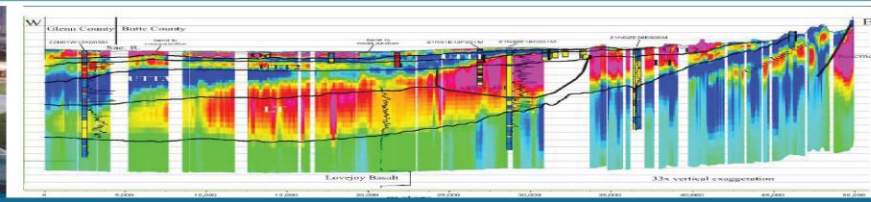
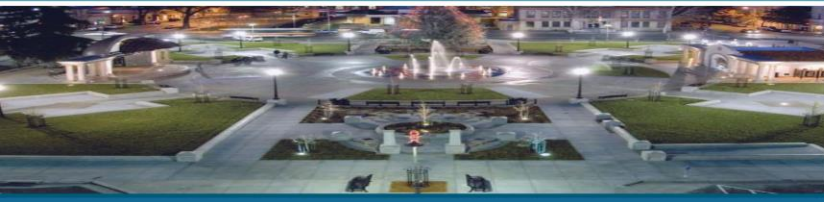
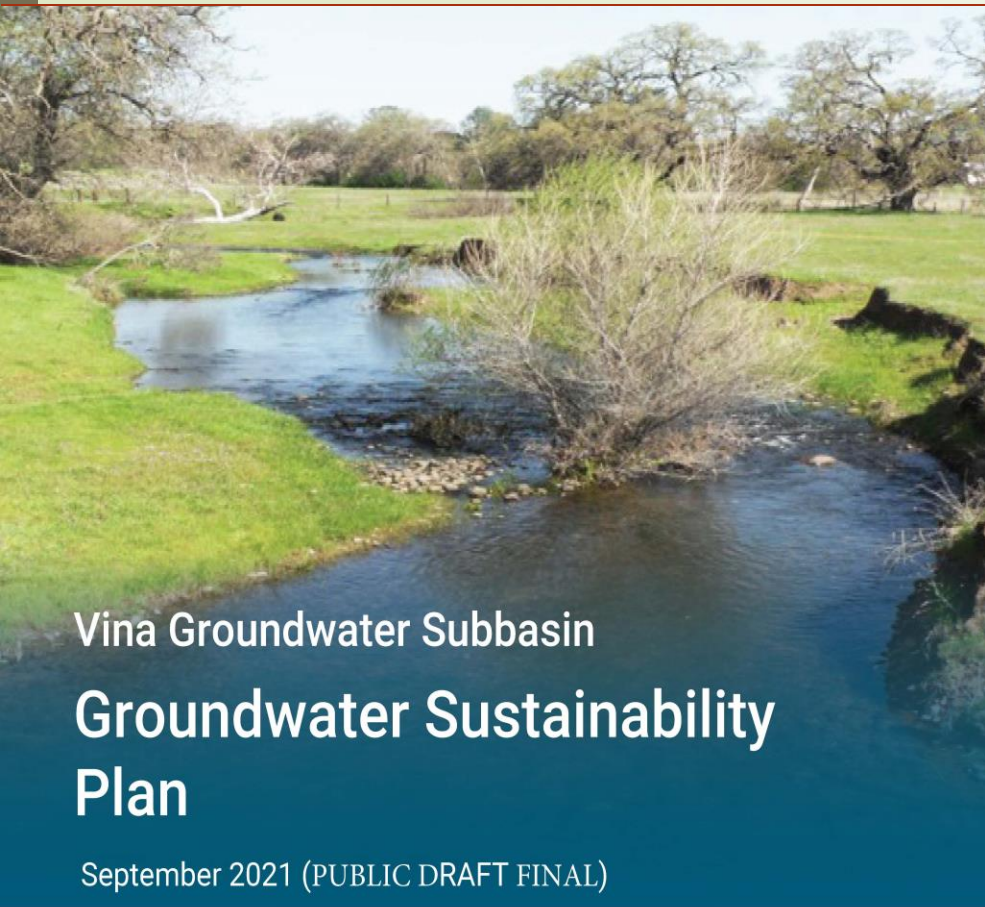




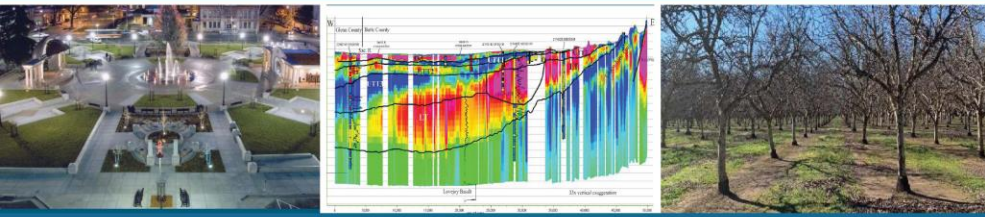
VINA SUBBASIN GROUNDWATER SUSTAINABILITY PLAN PUBLIC WORKSHOP OCTOBER 4, 2021





Vina Groundwater Subbasin Groundwater Sustainability Plan

September 2021 (PUBLIC DRAFT FINAL)



PREPARED FOR
VINA AND ROCK CREEK RECLAMATION
DISTRICT GROUNDWATER
SUSTAINABILITY AGENCIES

Executive
Summary

Chapter 1 -
Agency
Information, Plan
Area,
Communication

Chapter 2 - Basin
Setting

Chapter 3 -
Sustainable
Management
Criteria

Chapter 4 -
Monitoring
Networks

Chapter 5 - Project
and Management
Actions

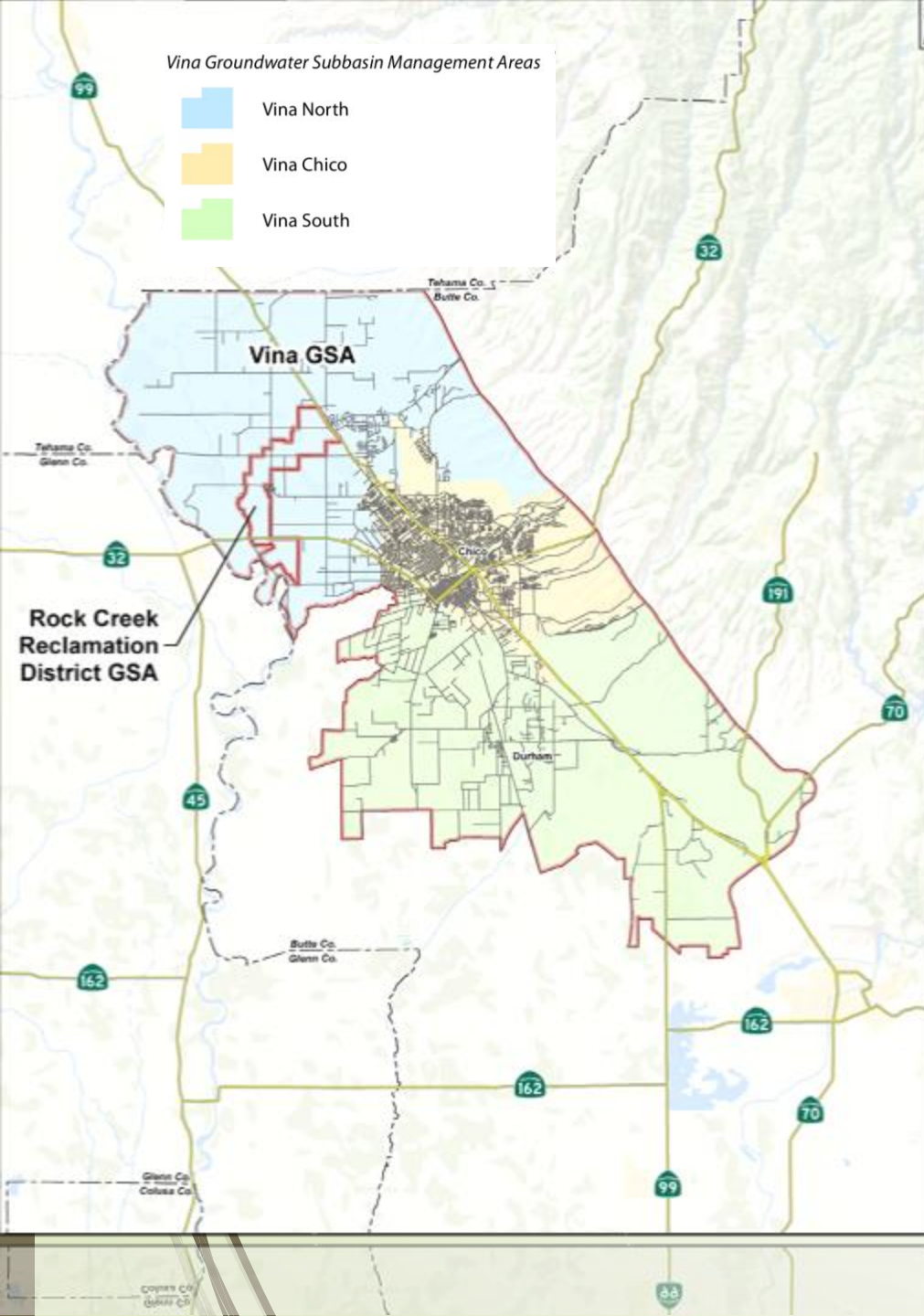
Chapter 6 - Plan
Implementation

GSP Outline Public Draft Final



CHAPTER 1

PLAN AREA



Plan Area

- Two Groundwater Sustainability Agencies
 - Vina GSA
 - Rock Creek Reclamation District GSA
- Three Management Areas
 - Vina North
 - Vina Chico
 - Vina South

