

# Water Augmentation Study Preliminary Screening



# Agenda

- Introductions
- Program Status
- Purpose
- Study Approach
- Water Augmentation Types JPA Input
- Draft Initial Screening
- Next Steps





 $\overline{}$ 

Bringing Our Water Full Circle

# Program Status

# Setting the Program Foundation...the First 6 Months

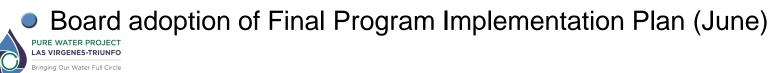
#### Program Implementation Plan

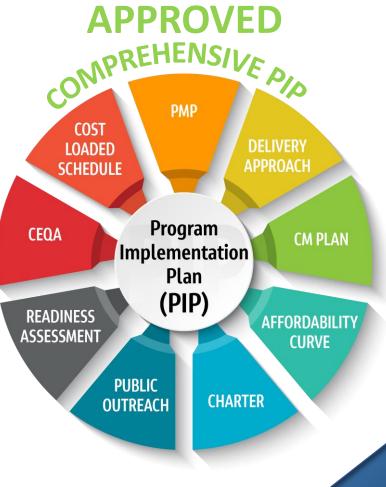
 Establish the program foundation with processes and tools, final projects, baseline cost-loaded master schedule, proposed delivery methods, environmental/regulatory strategies, and public outreach approach

### JPA Board Special Sessions for Input

- No. 1: Introduce Water Augmentation Study (February)
- No. 2: Introduce Collaborative Delivery Methods (March)
- No. 3: Present Draft Program Implementation Plan (April)

JPA Board Meeting for Adoption



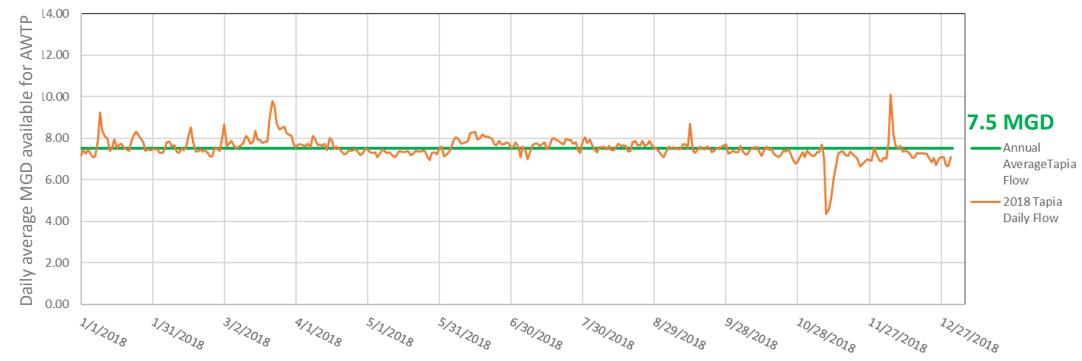




Bringing Our Water Full Circle

# Purpose

## 2018 Tapia WRF Flows



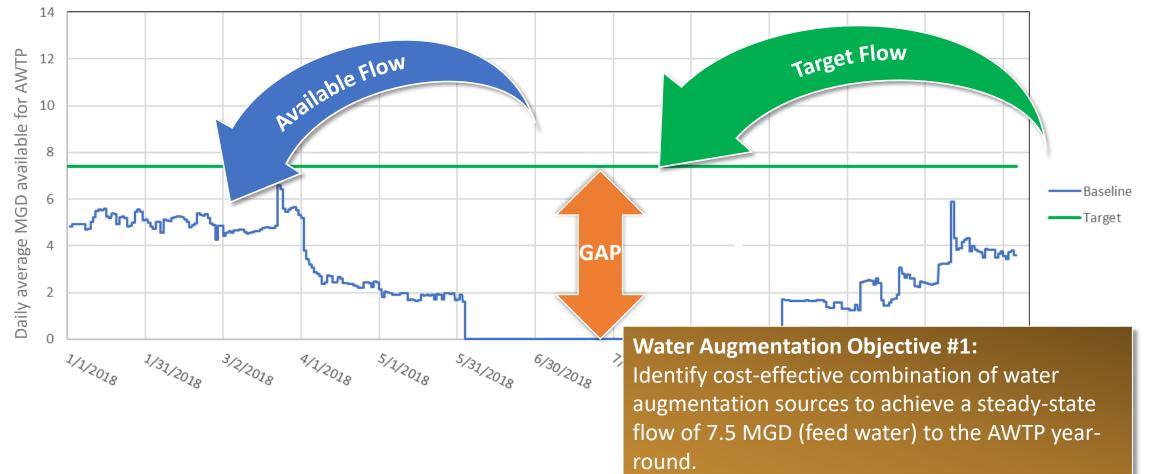
DATA SOURCE: Flow: LVMWD Daily Flow Data (2002-2018); Water Quality: Pepperdine University Reclaimed Water Usage 2019 annual Report.

Flow Source	Average Flow (MGD)	Туре		
Tapia WRF	7.5 MGD (2018)	Tertiary Effluent		



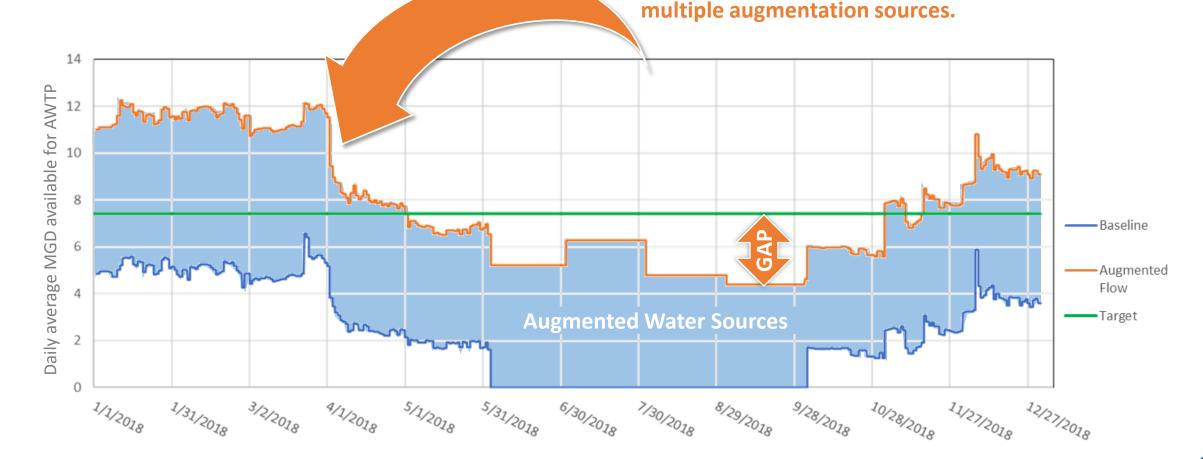
# Existing baseline Tapia WRF flow to feed AWTP – minus the recycled water demand

