Stakeholder Advisory Group (SAG) Quarterly Meeting:

Dinuba Wellfield RI/FS Project

December 13, 2021

Grant Agreement No. D1912528

Funding Disclosure

Funding for this project has been provided in full or in part by Proposition 1 – the Water Quality, Supply, and Infrastructure Improvement Act of 2014 through an agreement with the State Water Resources Control Board. The contents of this presentation do not necessarily reflect the views and policies of the foregoing, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Grant Agreement No. SWRCB D1912528

Agenda

1. Project Review
2. Schedule & Upcoming Milestones
3. Feasibility Study Approach
4. Technology Alternatives Screening
5. Implementation Project Alternative Evaluation and Ranking
6. Preferred Project
7. Next Steps
8. Questions & General Commentary

Project Review: Goals & Benefits

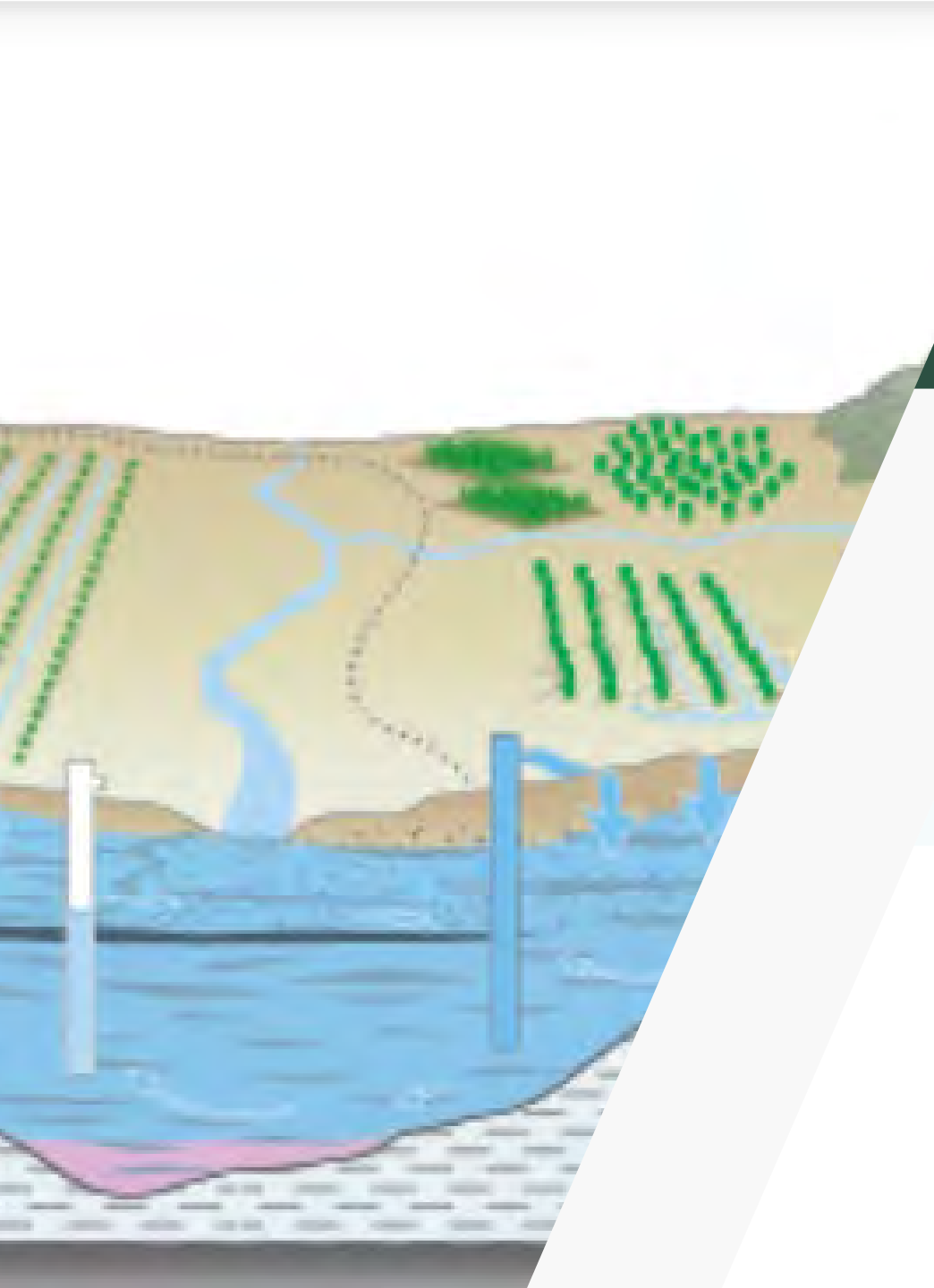
Project Overview

- City of Dinuba received a $1.75 million Proposition 1 Groundwater Grant from the SWRCB for the Dinuba Wellfield RI/FS Project.
- Study to develop potential implementation options to clean up or prevent the spread of non-point source pollutants in its municipal wellfield.
- Identify effective means to address nitrate, DBCP and 1,2,3-TCP, which are widespread in the shallow aquifers in the region and identify projects which can be funded under future implementation grants to help assure a more secure and higher quality water supply for the City.

Schedule & Upcoming Project Milestones

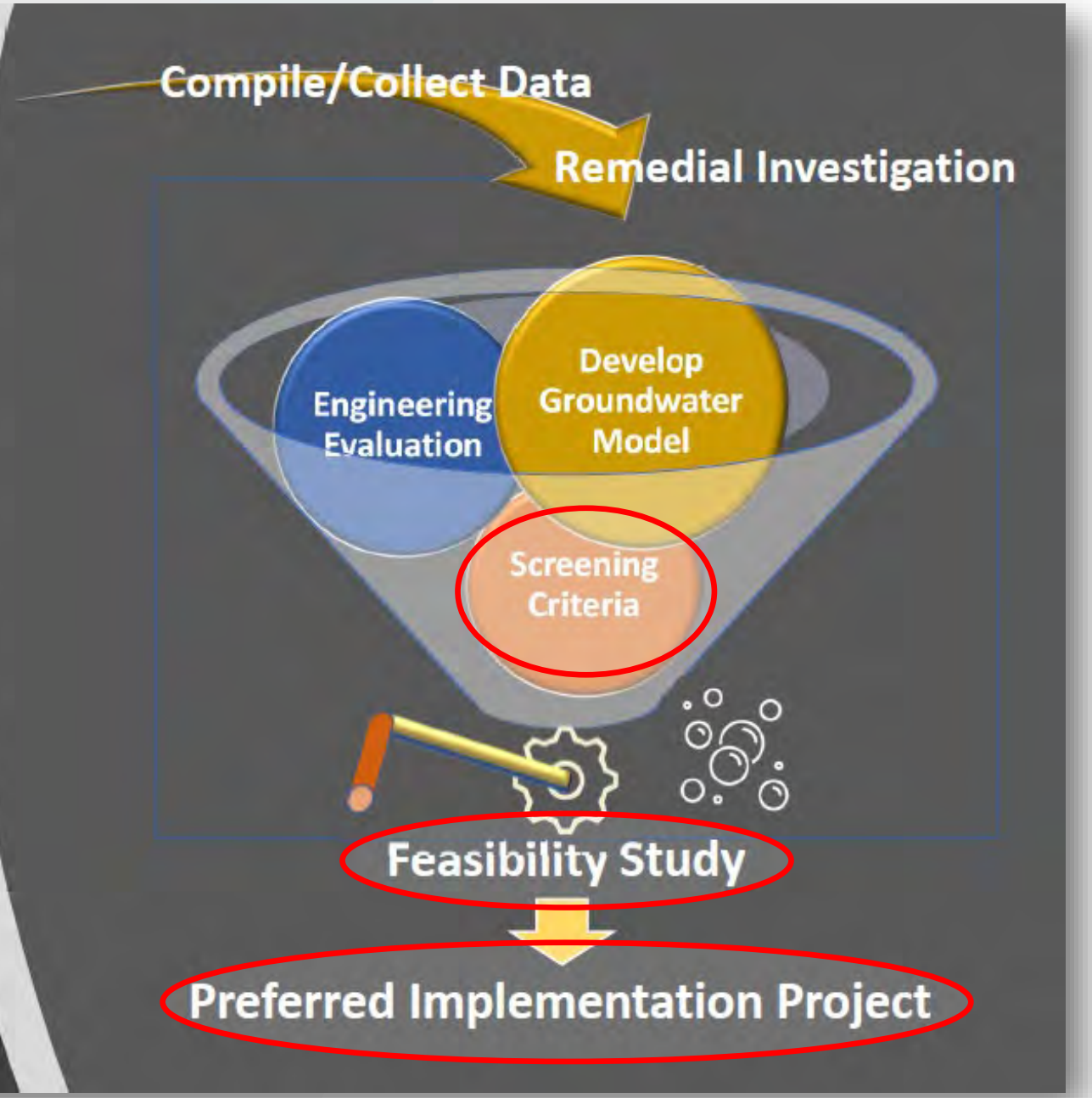
- Draft RI Report – November 8, 2021
- Groundwater Modeling Technical Memorandum – November 15, 2021
- Draft FS Report – December 2021
- Requested Schedule Extension from October 2021 to January 2022 – Approved
- Proposition 1 Grant Program Round 3 – Grant Application TBD

	Data Sourcing & Analytics	Geodatabase & Data Management	Data Visualization & Analysis	Conceptual Site Model	Remedial Investigation	Groundwater Transport Model	Feasibility Study	Project Closeout Documents
4th Quarter 20/21								
1st Quarter 21/22								
2nd Quarter 21/22					Draft 11/08/21 Final 12/31/21	Draft 11/15/21	Draft 12/15/21	
3rd Quarter 21/22						Final 01/15/22	Final 01/15/22	
		Complete		In Progress				



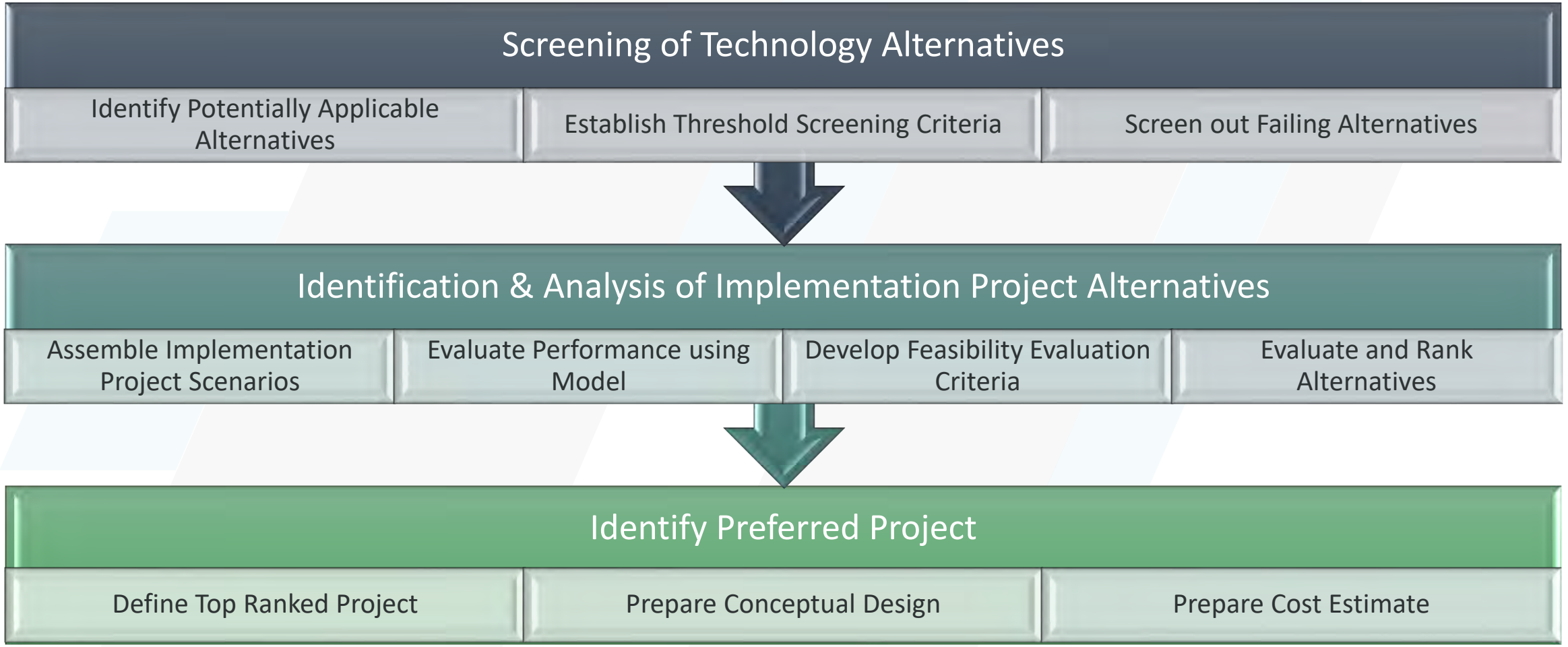
Feasibility Study Approach

Project Overview and Status



FORMATION ENVIRONMENTAL

Feasibility Study Process



FS Report Table of Contents

Technology Alternatives Screening

Threshold Screening Criteria

Pass/Fail

- P/F Regulatory Compliance and Acceptance
- P/F Community Acceptance
- P/F Implementability
- P/F Risk and Uncertainty