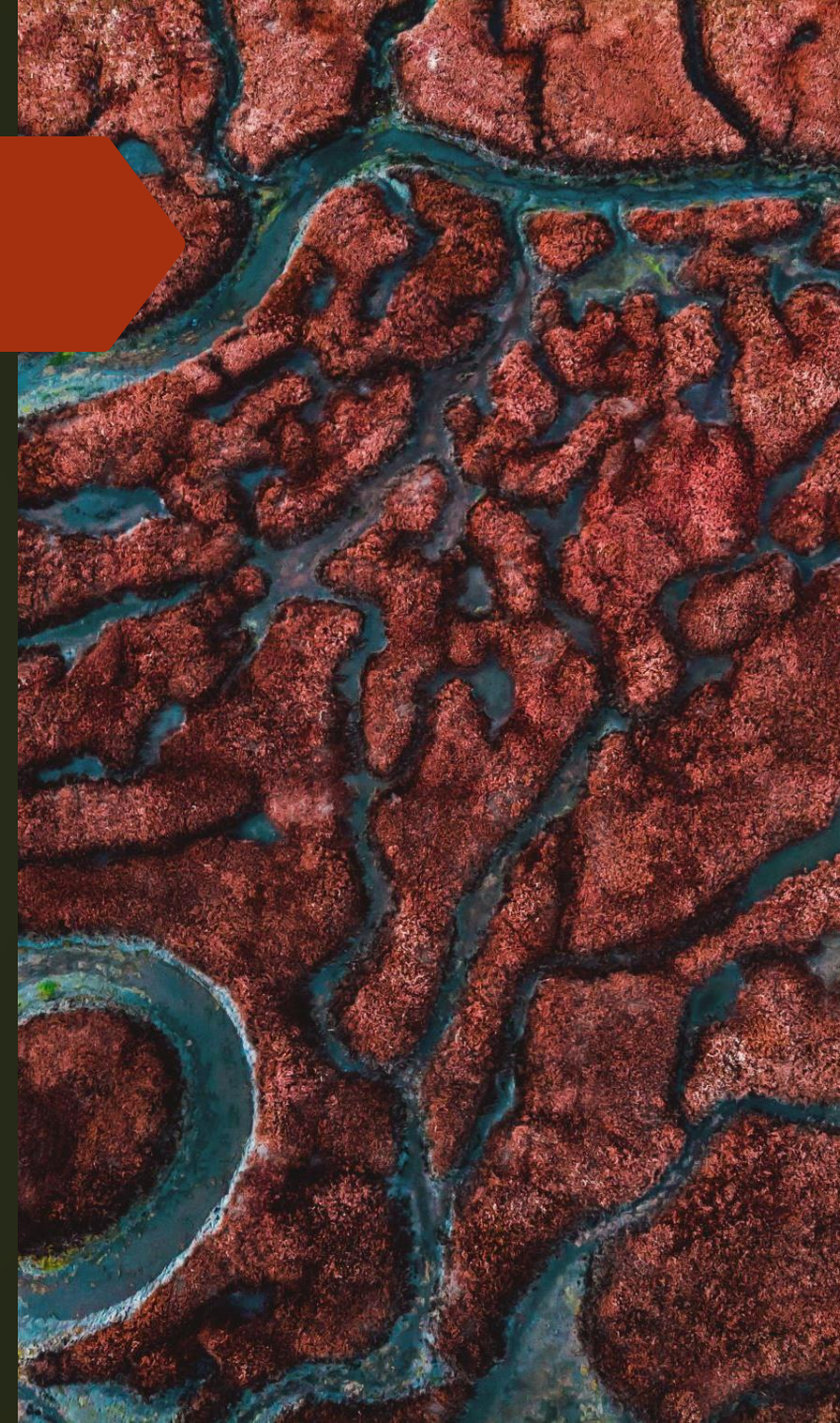


What We Know

CHAPTER 2 BASIN SETTING

CHAPTER 2 – BASIN SETTING HYDROGEOLOGIC CONCEPTUAL MODEL (HCM)

- ▶ What Will You Find
 - ❖ Basin Boundaries
 - ❖ Topography, Surface Water, and Recharge
 - ❖ Regional Geologic and Structural Setting
 - ❖ Geologic Formations
 - ❖ Groundwater Producing Formations
 - ❖ Cross Sections
 - ❖ Key Geologic Features
 - ❖ Principal Aquifers and Aquitards
 - ❖ HCM Data Gaps



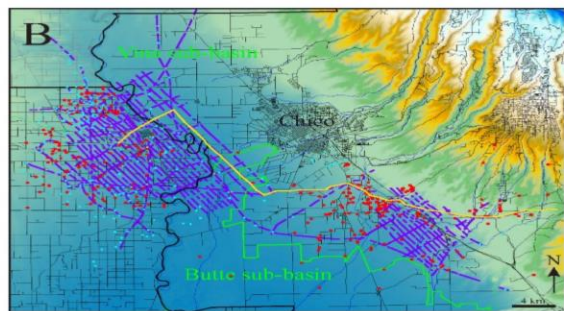
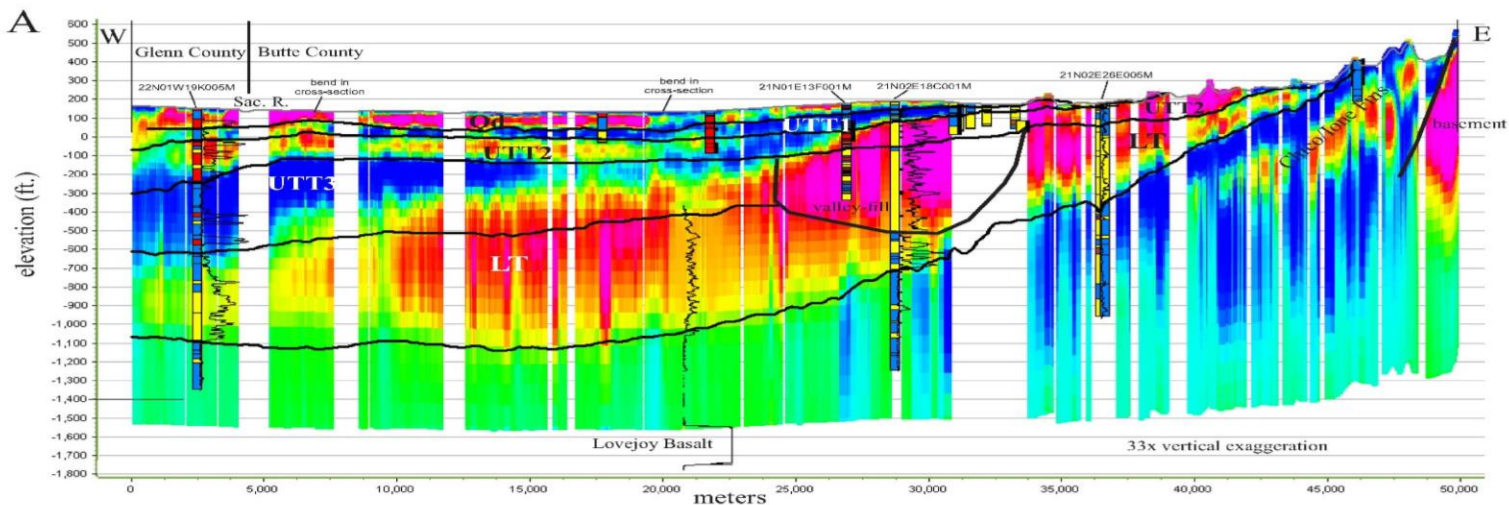
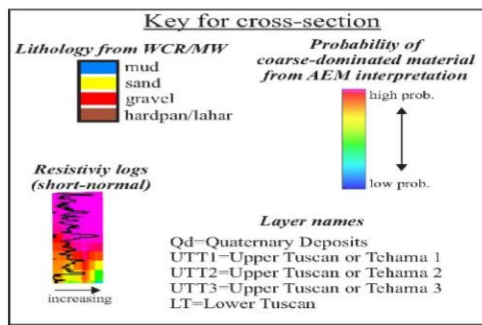


Figure ?. A) AEM and well-based hydrogeologic layering through AEM-acquired data areas. AEM interpretation shows probability (cold colors=low; warm colors=high) of encountering coarse-dominated material along the cross-section (from Kang et al., in prep.). Monitoring wells (MW) are denoted by the State's well number ID, B) Location map of cross-section, AEM data, and well data. Background colors are relative elevation.