#### This is the CURRENT Baseline Flow Available for the AWTP



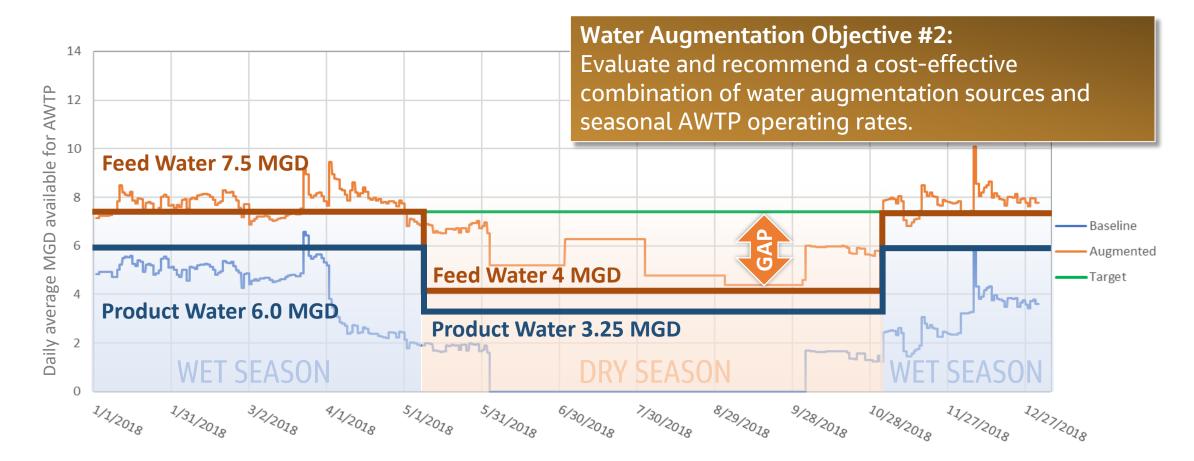


# Considering other options increases potential flows available for the AWTP





## Approximate flows available for the AWTP







Bringing Our Water Full Circle

# Study Approach

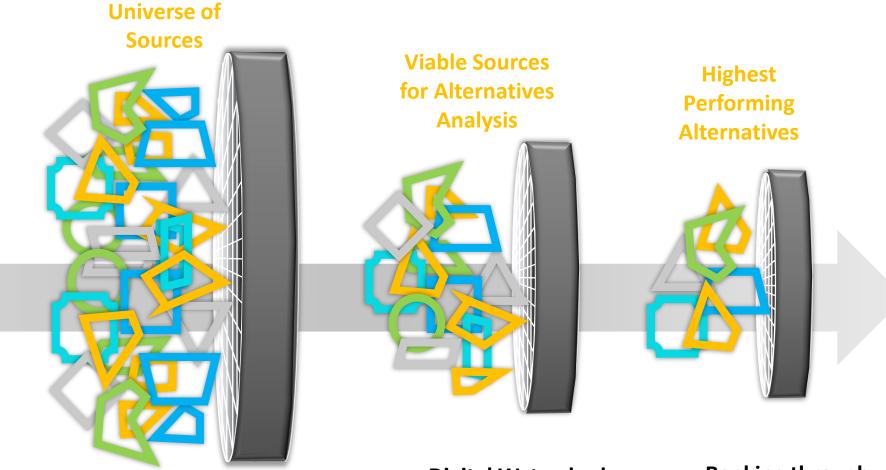
## Water Augmentation Study Guiding Principles

Water Augmentation Study will focus on augmentation sources that meet the following criteria:

- Source can be implemented within the Pure Water Project timeline to feed the AWTP.
- Flows will be reliable and controllable towards operation of the AWTP.
- Interception and conveyance of flow are cost-effective.



### Screening, Analysis, and Ranking Approach



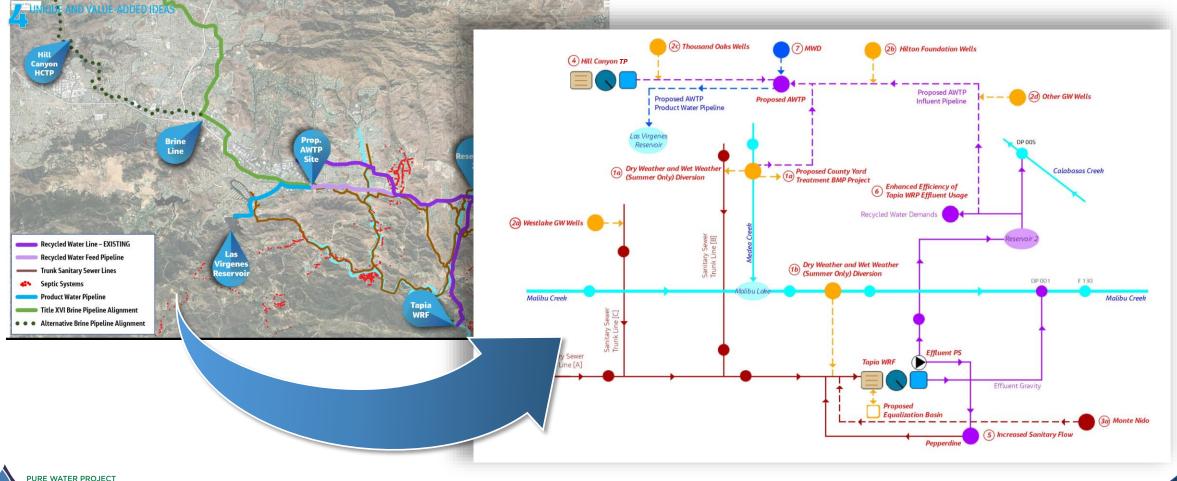
Recommended Water Augmentation Solution

Initial Screening: Risk, Reliability, Flow, Water Quality Digital Watershed Alternatives Analysis: Cost & Performance Ranking through Decision Science: Triple Bottom Line





### The Las Virgenes-Triunfo Digital Watershed System Framework models your existing and proposed infrastructure.



## **Augmentation Sources**

#### **Delivery Points**

- AWTP/Recycled Water System
- Tapia WRF / Sanitary Sewer System

#### **Augmentation Source Types**

- Raw Wastewater (4)
- Septic-to-Sewer Conversion (3)
- Treated Wastewater Effluent (1)
- Groundwater (14)
- Flow Diversions: Stream and Urban Runoff (10)
- Recycled Water Demand Reduction (3)
- Potable Water Supplementation (1)



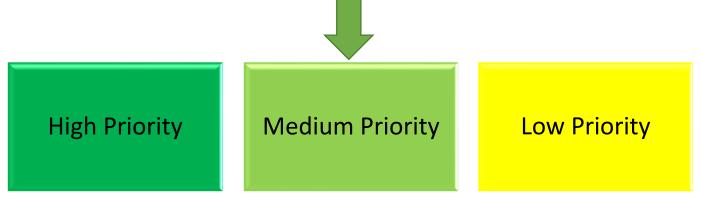
# **Overview of Initial Screening**

- Performed using readily available data; does not represent complete vetting of source.
- Purpose is to further narrow analysis to the most viable set of water augmentation sources likely to meet selected criteria.
- Augmentation sources are screened into three categories:
  - **1.** *High Priority*: Source will be included in Digital Watershed for alternatives analysis. These sources represent the focus of the augmentation study.
  - 2. *Medium Priority*: Source will not be modeled, but presents opportunity for additional augmentation in future.
  - **3.** Low Priority: Source will not be further analyzed in the context of this study, unless conditions change.



