CITY OF VENTURA

Phase 3 Stakeholder Workshop
November 3, 2015

carollo
Engineers...Working Wonders With Water®

Stillwater Sciences

Workshop Goals/Objectives

- Provide an update on activities conducted in 2015 including:
  - Estuary Monitoring
  - Evaluation of 100% Diversion Scenarios
  - Brine Disposal Options
- Opportunity to tour VenturaWaterPure Demonstration Facility
- Opportunity for public input

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Agenda

- Welcome and Introductions
- Special Studies Overview and Schedule
- Update on Estuary Monitoring Activities
- 100% Diversion Study
  - Recap of Phase 2 Opportunities
  - Definition of 100% Diversion from Consent Decree
  - Overview of City Water Supply Portfolio
  - 100% Diversion Scenarios
  - Estimated Range of Costs
- Brine Disposal
  - Preliminary Options
  - Estimated Range of Costs
- Summary – Next Steps

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WELCOME AND INTRODUCTIONS

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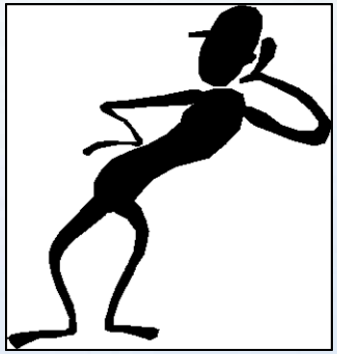
This is a Stakeholder Driven Process

What does that mean for you?



- **Actively Listen!**
  - We want you to understand how we got here and where we are going
- **Actively Participate!**
  - Please contribute ideas and concerns
  - Stakeholder contributions expressed at these workshops shape the project

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Please introduce yourself…

- Name
- Organization
- Interest

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SPECIAL STUDIES OVERVIEW AND SCHEDULE

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Ventura Wastewater Reclamation Facility (VWRF) discharges to Santa Clara River Estuary (SCRE)

- ~200 acres
- Open and closed mouth conditions
- Beneficial uses include RARE

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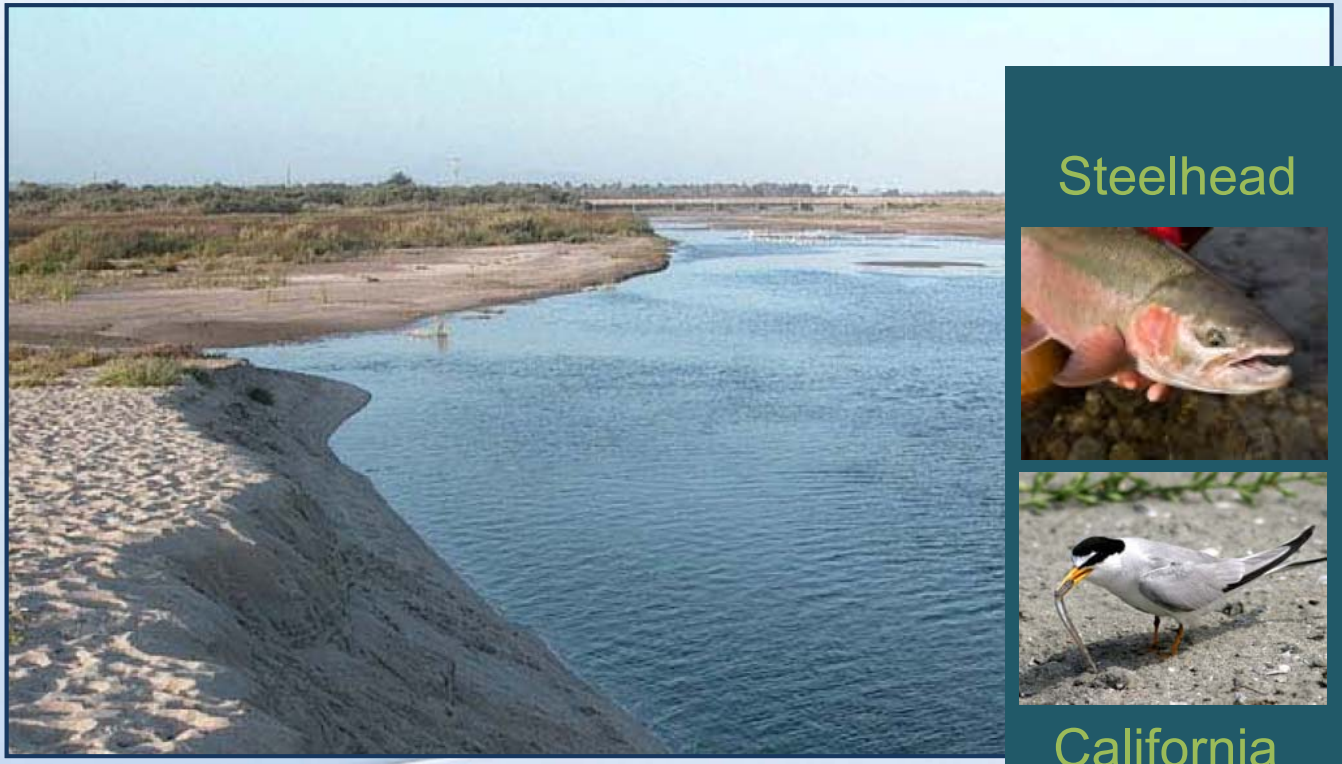
Goal of SCRE Special Studies

Determine best use of the treated water resources from the VWRF to protect the health of the SCRE (<u>and the endangered species that inhabit it</u>)



Steelhead

Tidewater goby

California least tern

Western snowy plover

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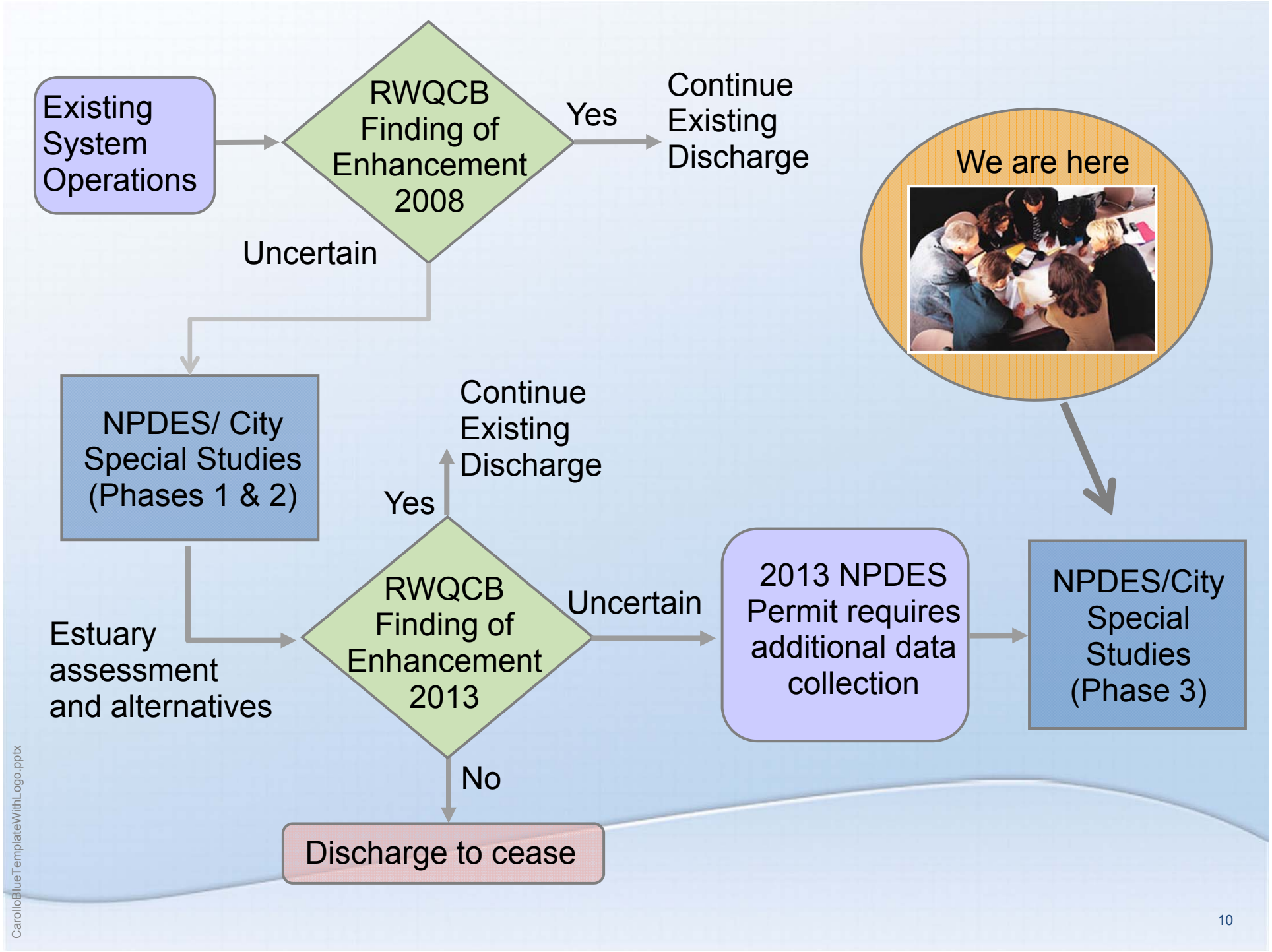

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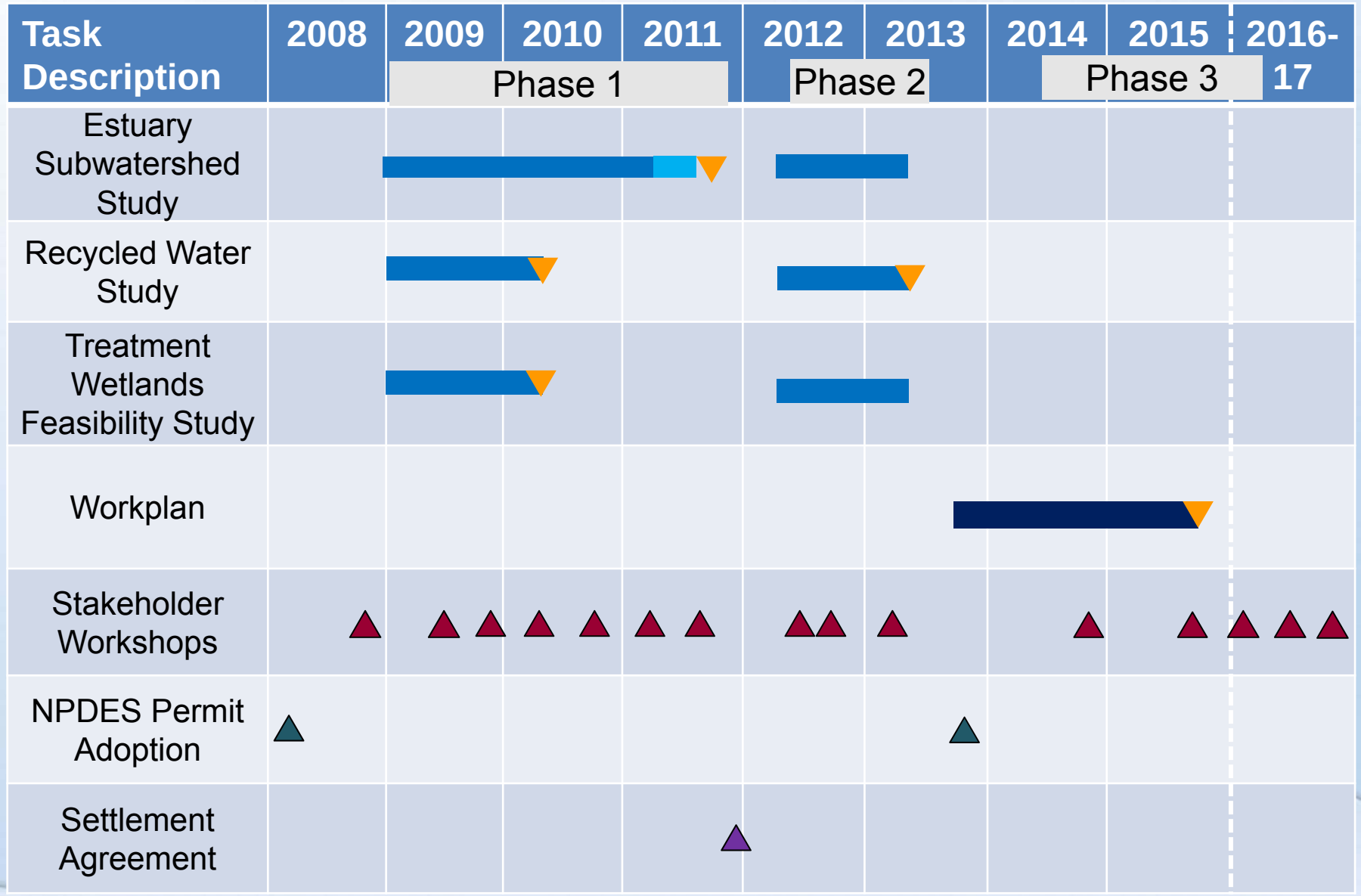
History of the Special Studies