Key for map
 - cross-section
 - AEM data
 - e-log well
 - WCR well



Principal Aquifers and Aquitards

Single Principal Aquifer

- Composed on Several Geologic Units
- Various Aquifer Zones
- Leaky Aquifer System with Varied Hydraulic Connections
- Varies From Northeast to Southwest





HCM Data Gaps

Additional Monitoring to Increase Understanding of Aquifer

Further Assess Interaction Between Rivers and Groundwater

Further Assess Groundwater Recharge

- Expand Isotopic Analysis
- General Water Quality Analysis
- From Rainfall Directly on Lower Tuscan Formation
- Recharge Rate

Additional Field Testing to Understand Recharge Rates and Stream Losses

Additional AEM Data Collection

CHAPTER 2 – BASIN SETTING

Groundwater Conditions

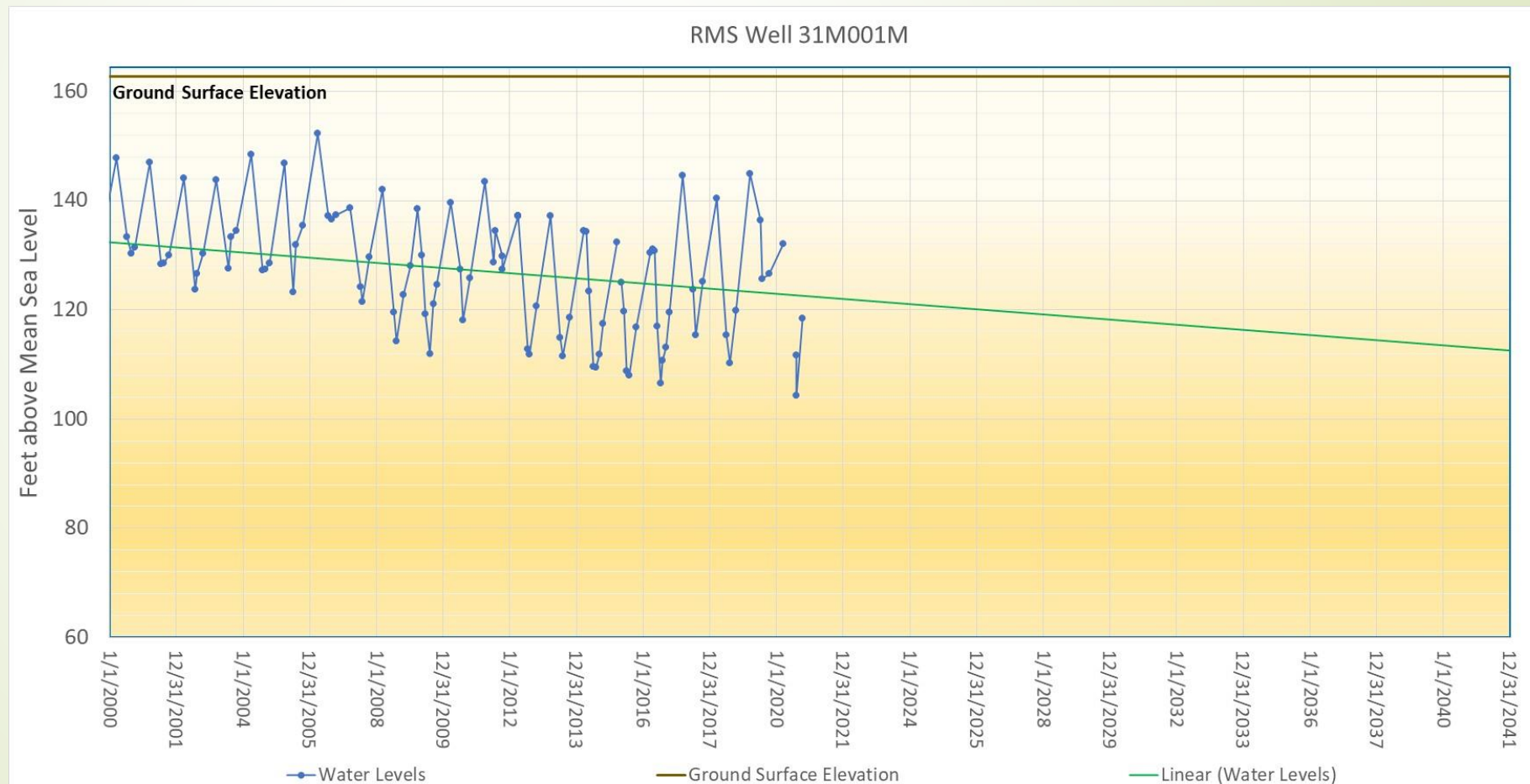
► What Will You Find

- ❖ Description of Current and Historical Conditions
- ❖ Groundwater Trends
- ❖ Seawater Intrusion
- ❖ Groundwater Quality
- ❖ Land Subsidence
- ❖ Interconnected Surface Water
- ❖ Groundwater Dependent Ecosystems