Technology Screening Results

Pass

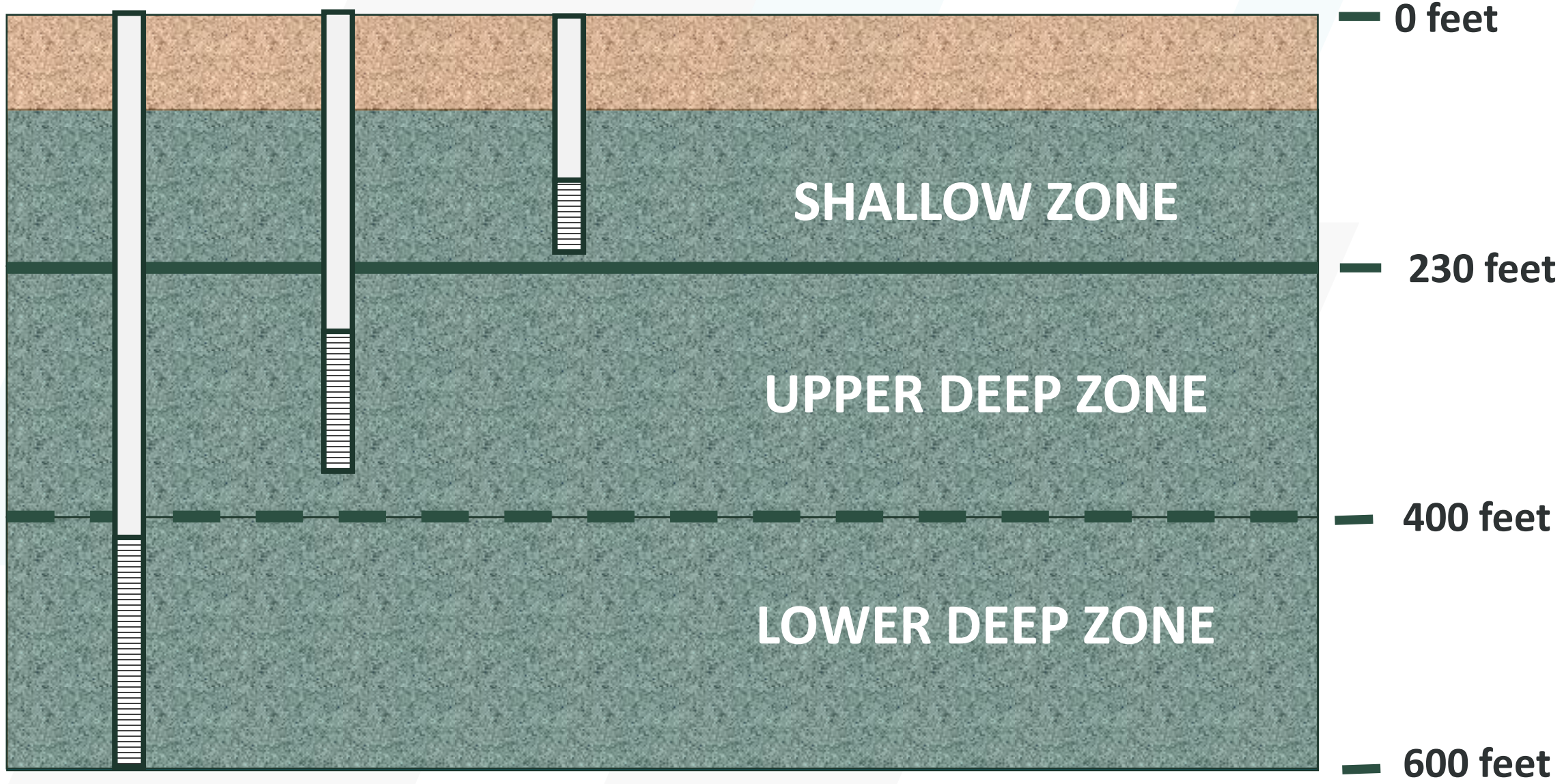
- [ ] Ex Situ Treatment: Pumping and Land Application
- [ ] Well Modification: Swaging/Sleeving, Wellhead Treatment, Replacement, Construction, Abandonment
- [ ] Administrative Controls: Pumping Schedules
- [ ] Managed Aquifer Recharge

Fail

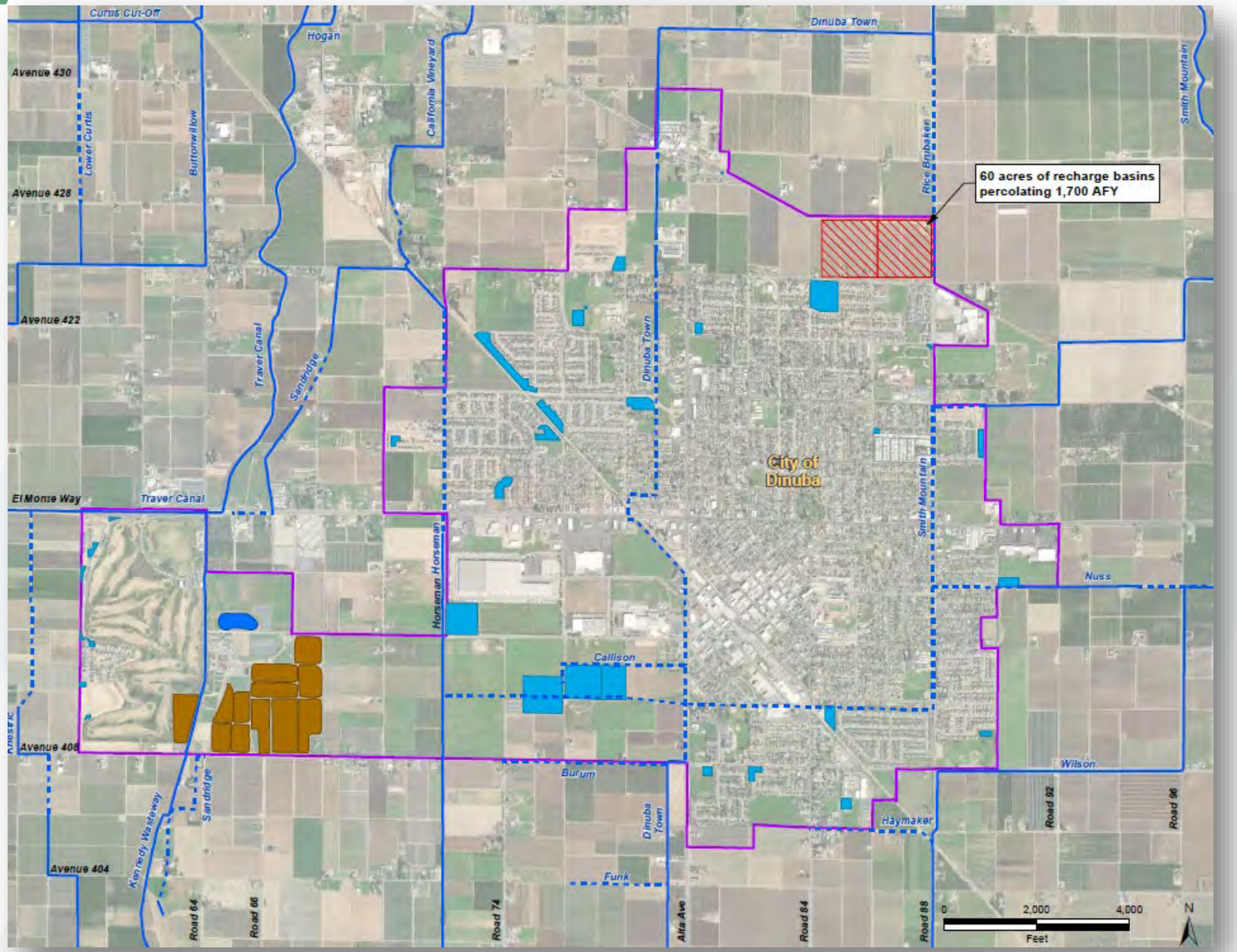
- [ ] No Action (Regulatory Acceptance, Risk)
- [ ] In Situ Treatment (Regulatory Acceptance, Implementability, Risk)
- [ ] Pump and Discharge to WWRF (Implementability)
- [ ] Pump and Discharge to AID Canals (Implementability)
- [ ] Aquifer Storage & Recovery (Implementability, Risk)