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Scope of Work for Phase 3

NPDES Required Tasks

1. Monitoring Plan
2. Hydrologic Data Collection
3. Water Quality Data Collection
4. Habitat Suitability
5. Analysis/Reporting
6. Stakeholder Workshops
7. Scientific Review Panel

Other Tasks

8. Regulatory/Permitting
9. 100% Diversion Study
10. Selection of Preferred Alt
11. RO Feasibility Analysis
12. Brine Disposal
13. Support/Coordination
14. Project Management

Phase 3 Studies due to RWQCB on Jan 1, 2018

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Update on Estuary Monitoring Activities

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Phase 3 Estuary Studies

Study Components

Water Balance Evaluation

- Update lagoon morphology, berm breach dynamics
- Improved groundwater inflow/outflow estimates
- Estimate SCRE water levels, breaching for VWRF flow scenarios and WY Types (Dry, Normal, Wet)

Water Quality Evaluation

- Improved estimates of surface and groundwater water quality contributions to SCRE
- Spatial and temporal characterization of water quality conditions in the SCRE
- Assess water quality for VWRF flow and treatment scenarios

Habitat Suitability Evaluation

- Identify any patterns in special status species habitat use and BMI indicators in relation to water quality and physical characteristics
- Update stage vs area relationships.

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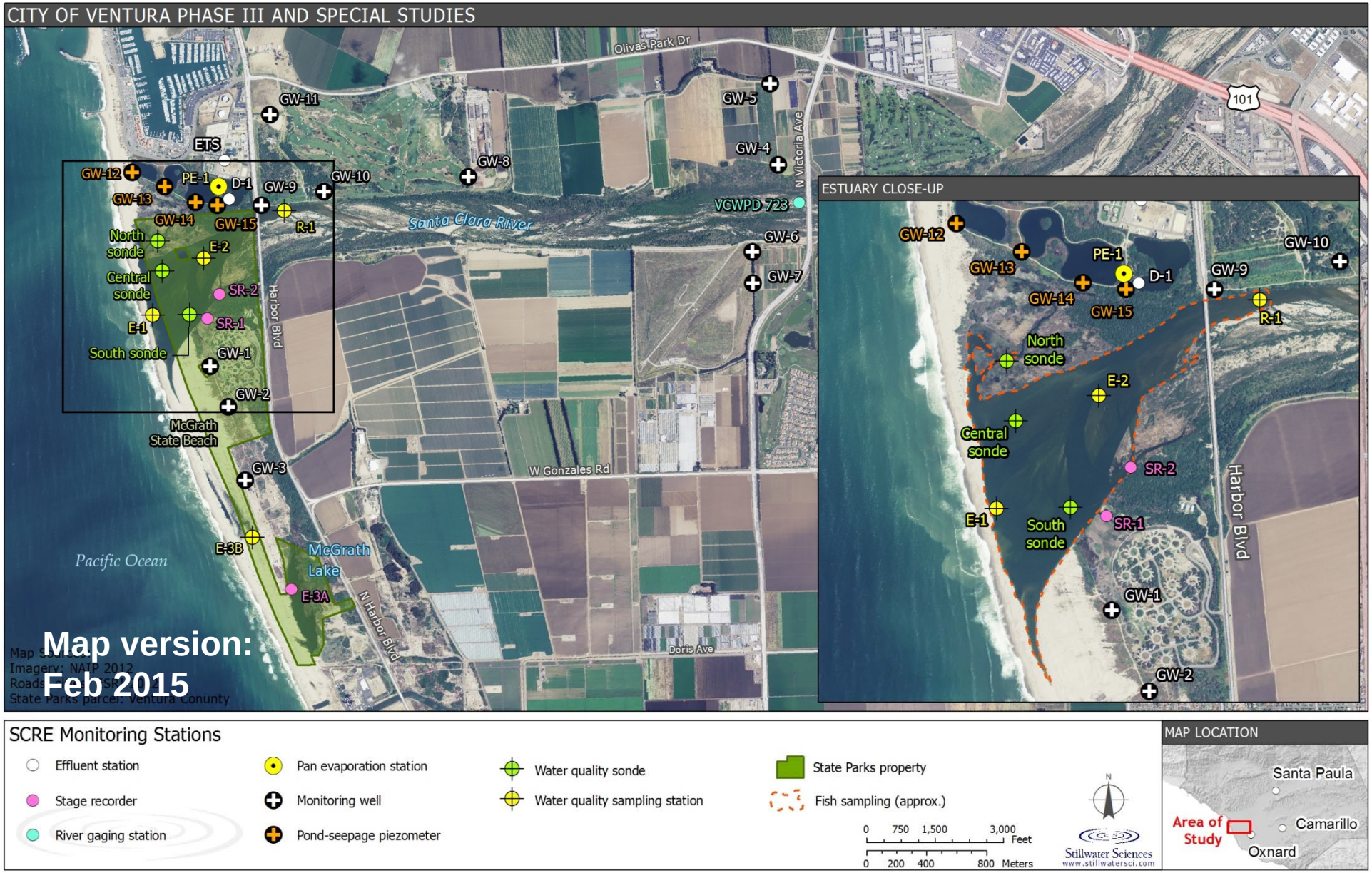
Estuary Studies Monitoring Locations



Estuary Studies - Water Balance

Status and Preliminary Results

- All stations re-activated / installed as of Jan 2015
- WY 2015 = drought year with few storms
- Only 2 days of mouth breaching
- Full lagoon, max surface-water elev. of ~11 ft (NAVD88)
- No surface-water connectivity between SCRE and McGrath Lake outfall pond
- Continued sampling in 2016

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Estuary Studies - Water Quality

Status and Preliminary Results

- All stations re-activated / installed as of Jan 2015
- No McGrath sampling (no surface-water connection)
- In Situ Water Quality (periods of low DO in Spring)
- Nutrients (NO_3 highest in upstream wells)
- Toxicity (100% survival/growth)
- CECs (sampled, awaiting results)
- Continued sampling in 2016

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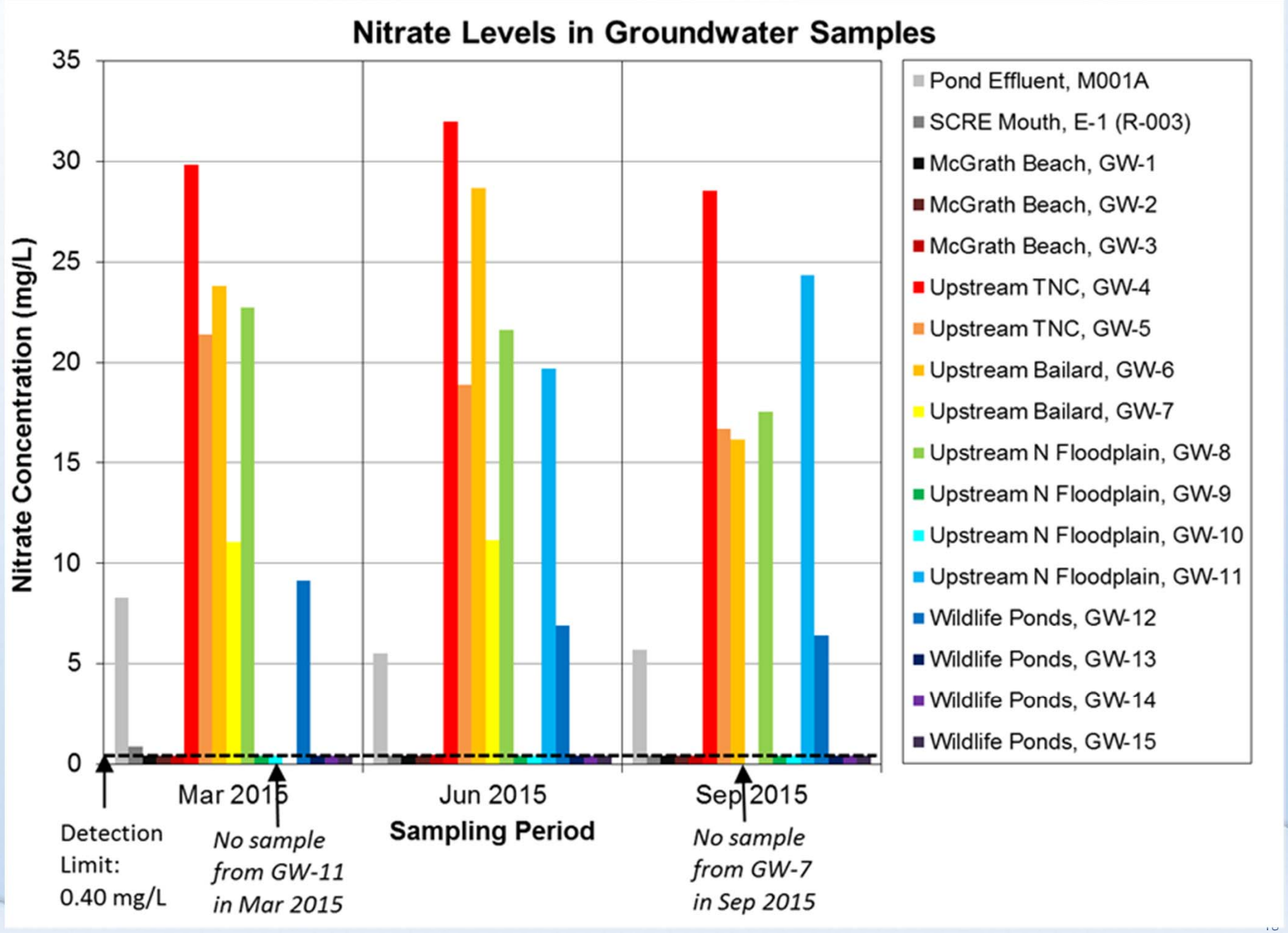
Nitrate Levels in Groundwater Samples
Nitrate Concentration (mg/L)
35
30
25
20
15
10
5
0
Mar 2015
Jun 2015
Sep 2015
Sampling Period
Detection Limit: 0.40 mg/L
No sample from GW-11 in Mar 2015
No sample from GW-7 in Sep 2015
Pond Effluent, M001A
SCRE Mouth, E-1 (R-003)
McGrath Beach, GW-1
McGrath Beach, GW-2
McGrath Beach, GW-3
Upstream TNC, GW-4
Upstream TNC, GW-5
Upstream Bailard, GW-6
Upstream Bailard, GW-7
Upstream N Floodplain, GW-8
Upstream N Floodplain, GW-9
Upstream N Floodplain, GW-10
Upstream N Floodplain, GW-11
Wildlife Ponds, GW-12
Wildlife Ponds, GW-13
Wildlife Ponds, GW-14
Wildlife Ponds, GW-15