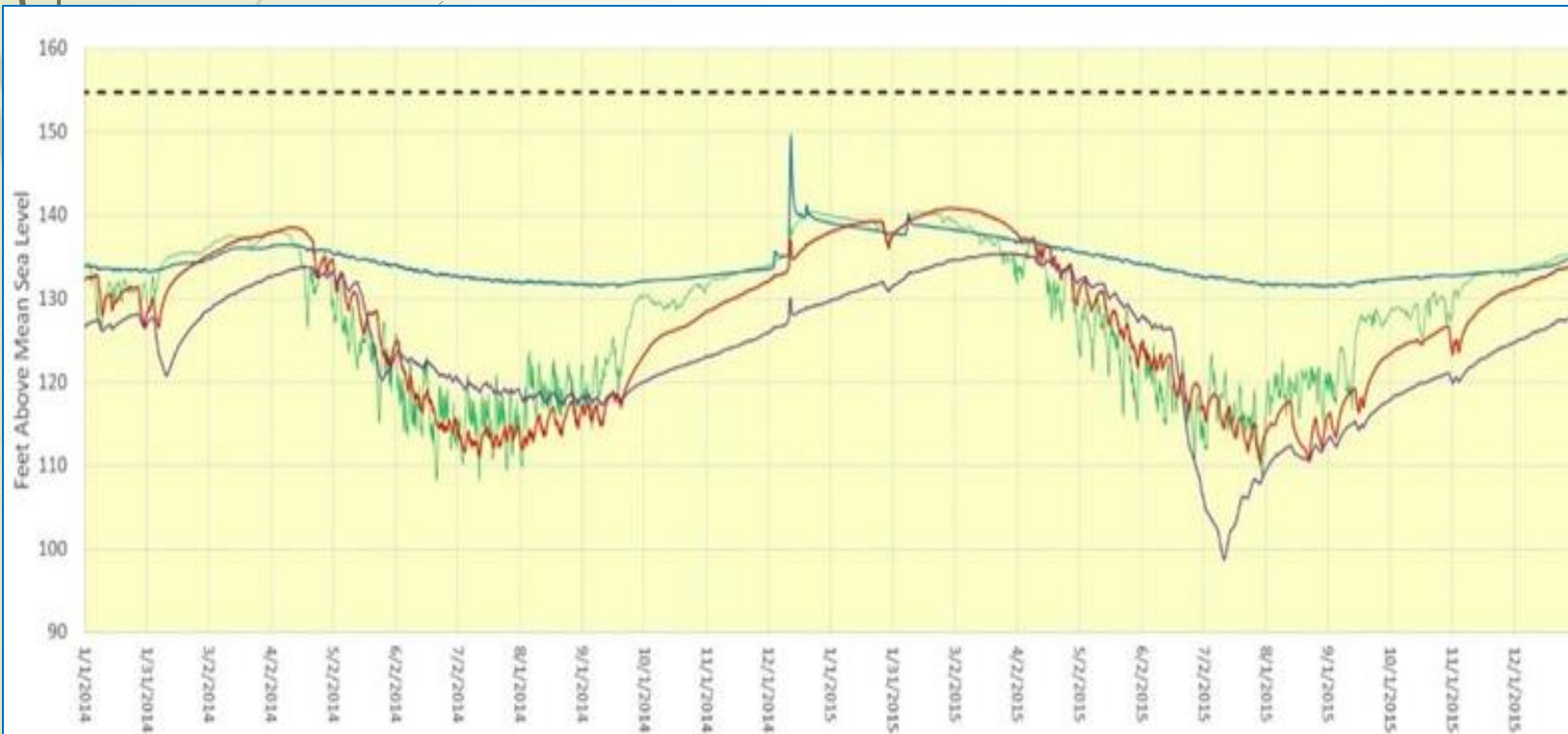
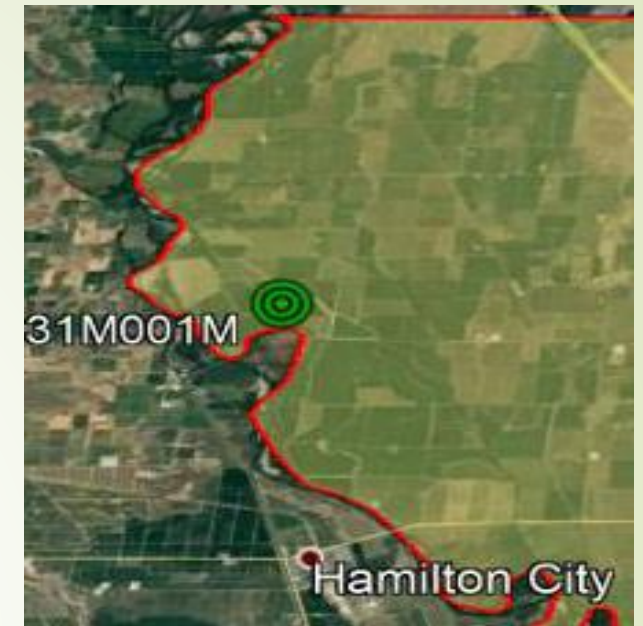
Groundwater Trends

- Groundwater Flows from the Northeast to Southwest
- Since 2000 there have been some decreases in water levels across the Vina Subbasin



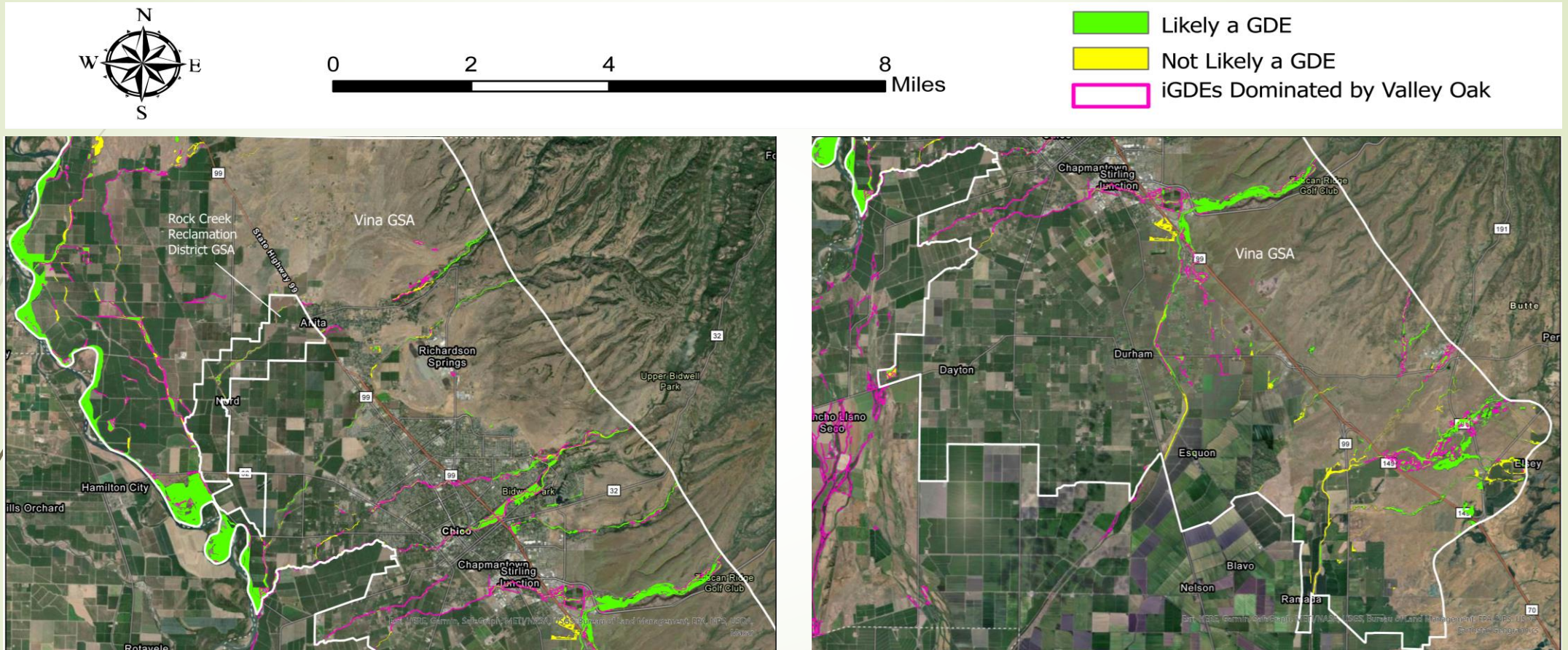
Interconnected Surface Water

- Relationship between surface water and the groundwater system not well understood
- Shallow Water near Sacramento River does not appear effected by groundwater pumping
- Groundwater does not appear to be connected to upland creeks



- Ground Surface Elevation
- Well Screen – 65 to 75 Feet Below Ground Surface
- Well Screen – 140 to 201 Feet Below Ground Surface
- Well Screen – 560 to 600 Feet Below Ground Surface
- Well Screen – 1020 to 1030 Feet Below Ground Surface