# Initial Screening Approach

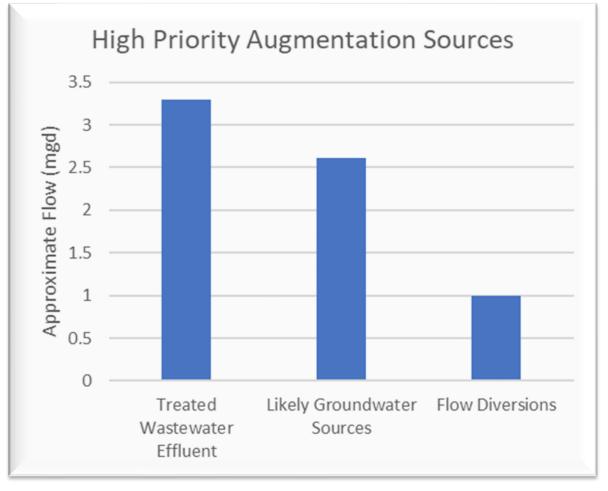
Score	Implementation Risk	Reliability	Estimated Available Flow	Estimated Water Quality
$\checkmark$	No disqualifying technical, regulatory, or jurisdictional risks were identified based on readily available data.	Augmentation source is anticipated to deliver predictable and regular flow to the AWTP during augmentation period and into the future. Source flow can be controlled by JPA.	Anticipated flows provide significant contribution to feedwater to the AWTP.	Quality of flow is anticipated to be acceptable for direction to the AWTP and/or Tapia WRF.
-	No information available.	No information available.	No information available.	No information available.
X	Augmentation source is not within the control of JPA to implement or otherwise has a technical, regulatory or jurisdictional risk that exceeds the project value based on available data.	Augmentation source is anticipated to provide irregular or unpredictable flow to the AWTP.	Anticipated flow is very low compared to other augmentation solutions.	Flow contains known unacceptable levels of a key constituent.





				Source	Source Type	Delivery Point			nitial Screening Estimated Available	1	Initial Screening	
			Project		Groundwater		Implementation Risk	Reliability	Flow	Estimated Water Quality	Recommendation	
Draft Initial Screening Results			GW-1	Westlake Wells	Production Groundwater - Existing	Sanitary Sewer to Tapia WRF or Direct to AWTP	U currently accepts this flow into sanitary server system to supplement recycled water demand in summer months.	Flow from this source has been reliably used by UV to supplement recycled water demand in summer months. Anticipated to reliably provide augmentation in winter months.	0.6 MGD (minimum)	No disqualifying water quality concerns identified. High Iron and Maganese concentrations identified. No data received on TDS.	High Priority	
							$\checkmark$	$\checkmark$	✓	✓		
	10		GW-2	Los Robles Golf Course Wells (Thousand Oaks)	Production Groundwater - Existing	AWTP	No disquilifying risk identified. Thousand Daks is a strategic partner for water augmentation. Due to high TDS, this source cannot be directly used for irrigation, making it more suitable for augmentation to the AWTP.	Reliable based on analysis providied in Kennedy/Jenks 2018 Study.	1.1 MGD	No disqualifying water quality concerns identified. TDS: 1,500 mg/L	High Priority	
	18						$\checkmark$	$\checkmark$	✓	✓		
	High Priority	36 Total	GW-3	Library Well (Thousand Oaks)	Production Groundwater - Existing	AWTP	No disqualifying risk identified. Thourand Daks is a strategic partner for water augmentation. Due to high TOS: this curve cannot be directly used for irrigation, making it more suitable for augmentation to the AWTP. May require construction of up to 4 new production wells due to condition of existing well.	Reliable based on analysis provided in CDM Smith 2016 Study.	0.71 MGD	No disqualifying water quality concerns identified. TDS: 1,500 - 2,000 mg/L	High Priority	
	J	Augmentation					√	<ul> <li>✓</li> </ul>	✓	✓		
		Sources Evaluated	GW-TO	Additional Thousand Oak (TO) Groundwater Wells	Groundwater – Existing and Proposed Wells per CDM Smith 2016 Study	AWTP	identified additional existing and proposed wells are located in lower TDS areas of the TO groundwater basin and have been identified in the 2015 study for local use. Both the gailty for the flow and the location of the wells relative to conveyance to the AVITP will influence which for wells in any ull instatly by included as augmentation solutions. Further discussion with Thousand Oak's is waranted before disqualifying these wells.	Reliable based on analysis provided in CDM Smith 2016 Study.	3.0 MGD (0.19 MGD/well * 16 proposed/existing wells)	No disqualifying water quality concerns identified. TDS: 560 - 1,000 mg/L	High Priority	
	11						$\checkmark$	$\checkmark$	X	✓		
	Medium Priority		GW-4	Four Seasons Well	Dewatering Groundwater - Existing	Sanitary Sewer to Tapia WRF or Direct to AWTP	No disqualifying risk identified. Well is located in close proximity to sever and to AWTP, which benefits conveyance. Consideration of dewatering to sanitary sever during wet weather will be required to ensure that capacity of sanitary sever is not compromised.	Anticipated to be reliable based on frequency of quality tests shown in data.	0.005 mgd	No disqualifying water quality concerns identified. TDS: 1,340 mg/L	Medium Priority	
							$\checkmark$	-	X	-		
			GW-5	Hilton Foundation Dole Building Wells	Dewatering Groundwater - Proposed	Sanitary Sewer to Tapia WRF or Direct to AWTP	No disqualifying risk identified. Well is located in close proximity to sewer and to AWTP, which benefits conveyance. Consideration of dewatering to sanitary sewer during wet weather will be required to ensure that capacity of sanitary sewer is not compromised.	No data available. Assumed to be reliable.	No flow information available. Assumed to produce similar flow rate as the Four Seasons Well (0.005 mgd)	No data available. No disqualifying water quality concerns identified.	Medium Priority	
							No disqualifying risk identified. Well is located in	-	X	-		
	7		GW-6	LA County Fire Departmen Well (Fire Station #89)	t Dewatering Groundwater - Existing	Sanitary Sewer to Tapia WRF	close proximity to sewer, which benefits conveyance. Consideration of dewatering to sanitary sewer during wet weather will be required to ensure that capacity of sanitary sewer is not compromised.	No data available. Assumed to be reliable.	No flow information available beyond NPDES permit indicating maximum discharge of 0.1 mgd. Assumed to produce similar flow rate as the Four Seasons Well (0.005 mgd)	No data available. No disqualifying water quality concerns identified.	Medium Priority	
							No disgualifying risk identified.	$\checkmark$	✓	✓		
	Low Priority		GW-7	Tapia WRF Balancing Pone Well	Dewatering Groundwater - Existing	Tapia WRF	Source is located at Tapia WRF; therefore, conveyance of flow to Tapia influent is relatively uncomplicated. One risk may be that redirecting this flow from Malibu Creek may occasionally result in an increase in augmentation of Malibu Creek flows with potable water to achieve the required minimum instream flow.	Reliable, although flow rate fluctuates based on season.	Summer average demand of 0.26 MGD. Winter average demand of 0.05 MGD.	No disqualifying water quality concerns identified. No TDS information provided in reporting.	High Priority	
				Rancho Las Virgenes Farm			No disqualifying implementation risk identified.	X	X	X		
			GW-8	Wells	Monitoring Wells	AWTP	Maintaining reliable flow may result in operational challenges. Existing monitoring wells would need to be replaced with wells suitable for continuous dewatering.	Unreliable since water tables drop by tens of feet in minutes once 5 gpm pumping occurred.	Low anticipated flow. Water level in well drops quickly at low pump rate.	Source is high in Nitrate and TDS. TDS: 3,000 - 4,000 mg/L	Low Priority	
			GW-9	Westlake Seepage	Dewatering Groundwater - Existing	Sanitary Sewer to Tapia WRF or Direct to AWTP	The reservoir dam seepage provides a component of the minimum flow that LV is obligated to discharge to the stream. For this reason, this augmentation solution is considered low priority.	Reliable based on available data.	X Average of 8.25 gpm (0.01 mgd)	– No data available. No disqualifying water quality concerns identified.	Low Priority	
PURE WATER PROJECT							No disqualifying risk identified. Well is located in	-	X	-		
Bringing Our Water Full Circle			GW-10	Old Hilton Foundation Wells	Dewatering Groundwater - Existing	Sanitary Sewer to Tapia WRF or AWTP	No asgualining risk identified. We is is octated in Close proximity to sever and to AWTP, which benefits conveyance. Consideration of dewatering to sanitary sewer during wet weather will be required to ensure that capacity of sanitary sewer is not compromised.	No data available. Assumed to be reliable.	No flow information available. Assumed to produce similar flow rate as the Four Seasons Well (0.005 mgd)	No data available. No disqualifying water quality concerns identified.	Medium Priority	