Estuary Studies – Habitat Suitability

Status and Preliminary Results

- Fish and BMI sampled 4 quarters in WY 2015
  - 1/26/15 sampling followed 1/12/15 breach
  - Fish—mosquito fish, Mississippi silversides, fathead minnow, green sunfish, carp, and tidewater goby (n=10 in Sept 2015)
  - BMI sampling at 4 stations (Outfall, E-1, E-2, R-1):
- Updating habitat map based on Sept 2015 survey
- 2016 Activities:
  - Required monitoring completed for 1 water year (2015)
  - Potential sampling with budget reserved (summer quarter)

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PHASE 2 CONCLUSIONS

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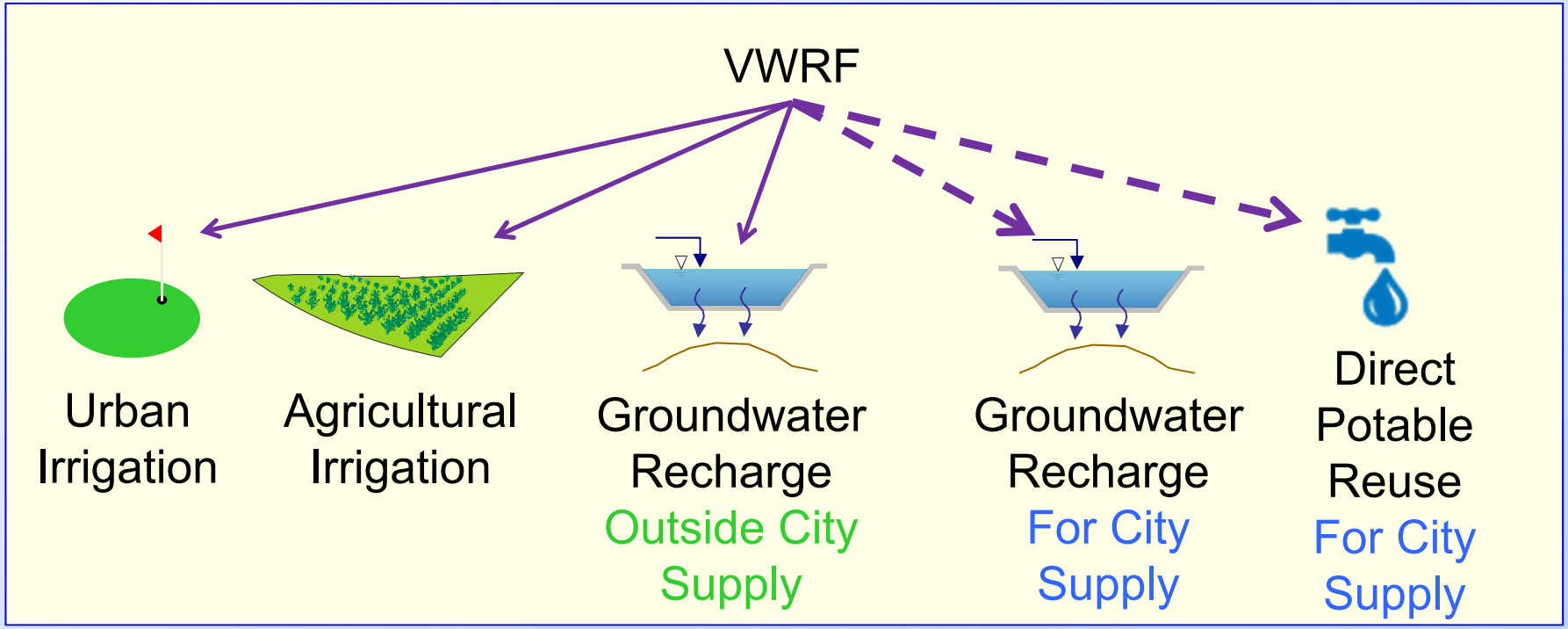
Phase 1 & 2 Recycled Water Studies considered a range of reuse alternatives



What is the reuse market for reducing the effluent flow?

What is the reuse market for reducing effluent flow and providing water supply?

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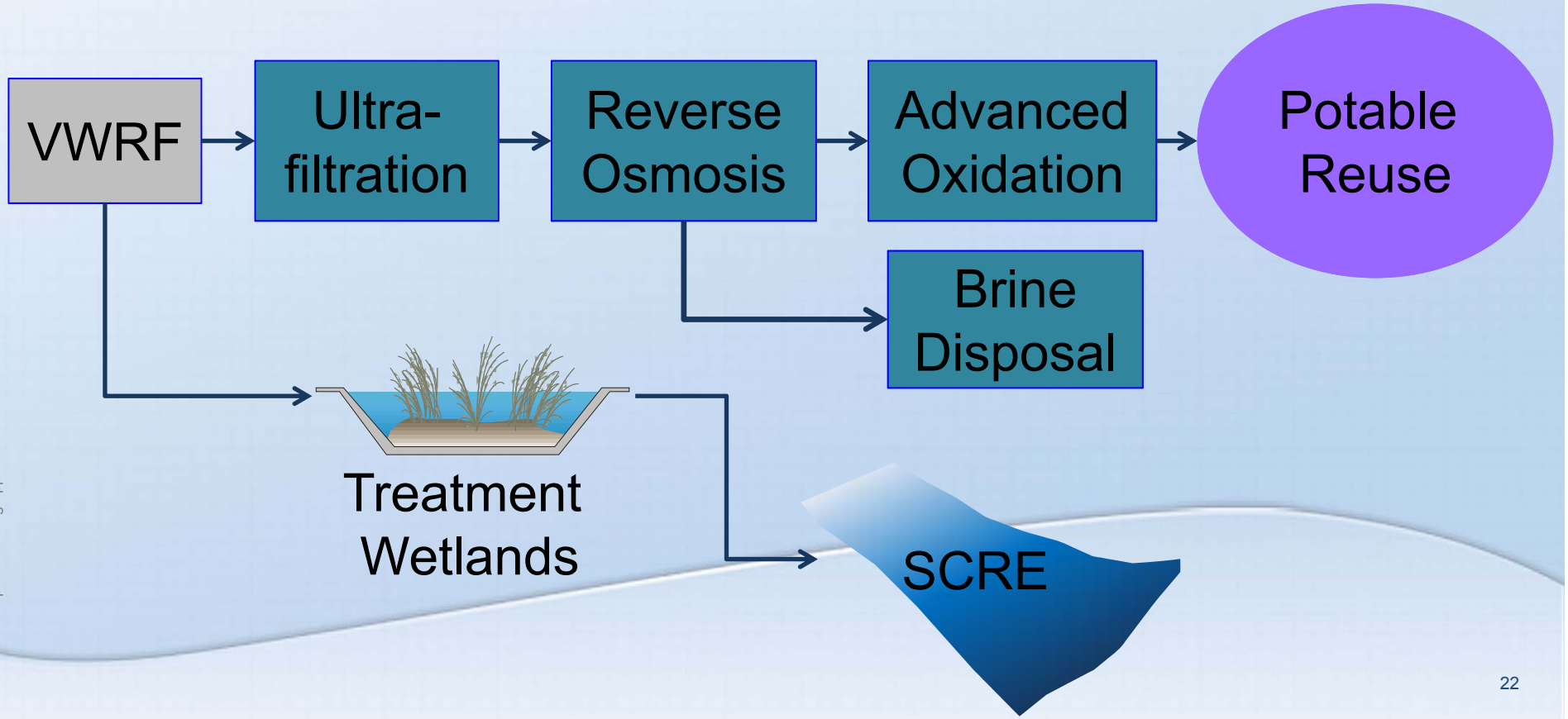
Phase 2 Conclusions

- No single recommended project
- Further investigation necessary



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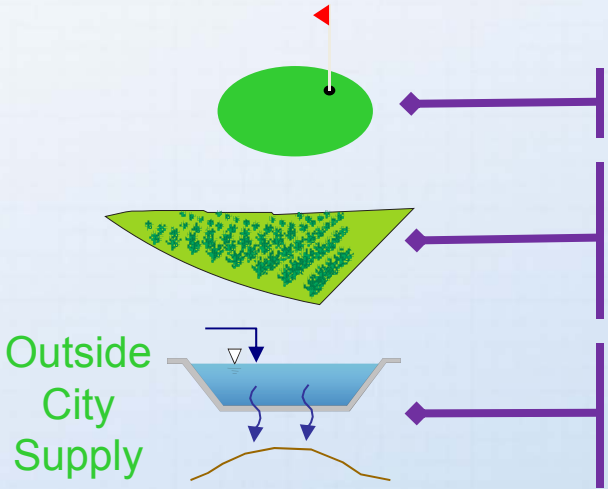
City is focusing on potable reuse based on several drivers:

- Reuse market study results:



Low demand, extensive purple pipe

High summer demand, but requires partial RO for chloride removal

Low demand unless partial RO is provided

- Updated evaluation of water supply and demand
- City relies on all local water resources (surface and groundwater)
- Increased vulnerability of water rights, degraded groundwater supply
- Drought conditions

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100% DIVERSION UPDATE

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EG4

100% Diversion Definition(s) per Consent Decree

- Design capacity for total effluent flow during:
  - 5 Year 24-Hour Storm Event: 8.73 mgd[1]
  - 5 Year 30-Day Storm Event: 12.2 mgd[1]

- Provide capacity to eliminate discharge of 100% of average annual flow
  - Average Annual Flow (AAF): 7.70 mgd

(1) Design flows for storm events were calculated using the NOAA Atlas 14 Precipitation Frequency Estimates, precipitation meter information from Downtown Ventura Meter, and VWRF historical flow data

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Slide 25

EG4 highlight average annual flow

Carollo User, 10/29/2015

100% Diversion Design Process

- Goal – Prevent discharge to SCRE
- Constraints
  - Treatment processes require even flow
  - Storm events cause peak surges
- Conclusion → Optimize!!
  - Use of storage to balance out flows and facility sizing