Potential Groundwater Dependent Ecosystems



Northern Subbasin

Southern Subbasin

CHAPTER 2 – BASIN SETTING

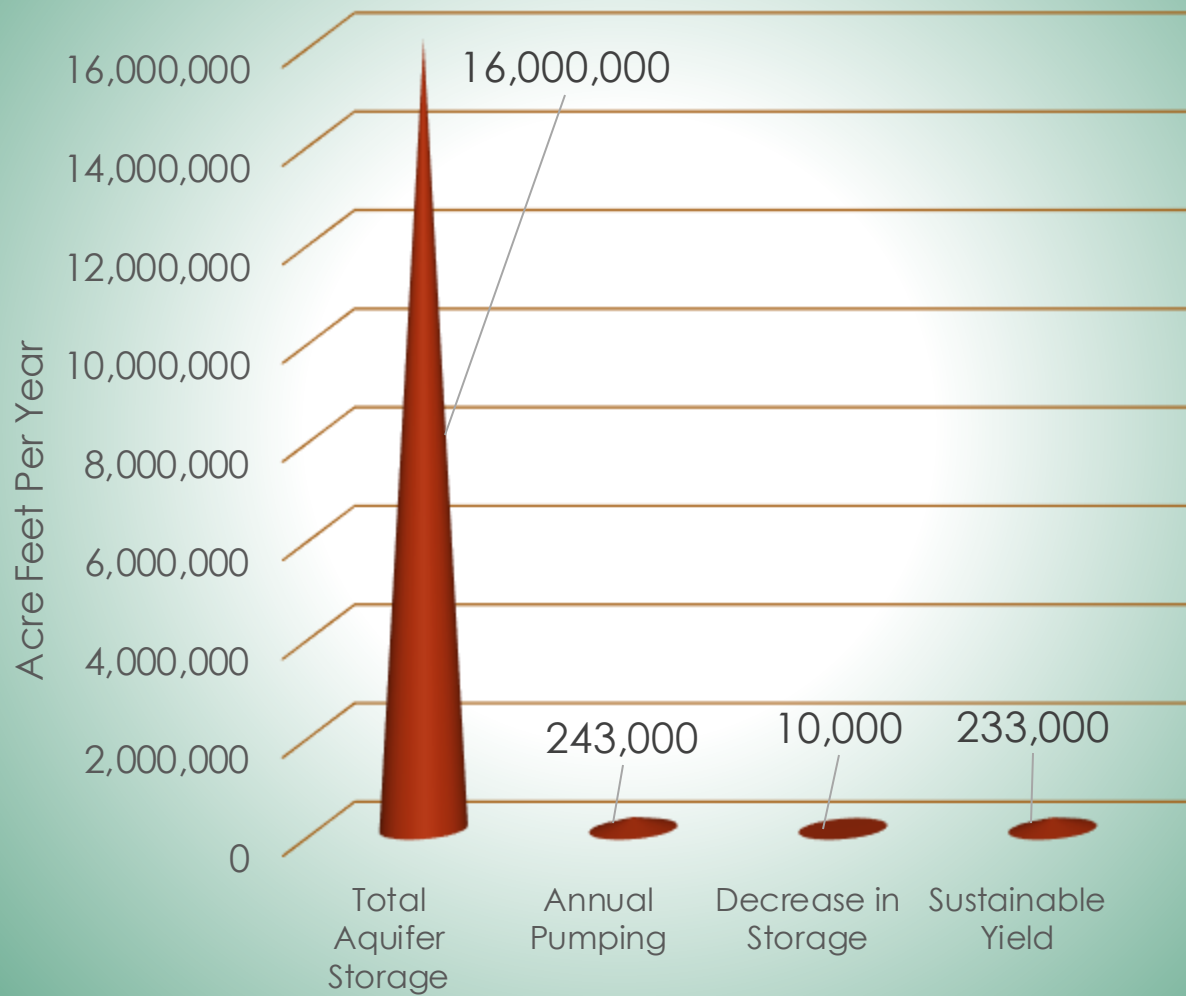
Water Budget

► What Will You Find

- ❖ Selection of Hydrologic Periods
- ❖ Usage of Groundwater Model
- ❖ Water Budget Assumptions
- ❖ Water Budget Estimates
- ❖ Water Budget Uncertainty
- ❖ **Overdraft Conditions**
- ❖ **Sustainable Yield Estimate**
- ❖ Recommended Next Steps



Vina Subbasin is Relatively Stable



Decrease in Storage and Sustainable Yield

Sustainable Yield

“Maximum quantity of water, calculated over a base period representative of long-term conditions in the basin, and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result.”

Accessible Storage

The primary aquifer extends to depths greater than 1,000 feet below ground surface over large portions of the basin. Ninety percent of municipal and irrigation wells are completed at depths less than 750 feet below ground surface.



Clarifying Questions





TRACKING CONDITIONS TO
MAINTAIN SUSTAINABILITY

CHAPTER 3 SUSTAINABLE MANAGEMENT CRITERIA

SUSTAINABILITY GOAL

To ensure that groundwater is managed to provide a water supply of adequate quantity and quality to support rural areas and communities, the agricultural economic base of the region, and environmental uses now and in the future.



Lowering
GW Levels

Reduction
of Storage

Seawater
Intrusion

Degraded
Quality

Land
Subsidence

Surface Water
Depletion

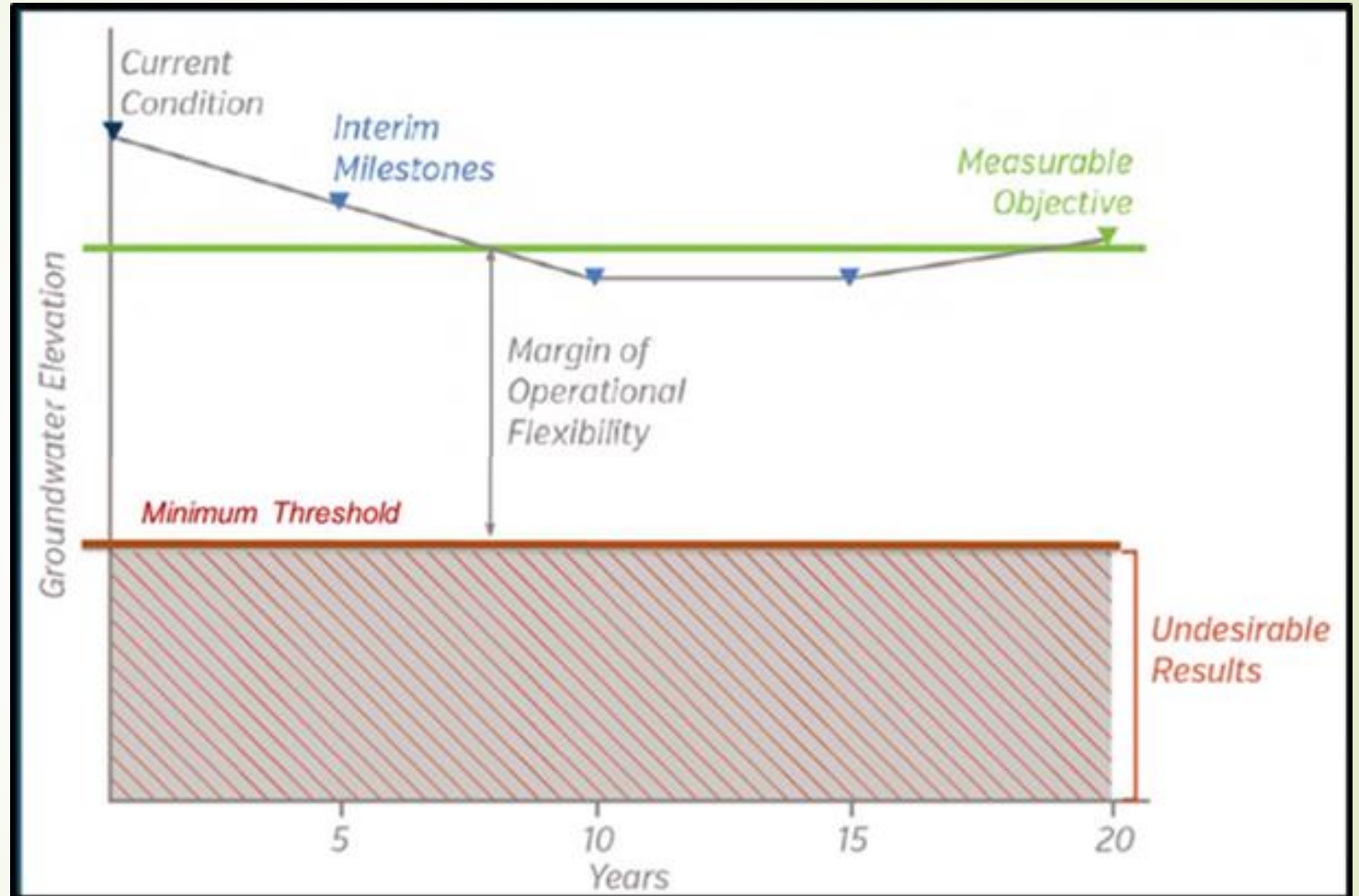


Sustainability Indicators

Used to Characterize Groundwater Conditions
Throughout the Subbasin

SUSTAINABLE MANAGEMENT CRITERIA

- ❑ Measurable Objective (MO)
 - ✓ Where We Want To Be
- ❑ Minimum Threshold (MT)
 - ✓ Point Where Undesirable Results May Start to Occur
- ❑ 20 Year Implementation Period





