

**Neighbors  
Together**

# The Future of Ventura's Water Supply



Daniel Cormode  
East Ventura Community Council  
Planning & Development Committee  
2016 02 25

**Working Towards The Future**



**We're  
running  
short of  
water?**



# Lake Casitas Storage

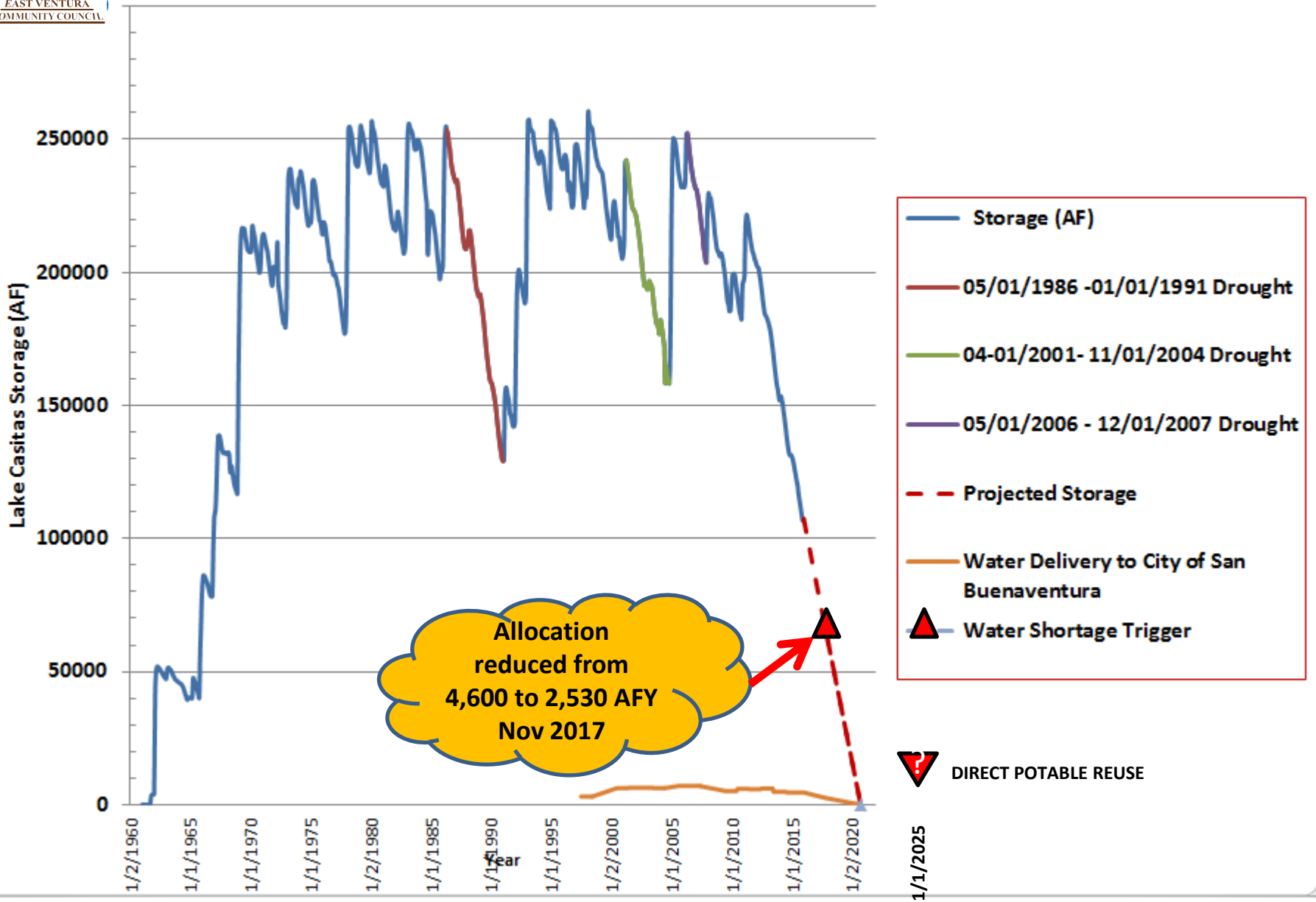
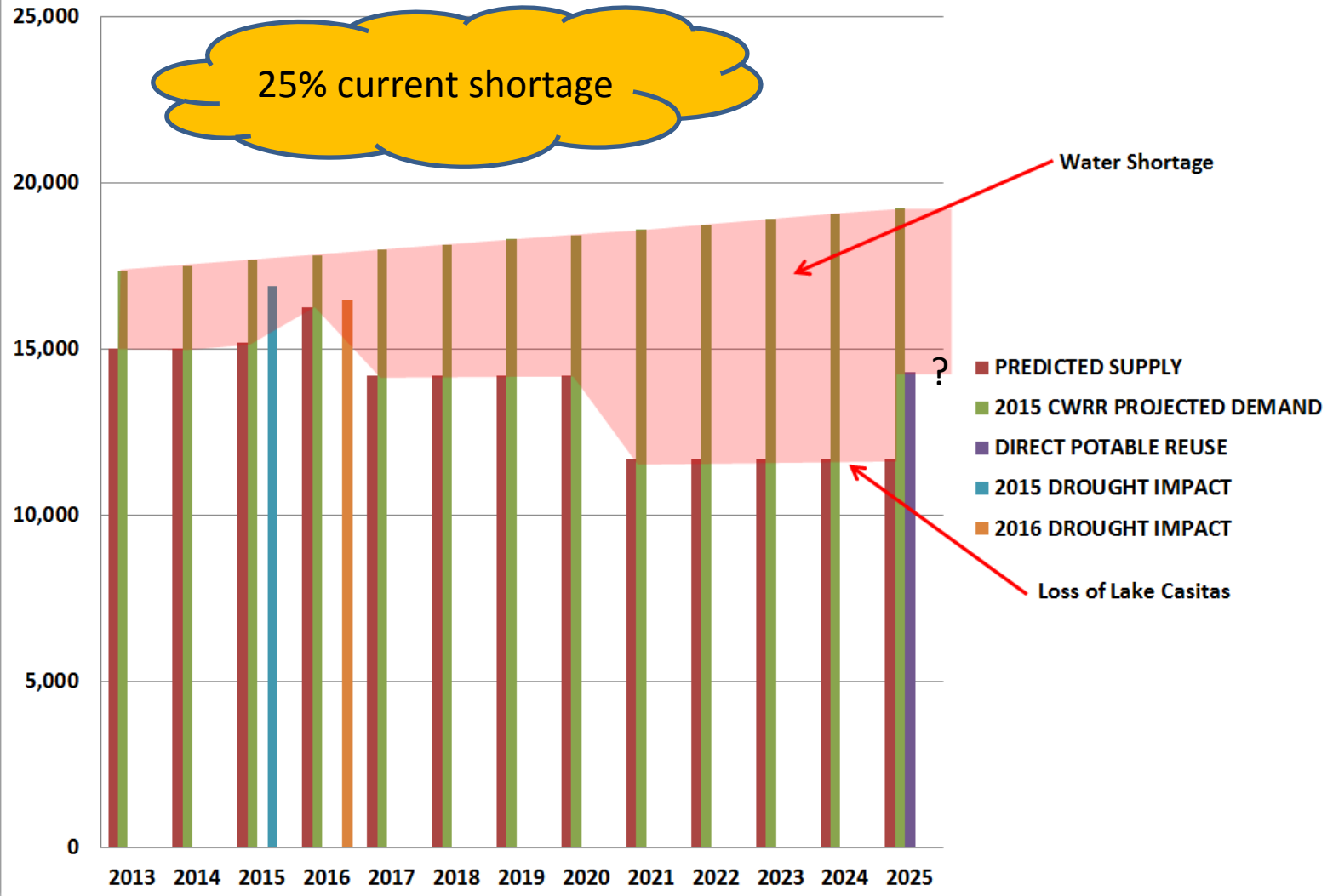