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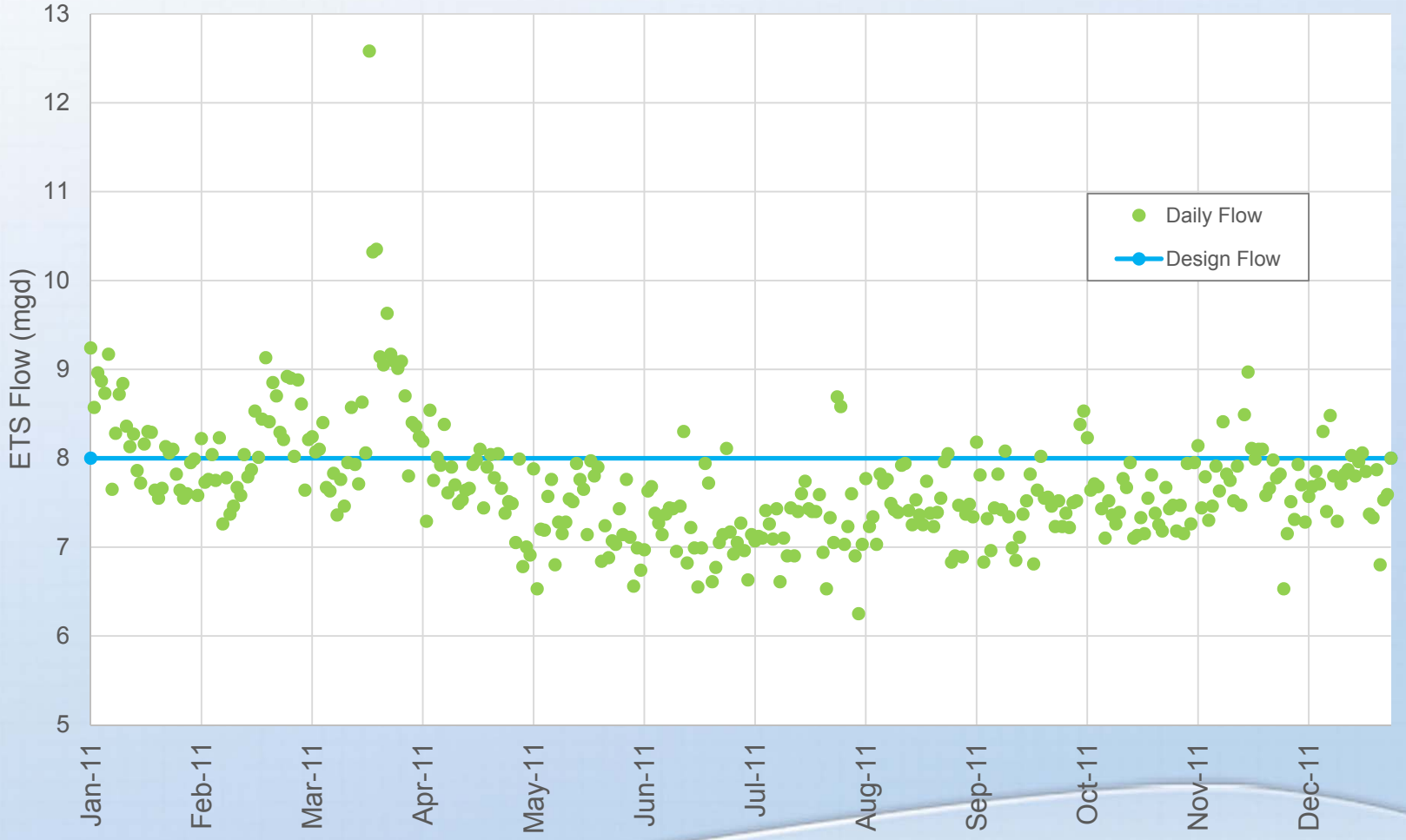
2011 Daily ETS Flow vs Design Flow = 8 mgd



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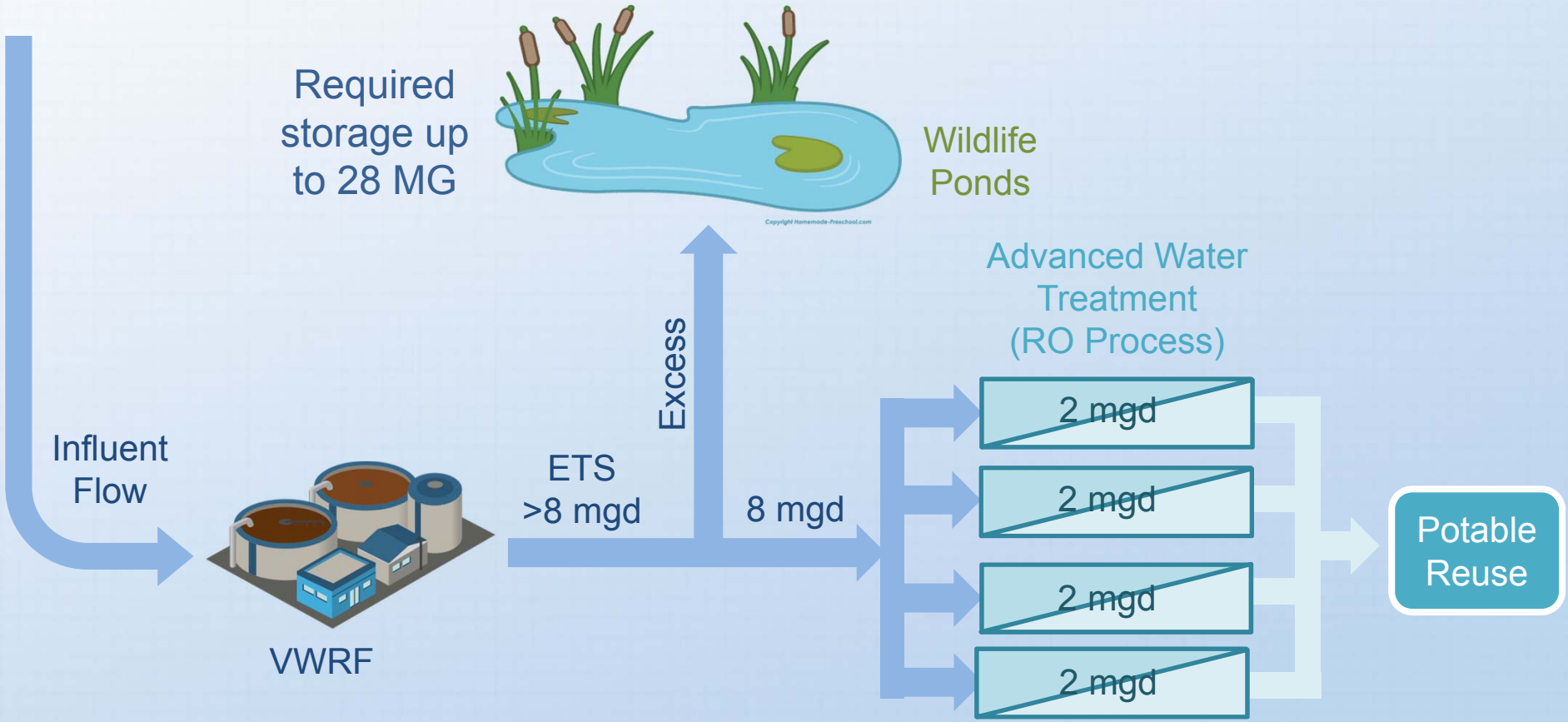
Operations During Wet Months (Winter)



Notes:

- 87 days where ETS flow > Design Flow
- Excess flows are stored in Wildlife Ponds

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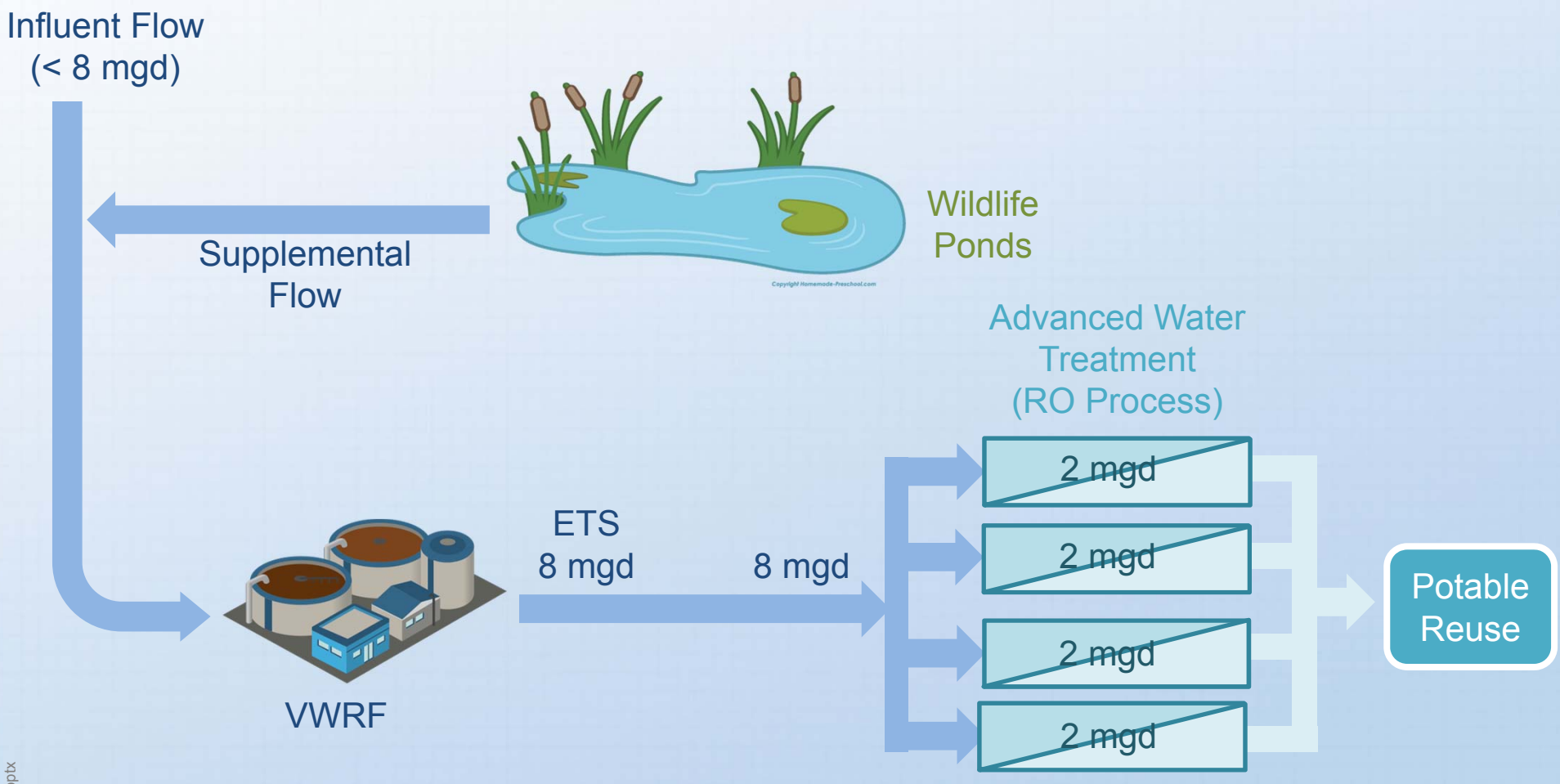
Operations During Low Flow Days



Notes:

- 277 days where recycling is necessary to make up required flow (but only possible on 220 of those days)
- Water stored in Wildlife Ponds must be sent into headworks of VWRF