Measuring Sustainability - Groundwater Levels

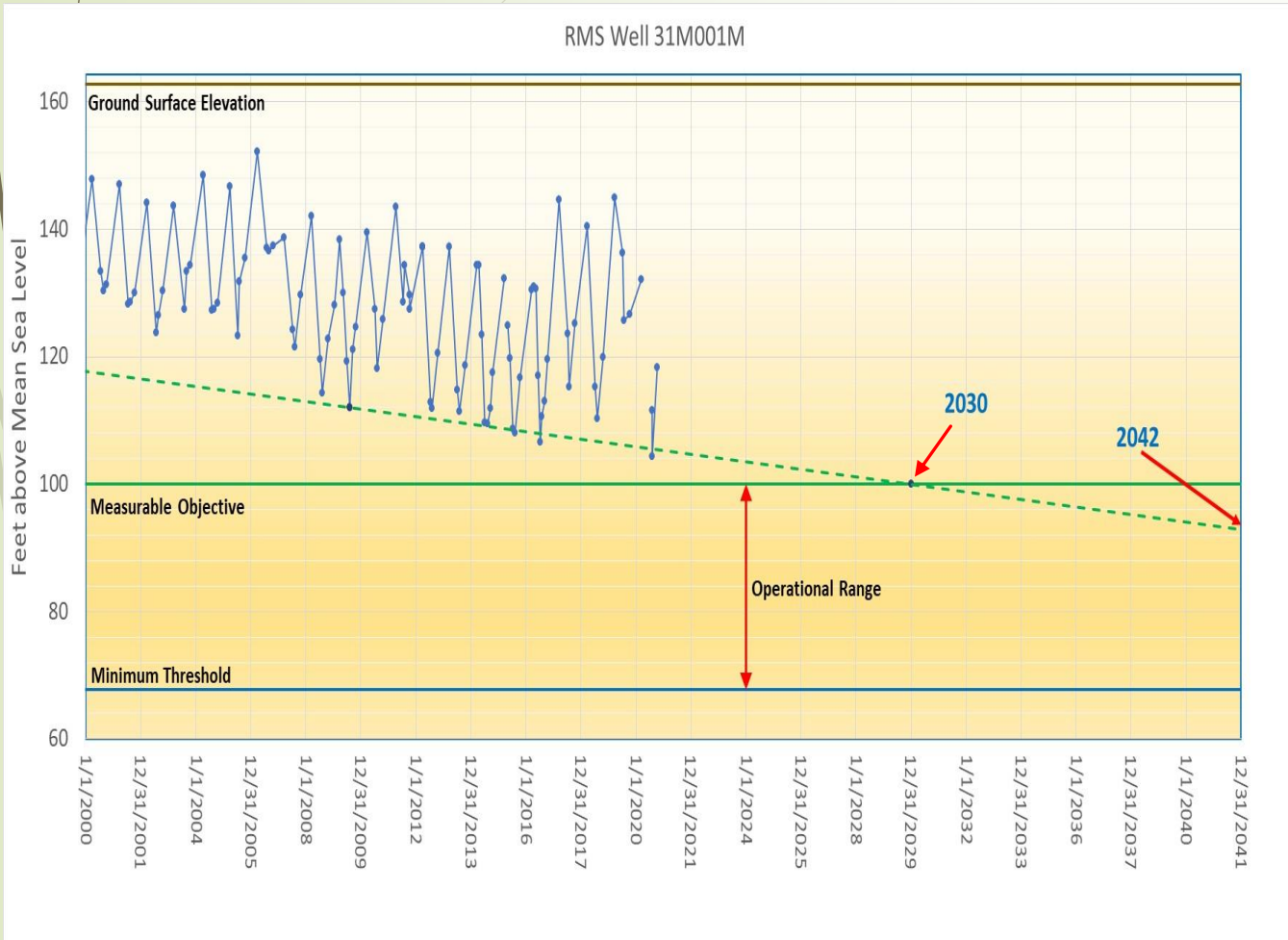
MO - Groundwater level based on the groundwater trend line for the dry periods (over the period of record) of observed short-term climatic cycles extended to 2030

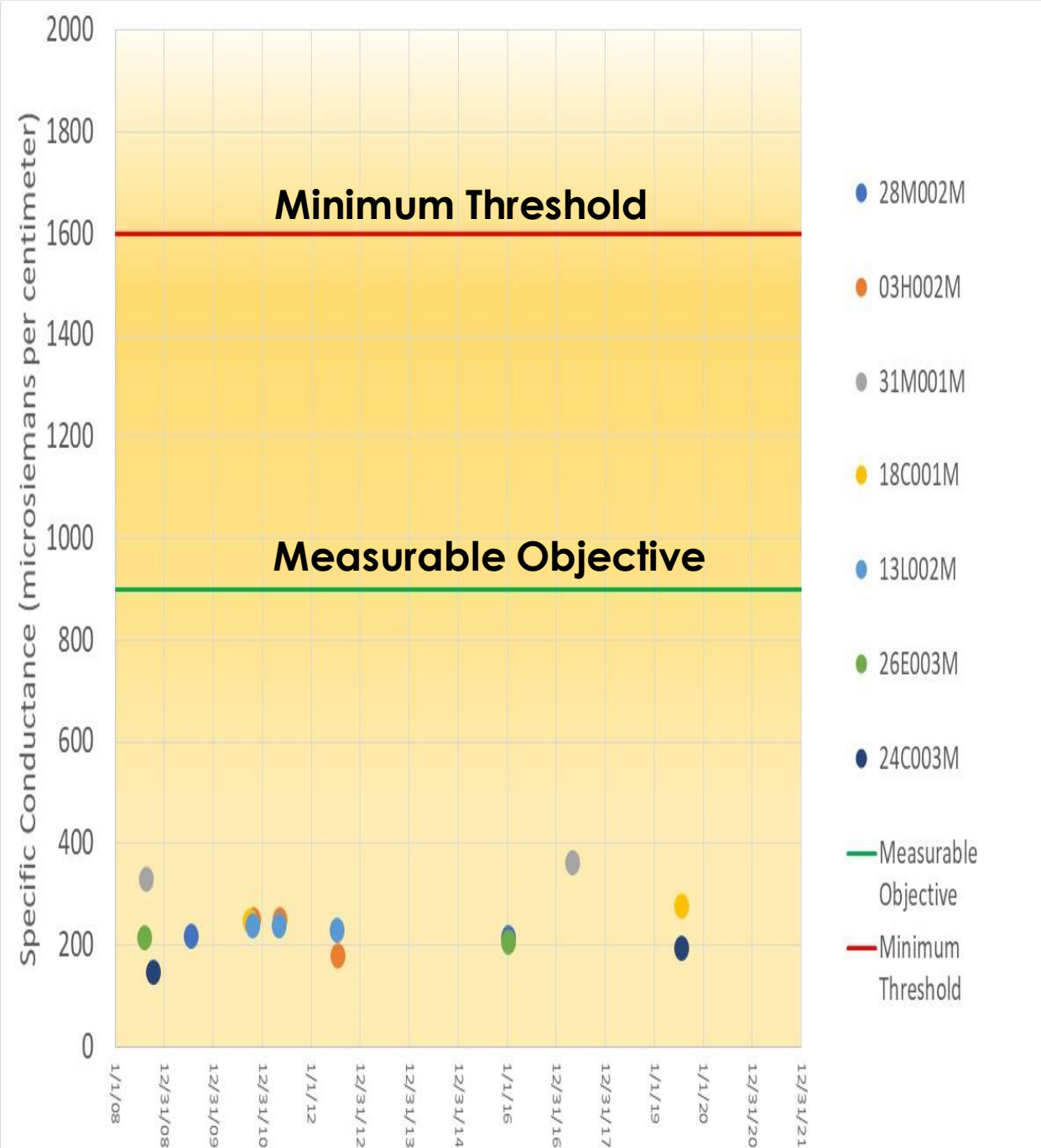
MT – Protective of Sustainably Constructed Domestic Wells.

