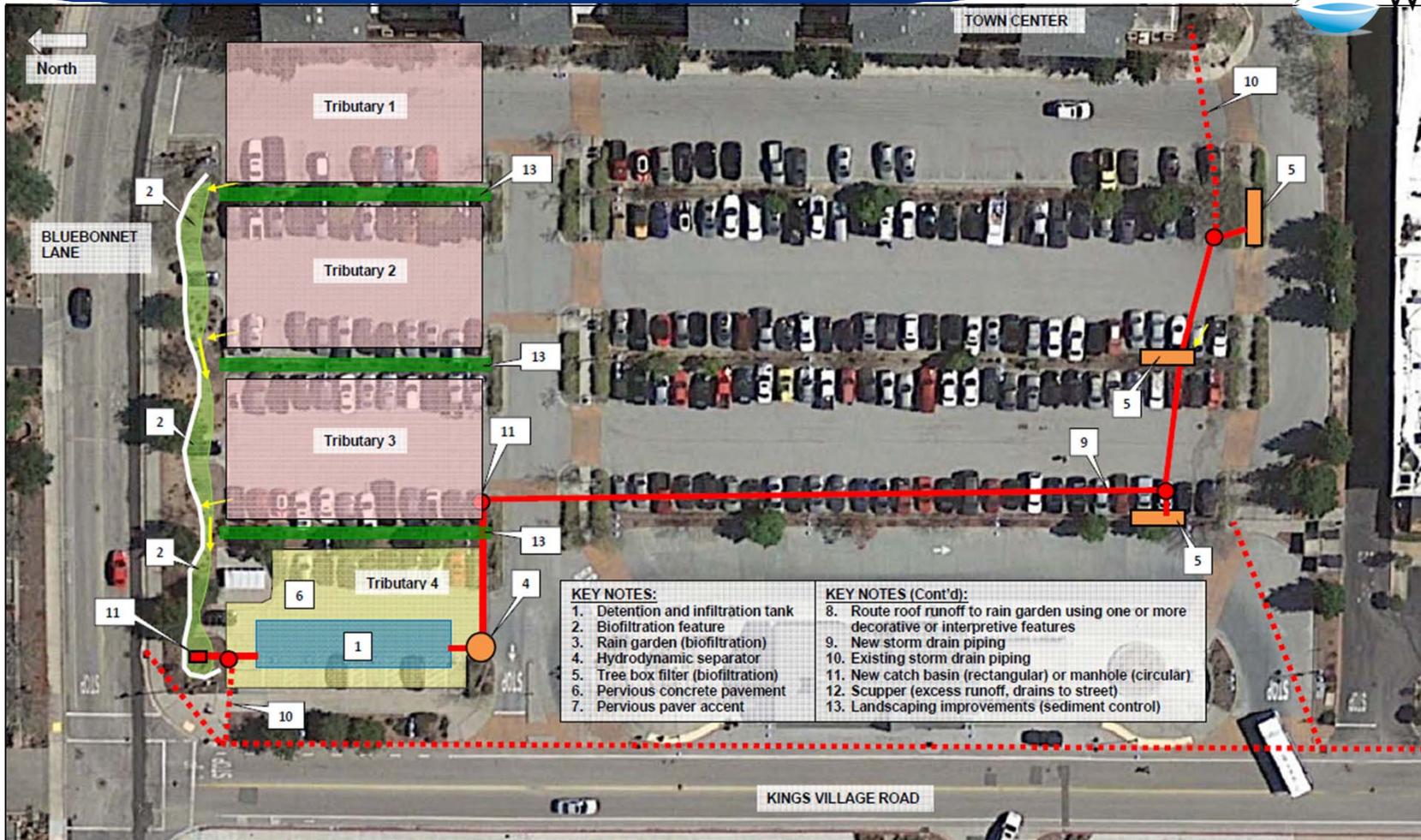


 **SCOTTS VALLEY WATER DISTRICT**

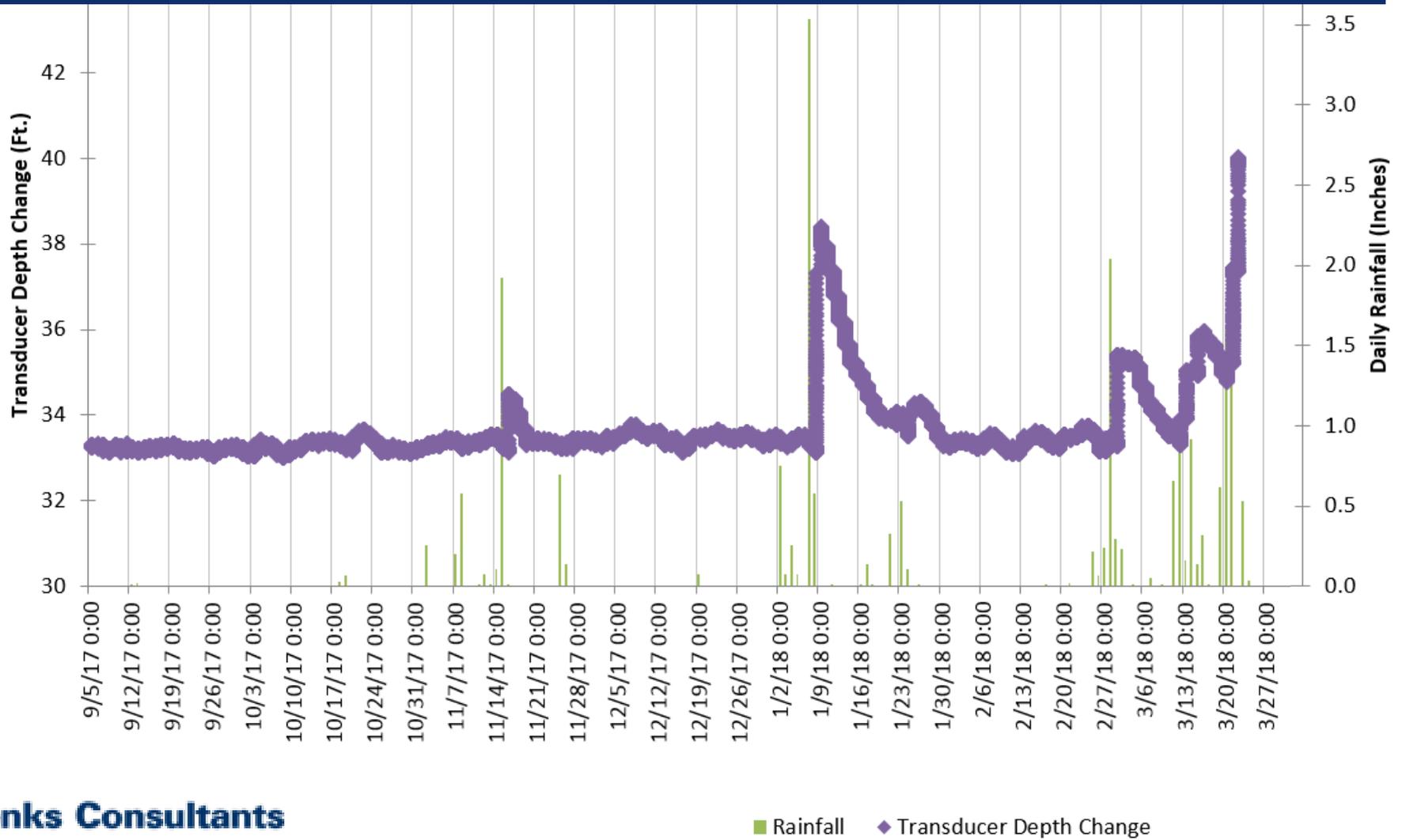
Low Impact Development Retrofit
Summary of Potential Alternatives