Chart Area

### Ventura Water Supply & Demand (Acre-Feet)

25% current shortage



87 Gpd/person

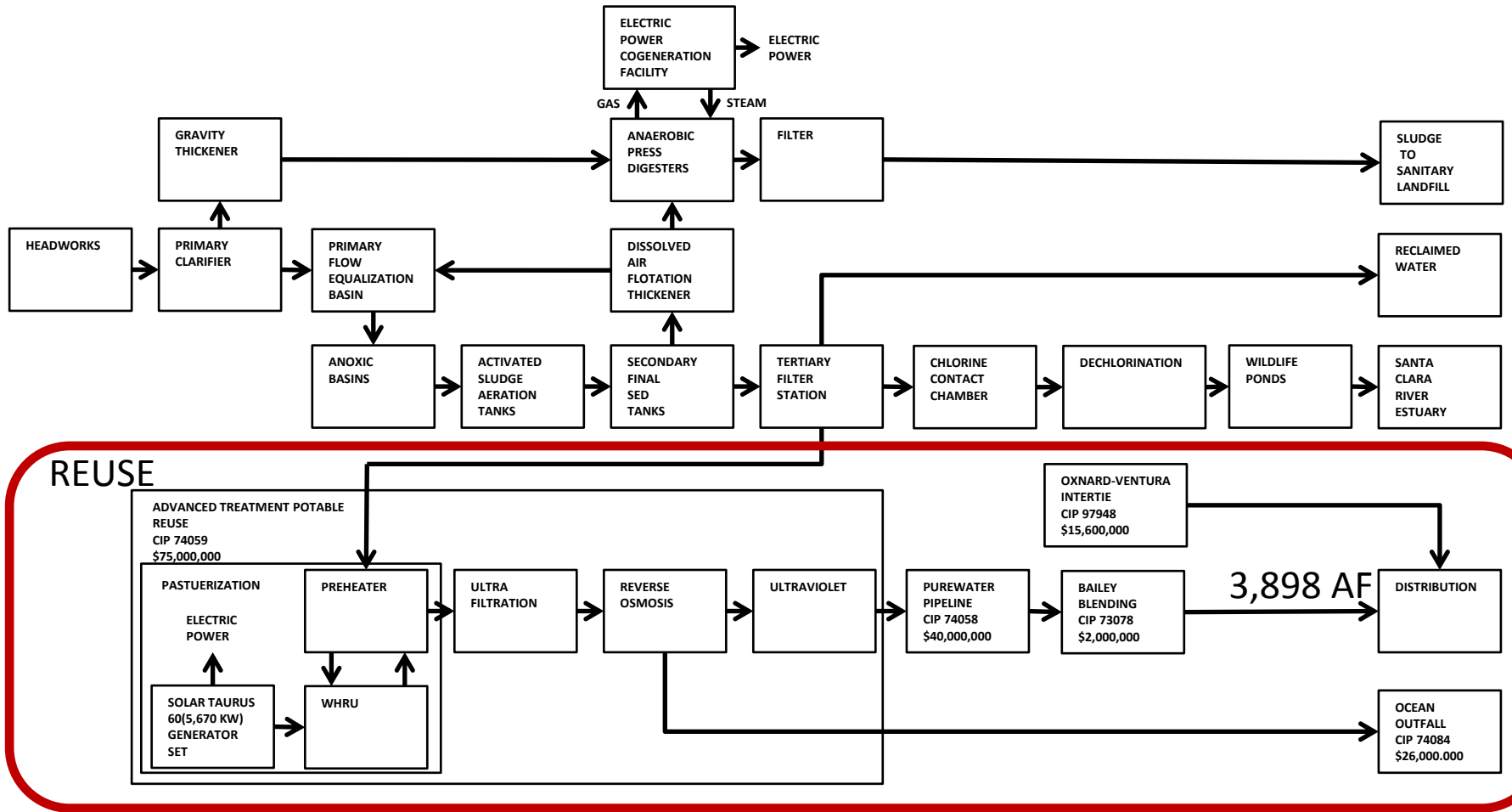


64 Gpd/person

Normal Demand: 101 gpd/person



# WASTEWATER TO REUSE PROCESS CHART





# Potable Reuse

Reclaimed water not available until sometime after 2022

WATER PROJECT SCHEDULES FROM WATER COMMISSION MEETING 22 DEC 2015												
Project	Title	Project Total		Prior	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	Future Years
97945	Repair and Restoration of Intake Structure	\$600,000	Administration & Planning	X	X	X						
			Design	X	X	X						
			Construction			X	X					
97949	Foster Park Wellfield Production Restoration	\$28,000,000	Administration & Planning	X	X	X	X	X				
			Design				X	X				
			Construction					X	X	X	X	
74070	Advanced Treatment Plant Land Acquisition	\$1,430,000	Administration & Planning				X	X				
			Design									
			Construction						X			
97949	Ventura-Oxnard Emergency Water Intertie	\$15,600,000	Administration & Planning				X	X				
			Design					X	X	X		
			Construction									X
74058	Recycled Water Line - Purewater Pipelines	\$40,000,000	Administration & Planning			X	X	X	X	X		
			Design						X	X	X	
			Construction									X
74084	Brine Line Ocean Outfall	\$26,000,000	Administration & Planning		X	X	X					
			Design					X	X	X		
			Construction									X
74059	Advanced Treatment Potable Reuse	\$75,000,000	Administration & Planning					S				
			Design									
			Construction									
73078	Bailey Treatment Plant Modification	\$2,000,000	Administration & Planning			S						
			Design									
			Construction									
73083	Advanced Treatment Plant - Desalination	\$120,000,000	Administration & Planning									S
			Design									
			Construction									