➤ **Installed after 1980**

➤ **Constructed per County Well Standards**

➤ **Proxy For:**

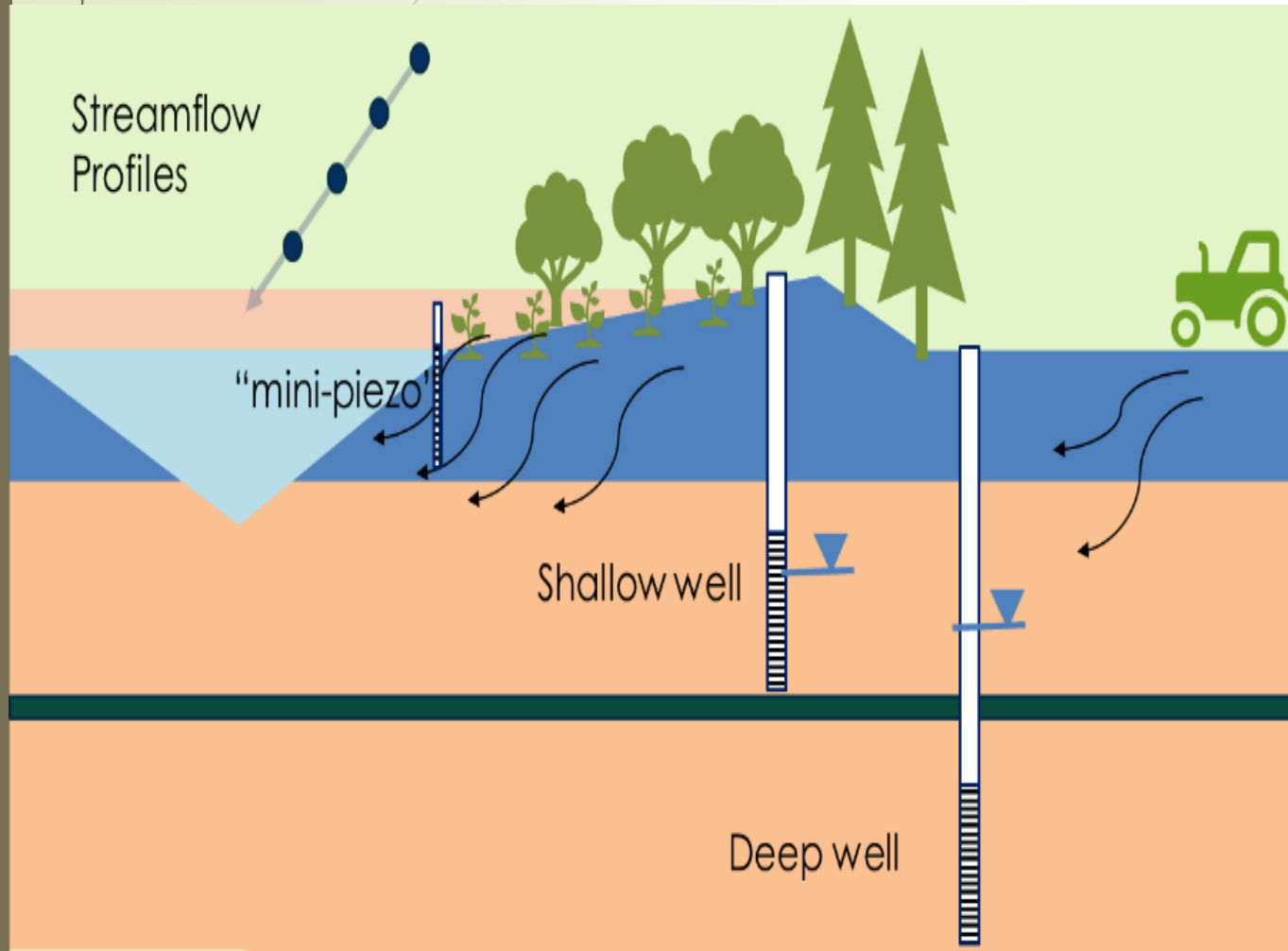




- **Based on Potential for Pulling Naturally Occurring Saline Water from Underlying Formations**
- **Salinity Reported as Specific Conductance Used to Assess Sustainability**
- **MO – USEPA Secondary Maximum Contaminant Level (MCL) – 900 µS/cm**
- **MT – USEPA Upper Secondary MCL – 1,600 µS/cm**
- **Values below these levels are acceptable for drinking water use**
- **Reported Values in Vina Subbasin Significantly Below MO**

Groundwater Quality

Measuring Sustainability Interconnected Surface Waters



DATA GAP

- GSP Presents Framework to Develop SMCs
- Uses Groundwater Levels as Proxy Until Developed