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Stormwater Treatment and Recharge Opportunity



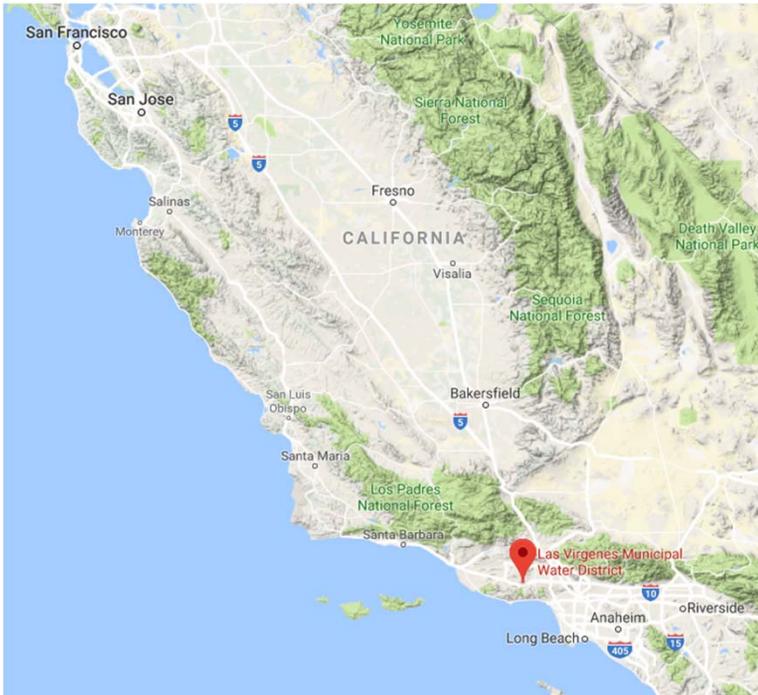
2017-2018 Data Estimate Recharge of 1.2 AF from about 20 inches of rainfall