Implementation Project Alternative Identification

Definition: Shallow, Upper Deep and Lower Deep Zones



Scenario 1 – Managed Aquifer Recharge, GSP Project



Legend

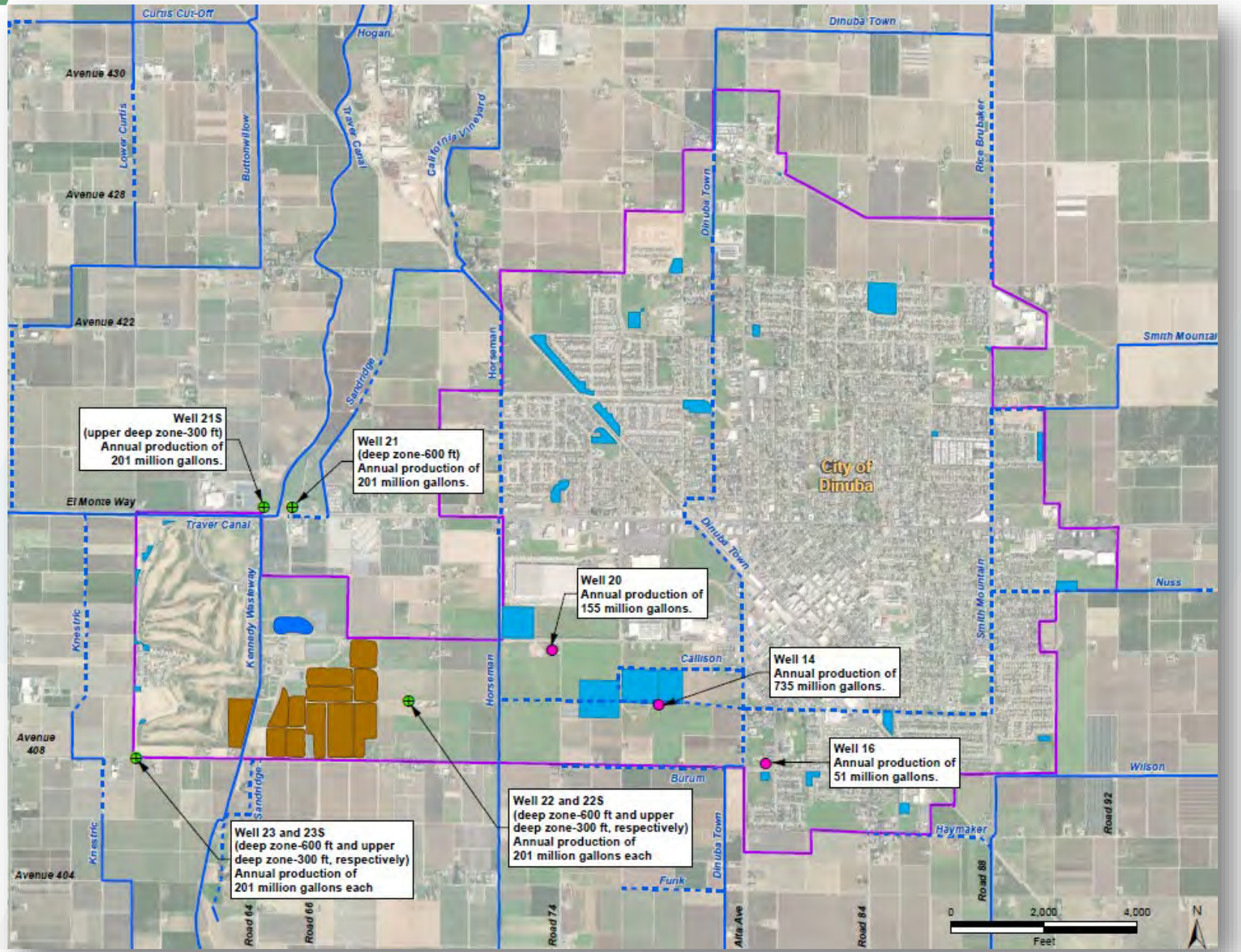
- Potential Recharge Basins
- City of Dinuba Reclamation Conservation Recreation Pond
- Storm Water Retention Basin
- City of Dinuba Wastewater Reclamation Facility
- Dinuba Water Service Area

Alta ID Facility

- Open Ditch
- Pipeline

AFY = Acre Feet per Year

Scenario 2 – Administrative Controls for 1,2,3-TCP Mitigation



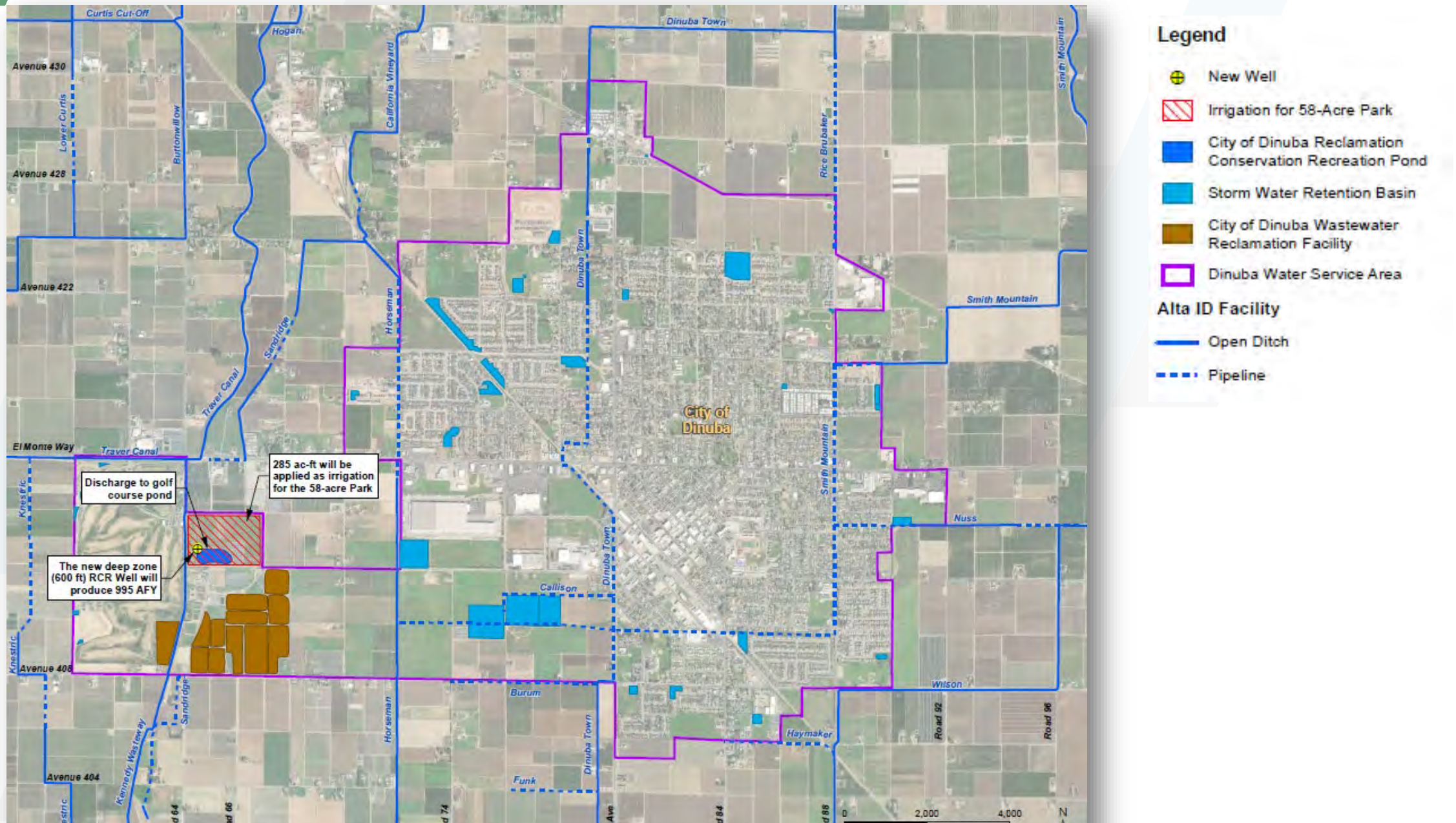
Legend

- Future Public Supply Well
- Existing Well
- City of Dinuba Reclamation Conservation Recreation Pond
- Storm Water Retention Basin
- City of Dinuba Wastewater Reclamation Facility
- Dinuba Water Service Area

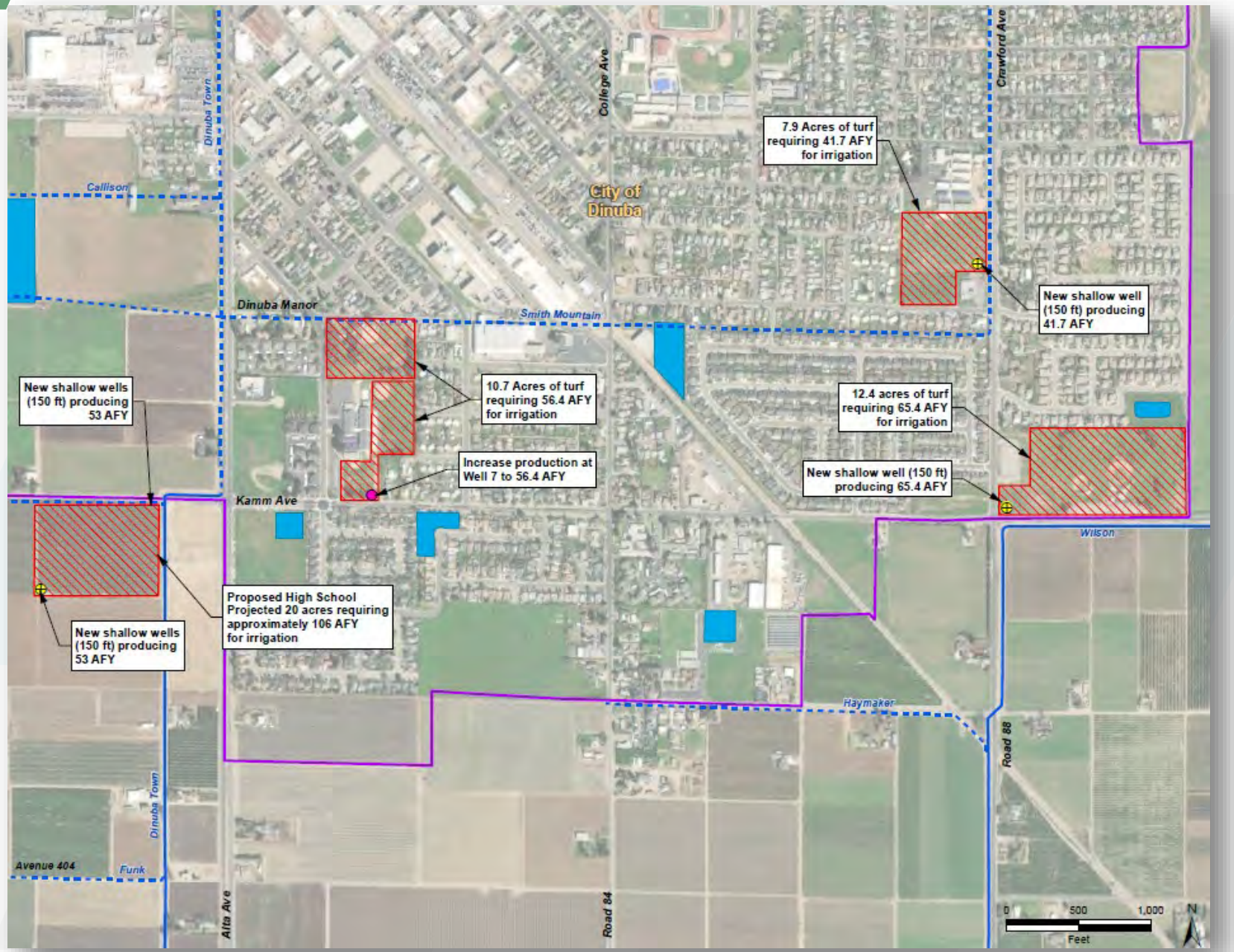
Alta ID Facility

- Open Ditch
- Pipeline

Scenario 3 – Administrative Controls for Nitrate (1)



Scenario 4 – Administrative Controls for Nitrate (2)