# **Draft Initial Screening Results**



Approximately 7 MGD in total available from the most likely High Priority sources.





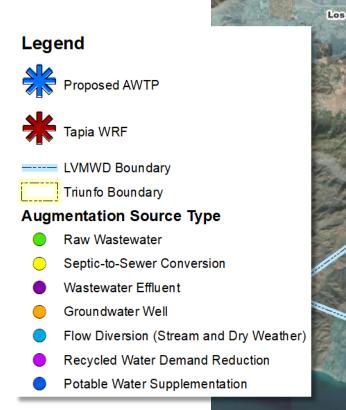
Bringing Our Water Full Circle

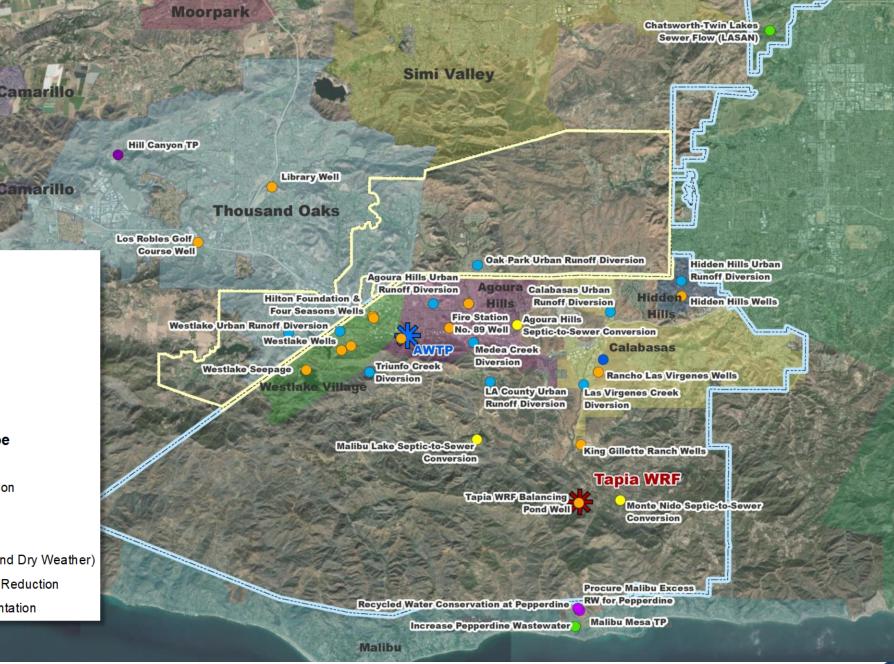
# Water Augmentation Types and Initial Screening

### Augmentation Sources

PURE WATER PROJECT

ging Our Water Full Circle





## Treated Wastewater Effluent

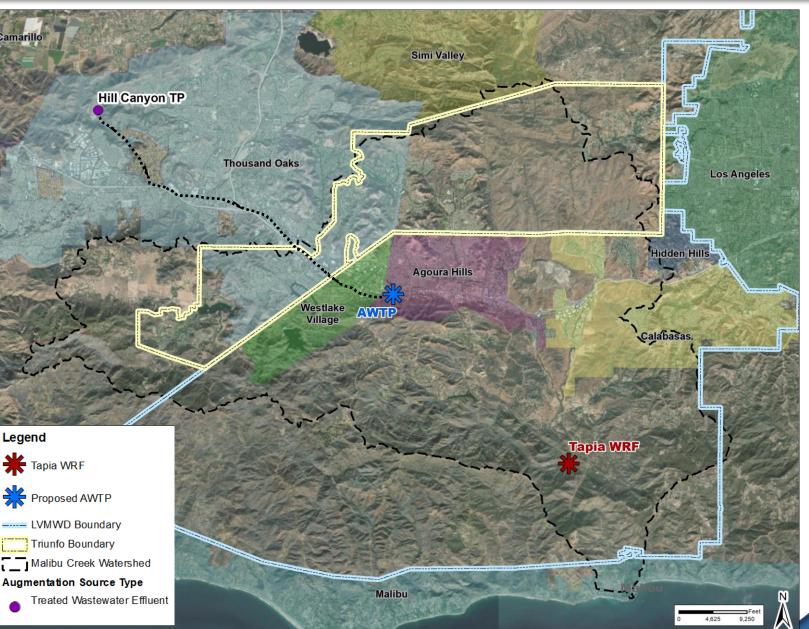
#### WE-1: Hill Canyon Treatment Plant

- 3.3 mgd of treated effluent from Hill Canyon TP directed to AWTP via new pipeline
- Provides reliable source from neighboring agency
- Pipeline from HCTP to AWTP may be shared with flow from Thousand Oaks wells and may be constructed with planned brine line.
- Hill Canyon Treatment Plant Master Plan (2021) highly ranks this approach under its analysis of future water resource alternatives