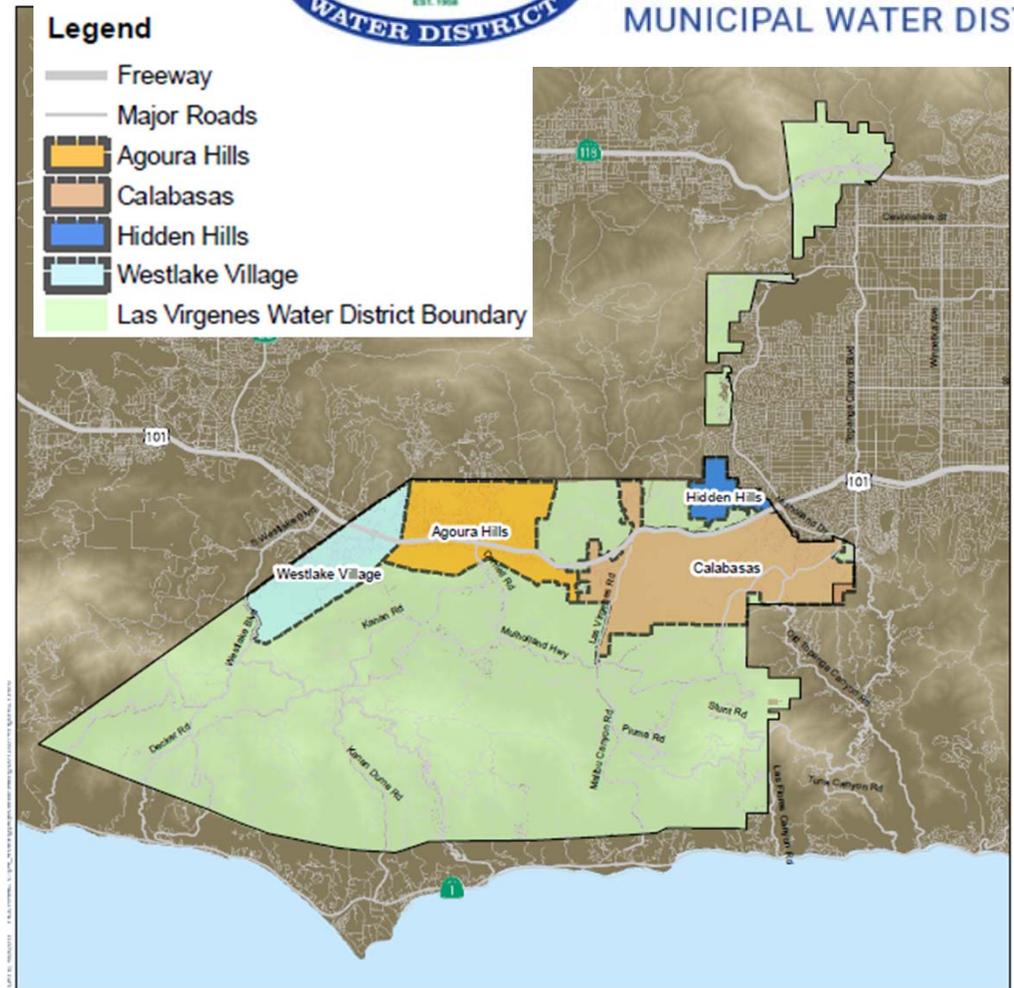
Las Virgenes Municipal Water District Stormwater to Supplement Recycled Water



LAS VIRGENES MUNICIPAL WATER DISTRICT



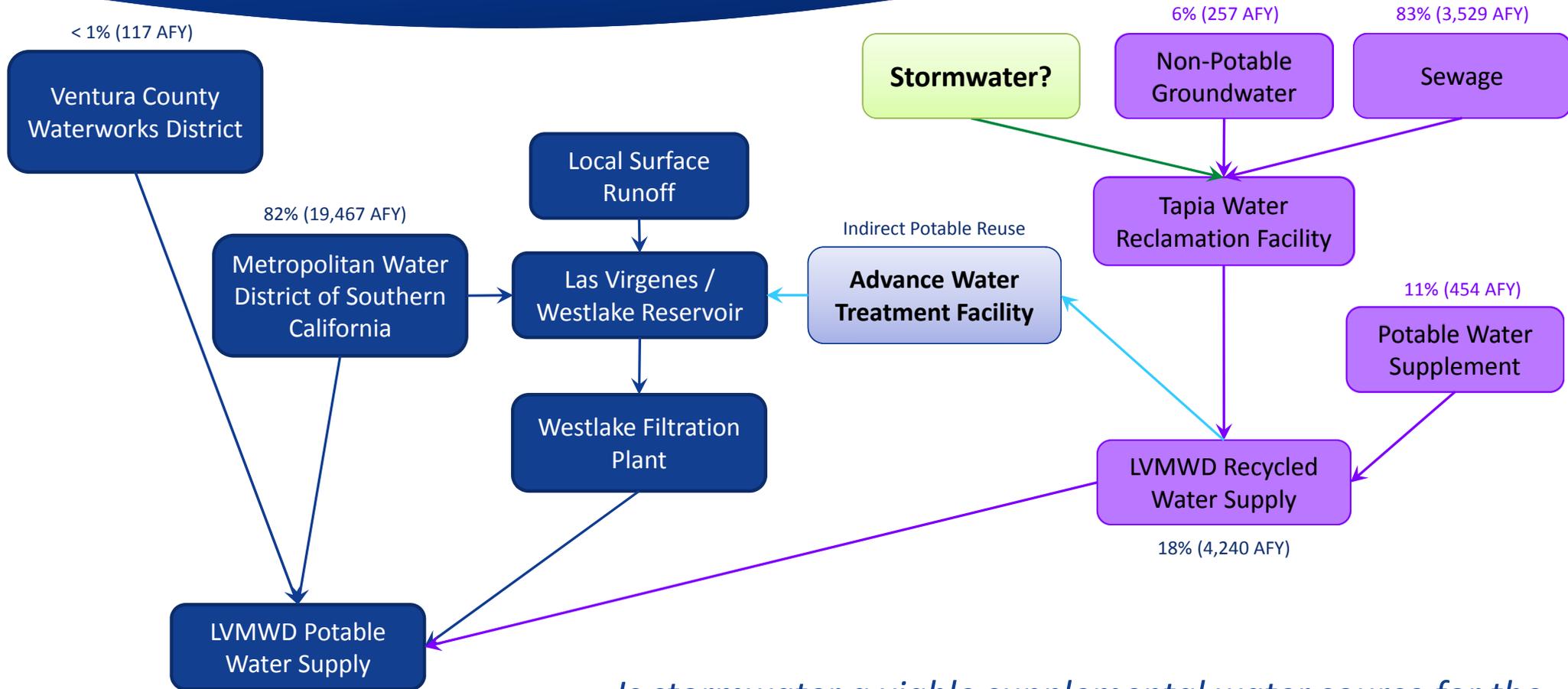
Source: (left) Google Maps; (right) LVMWD Urban Water Management Plan, June 2011. Prepared by Carollo Engineers.