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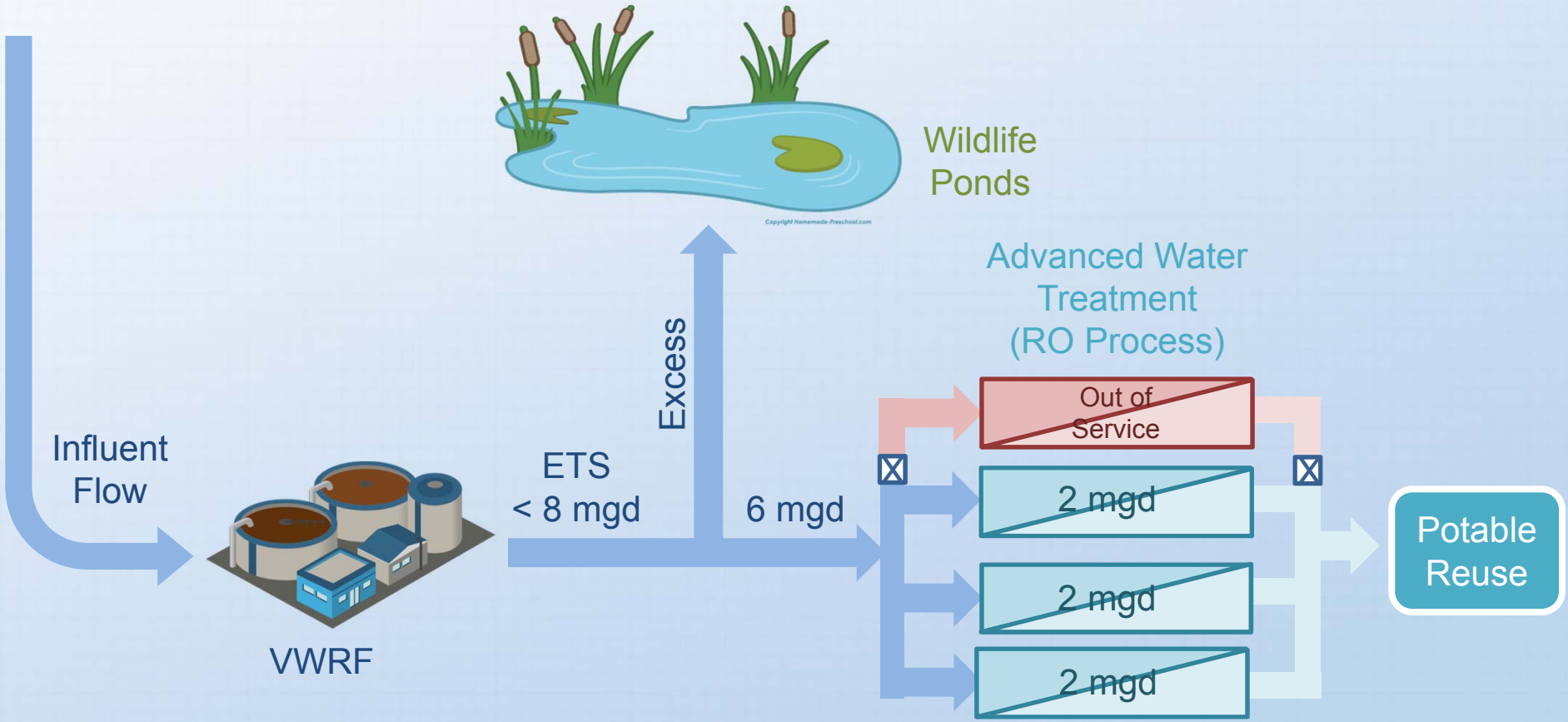
Operations During Low Flow W/O Storage



Summer Operation Options:

- Approx. 57 days where not sufficient storage to provide full capacity
- Alternate periods of full capacity & turn down (ex: T,W,R @ 8 mgd, rest @ 6 mgd)
- Increase non-potable recycled water distribution

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Evaluation of Using Wildlife Ponds for Storage

- Pros
  - Using existing facilities on-site
  - Eliminates need for extra storage construction
    - 34 MG capacity ➔ $34M savings (cost of new storage)
- Cons
  - Inconsistent flow to ponds may disturb wildlife
  - Water in ponds must be retreated through VWRF before going to AWTF. Adds ≈ $3M to cost.
  - If ponds are required to be lined to prevent infiltration, would eliminate habitat benefit and add cost (≈ $6-8M)

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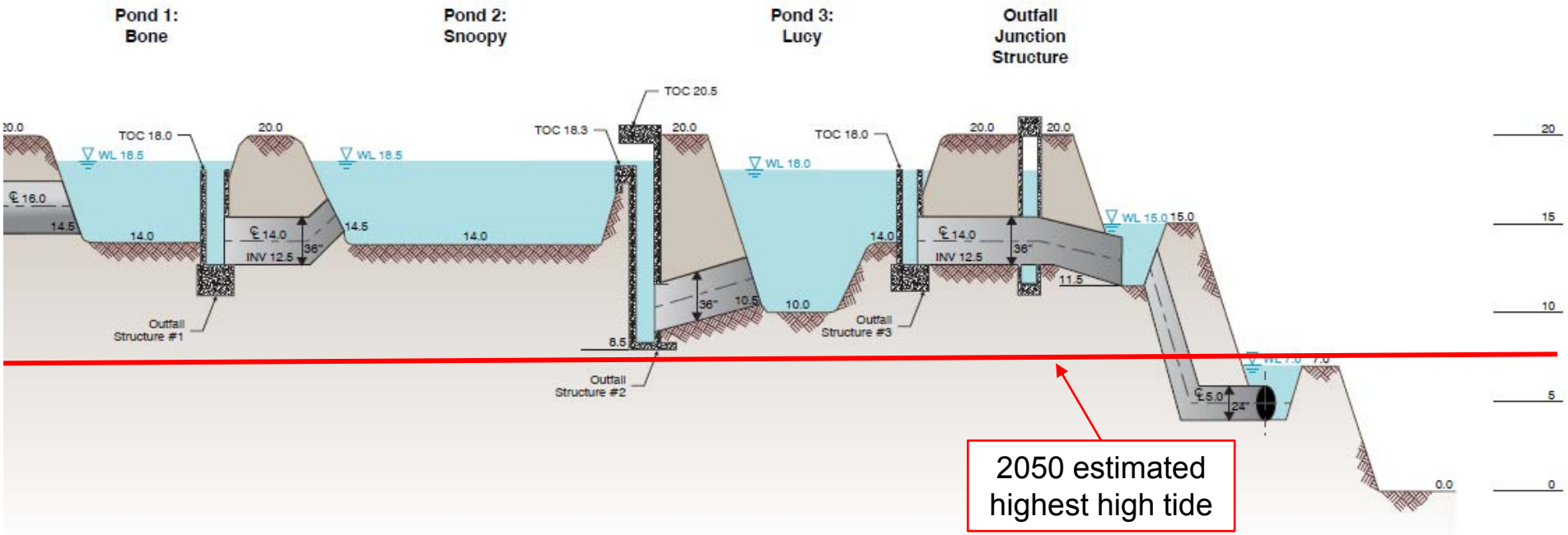
Impact on Wildlife Ponds due to Climate Change (Sea Level Rise)



2050 Estimated Highest Tide = 7.1 feet
Wildlife Berm Elevation = 20 feet

Design Flow Recommendations for 100% Diversion

- Existing Flows
  - Initial Design capacity for AWTF = 8 mgd
    - Slightly larger than AAF (7.7 mgd)
  - Capacity of 8 mgd provided in 4 – 2 mgd modules
  - Use on-site storage to handle storm events
- Future Flows
  - Design capacity of 12 mgd
    - Slightly larger than estimated AAF (11.8 mgd)
  - Use on-site storage to handle storm events

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VENTURA WATER SUPPLY OVERVIEW

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Ventura Water Supply Sources

- Surface Water
  - Lake Casitas Municipal Water District (CMWD)
  - Ventura River Surface and Subsurface Water
  - State Water Project (SWP)
    - 10,000 afy allocation – no infrastructure in place at this time
- Groundwater
  - Mound Basin
  - Santa Paula Basin
  - Oxnard Plain Basin
- Water provided by a variety of sources depending on availability in a given year

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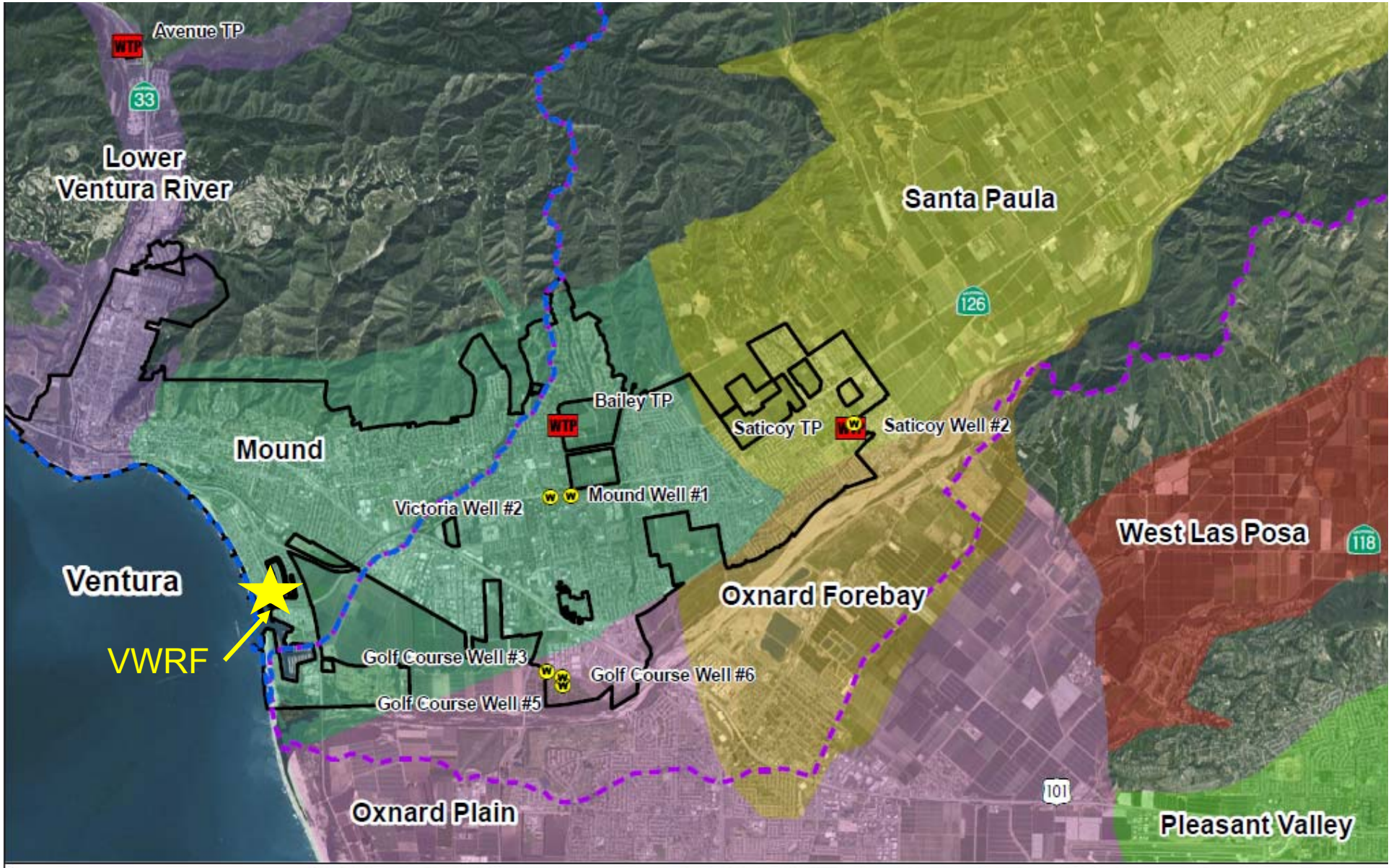