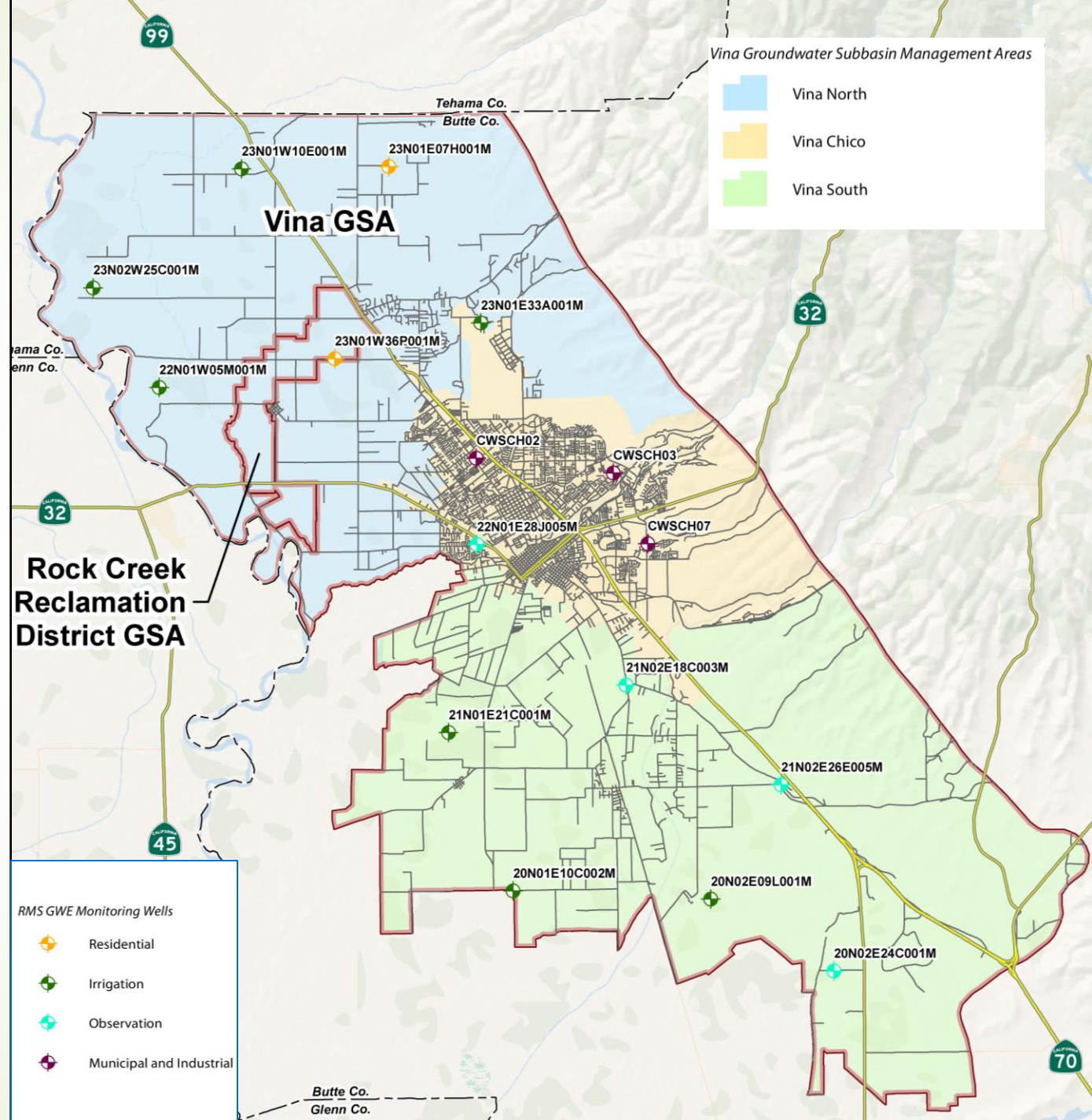


Where Sustainability Is
Measured

CHAPTER 4 MONITORING NETWORKS

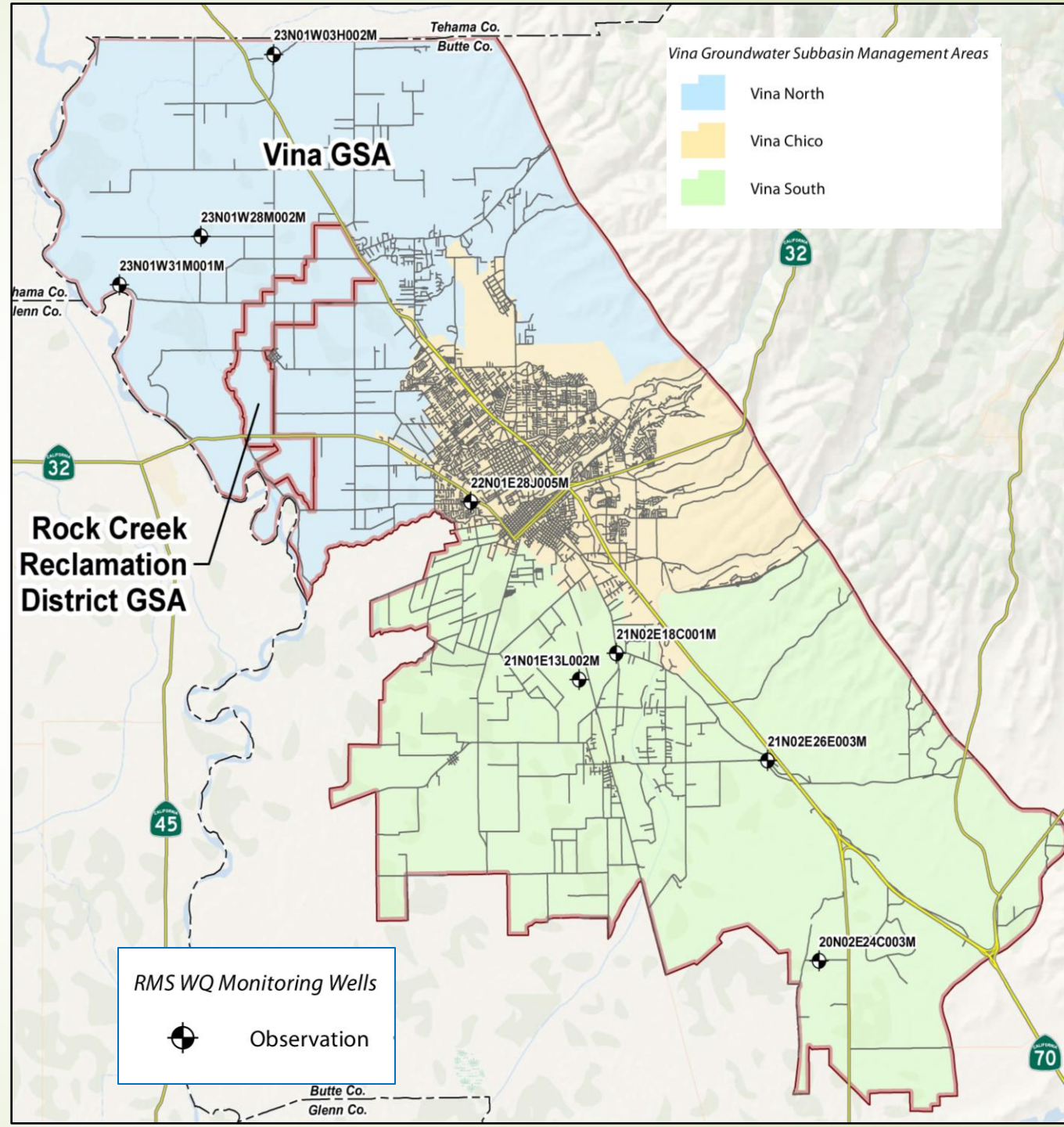
Representative Monitoring Sites Groundwater Levels

- Table 3.1 lists the MOs and MTs for Each RMS Well.
- Table 4.5 provides well construction details for each RMS Well.



Representative Monitoring Sites Groundwater Quality

- Table 3.2 lists the MOs and MTs for Each RMS Well.
- Table 4.7 provides well construction details for each RMS Well.



Clarifying Questions





How Sustainability will be
Maintained

CHAPTER 5 PROJECTS AND MANAGEMENT ACTIONS



Projects

15 Projects Identified

- ✓ 4 Planned
- ✓ 11 Potential

Management Actions

7 Management Actions Identified

- ✓ General Plan Updates
- ✓ Domestic Well Mitigation
- ✓ Well Permitting Ordinance
- ✓ Landscape Ordinance
- ✓ Prohibition of Groundwater use for Ski Lakes
- ✓ Expansion of Water Purveyors
- ✓ Groundwater Allocation



Planned Projects

- **Agricultural Irrigation Efficiency**
 - Implement a voluntary program to adopt BMPs for irrigation
 - 4,000 AF/year
- **Residential Conservation**
 - Implement a series of urban water conservation measures
 - 100 AF/year
- **Streamflow Augmentation**
 - Utilize high flow waters to increase stream flow for use in-lieu of ground water
 - 1,000 - 5,000 AF/year
- **FloodMAR**
 - Utilize high flow water for direct recharge
 - TBD AF/year



Potential Projects

Paradise Irrigation District Intertie

Agricultural Surface Water Supplies

Extend Orchard Replacement

Miocene Canal Recharge

Community Monitoring Program

Wastewater Recycling

Community Water Education Initiative

Rangeland Management and Water Retention

Fuel Management for Watershed Health

Removal of invasive Species

Surface Supply and Recharge



Management Actions

General Plan Updates	Coordinate with Butte County and City of Chico
Domestic Well Mitigation	Identify existing domestic wells impacted by SMCs
Well Permitting Ordinance	Coordinate with Butte County on updating the ordinance
Landscape Ordinance	Coordinate with Butte County to update ordinance
Prohibition of Ski Lakes	Limit the use of groundwater for ski lakes
Expansion of Water Purveyors Service Area	Evaluate the possibility of expanding the service areas
Groundwater Allocation	Last option to implementation groundwater pumping allocations



Data Collection

County Contour Mapping

- Regular water level monitoring across the region

Update Butte Basin Groundwater Model

- Update the model with new data

Community Monitoring

- Track domestic wells that go dry

Interconnected Surface Water

- Monitor groundwater adjacent to streams

Clarifying Questions



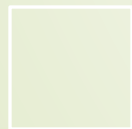


Schedule, Funding,
and Reporting

CHAPTER 6

IMPLEMENTATION

ID	Task Name	Start	Finish	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042			
1	GSP Implementation	1/31/22	4/1/42	[GSP Implementation Bar]																							
2	GSP Submittal	1/31/22	1/31/22	[GSP Submittal Bar]																							
3	Public Outreach	2/1/22	4/1/42	[Public Outreach Bar]																							
4	Monitoring	2/1/22	4/1/42	[Monitoring Bar]																							
5	Develop Intial DMS	2/1/22	2/1/23	[Develop Intial DMS Bar]																							
6	Annual Reports	4/1/22	4/1/42	[Annual Reports Bar]																							
28	Interbasin Coordination	4/1/22	4/1/42	[Interbasin Coordination Bar]																							
29	Five Year Updates	4/1/27	4/1/42	[Five Year Updates Bar]																							
30	2027 Update	4/1/27	4/1/27	[2027 Update Bar]																							
31	2032 Update	4/1/32	4/1/32	[2032 Update Bar]																							
32	2037 Update	4/1/37	4/1/37	[2037 Update Bar]																							
33	2042 Update	4/1/42	4/1/42	[2042 Update Bar]																							
34	Data Gaps			[Data Gaps Bar]																							
35	Interconnected Stream Monitoring	2/1/22	4/1/42	[Interconnected Stream Monitoring Bar]																							
36	Contour Mapping	2/1/22	5/5/32	[Contour Mapping Bar]																							
37	Community Monitoring	2/1/22	4/1/27	[Community Monitoring Bar]																							
38	Update Butte Basin Model 1	1/1/23	1/3/27	[Update Butte Basin Model 1 Bar]																							
39	Update Butte Basin Model 2	1/1/27	1/1/32	[Update Butte Basin Model 2 Bar]																							
40	Project Implementation	1/1/23	1/1/40	[Project Implementation Bar]																							
41	Project 1: Ag Irrigation Efficiency	1/1/23	12/31/27	[Project 1: Ag Irrigation Efficiency Bar]																							
42	Project 2: Flood MAR	1/1/23	1/1/31	[Project 2: Flood MAR Bar]																							
43	Project 3: Residential Conservation	1/1/23	12/31/35	[Project 3: Residential Conservation Bar]																							
44	Project 4: Streamflow Augmentation	1/1/30	1/1/40	[Project 4: Streamflow Augmentation Bar]																							
45	Adaptive Management	2/1/22	2/2/42	[Adaptive Management Bar]																							
46	Evaluate Potential Projects	2/1/22	2/2/42	[Evaluate Potential Projects Bar]																							
47	Evaluate New Projects	2/1/22	2/2/42	[Evaluate New Projects Bar]																							
48	Evaluate Management Actions	2/1/22	2/2/42	[Evaluate Management Actions Bar]																							



Estimate of Costs



Funding Alternatives



Schedule



Data Management System



Annual Reporting



Evaluation Report



Interbasin Coordination



Estimate of GSP Implementation

Administrative Costs

- **\$200,000 - \$400,000/year**

Monitoring

- **\$30,000/year**

Data Analysis

- **\$10,000/year**

Reporting and Evaluation

- **\$30,000/year**

Data Gaps

Projects and Management Actions



Funding Alternatives

Existing funding and programs
to minimize overlap

State and federal grants

Other funding mechanisms
(i.e., Prop 218 or 26)



Inter-basin Coordination

- ▶ Participate in on going coordination efforts with surrounding 10 basins
- ▶ Northern Valley Inter-basin Coordination report
 - ▶ Provides a framework for coordination efforts
 - ▶ Discussions to determine GSA priorities

Clarifying Questions