Title XVI Recycled Water Feasibility Study

- Grant from the U.S. Bureau of Reclamation. Water Reclamation and Reuse (Title XVI) Program
- Goal: identify project to improve local water supply reliability and drought resilience
 - Capture all unused recycled water available during low irrigation demand months
 - Indirect potable reuse
- Secondary goal: eliminate treated wastewater discharges from Tapia WRF to Malibu Creek in response to new regulations

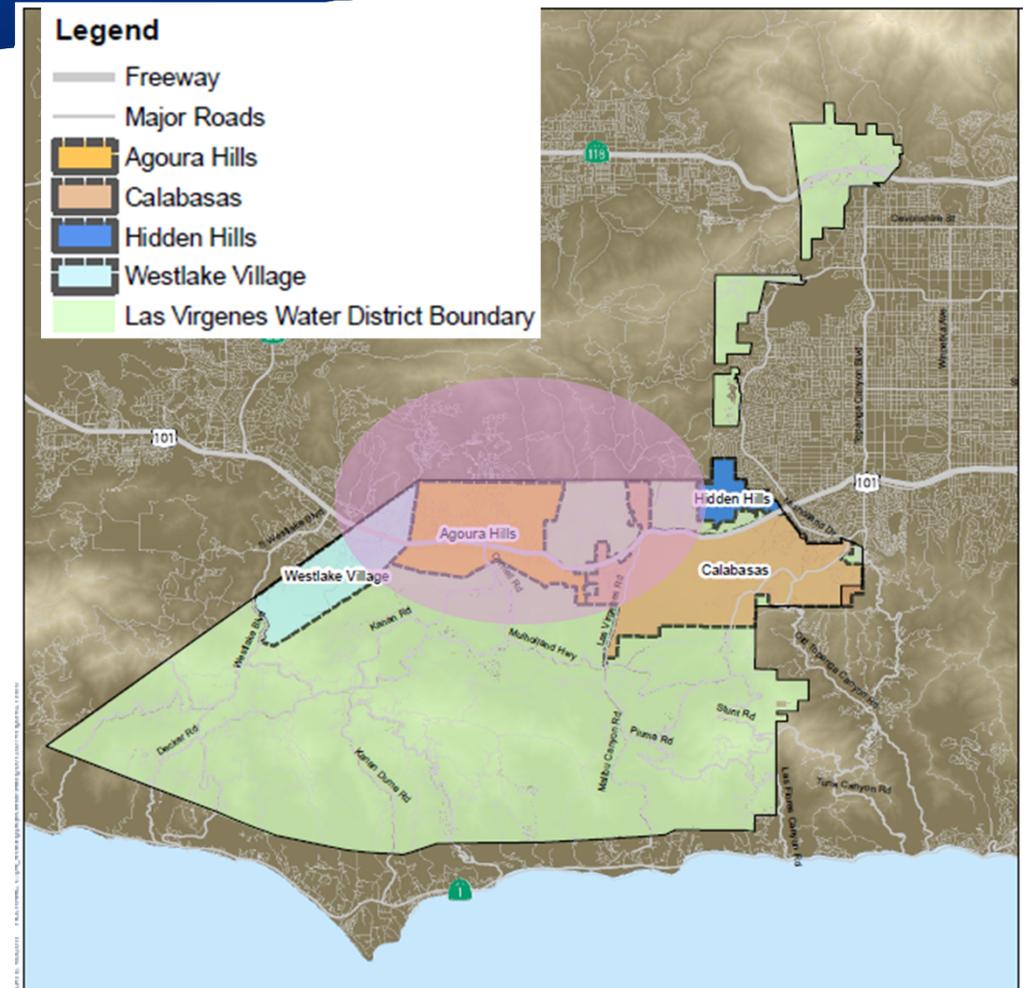
Las Virgenes Municipal Water District Water Supply



Is stormwater a viable supplemental water source for the Pure Water Project?