URE WATER PROJECT

VIRGENES-TRIUNEO

High Priority



21

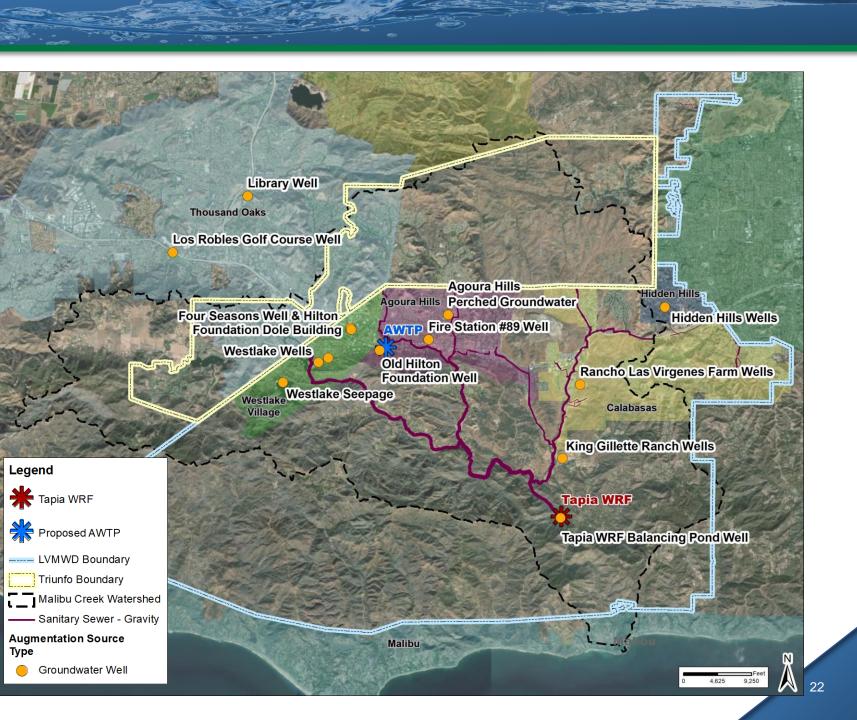
### Groundwater

- Thousand Oaks Wells
- GW-2: Los Robles Golf Course Wells
- GW-3: Library Well
- GW-TO: Additional TO Wells
- Other Production Wells
- GW-1: Westlake Wells,
- GW-13: King Gillette Ranch Well
- Dewatering:

PURE WATER PROJECT

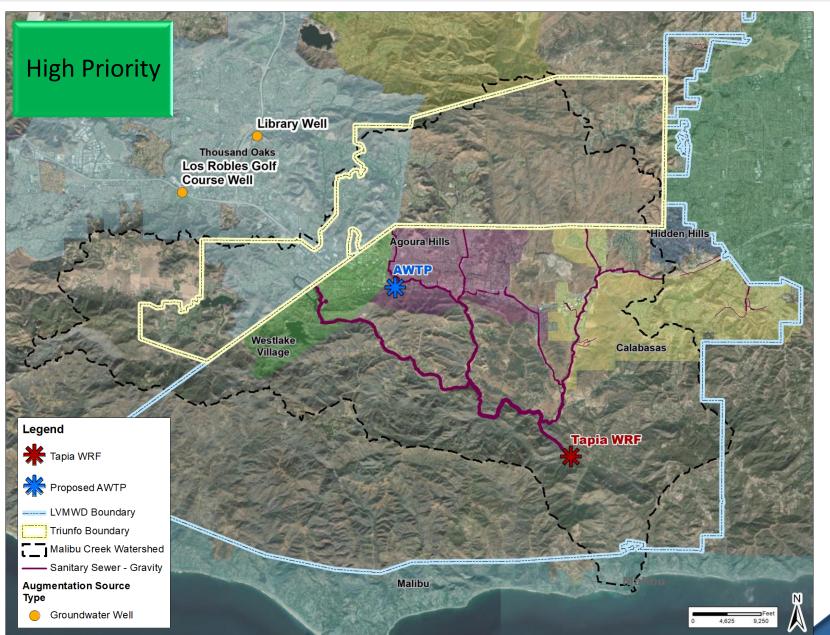
Our Water Full Circle

- GW-4: Four Seasons Well
- GW-5: Hilton Foundation Dole Building
- GW-6: Fire Station #89 Well
- GW-7: Tapia Balancing Pond
- GW-8: Rancho Las Virgenes Farm wells
- GW-9: Westlake Seepage
- GW-10: Old Hilton Foundation Well
- GW-11: Perched groundwater in Agoura Hills
- GW-12: Hidden Hills Wells



### Groundwater – Thousand Oaks Wells

- GW-2: Los Robles Golf Course Wells (1.1 mgd)
  - Significant, reliable source of flow
  - Due to high TDS, source cannot be used directly for irrigation
- GW-3: Library Well (0.7 mgd)
  - Significant, reliable source of flow.
  - Due to high TDS, source cannot be used directly for irrigation
- GW-TO: Additional TO Wells (up to 3 mgd)
  - Additional existing and proposed wells have been identified by 2016 TO Groundwater and Reclaimed Water Study
  - Identified for local use due to low TDS



### Groundwater – Other Production Wells

- GW-1: Westlake Wells (0.6 mgd)
  - Currently accepts this flow into sanitary system to supplement recycled water demand in summer months
  - Anticipated to reliably provide augmentation in winter months as well