May Not Be Operational Until All Elements Are Functional

\$235,244,100\*

No Scheduled Completion Date

Pending Project

Unscheduled Pending Project

\* Includes cost of financing

Loss of Lake Casitas Supply ▲

▼ Direct Potable Reuse



**\$10,766 per household**

**Table 1 - COMPARISON OF WATER PROJECT COSTS**

Project	Title	Cost Listed on CIP Project Descriptions	Cost Listed on Water Commission Potential Water Supply Sources Presentation	Yield (With Foster Park Wellfield Restoration) (AFY)	Yield (Without Foster Park Wellfield Restoration) (AFY)
97945	Repair and Restoration of Intake Structure	\$600,000			
97921	Foster Park Wellfield Production Restoration	\$28,000,000			
	<b>Total Foster Park Production Restoration</b>	<b>\$28,600,000</b>	<b>\$23,300,000</b>	<b>2,500</b>	<b>0</b>
74070	Advanced Treatment Plant Land Acquisition	\$1,430,000			
97949	Ventura-Oxnard Emergency Water Intertie	\$15,600,000			
74058	Recycled Water Line - Purewater Pipelines	\$40,000,000			
74084	Brine Line Ocean Outfall	\$26,000,000			
74059	Advanced Treatment Potable Reuse	\$75,000,000			
73078	Bailey Blending	\$2,000,000			
	<b>Total Advanced Treatment Potable Reuse</b>	<b>\$160,030,000</b>	<b>\$65,800,000</b>	<b>3,898</b>	<b>3,898</b>
73083	Advanced Treatment Plant - Desalination	\$120,000,000			
	<b>Total Advanced Treatment Plant - Desalination</b>	<b>\$120,000,000</b>	<b>\$80,000,000</b>	<b>3,000</b>	<b>3,000</b>
	<b>Total Project Cost</b>	<b>\$308,630,000</b>	<b>\$169,100,000</b>		
	<b>Estimated Financing Cost (50%)*</b>	<b>\$144,116,100</b>	<b>\$79,477,000</b>		
	<b>NetZero Cost Basis</b>	<b>\$452,746,100</b>	<b>\$248,577,000</b>		
	<b>Unit Cost with Foster Park Wellfield Restoration (\$/AF)</b>	<b>48,174</b>	<b>26,449</b>	<b>9,398</b>	
	<b>Unit Cost Without Foster Park Wellfield Restoration (\$/AF)</b>	<b>65,634</b>	<b>36,036</b>		<b>6,898</b>

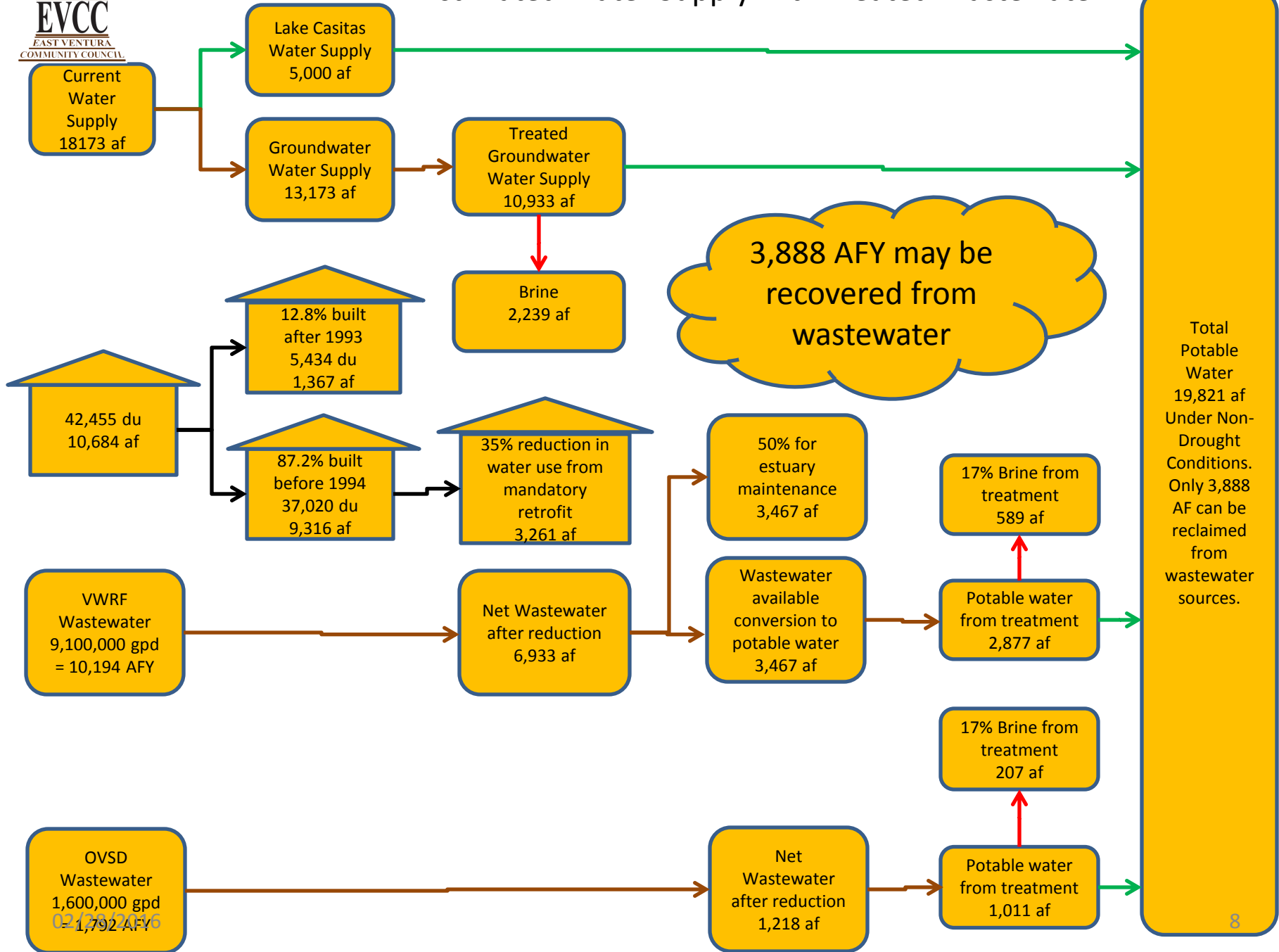
The cost of reclaimed water is underestimated and the yield overestimated.

No current CIP for Desal

\*Based on 50% of capital cost for 30 years with semi-annual payments.



# Estimated Water Supply with Treated Wastewater







# Pending Projects Summary

PENDING PROJECTS 2016 02 11												
	SQFTCOMMER	SQFTINDUST	SQFTINST	SQFTOFFICE	SQFTRETAIL	SQFTHOTEL	SQFTMFG	SQFTWAREHS	ACREPARK	NUMBEDS	NUMUNITTOT	
In Planning Process	53,408	12,239	0	85,646	48,789	180,121	0	0	3	0	1,627	
In Plan Check	0	62,000	0	0	3,000	93,000	0	0	0	0	287	
All Planning Approvals	3,382	234,010	0	14,255	68,760	0	0	0	0	0	1,923	
Under Construction	0	0	320,000	4,860	3,456	0	0	0	0	230	439	
Total	56,790	308,249	320,000	104,761	124,005	273,121	0	0	3	230	4,276	
PENDING PROJECTS 2016 02 11												
	SQFTCOMMER	SQFTINDUST	SQFTINST	SQFTOFFICE	SQFTRETAIL	SQFTHOTEL	SQFTMFG	SQFTWAREHS	ACREPARK	NUMBEDS	NUMUNITTOT	InCasitas
Out of District	11,065	369,738	0	83,260	85,068	116,961	0	73,728	0	0	2,461	N
Casitas MWD District	45,725	12,239	320,000	21,501	38,937	156,160	0	0	3	230	1,815	Y
Total	56,790	381,977	320,000	104,761	124,005	273,121	0	73,728	3	230	4,276	

EXPECTED WATER DEMAND (AF) 2016 02 11

	COMMERCIAL	INDUSTRIAL	INSTITUTIONAL	OFFICE	RETAIL	HOTEL	MANUFACTURING	WAREHOUSE	PARK	HOSPITAL	RESIDENTIAL
In Planning Process	16	4	0	26	15	54	0	0	6	0	667
In Plan Check	0	19	0	0	1	28	0	0	0	0	118
All Planning Approvals	1	70	0	4	21	0	0	0	0	0	788
Under Construction	0	0	96	1	1	0	0	0	0	140	180
Total	17	92	96	31	37	82	0	0	6	140	1,753

EXPECTED WATER DEMAND (AF) 2016 02 11

	COMMERCIAL	INDUSTRIAL	INSTITUTIONAL	OFFICE	RETAIL	HOTEL	MANUFACTURING	WAREHOUSE	PARK	HOSPITAL	RESIDENTIAL	IN CASITAS
Out of District	3	111	0	25	26	35	0	22	0	0	1,009	N
Casitas MWD District	14	4	96	6	12	47	0	0	6	140	744	Y
Total	17	115	96	31	37	82	0	22	6	140	1,753	

# 2005 Foster Park Wellfield Storm Damage

Is restoration of the Foster Park Wellfield a sound economic decision based on damage experienced by 1998, 2001 and 2005 storm events?