Stormwater Setting

- Malibu Creek Watershed
 - 303(d)-listed for fecal coliform, N, P, and sediments
- Cities of Agoura Hills, Calabasas, Westlake Village, unincorporated Los Angeles County
 - Co-permittees on MS4 permit
 - Own and operate stormwater infrastructure within LVMWD service area
- Monterey/Modelo Geologic Formation
 - Natural marine sediments contain SO₄, metals, P, N, and sediments
 - Runoff and groundwater discharges generally higher in salinity

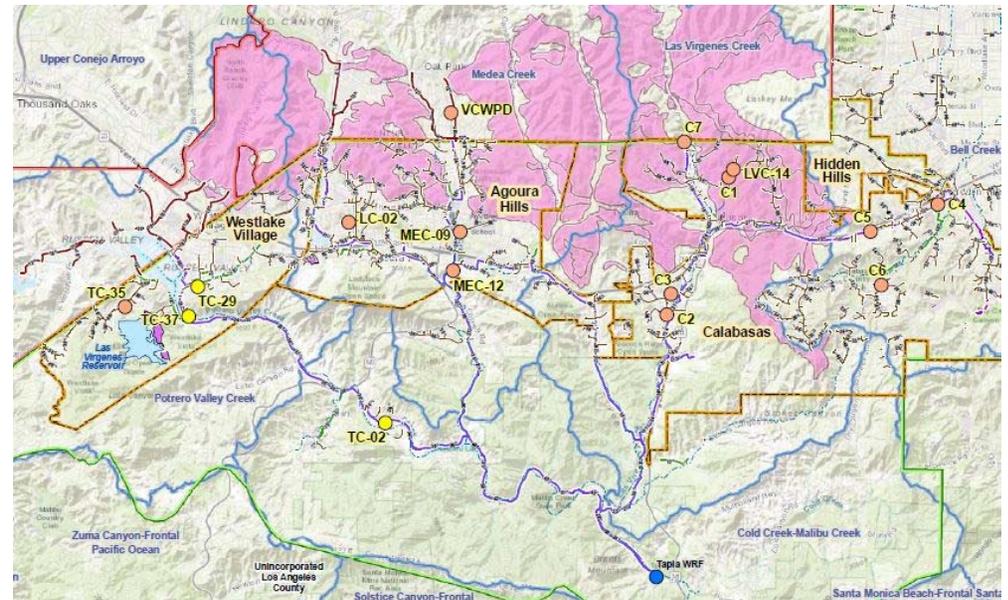


Feasibility of Stormwater Capture Opportunities