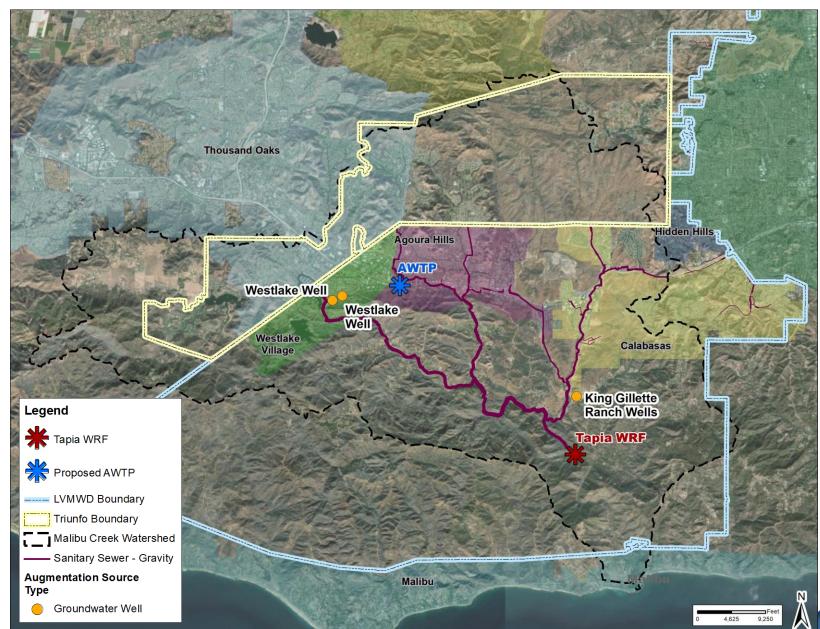
- GW-13: King Gillette Ranch Well (0.03 mgd)
  - Low estimated flow

PURE WATER PROJECT

Our Water Full Circle

- May already be in use by Ranch

Medium Priority



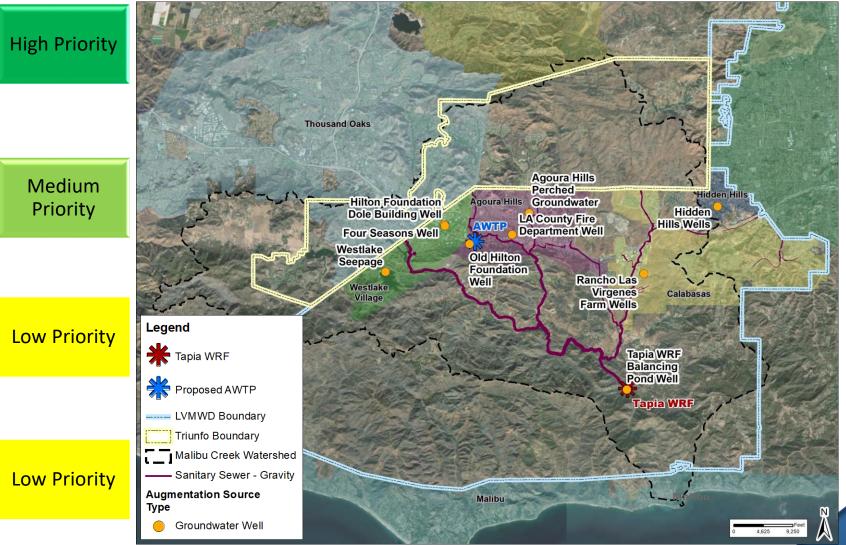
### **Groundwater – Dewatering**

- GW-7: Tapia Balancing Pond
- Reliable source at Tapia WRF, currently managed by LV
- Average summer flow ~0.26 mgd
- Dewatering Wells with low estimated flow (~0.005 mgd)
- GW-4: Four Seasons Well
- GW-5: Hilton Foundation Dole Building
- GW-6: Fire Station #89 Well
- GW-10: Old Hilton Foundation Well
- GW-12: Hidden Hills Wells
- GW-9: Westlake Seepage
- Seepage from Las Virgenes Reservoir Dam: Average flow ~0.01 mgd
- Current flow contributes to minimum flow obligation for creek discharge
- Other Sources Considered

PURE WATER PROJECT

g Our Water Full Circle

- GW-8: Rancho Las Virgenes Farm wells
- GW-11: Perched groundwater in Agoura Hills



# Flow Diversions: Stream Diversions and Urban Runoff Diversions

- Both are approaches to capturing dry weather and some wet weather urban runoff
- Both lend themselves to meeting MS4 requirements of NPDES permit
- Both have potential for costsharing from affected MS4s



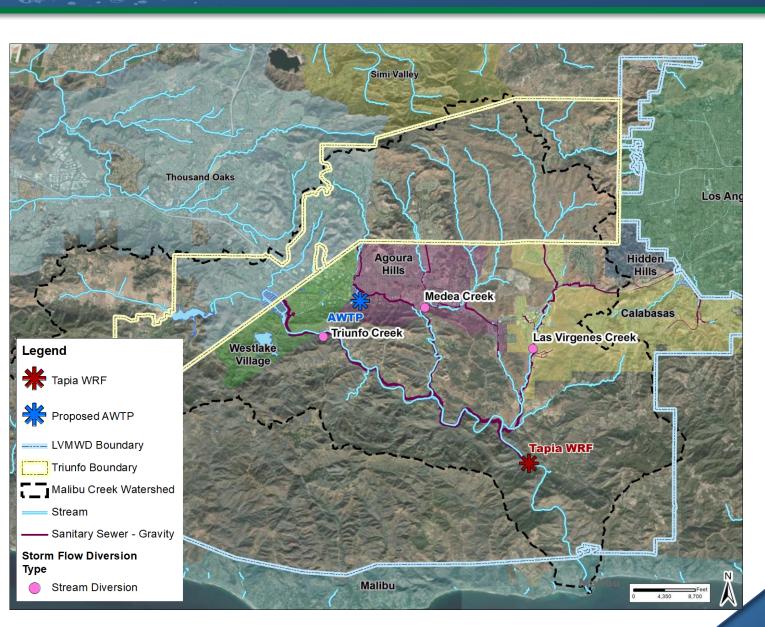
ff	Stream Diversions	Urban Runoff Diversions
	Targeted diversion of flow from streams, downstream of storm outfalls from urbanized areas.	Decentralized diversion of urban runoff directly from storm sewer outfalls.
	Higher TDS due to natural stream flow and therefore must be diverted to AWTP rather than Tapia WRF.	Lower TDS and therefore can likely be diverted to sanitary sewer or to AWTP.
	<b>Benefit</b> : Centralized diversion may be more cost-effective and capture more flow.	<b>Benefits</b> : Diversion to sanitary sewer is convenient due to typical proximity of storm to sanitary. Sewer and Tapia WRF likely have capacity to accept flow.
	<b>Challenge</b> : Natural flow must remain in stream, which may be difficult to quantify and may add cost to control.	<b>Challenge</b> : Diversions required in many locations to achieve capture of flow.