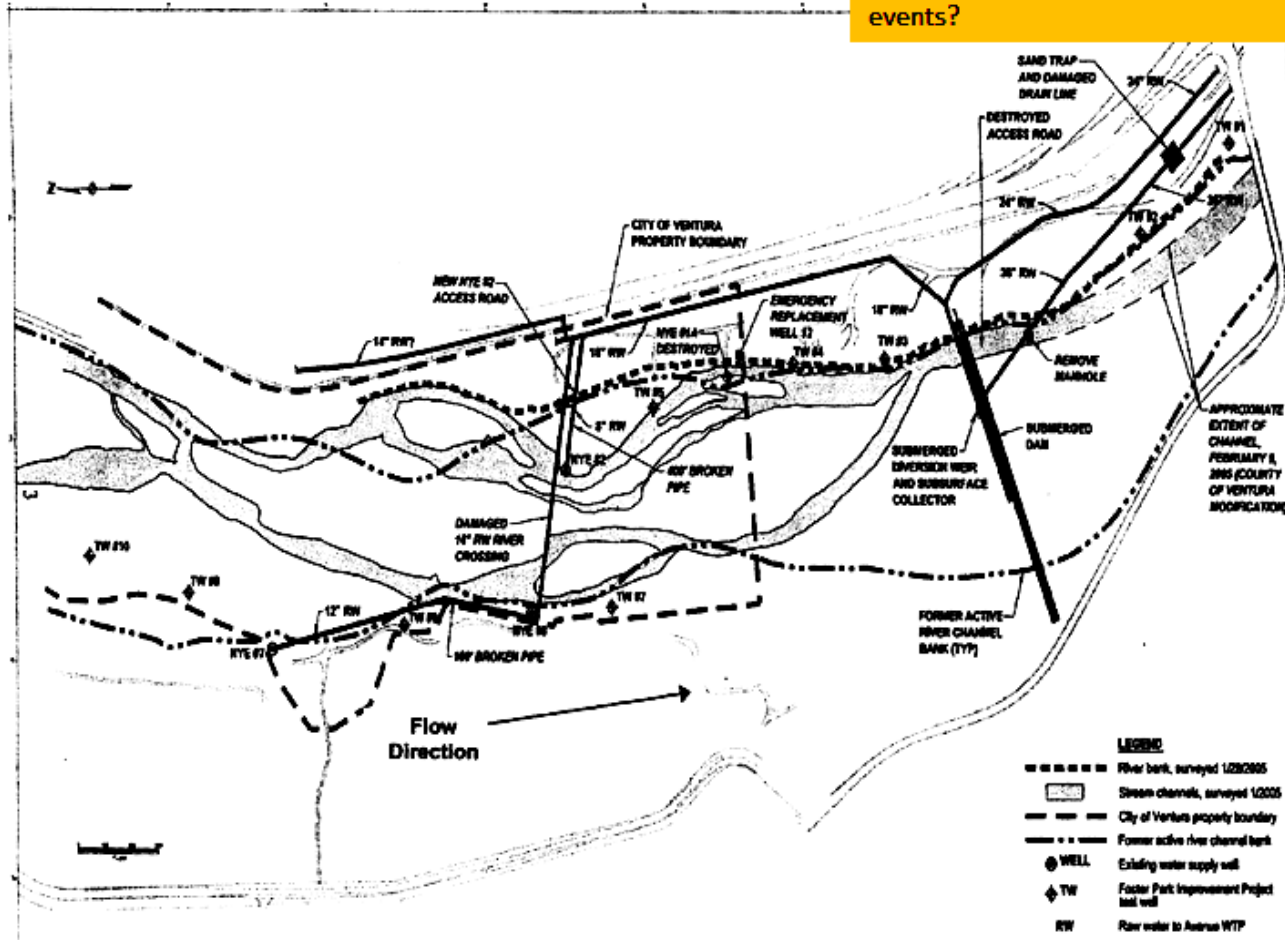


Figure 1: City of Ventura's Foster Park Well Field showing production wells, monitoring (test) wells, subsurface diversion and related components

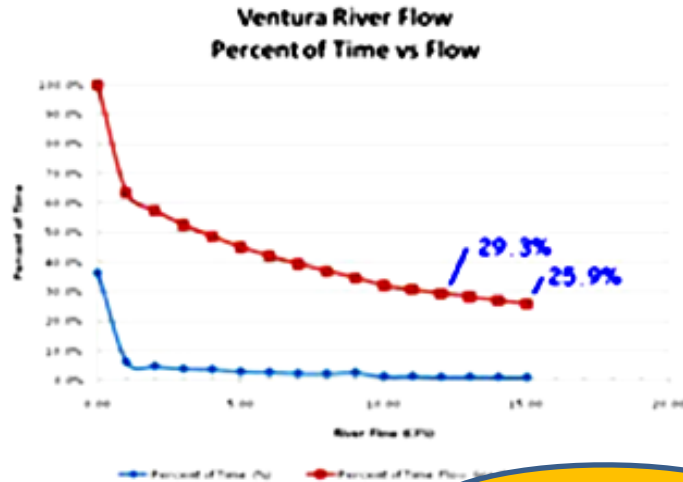
Source: 2005 Foster Park Wellfield Storm Damage Biological Opinion