- Step 1: Identified 16 Existing Projects

- Step 2: Project Screening

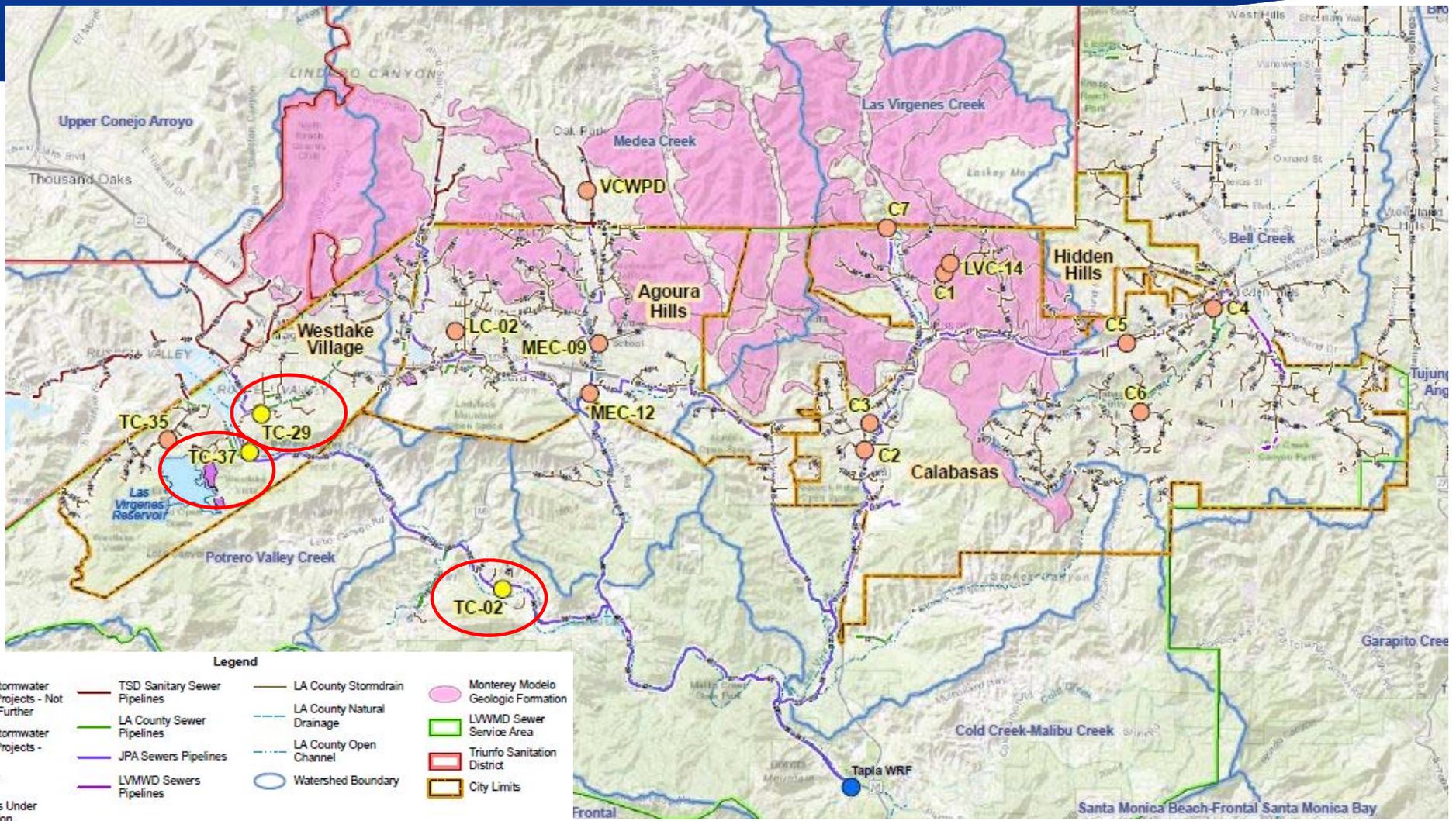
- Proximity to existing sanitary sewer
- Estimated quantity for diversion
- Monterey/Modelo Formation
- Project Flexibility
 - » Upsize potential
 - » Project status
 - » Potential for project partner



- Step 3: Identify short list of projects for further evaluation

- TC-02, TC-37, TC-29





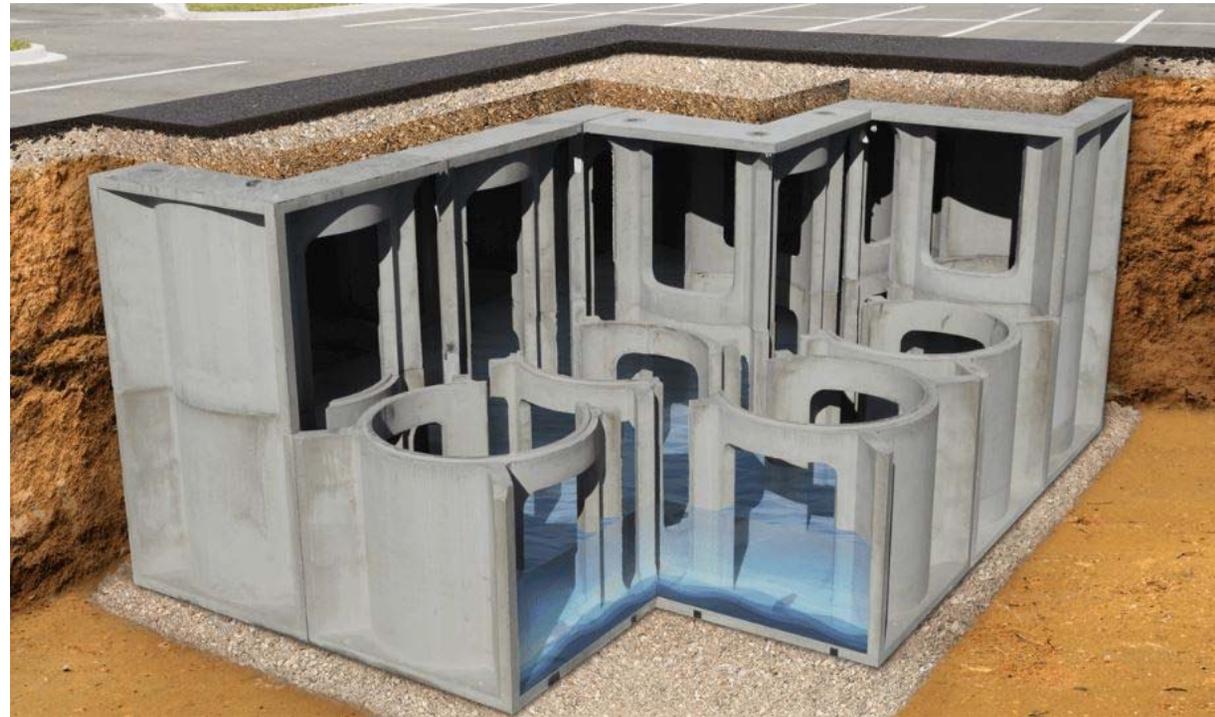
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Feasibility Stormwater Capture Opportunities