Legend

- City of Ventura
- **Watersheds**
  - Santa Clara
  - Ventura
- **Groundwater Basins**
  - Lower Ventura River
  - Mound
  - Oxnard Forebay
  - Oxnard Plain
  - Pleasant Valley
  - Santa Paula
  - West Las Posa
- **Water Facilities**
  - Treatment Plant
  - Well

0 4,500 9,000 Feet

Ventura Water Supply Sources
Phase 3 Recycled Water Study
City of Ventura

carollo

Supply Reliability Concerns Results in Need for Flexibility and New Supplies

- Regulatory
  - Groundwater quality
    - Attainment of secondary standards – Mound, Santa Paula, Oxnard Plain
- Groundwater Management Agency Policies
  - Allocation changes
- Hydrologic Conditions
- Environmental Concerns

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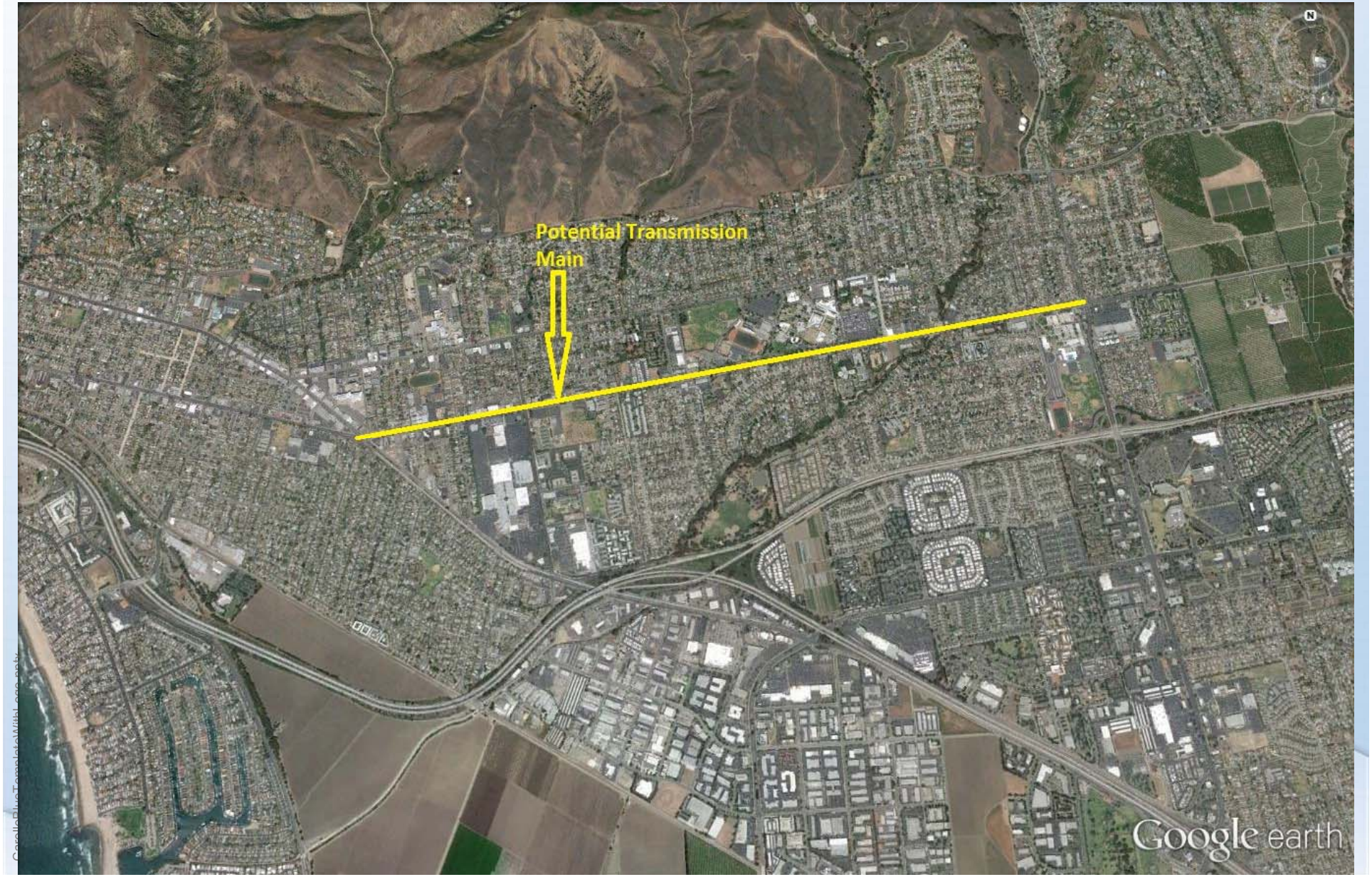
Planned Project - Increases System Flexibility to Move Water East to West



EG2

100% DIVERSION SCENARIOS

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Slide 39

EG2 put water supply discussion here
Carollo User, 10/29/2015

Planning Parameters for 100% Diversion

- Distribution (Drinking Water) Priorities
  1. Mound Basin – Bailey Water Conditioning Facility
     - Worst water quality
  2. Santa Paula Basin – Saticoy Water Conditioning Facility
  3. Oxnard Plain (best water quality)

- Treat design flow at VWRF to DPR standards, distribute to end users/groundwater recharge

- Flow Distribution
  - 3.6 mgd (4,033 afy) DPR to Bailey
  - Rest of flow – varies per scenario

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Existing Flow 100% Diversion Scenarios

Flow Allocation in MGD

	Alternative 1	Alternative 2
Flow Diverted	8.0	
Flow to Bailey (DPR)	3.6	3.6
Flow to Saticoy (DPR)	0.0	2.8
Flow to Mound Basin (IPR)	2.8	0.0
Total Product Water Flow	6.4	
Brine Flow	1.6	

Flow Allocation in AFY

	Alternative 1	Alternative 2
Flow Diverted	8,961	
Flow to Bailey (DPR)	4033	4033
Flow to Saticoy (DPR)	0	3136
Flow to Mound Basin (IPR)	3136	0
Total Product Water Flow	7,169	
Brine Flow	1,792	

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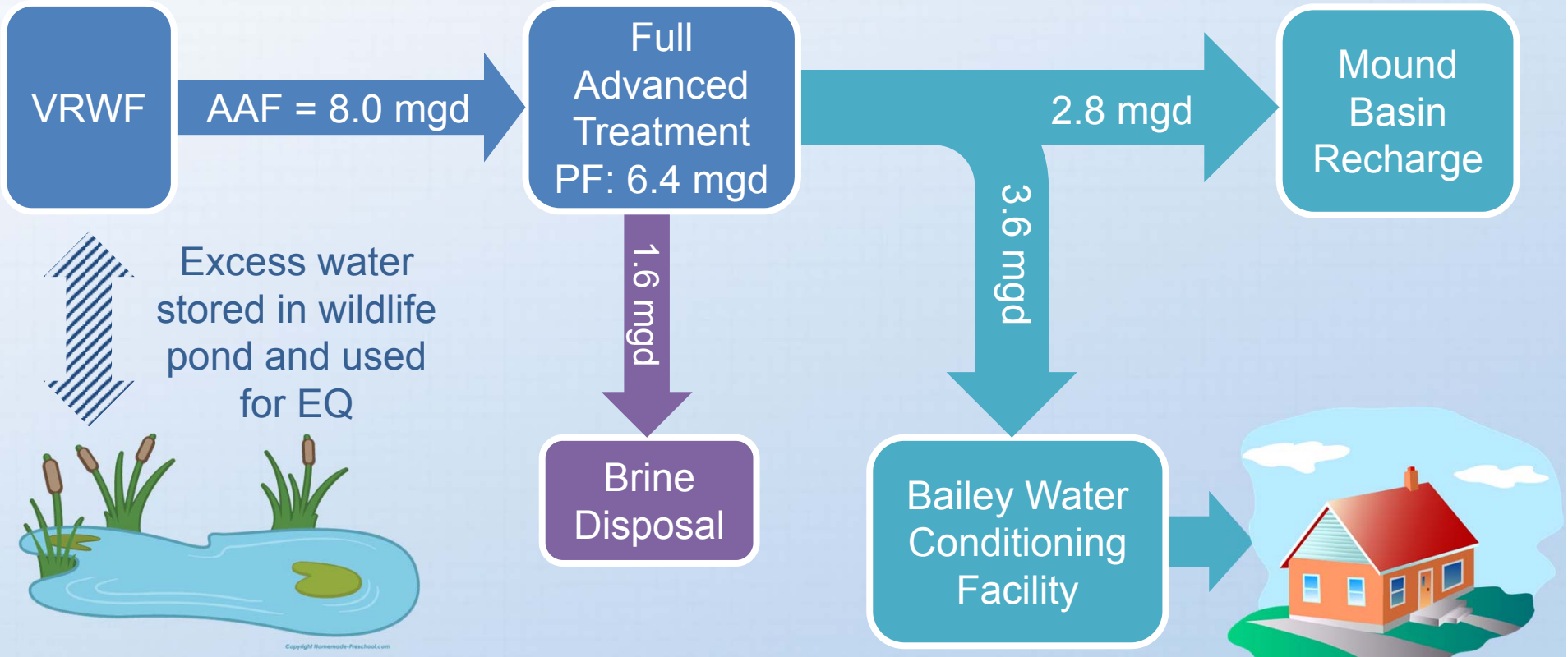
Existing Flows – Alternative 1



Note:
PF = Product Water Flow

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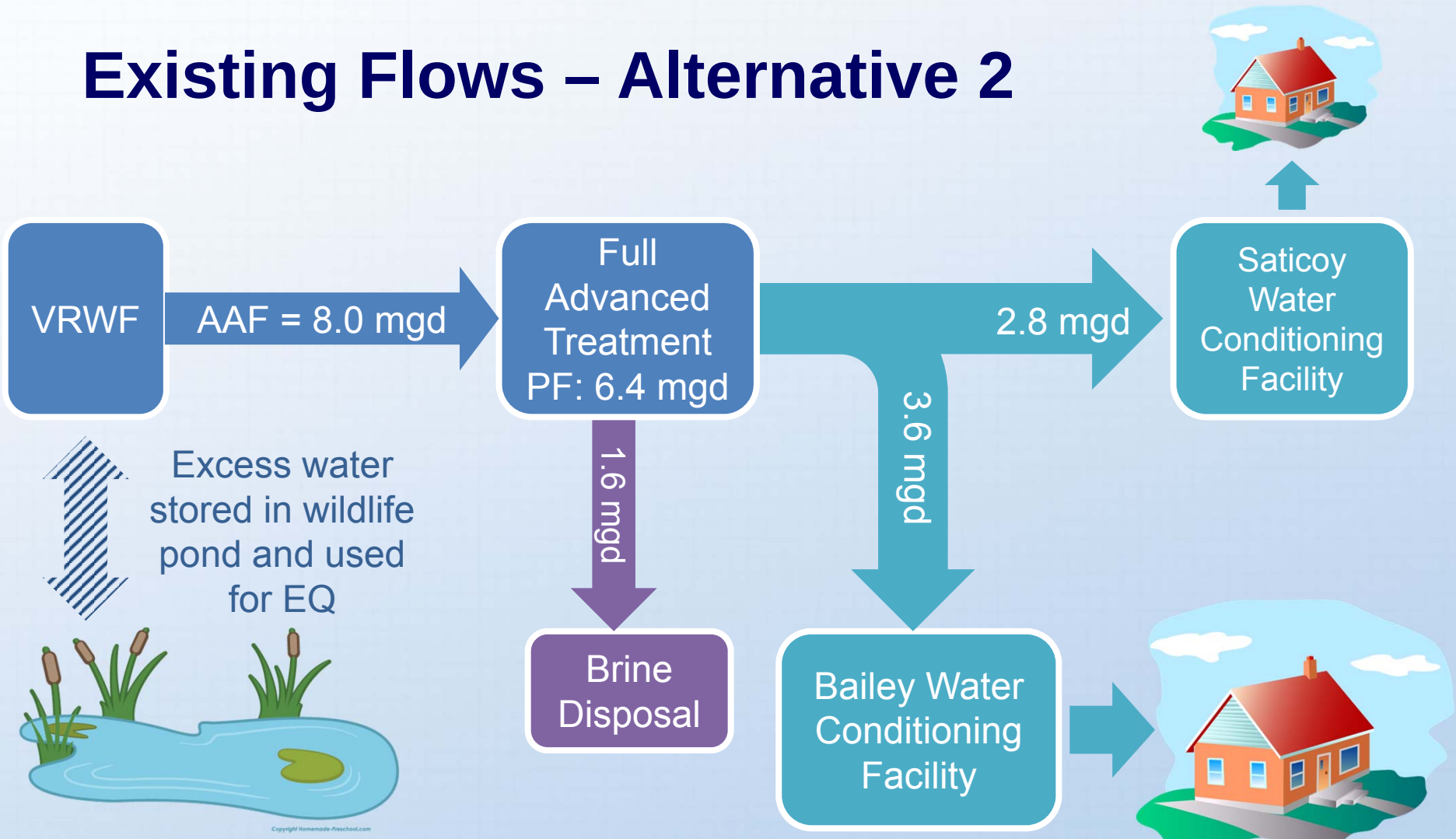
Existing Flows – Alternative 2