# Foster Park Wellfield Surface Intake





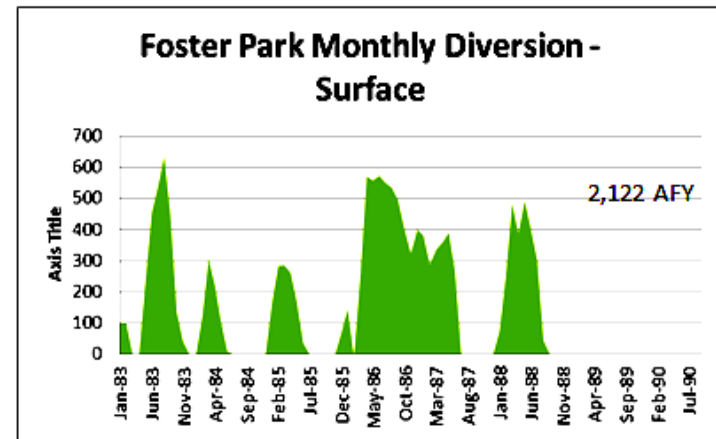
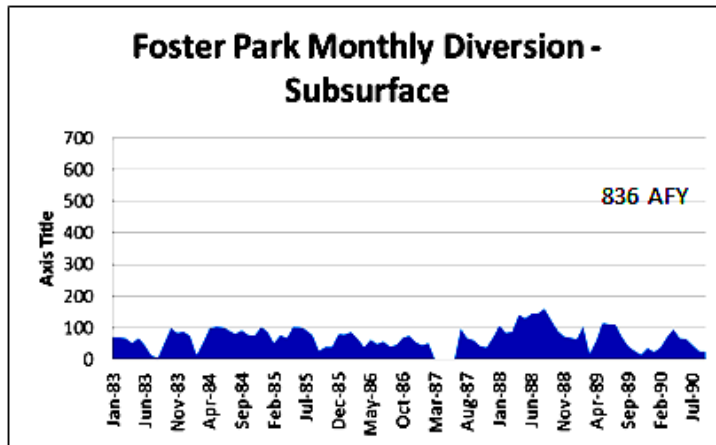
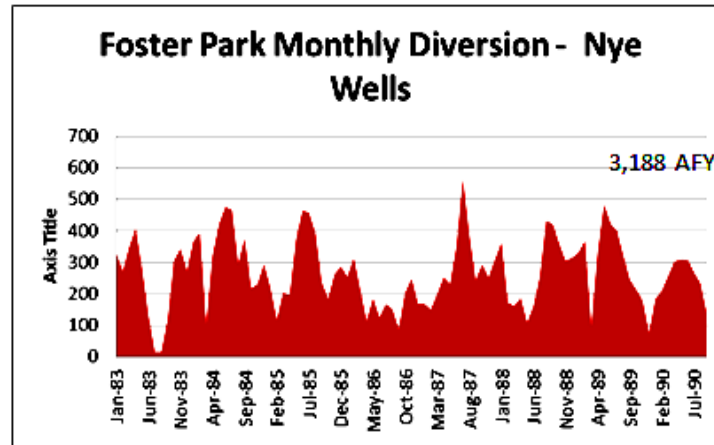
# Ventura River Flow



- The U.S. Army Corps of Engineers Biological Opinion SWR/2002/01708 issued 29 Mar 2007 states the new Foster Park Groundwater wellswill have a combined flow of 3 cfs and be operated only when surface flows in the Ventura River (measured at the Foster Park Gaging Station, USGS 11118500, or similar device), equal or exceed 15 cubic feet per second (cfs). When surface flows in the river, as above, fall below 12 cfs, operation of the subject well will cease.

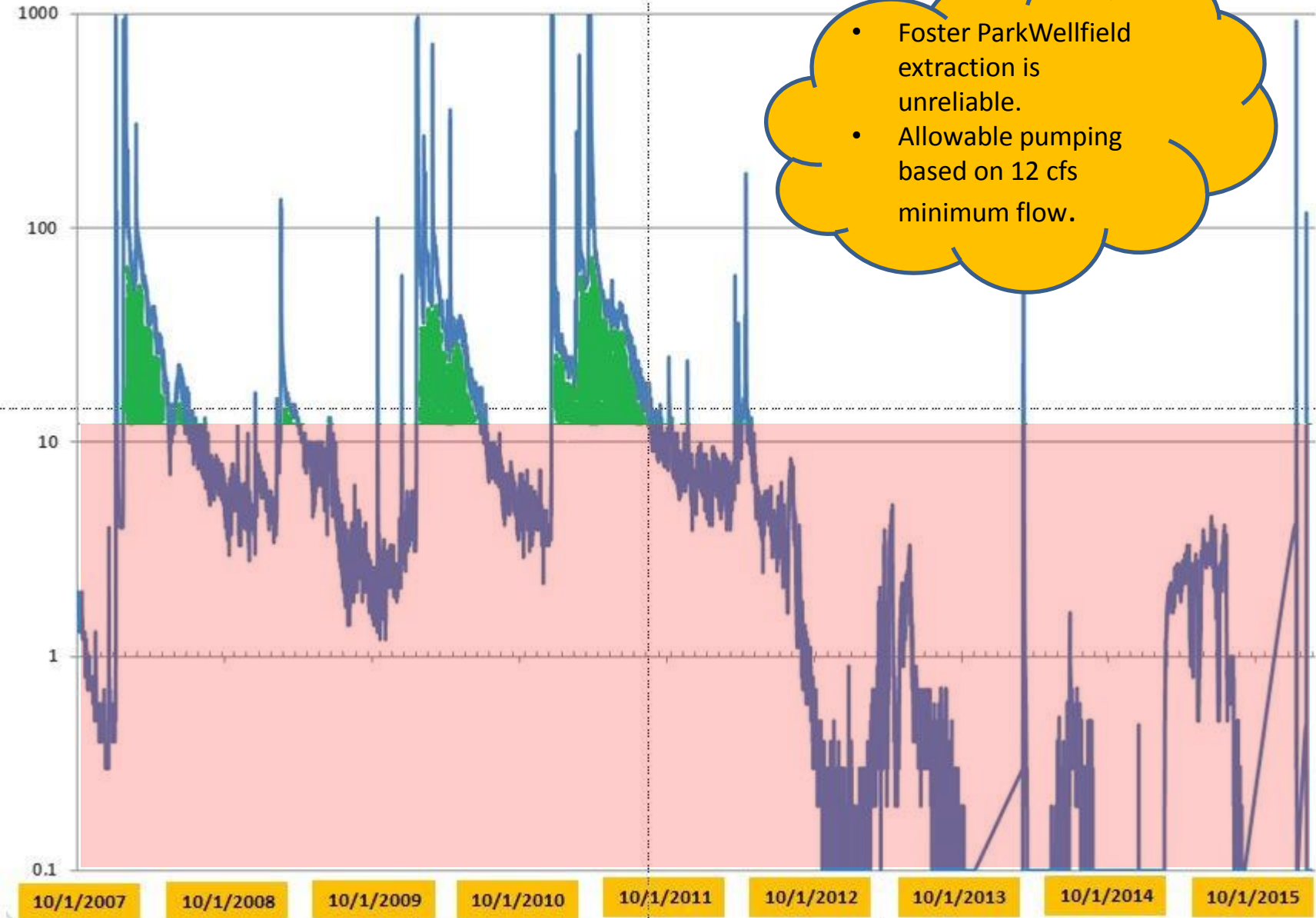
- The ability to recover water from high and normal flows is undependable and limited.
- Ventura River flow is greater than 12 cfs only 29.3% of the time

# Foster Park Monthly Diversion



Source: City of San Buenaventura Final Report on the Evaluation of Long Term Alternative Water Sources, Montgomery-Watson, July 1993

## Ventura River Flow (cfs)



- Foster Park Wellfield extraction is unreliable.
- Allowable pumping based on 12 cfs minimum flow.



# Foster Park Wellfield Production Restoration Construction Estimate

May be used only to mitigate impact of Matilija dam Removal.

CIP No.	Description	CIP Cost
97924	Golf Course Well 7	\$4,800,000
97951	Mound Well 3	\$3,500,000
97923	Mound Well 2	\$4,855,000
73048	Saticoy Well 4	\$3,000,000

Well Replacement, not new source

Why the large cost difference?