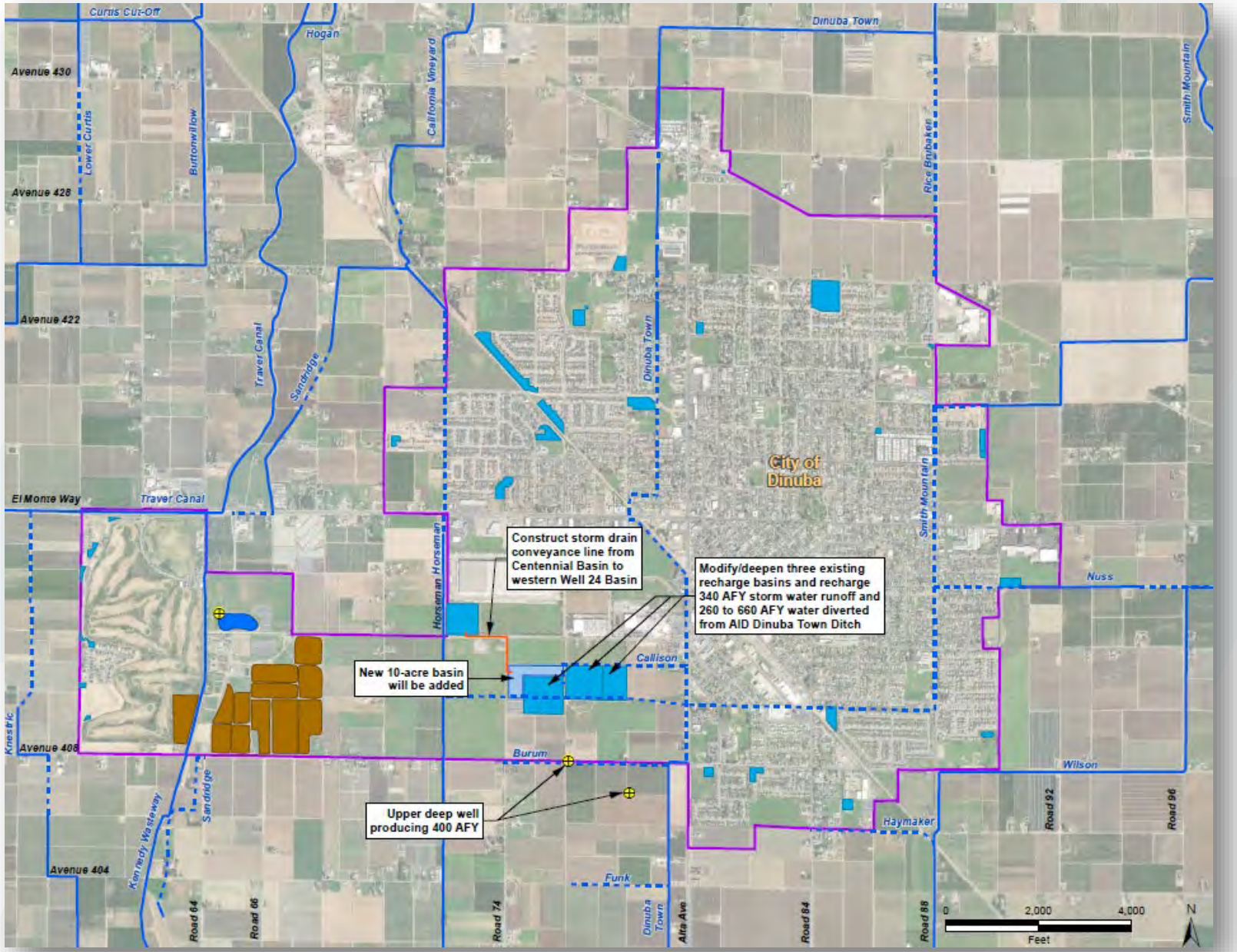
Legend

- Existing
- New
- Areas Identified for Potential Well Sites for Shallow Zone Pumping and Turf Irrigation
- Storm Water Retention Basin
- Dinuba Water Service Area

Alta ID Facility

- Open Ditch
- Pipeline

Scenario 5 – Managed Aquifer Recharge (Well 14 Basins) and Administrative Controls



Legend

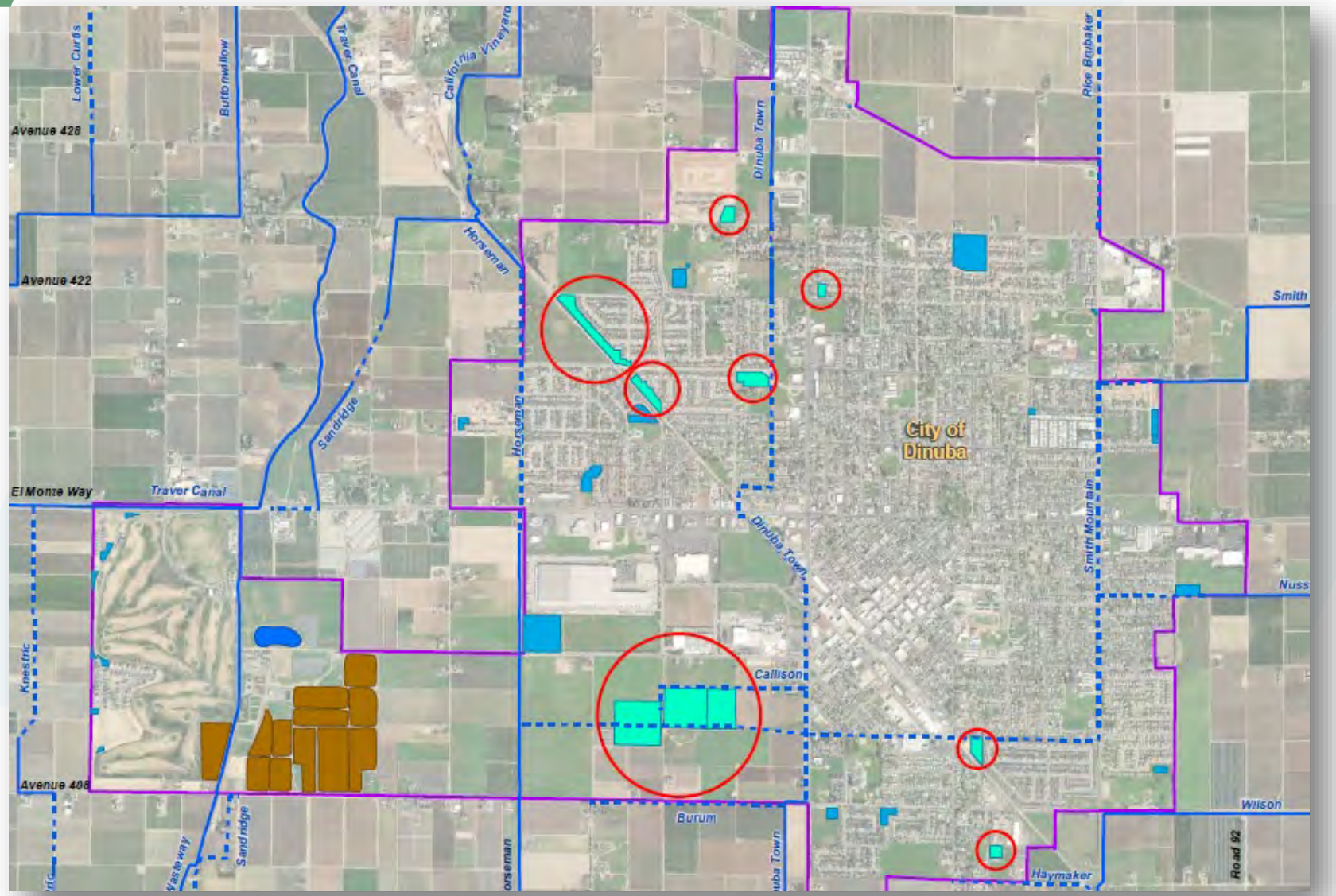
- New Well
- City of Dinuba Reclamation Conservation Recreation Pond
- Storm Water Retention Basin
- City of Dinuba Wastewater Reclamation Facility
- Dinuba Water Service Area

Alta ID Facility

- Open Ditch
- Pipeline

AFY = Acre Feet per Year

Scenario 6 – Stormwater Retention Basin Improvements



Legend

- City of Dinuba Reclamation Conservation Recreation Pond
- Storm Water Retention Basin
- Storm Water Retention Basin Potential Capacity Expansion
- City of Dinuba Wastewater Reclamation Facility
- Dinuba Water Service Area

Alta ID Facility

- Open Ditch
- Pipeline

Implementation Project Alternative Evaluation and Ranking

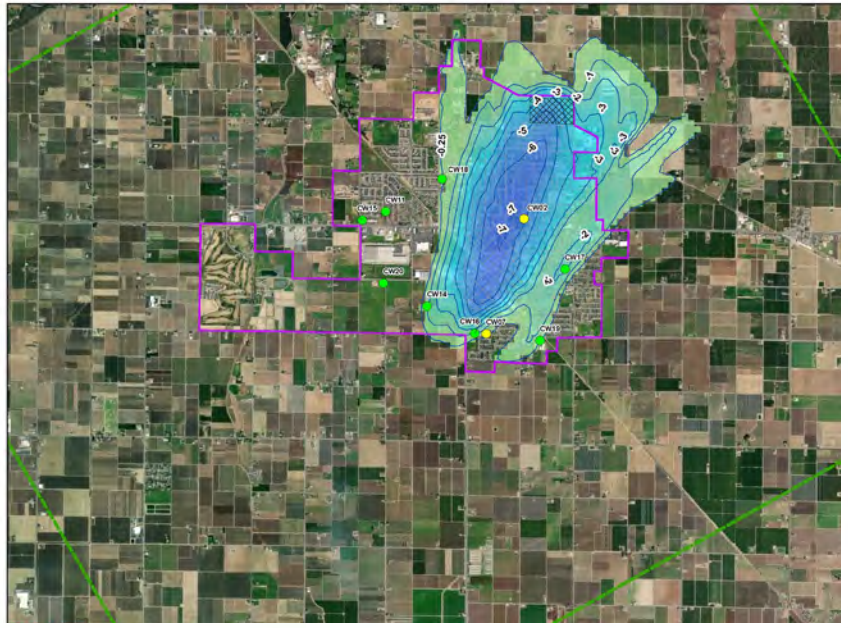
Feasibility Evaluation Criteria and Scoring

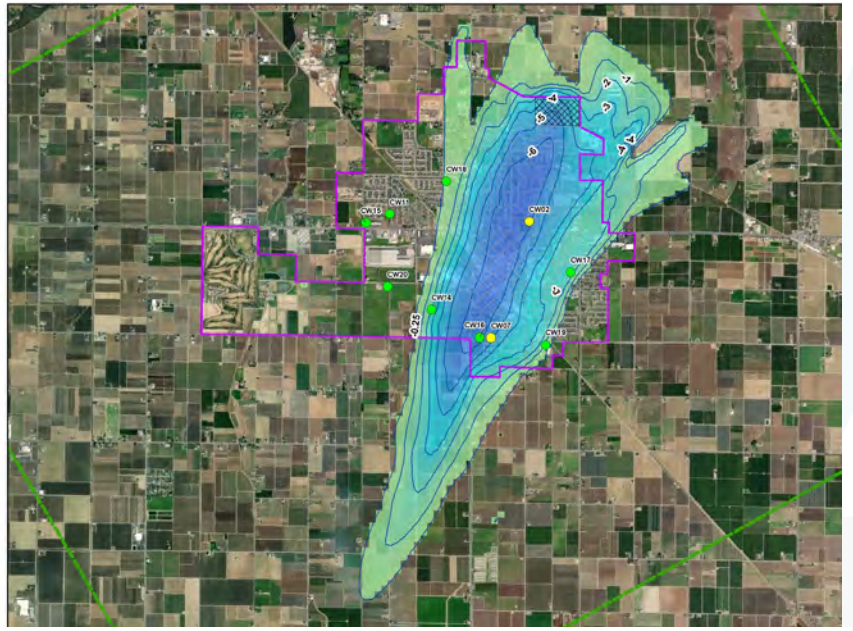
- **2.0** Effectiveness
- **1.5** Cost
- **1.25** Risk and Uncertainty
- **1.0** Promotion of Groundwater Sustainability
- **1.0** Grant Program Priorities and Preferences