# Stream Diversions to AWTP

#### Sources:

- FD-1: Medea Creek Diversion: 0.7 MGD
- FD-2: Triunfo Creek Diversion: 0.2 MGD
- FD-3: Las Virgenes Creek Diversion: 0.1 MGD
- Amount of flow available for diversion will vary seasonally
- Potential cost sharing with affected MS4 permittees
- Regulatory challenges relative to stream flow modifications may affect project schedule
- High TDS (~2,500 mg/L), no disqualifying water quality concerns identified



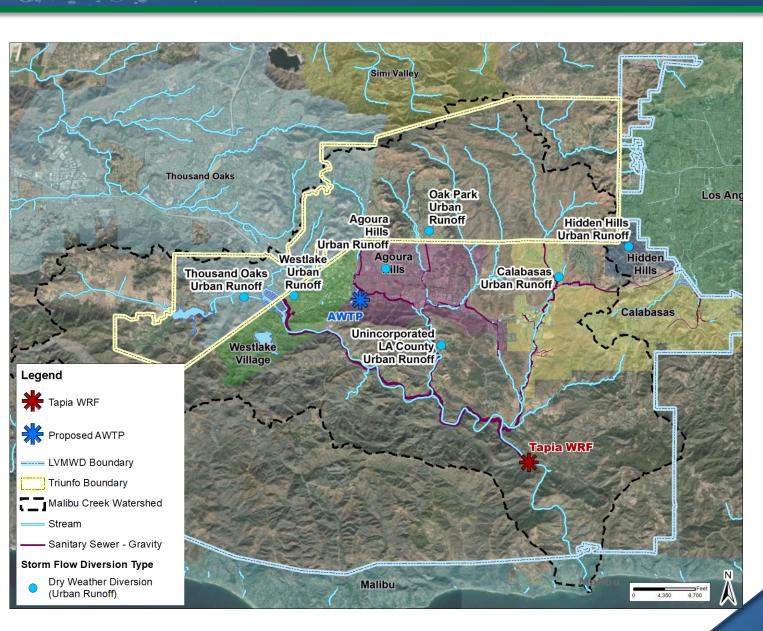


PURE WATER PROJECT LAS VIRGENES-TRIUNFO Bringing Our Water Full Circle

## Urban Runoff Diversions

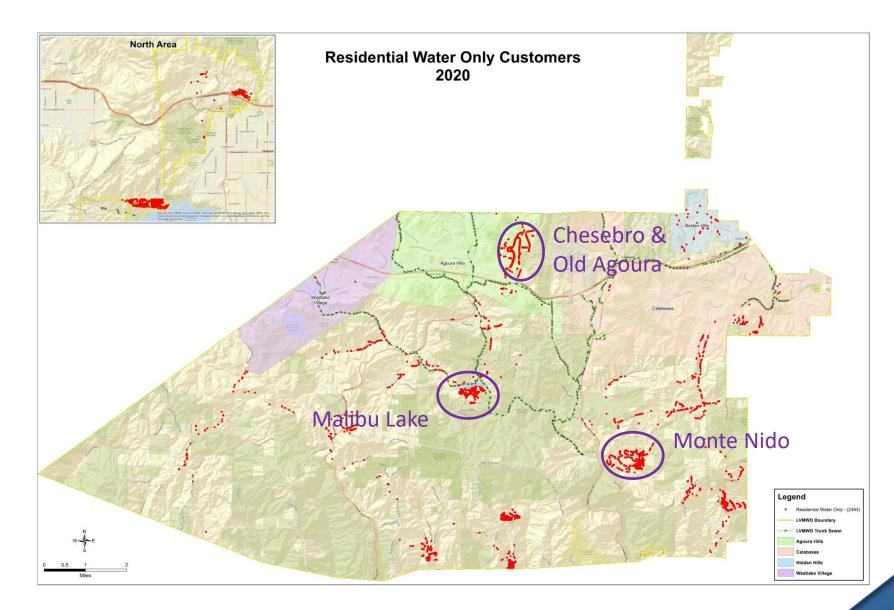
- Urban Runoff Diversion Sources organized by municipality:
  - FD-4: Agoura Hills (~0.3 mgd)
  - FD-5: Calabasas (~0.3 mgd)
  - FD-6 Oak Park (~0.1 mgd)
  - FD-7: Hidden Hills (~0.1 mgd)
  - FD-8 Unincorporated LA County (~0.03 mgd)
  - FD-9: Thousand Oaks (~0.3 mgd)
  - FD-10: Westlake (~0.2 mgd)
- Screening Considerations
  - Can construct diversions from storm sewer to sanitary sewer or to the AWTP
  - Potential cost sharing with affected MS4 permittees.
  - Dry weather flow anticipated to vary seasonally.
  - Water Quality not anticipated to limit feasibility

#### **High Priority**



### Septic-to-Sewer Conversion

 Concentrations of septic systems offer opportunity for conversion to sewer



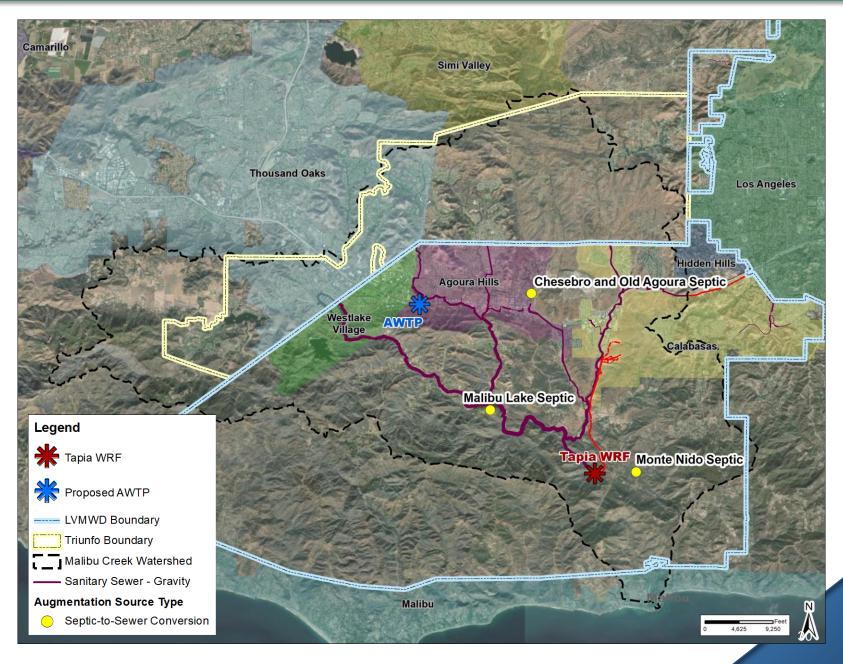


### Septic-to-Sewer Conversion

- Sources:
- SS-1: Malibu Lake Septic
- SS-2: Chesebro & Old Agoura Septic
- SS-3: Monte Nido Septic
- Screening Considerations:
- Requires construction of new local sewers and possible extension of trunk sewers
- Connection to sewer will likely be voluntary with an uncertain implementation period
- Flow rate from this source within project timeline cannot be accurately estimated

#### Medium Priority





### Raw Wastewater Sources

- RW-1: Increase in Pepperdine wastewater flows
  - Increased flows from campus expansion. Timeline unknown.
- RW-2: Chatsworth-Twin Lakes Sewer Flow to LASAN
  - Redirect flow to Tapia WRF that currently discharges to LASAN system
  - Requires coordination with LASAN
  - Requires significant new infrastructure
- RW-3: Swimming Pool Maintenance Flows
  - Discharge swimming pool dewatering to sanitary sewer system
  - Requires regulatory changes and relies on individual behavior
- RW-4: Malibu Mesa TP