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Future Flow 100% Diversion Scenarios

Future Flow Allocations (mgd)

	Alternative 1	Alternative 2
Flow Diverted	12.0	
Flow to Bailey (DPR)	3.6	3.6
Flow to Saticoy (DPR)	0	2.7
Flow to Mound Basin (IPR)	6.0	3.3
Total Product Water Flow	9.6	
Brine Flow	2.4	

Future Flow Allocations (afy)

	Alternative 1	Alternative 2
Flow Diverted	13,442	
Flow to Bailey (DPR)	4033	4033
Flow to Saticoy (DPR)	0	3024
Flow to Mound Basin (IPR)	6721	3696
Total Product Water Flow	10,753	
Brine Flow	2,688	

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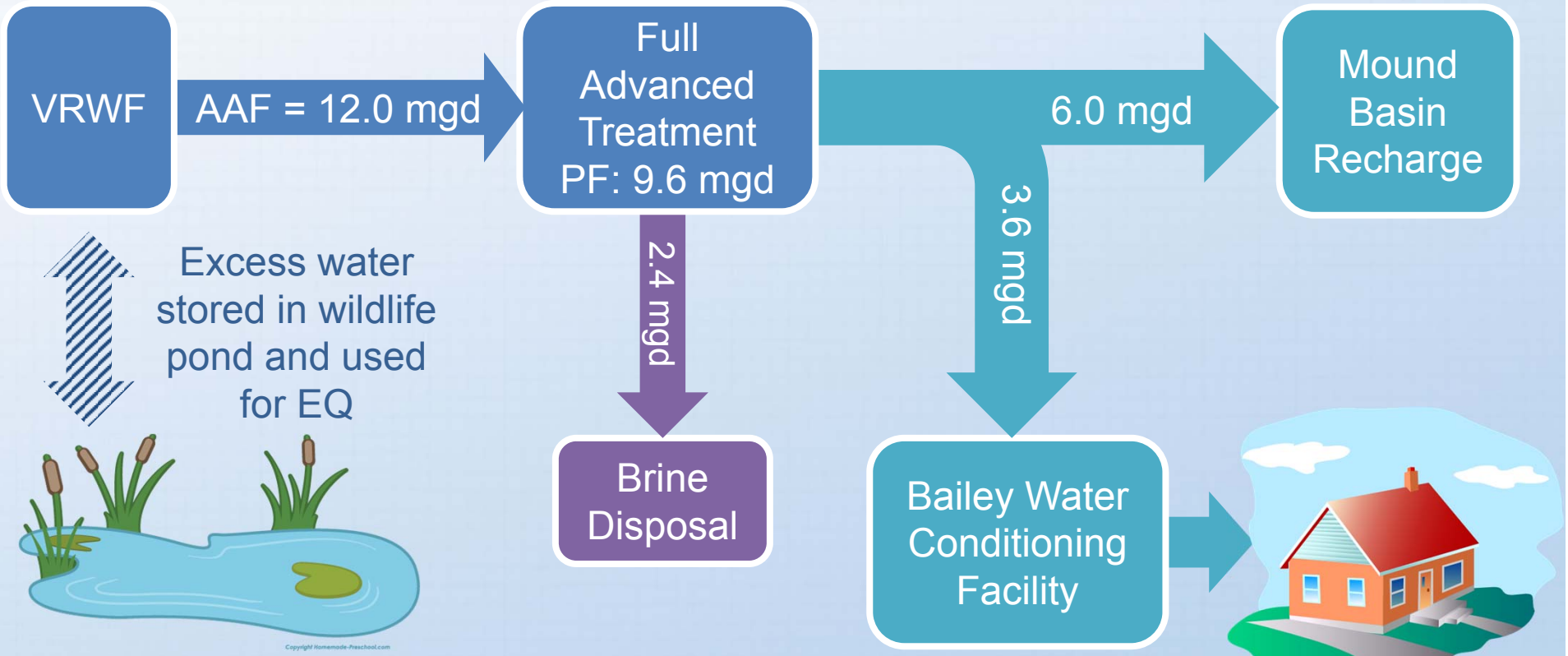
Future Flows – Alternative 1



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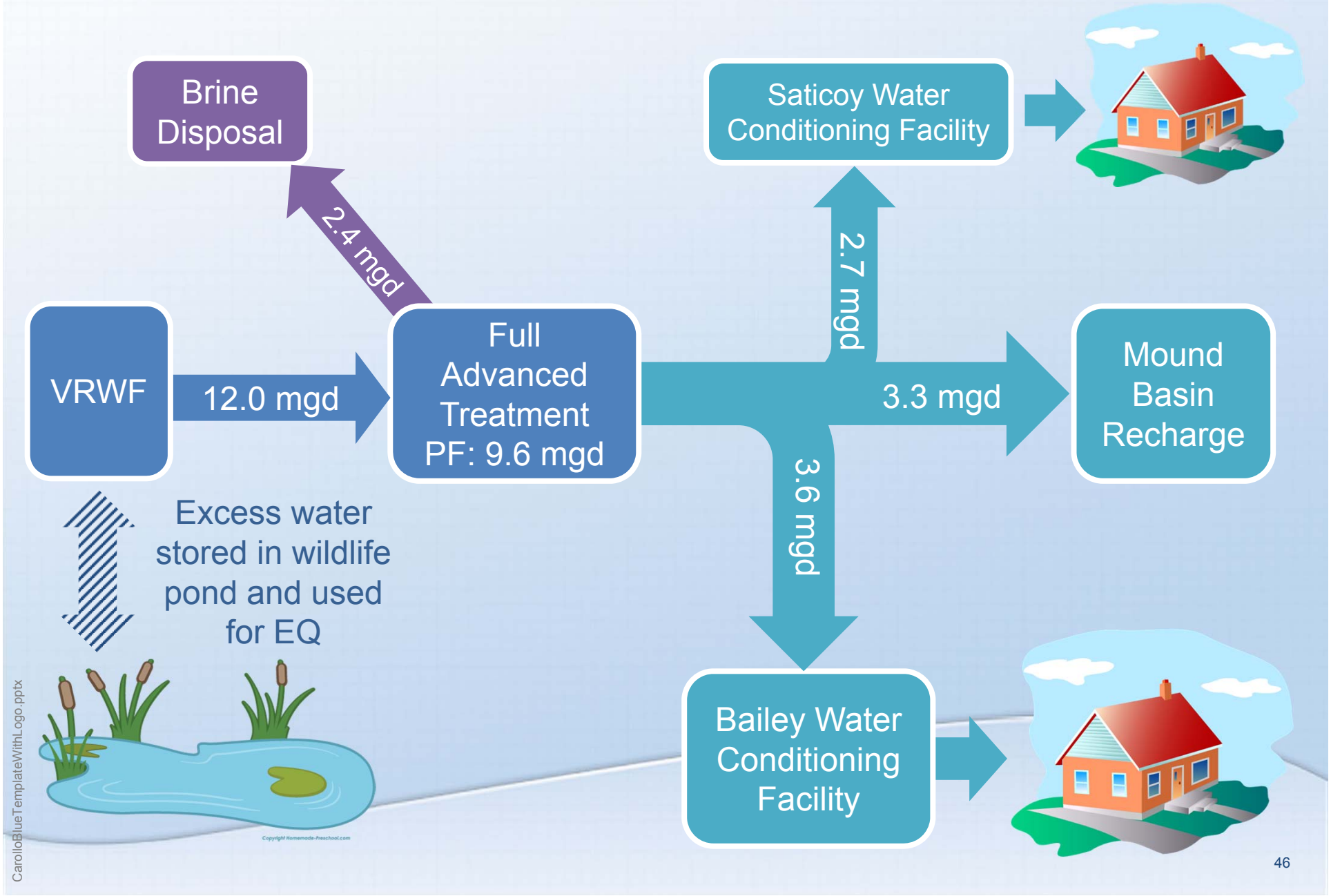
Future Flows – Alternative 2