## Construction Estimate

Program 97921  
 Project Title Foster Park Well  
 Last Updated 10/1/2015  
 by JM  
 Escalation Factor 3.00%

Item	Description	Quantity	Unit	Unit Cost	Extension	Base Year Estimate	Mid-Point Construction	Actual \$	Notes
1	New Well - Nye 9	1	ea	400000	\$400,000	2005	2019	\$605,036	includes well drilling, wellhead, pump, motor, controls
2	New Well - Nye 10	1	ea	400000	\$400,000	2005	2021	\$641,883	includes well drilling, wellhead, pump, motor, controls
3	Wellhead Nye 12	1	ea	200000	\$200,000	2005	2025	\$361,222	includes wellhead piping, pump, motor, controls
4	Wellhead Nye 13	1	ea	200000	\$200,000	2005	2025	\$361,222	includes wellhead piping, pump, motor, controls
5	New Well Nye 14 (future replacement Nye 7)	1	ea	400000	\$400,000	2005	2030	\$837,511	includes well drilling, wellhead, pump, motor, controls
6	New Well Nye 15 (future replacement Nye 8)	1	ea	400000	\$400,000	2005	2030	\$837,511	includes well drilling, wellhead, pump, motor, controls
7	Destroy Nye z	1	ea	250000	\$200,000	2015	2025	\$268,783	estimated effort based on similar projects
8	Convert Surface Intake Into Subsurface Only	1	ea	100000	\$100,000	2013	2030	\$165,285	estimated effort based on similar projects
9	New Pipeline for River Crossing	2000	ft	900	\$1,800,000	2015	2025	\$2,419,049	directional drilling and HDPE
10	New Pipe Interconnections/Transmission Pipes	10000	ft	275	\$2,750,000	2007	2025	\$4,681,691	
11	Subsurface Collector Rehab/Replacement/Extension	1000	ft	500	\$500,000	2015	2019	\$562,754	
12	East Stream Bank Protection	1	ea	3764000	\$3,764,000	2010	2025	\$5,864,189	Hawks Estimate 2010
13	West Stream Bank Protection	1	ea	1653500	\$1,653,500	2010	2025	\$2,576,099	Hawks Estimate 2010
14	Other Misc. Improvements/Mitigation	1	ea	1000000	\$1,000,000	2013	2030	\$1,652,848	allowance for upgrading existing wells, additional environmental
Subtotal (no contingency)								\$21,835,084	
Construction Contingency 10%								\$2,183,508	
Total Construction (estimate in CIP may be rounded up or down)								\$24,018,593	



# Foster Park Wellfield Production Restoration Construction Estimate

## Construction Estimate

Program 97921  
 Project Title Foster Park Wellfield Production Restoration  
 Last Updated 10/1/2015  
 by JM  
 Escalation Factor 3.00%

Item	Description	Quantity	Unit	Unit Cost	Extension	Base Year Estimate	Mid-Point Construction	Actual \$	Notes
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6	New Well Nye 15 (future replacement Nye 8)	1	ea	400000	\$400,000	2005	2030	\$837,511	includes well drilling, wellhead, pump, motor, controls
7	Destroy Nye 2	1	ea	250000	\$200,000	2015	2025	\$268,783	estimated effort based on similar projects
8	Convert Surface Intake Into Subsurface Only	1	ea	100000	\$100,000	2013	2030	\$165,285	estimated effort based on similar projects
9	New Pipeline for River Crossing	2000	ft	900	\$1,800,000	2015	2025	\$2,419,049	directional drilling and HDPE
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14	Other Misc. Improvements/Mitigation	1	ea	1000000	\$1,000,000	2013	2030	\$1,652,848	allowance for upgrading existing wells, additional environmental
	Subtotal (no contingency)							\$21,835,084	
	Construction Contingency	10%						\$2,183,508	
	Total Construction (estimate in CIP may be rounded up or down)								

It has been concluded that rehabilitation of the subsurface collector is not considered feasible due to the age of the structure, the nature of the openings, the materials of construction, and the anticipated high cost of what would be considered unconventional rehabilitation techniques



# Foster Park Wellfield Restoration

- Predicted change in climate can be expected to reduce the ability of the aquifer to recharge due decreasing flows caused by to higher temperature, greater summertime heat stress, prolonged periods of very hot weather, later onset of winter rain and the increase in storm intensity and runoff.
- Restoration of the Foster Park wellfield has not been demonstrated to be a sound economic decision based both on damage by previous storm events and new facilities being constructed within 100 year floodplain.
- The two additional wells installed at Foster Park as part of the Matilija Dam Ecosystem Restoration Project were constructed in order to mitigate for water lost as a result of increases in turbidity due to removal of Matilija Dam and are not to be operated until project related impacts after removal of Matilija Dam necessitate the activation.
- Biological Opinions issued by the National Marine Fisheries Service dictate that new wells may be operated only when the River flow exceeds 12 cubic feet a second.



# Foster Park Wellfield Restoration

- The future of Foster Park wellfield as a continued source of water supply is clouded due to ongoing litigation by the Santa Barbara Coastal Keepers and City of San Buenaventura.
- Hydrogeological Studies and Environmental Impact Reports address operational capacities and peak water production flow rates but do not predict a sustainable yield.
- Estimated operational capacities of wells are based on testable findings, well test data, aquifer parameter estimates and well interference analysis and do not predict a sustainable yield based on the variable and unreliable River flow conditions.
- The proposed strategy for management of the Foster Park wellfield will place an inordinate amount of stress on the aquifer and exacerbate depletion of the aquifer during periods of low water availability.



# Foster Park Wellfield Restoration

- Current water supply predictions are based on a 21-year-old evaluation of long-term alternative water sources which relied on increase surface diversion and sub service diversion which has subsequently been destroyed or if projected to be abandoned due to change in the River's course.
- The rivers groundwater basin could be depleted in less than two years if the city were to extract less than the historical average of 5,500 acre-feet per year from River.
- Production from the Ventura River varies greatly from year to year due to the effects of weather, local hydrology, the storage capacity of the Ventura River alluvium and upstream diversions.
- A more realistic understanding of the basis potential yield and production capacity requires a modeling effort thought is beyond the scope of study of previous models.
- There is a limited opportunity to derive additional yield from existing facilities even though the city has the belief that it has the ability to restore and continue surface diversion based on historic use.