Source: <http://stormprism.com/>

- Step 4: Evaluate potential to increase storage capacity
 - Increase storage by increasing depth
 - Gravity vs stormwater pumping for flow control
 - Geologic setting constraints
 - Partner with vendor to estimate maximum potential storage capacity given site constraints

- Step 5: Estimate Quantity and Cost



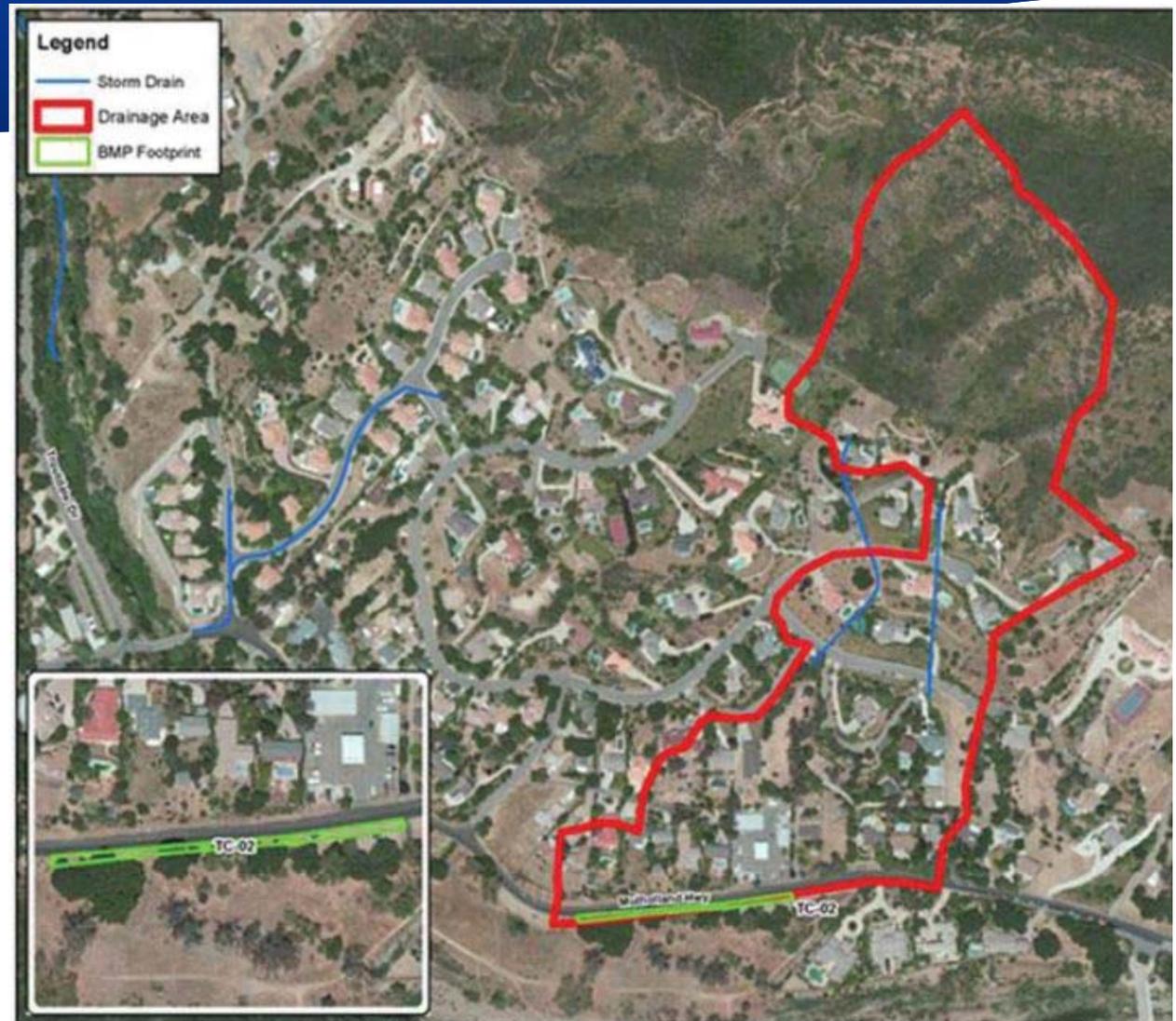
Project: TC-02

MCWEWMP Information:

- 62 Acre Drainage Area
- 0.19 Acre Bioretention Facility
- Estimated MCWEWMP Project Capital Cost: \$2,132,000

Analysis:

- Estimated stormwater available for diversion: 6.8 acre-feet per year
- Estimated incremental capital cost for storage and diversion: \$960,000