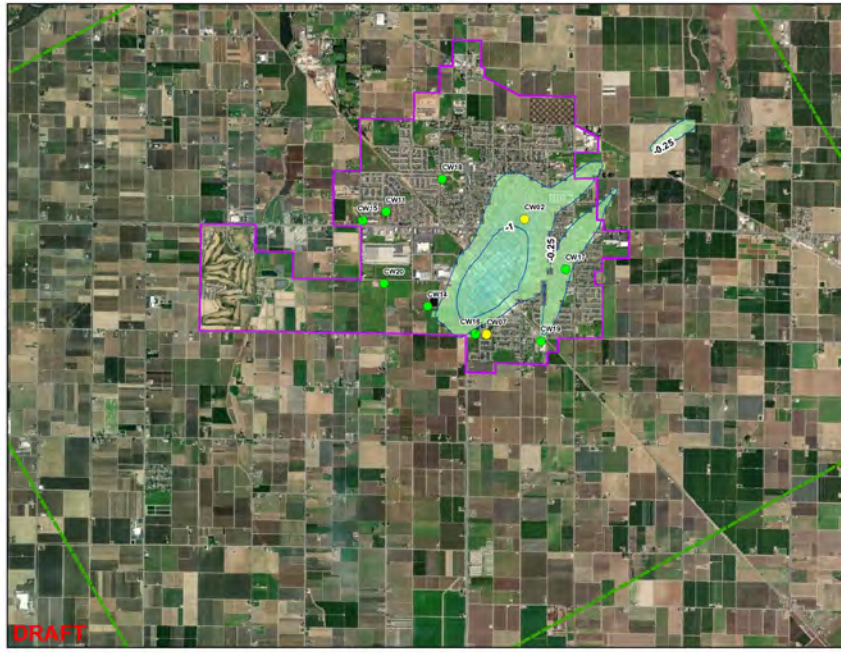
SCENARIO 1

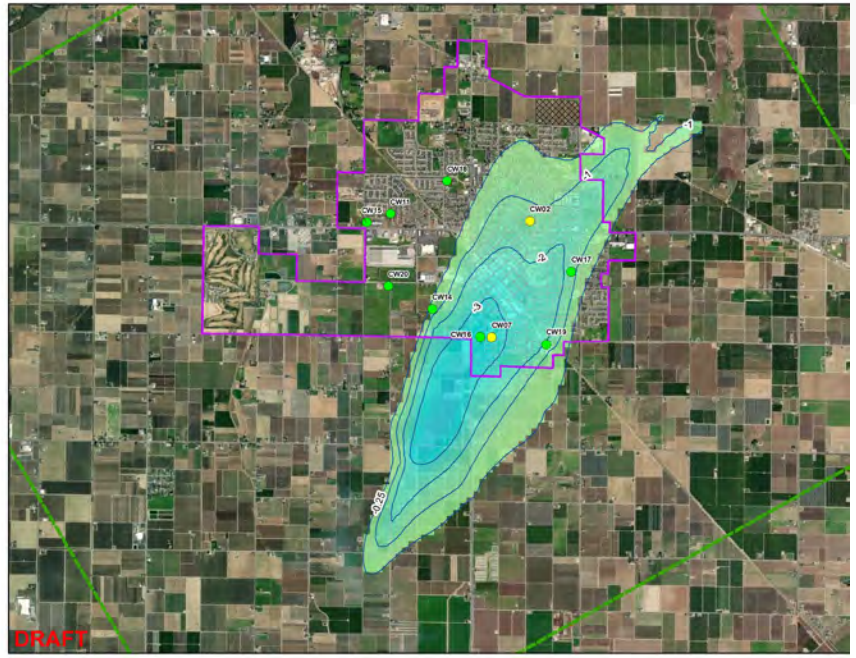
Shallow Zone

Upper Deep Zone









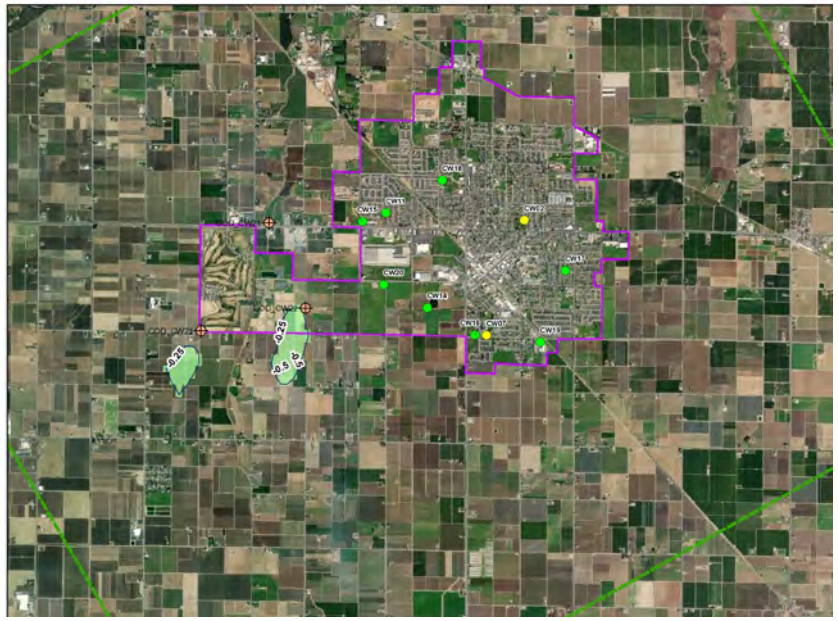
20 Years

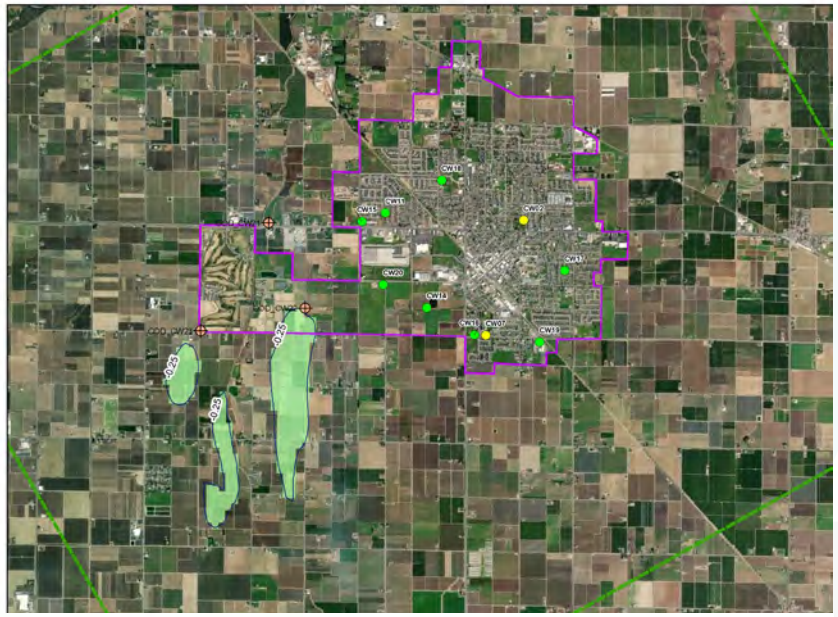
50 Years

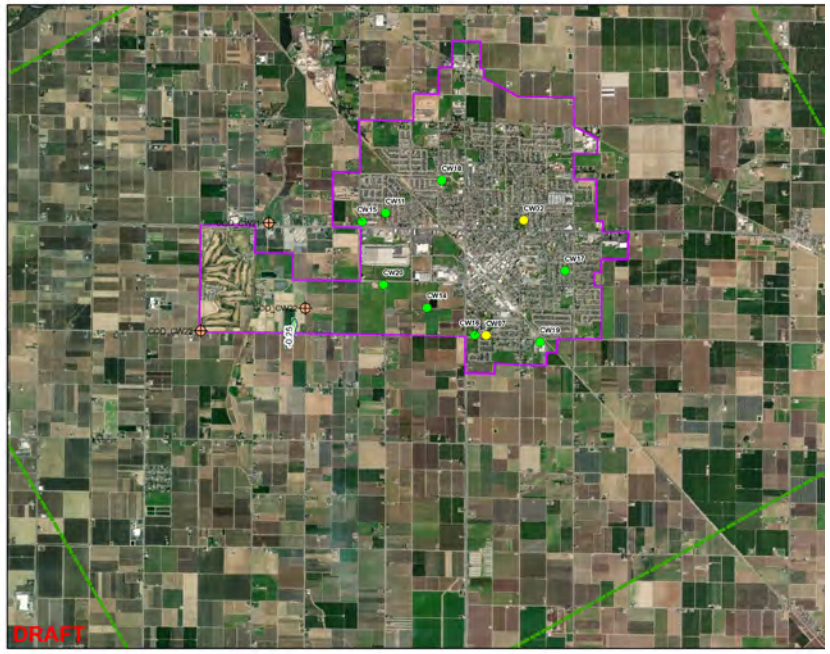
SCENARIO 2

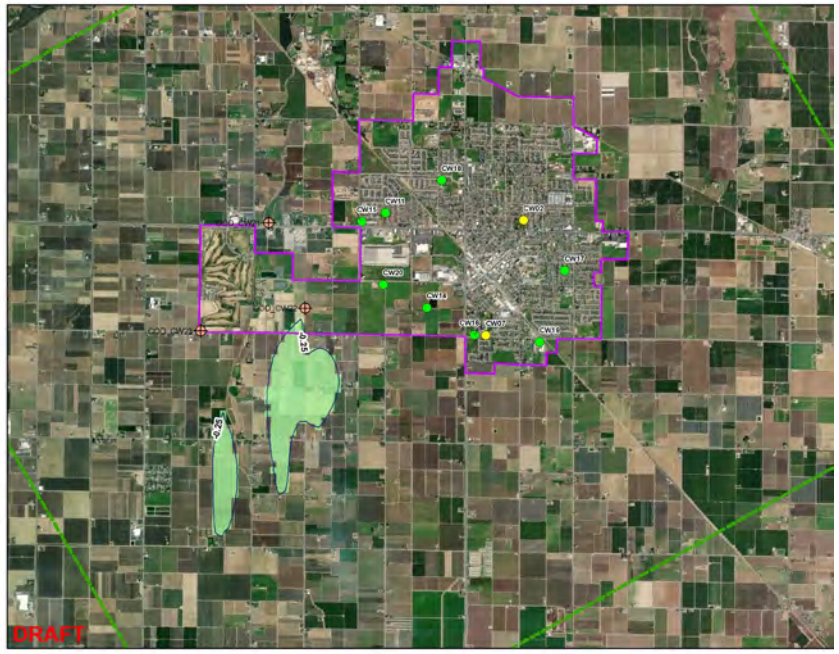
Shallow Zone

Upper Deep Zone



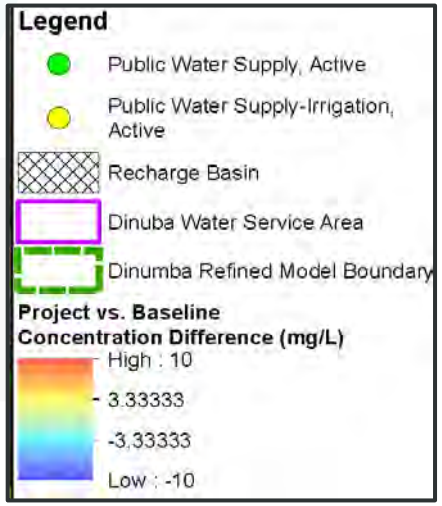