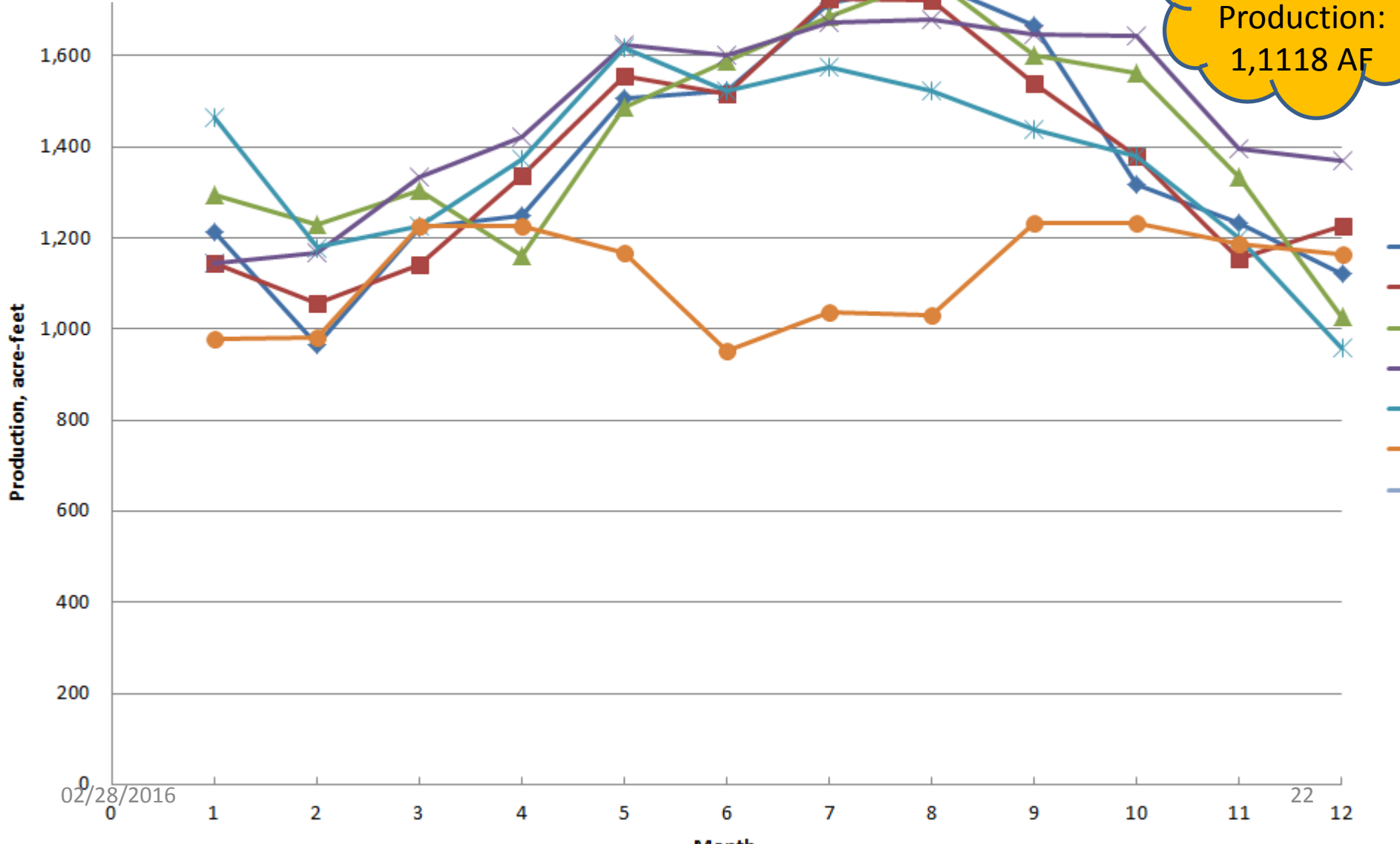
# Foster Park Wellfield Restoration



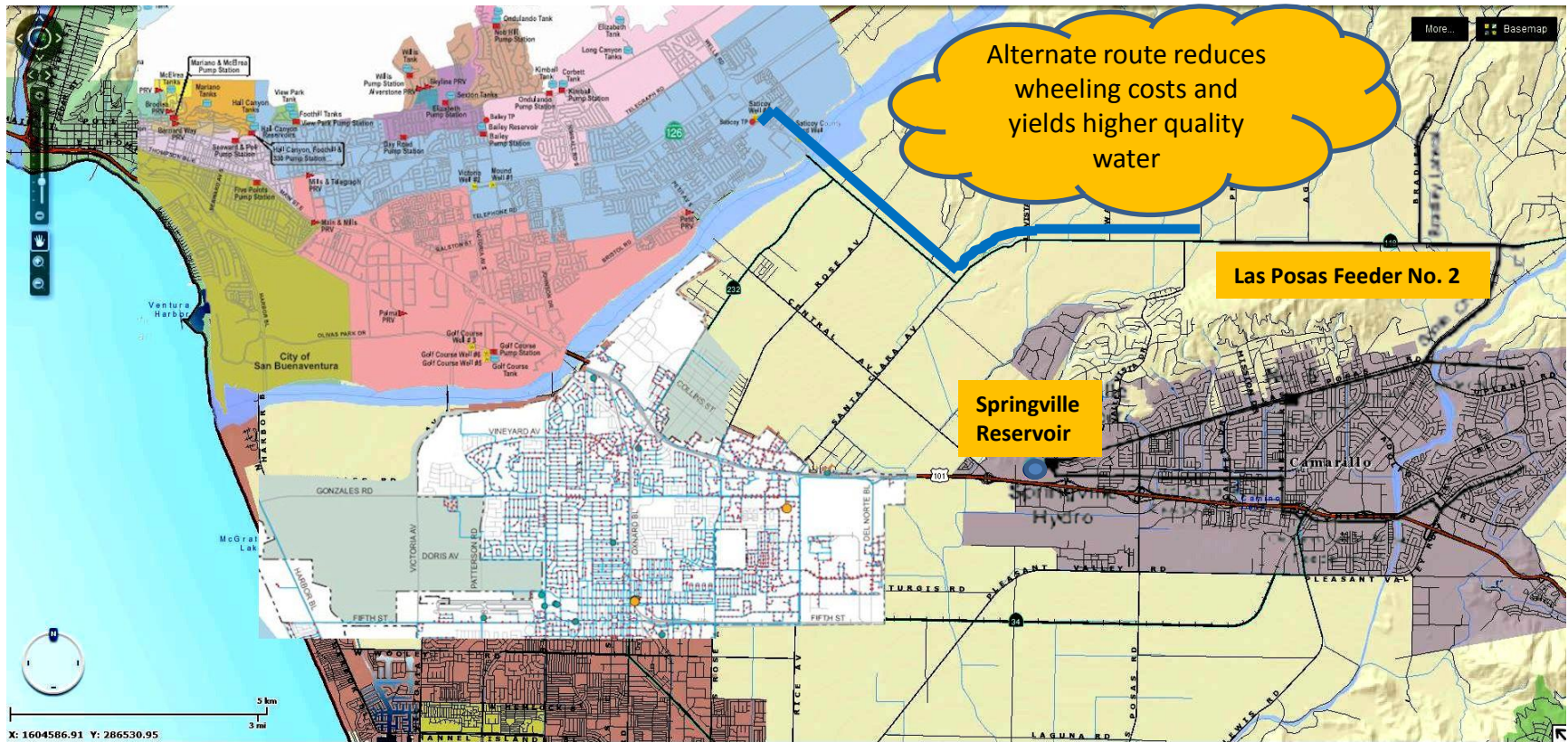
# Ventura Water Monthly Production



Average  
5015  
Monthly  
Production:  
1,1118 AF



# Oxnard-Ventura Emergency Intertie Alternate Route

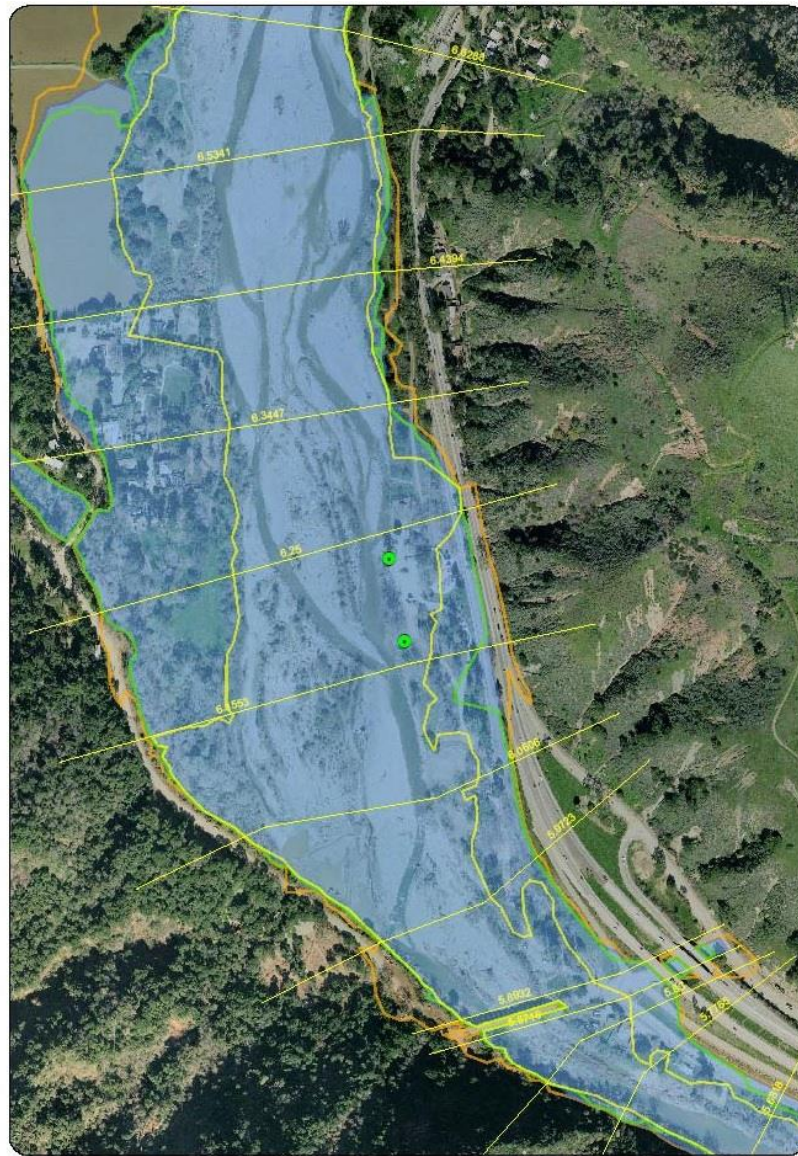


Use of potable water  
for grading  
operations and dust  
control is not best use  
of water

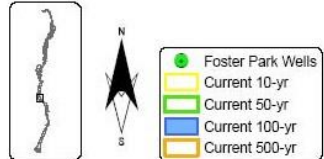




# **SUPPLEMENTAL SLIDES**



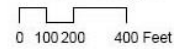