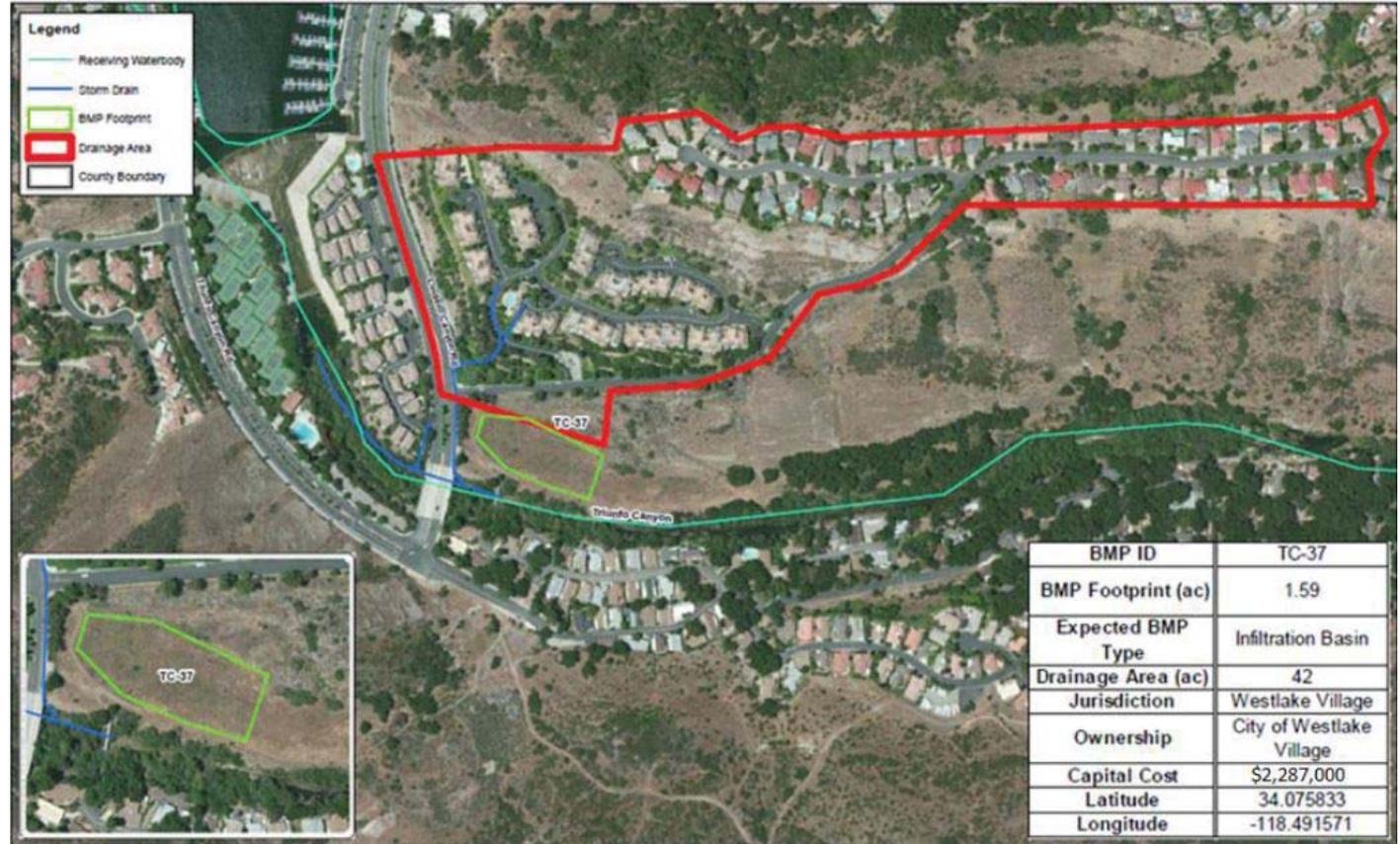
Project: TC-37

MCWEWMP Information:

- 42 Acre Drainage Area
- 1.59 Acre Infiltration Basin
- Estimated MCWEWMP Project Capital Cost: \$2,448,000

Analysis:

- Estimated stormwater available for diversion: 4.6 acre-feet per year
- Estimated incremental capital cost for storage and diversion: \$6,683,000



Source: 2016. Enhanced Watershed Management Program for Malibu Creek Watershed. January 26.

Project: TC-29

■ MCWEWMP Information:

- 96 Acre Drainage Area
- 0.27 Acre Infiltration Chamber
- Estimated MCWEWMP Project Capital Cost: \$1,302,000

■ Analysis:

- Estimated stormwater available for diversion: 10.4 acre-feet per year
- Estimated incremental capital cost for storage and diversion: \$1,282,000



Source: 2016. Enhanced Watershed Management Program for Malibu Creek Watershed. January 26.

Conclusion

- Projects were funded by grants
 - SVWD – CA State Water Resources Control Board RW Facilities Planning and Water Quality Grants
 - LVMWD – Federal US BOR Title XVI Recycled Water grants
- Opportunities exist to modify water quality BMPs to include capture and reuse – multiple benefits!
- Individual projects likely have small impact, but anticipate economies of scale in designing multiple BMPs. Collectively, have potential to contribute meaningful quantity of stormwater.
- And remember...



www.kennedyjenks.com/Stormwater

QUESTIONS?