20 Years

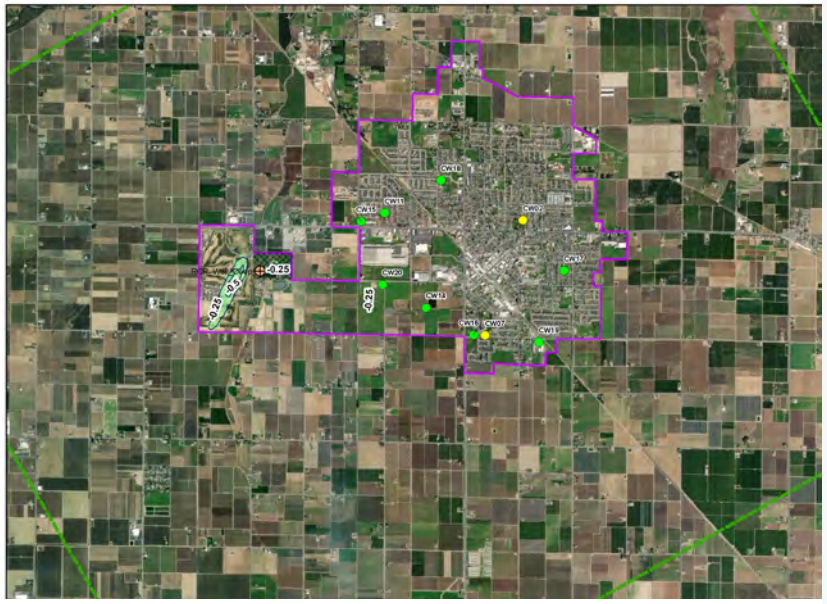
50 Years

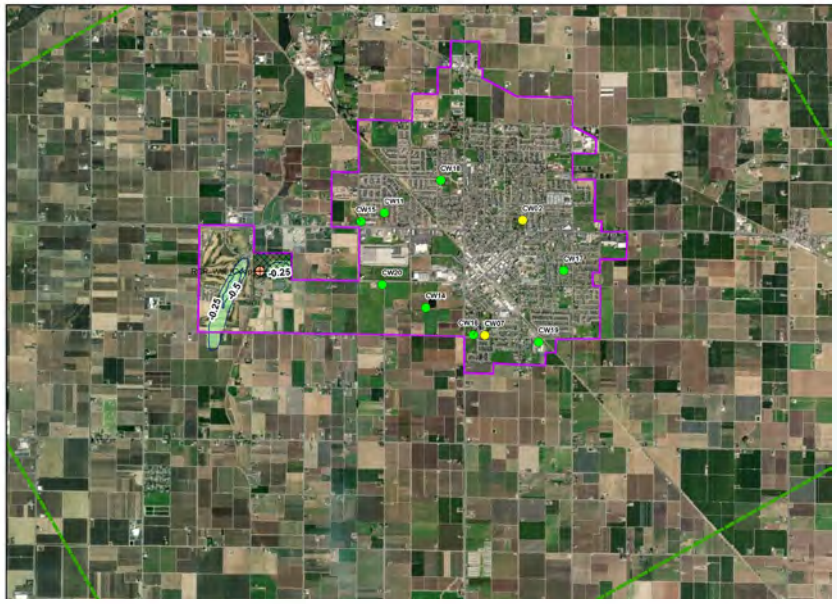


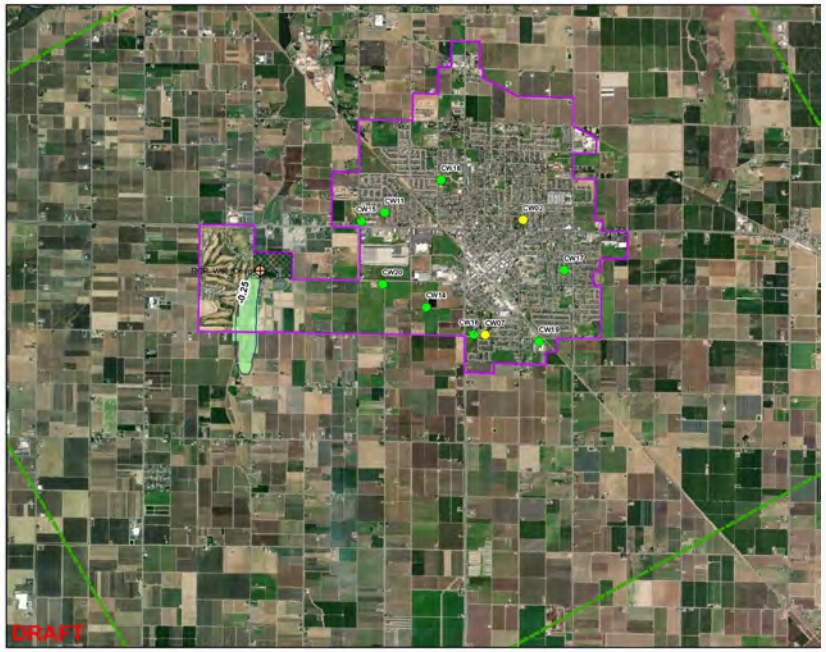
SCENARIO 3

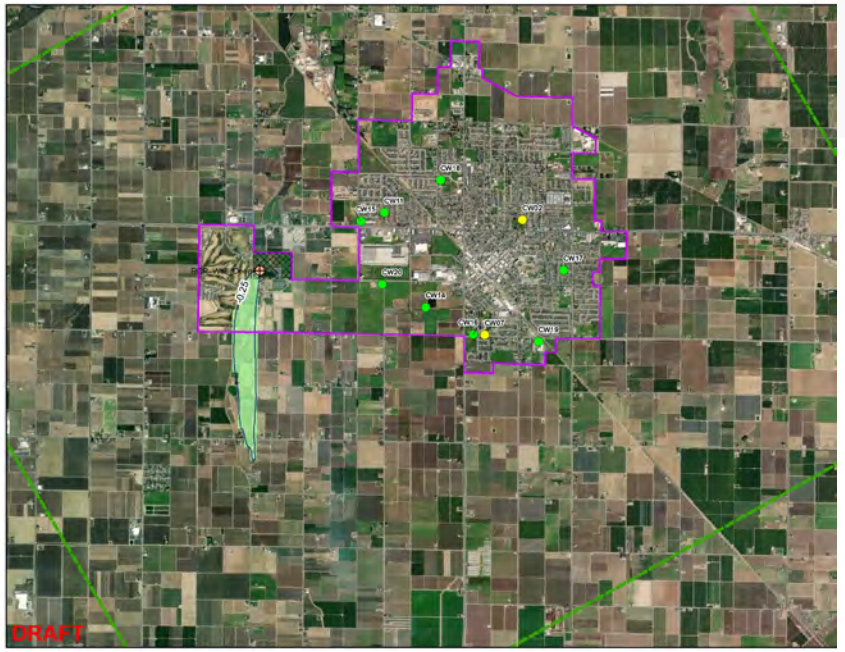
Shallow Zone

Upper Deep Zone









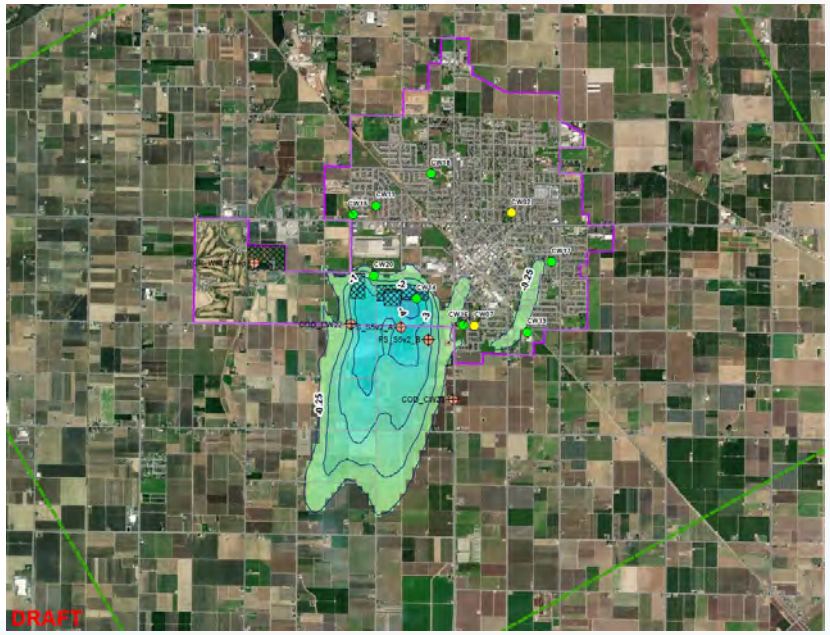
20 Years

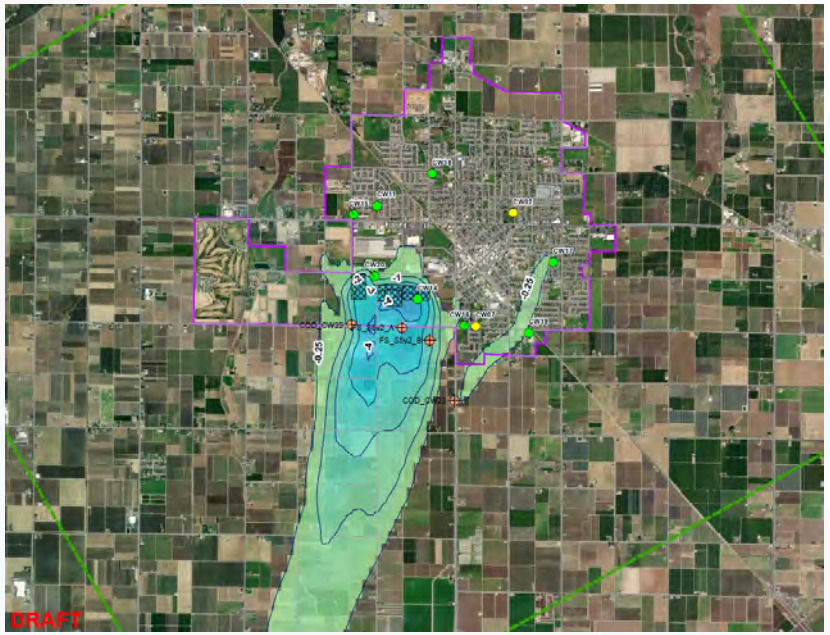
50 Years

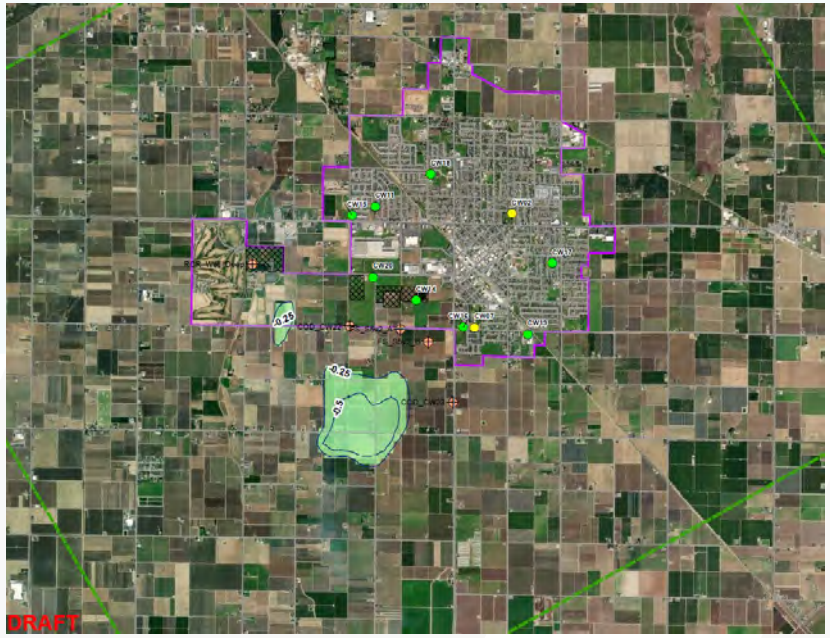
SCENARIO 5 (1,000 AFY)