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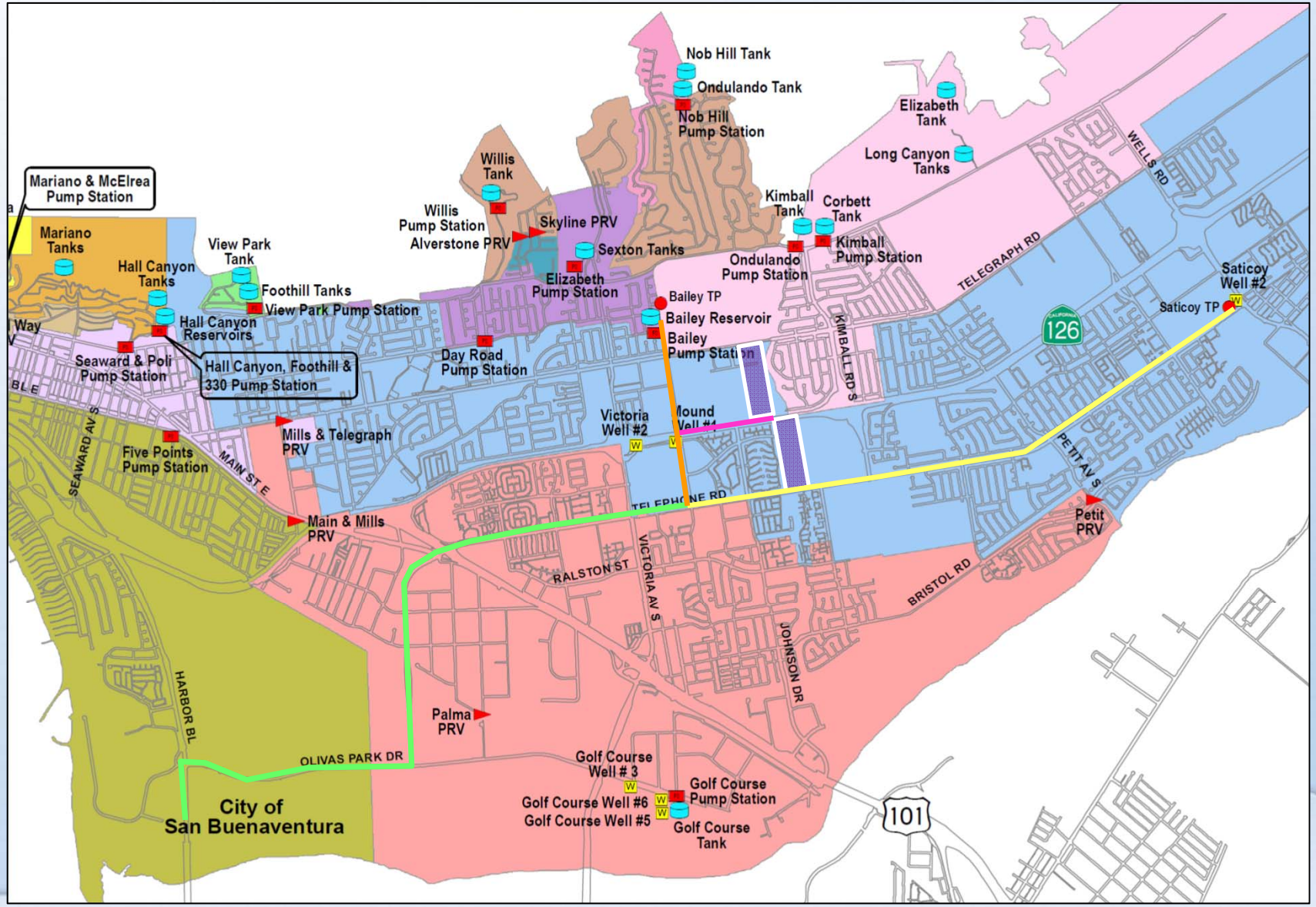
Potential Pipeline Alignment



100% DIVERSION PRELIMINARY COSTS

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100% Diversion Cost Estimates for Existing Flows (8 mgd)

Cost Component	Alternative 1 (DPR Bailey and IPR Mound)	Alternative 2 (DPR Bailey and DPR Saticoy)
Treatment Cost	$93 M to $102 M	$93 M to $102 M
Conveyance	$29 M	$18 M
Pond Recirculation and Lining	$10 M	$10 M
Total	$132 M to $141 M	$121 M – $130 M

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BRINE DISPOSAL STUDY

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Brine Flow Estimates

- Approximately 1.6 mgd of RO Concentrate (existing flow scenarios).
- Up to 2.4 mgd for future
- Considering regional and future needs
  - Up to 5 mgd

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Brine Disposal Options Considered Previously

- Evaporation Ponds
- Deep Well Injection
- Disposal in existing ocean outfall
  - Calleguas Salinity Management Pipeline (Calleguas SMP)
  - Reliant Energy Power Plant – Ormond, CA
  - Oxnard WWTP Outfall
- Construction of New Outfall

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VWRF and Existing Oufalls

Top Options:

- Discharge to Calleguas SMP
- New Ocean Outfall

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Calleguas SMP

- Conditions for discharge
  - 50% Surcharge for service to discharger located outside service area
    - $750 per AF of brine
  - Calleguas designs and build discharge stations funded up front by discharger
  - Dischargers must connect at pressure to SMP
  - Water quality must be within NPDES permit

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Calleguas NPDES Limits

Constituent	Units	Average Monthly	Average Weekly	Daily Max	Instantaneous Max	6-Month Median
BOD	mg/L	30	45	--	--	--
Oil and Grease	mg/L	25	40	--	75	--
Settleable Solids	mL/L	1.0	1/5	--	3.0	--
TSS	mg/L	60	--	--	--	--
Turbidity	NTU	75	100	--	225	--
Total Residual Chlorine	µg/L	--	--	580	4,400	150
Ammonia (as N)	mg/L	--	--	180	440	44
Chronic Toxicity	P/F % Effect	Pass	--	Pass or % Effect < 50	--	--
Total Coliform	MPN / 100 mL	Geometric Mean: 1,000		Single Sample Max: 10,000; 1,000 if fecal/total ratio exceeds 0.1		
Metals	µg/L	Varies depending on metal				
Organic Compounds	µg/L	Varied depending on compound				

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New Ocean Outfall

- Assumptions
  - Design Based on SMP Outfall
    - Outfall Length: 5,000 ft
    - Target Dilution: 72:1
  - Up to 16” Pipe
- Permitting
  - Several years
  - Relatively higher risk

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Brine Disposal Preliminary Costs

Cost Item	Connection to Calleguas SMP	New Ocean Outfall
Total Construction Cost ($M)[1]	15.9 – 19.2	4.6 – 6.3
ELA and Construction Management ($M [%])[1]	5.6 – 6.7 (35%)	2.8 – 3.8 (60%)
Total Project Cost ($M)[1]	21.5 – 25.9	7.4 – 10.1[2]

Note:
(1) Lower bound is cost estimate for up to 2.6 mgd pipeline. Upper bound is cost estimate for 5 mgd pipeline.
(2) Preliminary cost - need to be verified.

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SUMMARY – NEXT STEPS

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Next Steps

Task Description	2015	2016	2017	2018
Data Collection				
100% Diversion Report				
Pilot Study Report				
Estuary Study Report			Draft Final	
Stakeholder Workshops				
Scientific Review Panel				

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VenturaWaterPure Demonstration Helps Educate Community Re: Potable Reuse

http://abc7.com/news/ventura-company-making-wastewater-drinkable/859119/

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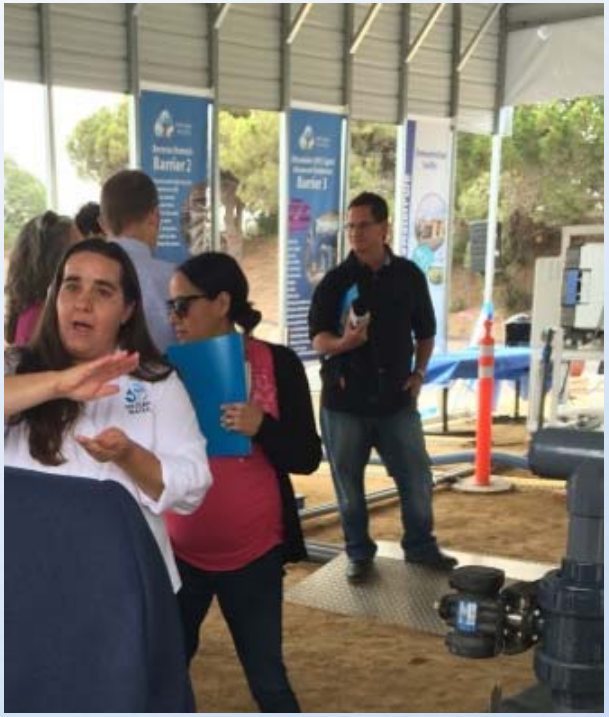
Public Tours and Survey



Pre-Tour

1. How much do you feel you know about Ventura's water sources?
2. How do you feel about adding recycled water to our drinking water supply?
3. What concerns do you have about this water supply, if any?

Post-Tour

1. How informative was the tour today?
2. Is there any additional information you think should be included in the tour?
3. Having learned more, how do you feel now about the idea of adding recycled water to our drinking water supply?

★ Generally more support than opposition

★ Post-tour opinion is more supportive

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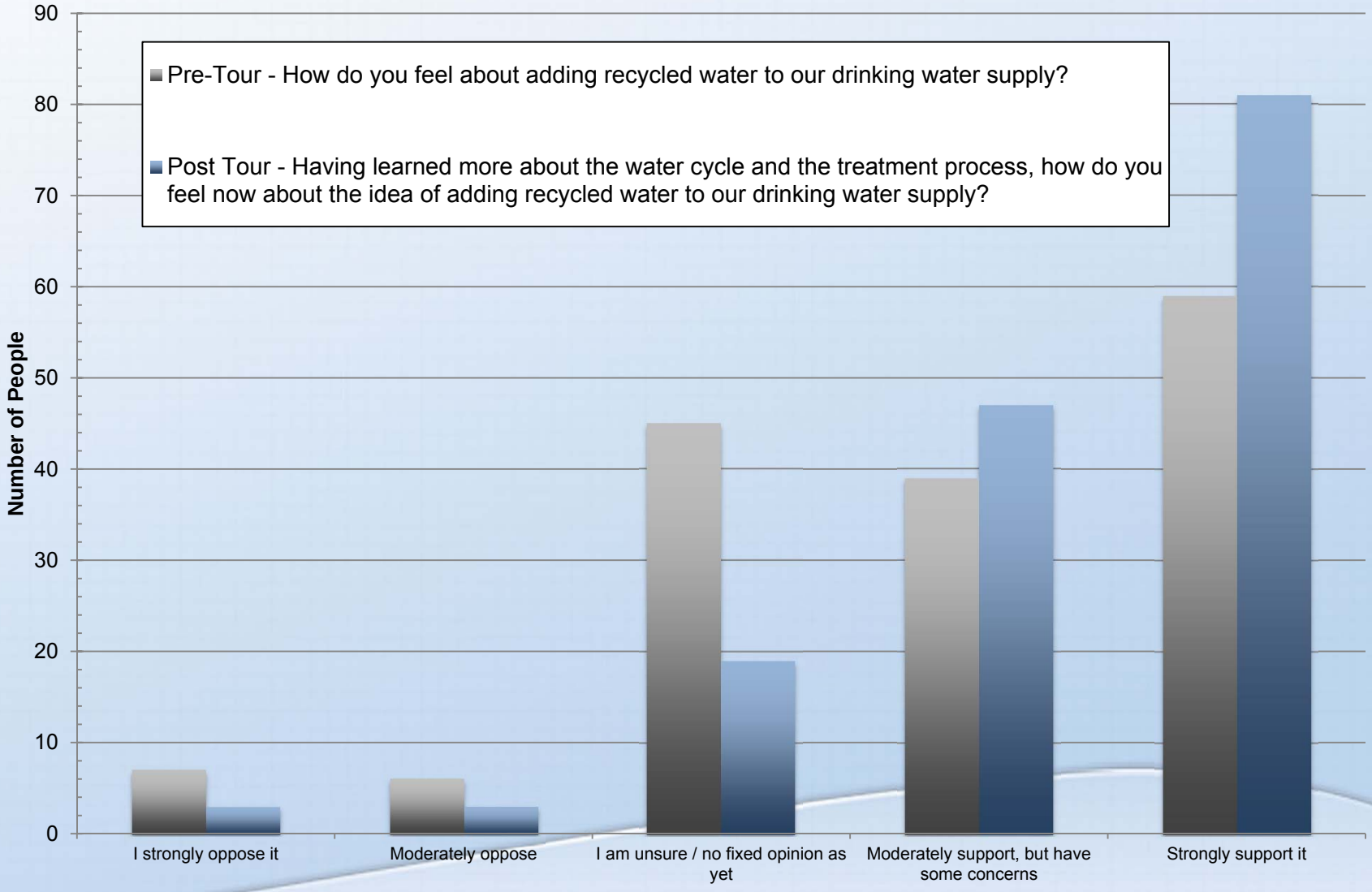
Surveys Show Support for Potable Reuse



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For more information:

- Meeting Notes will be posted on Project Website:

http://www.cityofventura.net/water/screstudies

- Contact

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http://www.cityofventura.net/water/sustainable-water

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