VIRGENES-TRIUNEO

Our Water Full Circle

- Direct raw wastewater from Malibu Mesa TP to Tapia WRF for treatment
- Requires new force main from Malibu to Tapia WRF – existing force main does not have the capacity

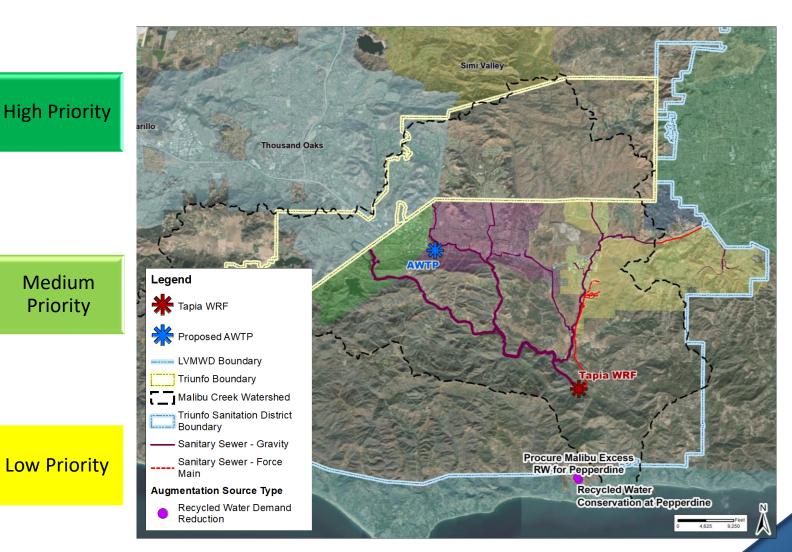
```
Chatsworth-Twin Lakes
                                                                                       Sewer Flow (LASAN)
   Low Priority
                                                         Simi Valley
                          Thousand Oaks
                                                                                                           Los Angeles
                                                       Agoura
                                                                                               Hidden
                                                         Hills
                                                                                                 Hills
                                                                                              Calabasas
                                               Vestlake
Legend
                                 Village
X Tapia WRF
 Proposed AWTP
                                                                                Tapia WRF
----- LVMWD Boundary
    Triunfo Boundary
     Malibu Creek Watershed

    Sanitary Sewer - Gravity

    Sanitary Sewer - Force
    Main
                                              Increase Pepperdine Wastewater
Augmentation Source
Туре
                                                     Malibu
                                                                               Malibu Mesa TP
    Raw Wastewater
```

## **Recycled Water Conservation Sources**

- RWD-1: LV Recycled Water Conservation Program
  - LV plans to implement rate structure to encourage further conservation of recycled water
  - Timeline of implementation is unknown
  - Flow reduction cannot be accurately estimated at this time because it relies on behavior
- RWD-2: Procure Malibu Excess Tertiary Flow for Pepperdine
  - Purchase of excess tertiary flow from Civic Center Treatment Plant to meet Pepperdine's full recycled water demand, freeing up flow for AWTP
  - Likely will encounter institutional barriers
  - May also require significant new infrastructure
- RWD-3: Recycled Water Conservation at Pepperdine
  - Encourage further conservation of recycled water at Pepperdine





## **Draft Initial Screening Results**

	High Priority Sources
GW-1	Westlake Wells
GW-2	Los Robles Golf Course Wells (TO)
GW-3	Library Well (TO)
GW-TO	Additional Thousand Oaks (TO) Groundwater Wells
GW-7	Tapia WRF Balancing Pond Well
WE-1	Hill Canyon TP
FD-1	Medea Creek
FD-2	Triunfo Creek
FD-3	Las Virgenes Creek
FD-4	Agoura Hills Urban Runoff
FD-5	Calabasas Urban Runoff
FD-6	Oak Park Urban Runoff
FD-7	Hidden Hills Runoff
FD-8	Unincorporated LA County Runoff
FD-9	Thousand Oaks Urban Runoff
FD-10	Westlake Urban Runoff Diversion
	Recycle Water Conservation
RWD-1	Programs
PO-1	Potable Water Supplementation

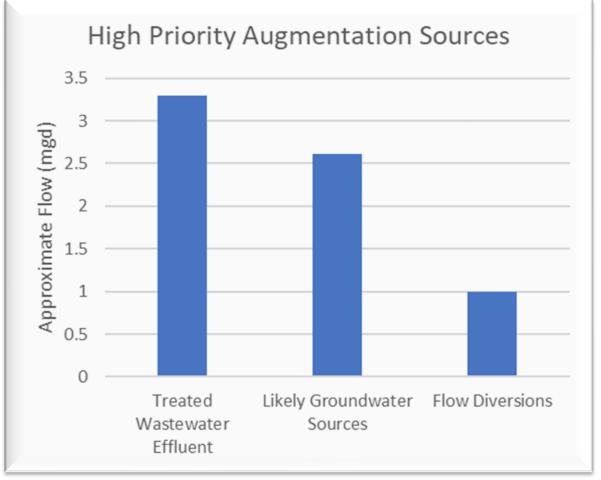
PURE WATER PROJECT LAS VIRGENES-TRIUNFO
Bringing Our Water Full Circle

	Medium Priority Sources		
GW-4	Four Seasons Well		
GW-5 Hilton Foundation Dole Building Wells			
GW-6	LA County Fire Department Well (Fire		
	Station #89)		
GW-10	Old Hilton Foundation Wells		
GW-11	Agoura Hills Perched Groundwater		
GW-12	Hidden Hills Wells		
GW-13	King Gillette Ranch Wells		
SS-1	Malibu Lake Septic		
SS-2	Chesebro & Old Agoura Septic		
SS-3	Monte Nido Septic		
RWD-2	Procure Malibu Excess Tertiary Flow for		
	Pepperdine		

#### Low Priority Sources

GW-8	Rancho Las Virgenes Farm Wells
GW-9	Westlake Seepage
RW-1	Increase Pepperdine Wastewater
RW-2	Chatsworth-Twin Lakes Sewer Flow (LASAN)
RW-3	Swimming Pool Maintenance Flows
RW-4	Malibu Mesa TP
RWD-3	Recycled Water Conservation at Pepperdine

# **Draft Initial Screening Results**



Approximately 7 MGD in total available from the most likely High Priority sources.





Bringing Our Water Full Circle

5037

# Next Steps

# Target Milestones

- Update Digital Watershed with Water Augmentation Sources (March)
- Perform Alternatives Analysis and Identify Cost-effective Augmentation Solutions (April)
- Rank Solutions and Identify Recommendation (April)
- Draft Documentation (May)





Bringing Our Water Full Circle

# Thank You