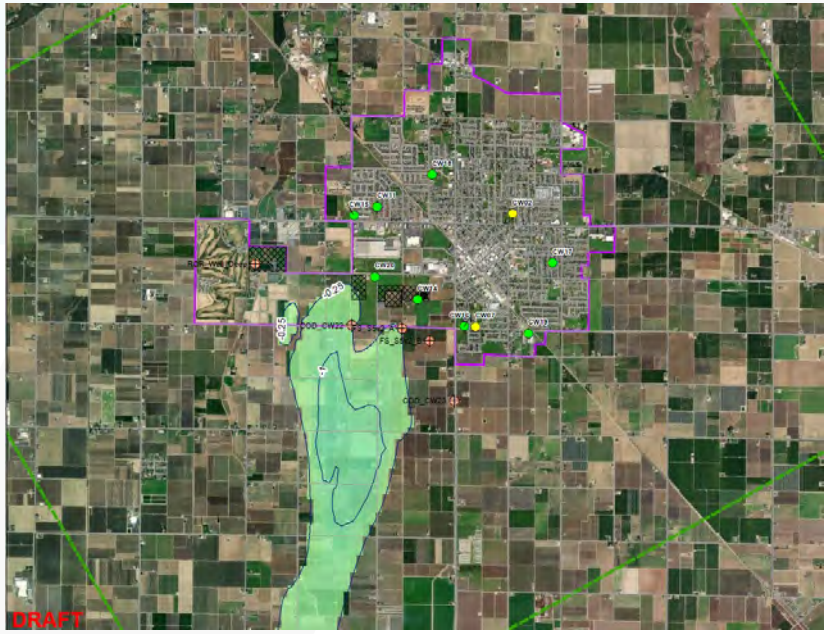
Shallow Zone

Upper Deep Zone









20 Years

50 Years

Implementation Project Scenario Scoring and Ranking

		Effectiveness		Cost		Risk/Uncertainty		Groundwater Sustainability		Grant Priorities/Preferences		
Alternative Number	**Alternative Description**	Score	Weighting	Score	Weighting	Score	Weighting	Score	Weighting	Score	Weighting	**Weighted Score**
3	Administrative Controls for Nitrate I	3	2	5	1.5	5	1.25	1.5	1	2	1	**23**
5	Managed Aquifer Recharge (Well 14 basins) and Administrative Controls	4	2	2	1.5	2	1.25	4	1	5	1	**23**
1	Managed Aquifer Recharge (GSP Proposed Project)	5	2	1	1.5	3	1.25	5	1	1	1	**21**
2	Administrative Controls for TCP Mitigation	2	2	3.5	1.5	1	1.25	3	1	4	1	**18**
4	Administrative Controls for Nitrate II	1	2	3.5	1.5	4	1.25	1.5	1	3	1	**17**

Implementation Project Feasibility Evaluation Scoring and Ranking Results

Scenario 1 GSP Project	Scenario 2 Rebalanced Pumping	Scenario 3 Deeper RCR Pumping	Scenario 4 Shallow N Pumping	Scenario 5 Recharge & Extraction	Scenario 6 Stormwater Retention
Rank 3	**Rank 4**	**Rank 1**	**Rank 5**	**Rank 2**	**Not Ranked**
Best performance, but high uncertainty makes it unsuitable for implementation at this time	Limited performance and no obvious benefits	Limited performance, but obvious benefits, relatively low cost and low risk and uncertainty	Lowest performance. Proven technology and readily implementable, but low pumping rates limit effectiveness	Second best performance and most benefit to City water supply Some uncertainty and risk but can be managed	Insufficient data for evaluation at this time, but expected to result in groundwater sustainability and water quality benefits

Preferred Project

Scenario 3 Deeper RCR Pumping

Deeper pumping in the RCR project area to remove and contain nitrate mass, lessen vertical gradients between upper and lower Deep Zone, and increase vertical penetration of low nitrate recharge

- Install deeper RCR Well completed from 250 - 400 ft
- Pump at ~945 acre-feet/year
- Irrigate golf course and new 58-acre park area
- Little or no supplemental nutrients needed
- 90 percent nitrate uptake estimated

Scenario 5 Recharge & Extraction

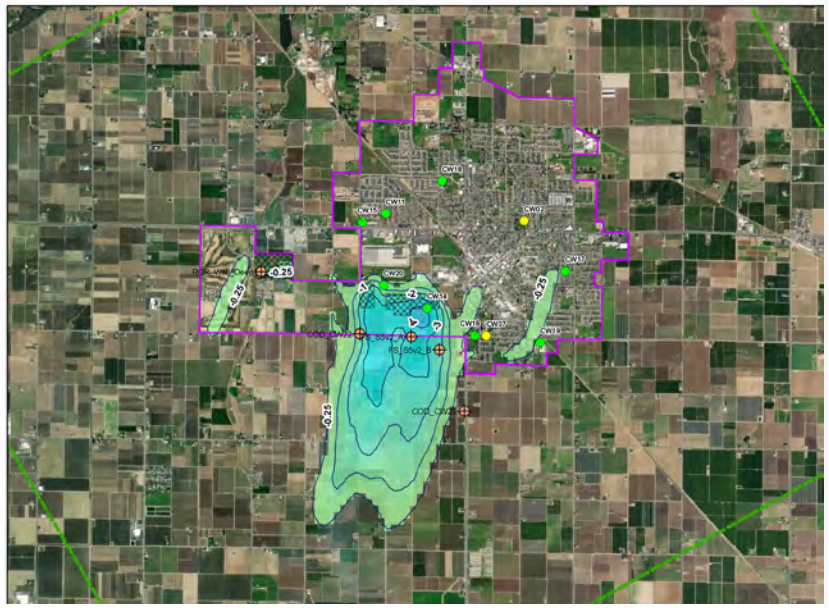
Recharge stormwater runoff and wet-year non-irrigation season surface water delivered by AID to improve water quality in the City wellfield expansion area and downgradient domestic well usage area, and to help offset City groundwater demand growth

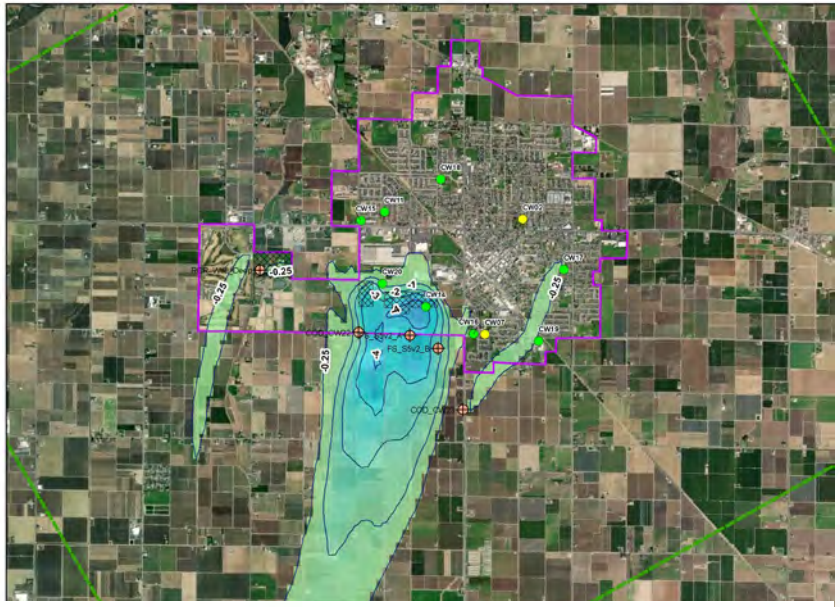
- Improve and expand existing Well 14 basins
- Install stormwater pipeline from Centennial Basin to Well 14 Basins
- Deliver surface water from Dinuba Town Ditch
- Install two upper Deep Zone non-potable wells
- Relocate CW22 and CW23 to downgradient area

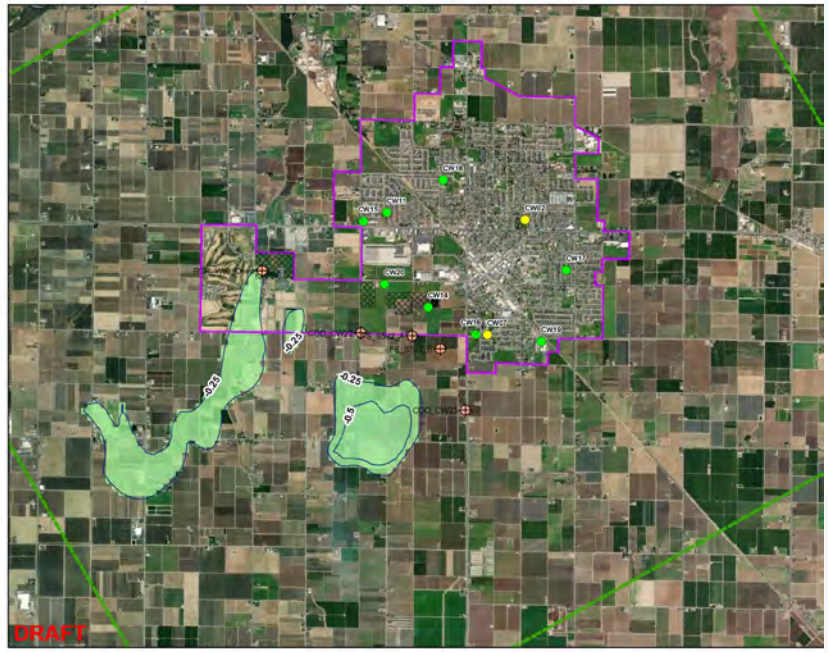
PREFERRED PROJECT (1,000 AFY)