Wells are located in Flood Plain



**Current Conditions Flood Boundaries**

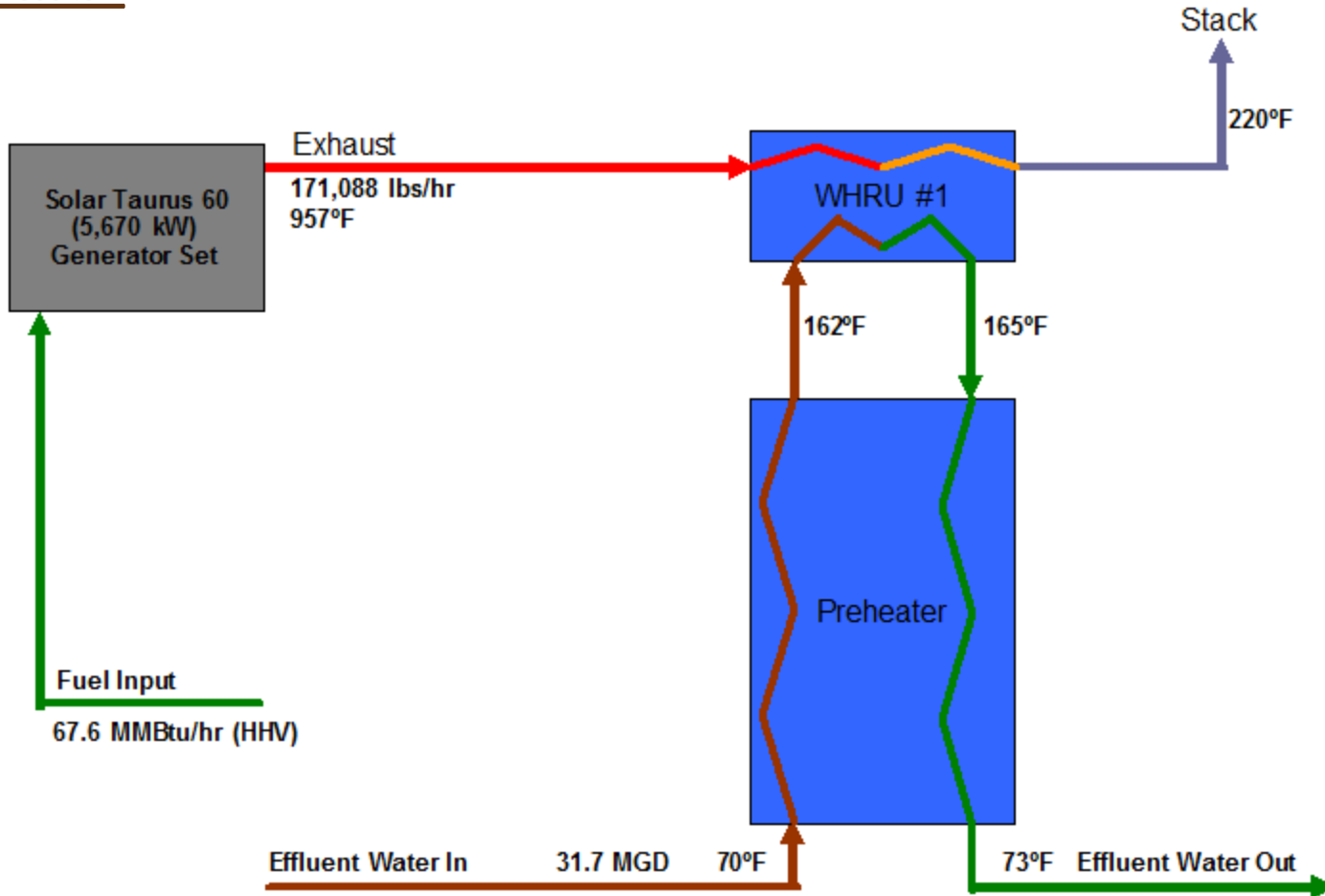
Matilija Dam Ecosystem Restoration Project  
Ventura County, CA

Figure A1  
Principal Investigators:  
Blair Greimann, David Mooney  
US Bureau of Reclamation  
Technical Service Center  
April 9, 2007





# Wastewater Pasteurization Process Diagram



**Cogeneration System Efficiency = 77.6% (HHV)**  
**Equivalent Power Generation Efficiency = 64.5% (HHV)**