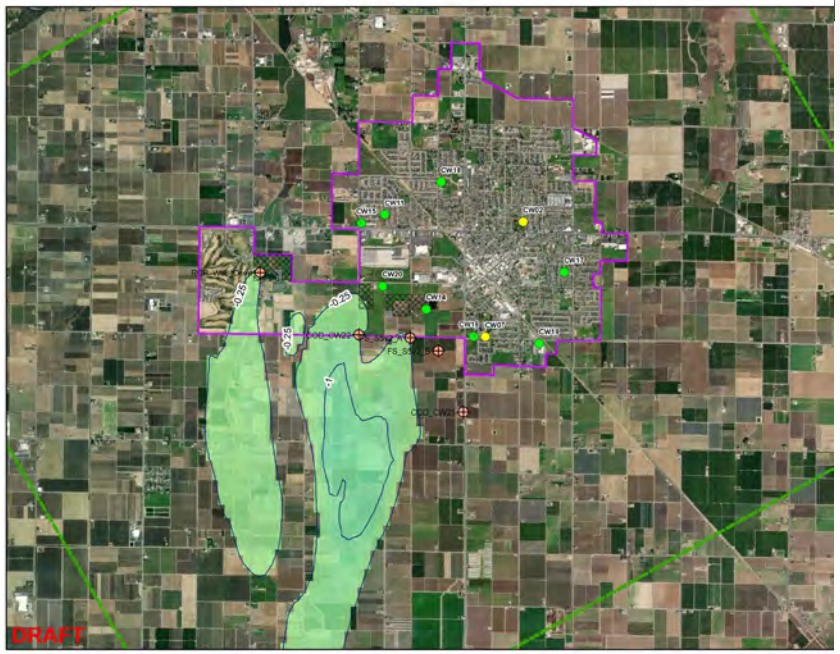
Shallow Zone

Upper Deep Zone





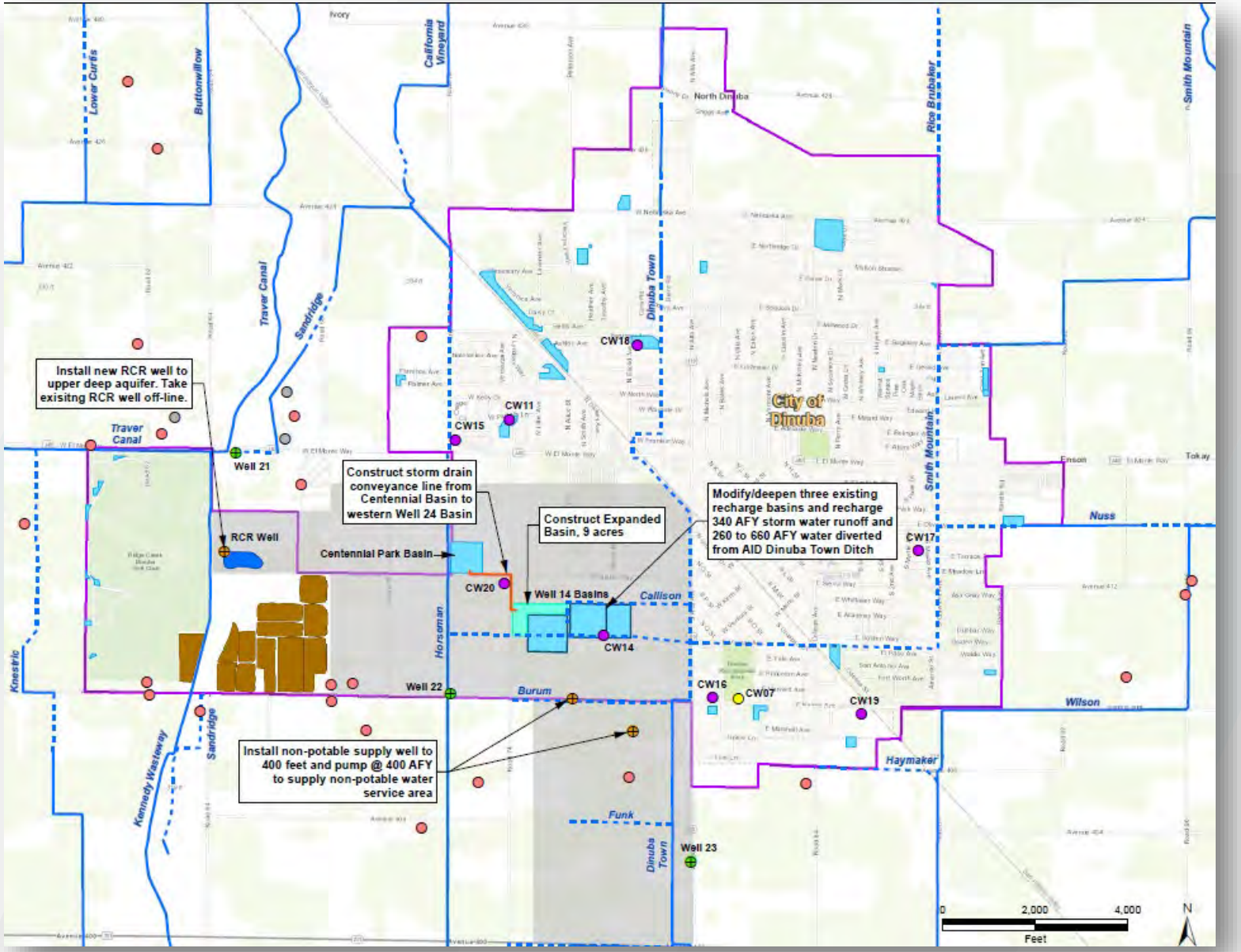




20 Years

50 Years

Preferred Project – Managed Aquifer Recharge (Well 14 Basins) and Administrative Controls



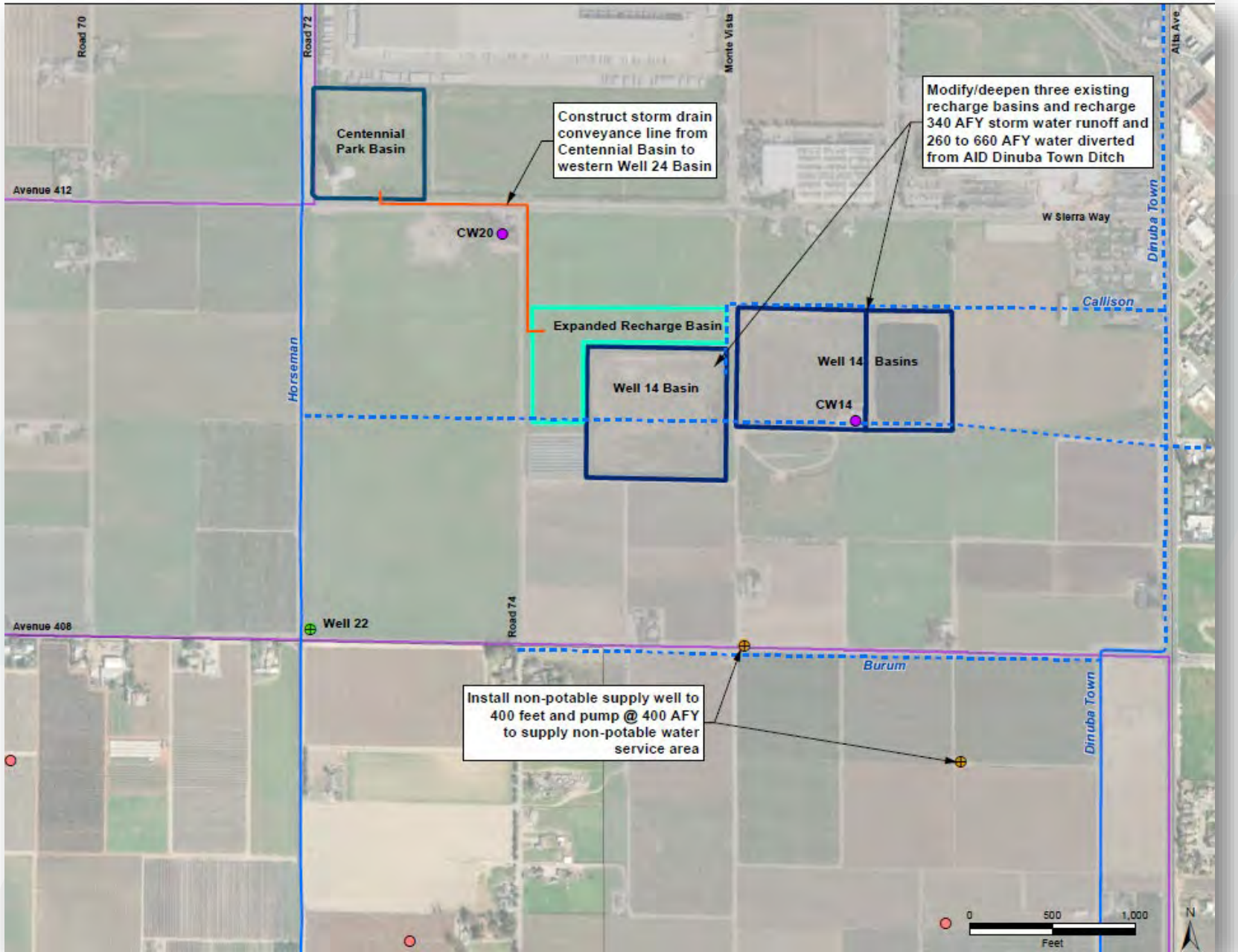
Legend

- Future Public Supply Well
- Non-Potable Well
- Domestic Well
- Public Water Supply, Active
- Public Water Supply - Irrigation, Active
- Small Water System Well
- Proposed Storm Drain
- Project Recharge Basin
- Well 14 Basins
- City of Dinuba Planned Non-Potable Wate Service Area
- Dinuba Water Service Area
- City of Dinuba Reclamation Conservation Recreation Pond
- Storm Water Retention Basin
- City of Dinuba Wastewater Reclamation Facility

Alta ID Facility

- Open Ditch
- Pipeline

Preferred Project – Well 14 Basin Construction Details



Legend

- Future Public Supply Well
- Non-Potable Well
- Domestic Well
- Public Water Supply, Active
- Proposed Storm Drain
- Expanded Recharge Basin
- City of Dinuba Planned Non-Potable Water Service Area
- Dinuba Water Service Area
- Storm Water Retention Basin

Alta ID Facility

- Open Ditch
- Pipeline

Preferred Project Design Assumptions

Design Consideration	Low	High
Recharge Water Delivery Volumes		
Long-Term Average Total Recharge	600 acre-feet/year	1,000 acre-feet/year
Water Infiltration and Delivery Rates for 40-Acre Ponds and 0.5 foot/day Infiltration Rate		
Duration of AID Water Delivery	58 days	148 days
Water Infiltration and Delivery Rates for 40-Acre Ponds and 1.0 foot/day Infiltration Rate		
Duration of AID Water Delivery	29 days	74 days

Preferred Project Cost Estimate

Base Bid Items	Cost
General	$781,000
Earthwork to Deepen Well 14-1 Recharge Basin	$177,000
Earthwork to Deepen Well 14-2 Recharge Basin	$245,000
Earthwork to Deepen Well 14-3 Recharge Basin	$287,000
New Basin to Expand Well 14-3 Recharge Basin	$456,000
Pipeline, Basin Outfalls, Pipeline, Water Measurement	$534,000
Non-potable Wells (3) for 1300 Acres Light Industrial & Commercial plus RCR Replacement	$964,000
New Non-potable Well Site Construction (3 sites)	$1,918,000
CONSTRUCTION SUBTOTAL	$5,287,000
Contingency:	20%
Construction Total	$6,345,000

Next Steps

- ✓ Questions?
- ✓ Review/comment on draft reports
- ✓ Thank you for participating

Project Website:

http://www.dinuba.org/departments/122-public-works/598-dinuba-rifs

For more information please contact:

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Sarah Raker at sraker@formationenv.com

Implementation Project Alternatives

Scenario 1 GSP Project

- Recharge surface water from AID in NE Dinuba
- Recharge surface water from AID in one or two recharge basins in NE Dinuba

Scenario 2 Rebalanced Pumping

- Capture and remove DBCP and 1,2,3-TCP from groundwater
- Increase CW14 and decrease CW 16 and 20 pumping, shallow pumping in wellfield expansion area

Scenario 3 Deeper RCR Pumping

- Construct deeper well at RCR to capture nitrate in deep groundwater
- Pump water to RCR pond and use to irrigate new 58-acre park

Scenario 4 Shallow N Pumping

- Pump shallow groundwater in nitrate impacted areas
- Increase Well 7 pumping, install shallow irrigation wells and use for turf irrigation at athletic fields and new High school

Scenario 5 Recharge & Extraction

- Recharge AID surface water; shallow groundwater extraction
- Recharge at CW14 Ponds combined with shallow groundwater extraction at new High School

Scenario 6 Stormwater Retention

- Increase City stormwater retention basin capacity
- Increase capacity of existing retention basin system to retain all stormwater in the City during normal years

Effectiveness Comparison – NO_3 Assimilative Capacity

Scenario	Description	Simulation Time	Aquifer Volume with >20% Improvement in Assimilative Capacity (acre-feet)			
			Shallow Zone	Upper Deep Zone	Lower Deep Zone	Total
1	GSP Project	20 Years	374,725	82,210	91	457,026
		50 Years	559,821	217,664	47,370	824,855
2	Rebalanced Pumping	20 Years	0	20,139	544	20,683
		50 Years	0	65,658	20,509	86,167
3	Deeper RCR Pumping	20 Years	10,955	12,414	272	23,641
		50 Years	10,577	24,553	17,333	52,462
4	Shallow N Pumping	20 Years	0	0	0	0
		50 Years	0	0	0	0
5 (600 AFY)	Well 14 Ponds	20 Years	217,204	114,212	4,447	335,863
		50 Years	364,148	270,908	60,620	695,675
5 (1,000 AFY)	Well 14 Ponds	20 Years	287,088	128,281	3,721	419,089
		50 Years	480,494	291,598	52,906	824,998