White Wolf Subbasin Groundwater Sustainability Agency
Board of Directors

Agenda
March 20, 2018 at 1:00 p.m.

Iron Skillet Conference Room
5821 Dennis McCarthy Drive, Lebec, CA 93243

1. **Call to order**
2. **Roll Call**
3. **Approval of Minutes of the Regular Board Meeting of September 19, 2017**
4. **Discussion of administrative matters related to GSA (Angelica)**
5. **Presentation from EKI – Part 1 (Anona)**
    - DWR / SGMA updates
    - Interaction with Kern County Subbasin, including modeling activities.
6. **Discuss Formation of a Technical Committee (Angelica)**
7. **Presentation from EKI – Part 2 (Anona)**
    - Proposed Groundwater Sustainability Plan (GSP) Scope of Work
8. **Review and Approve EKI Proposal to Develop a GSP (Angelica)**
9. **Public Comment**

At this time, the public may address the Board on any item not appearing on the agenda that is within the subject matter jurisdiction of the Board. Comments will be limited to three minutes.

10. **Consider and provide direction on future agenda items**
11. **Adjourn**

In compliance with the Americans with Disabilities Act, if you need disability-related modifications or accommodations, including auxiliary aids or services, please call Angelica Martin (661) 663-4262.

White Wolf Subbasin Groundwater Sustainability Agency

Conference Room, Iron Skillet
5821 Dennis McCarthy Dr., Lebec, CA 93243
MINUTES
OF THE REGULAR BOARD OF DIRECTORS MEETING

Date of Meeting: Tuesday, September 19, 2017
Place of Meeting: Conference Room, Iron Skillet, 5821 Dennis McCarthy Drive, Lebec, CA 93243

Meeting Commenced at 1:01 p.m.

DIRECTORS PRESENT: Jeevan Muhar, Tito Martinez, Allen Lyda, Jeff Mettler, Sheridan Nicholas, Angelica Martin.
DIRECTORS ABSENT: Patty Poire, Jon Reiter
PUBLIC AND STAFF: See attendees attached.

On motion by Director Lyda, seconded by Director Mettler, the draft minutes of the Regular Board meeting of August 22, 2017 were approved unanimously.

Ms. Martin announced that the Department of Water Resources had designated the White Wolf Subbasin GSA as exclusive.

Ms. Martin mentioned that those Director's and Alternates who had not mailed their Form 700 had until September 22nd to do so. Also, Ms. Martin informed that Director Reiter communicated with her to inform her that he had a conflict attending the GSA's meetings due to another commitment. Since Director Reiter was not present it was agreed that the Board would review the meeting schedule during the next Board meeting.

Anona Dutton from EKI Consultants gave a technical presentation in which an update of Prop 1 Grant Application was provided. Near term decisions were also brought up and it was recommended by the Board that the GSP should be prepared simultaneously to the Kern County Subbasin GSAs, with a soft deadline of 2020, and with the option of formally submitting until 2022. It was also agreed that it would be economically convenient to participate with the Kern County Subbasin GSAs in the modeling option of S2VSim with the open option of using a different model if needed in the future. Also, part of the presentation was the monitoring network infrastructure. It was discussed that a basin boundary "buffer zone" for well drilling needs to be defined. It was agreed by the Board that this topic should be a future action item. The Board agreed on the need to form a technical committee and that this should be in the Agenda for the next Board meeting.

Legal Counsel explained the need to adopt a Conflict of Interested Code and recommended approving Resolution No. 2017-03, Announcing the Intent to Adopt a Conflict of Interest Code and Establishing a Comment Period. During the next GSA Board meeting, December 19, a final approval will be brought before the Board. On motion by Director Nicholas and seconded by Director Lyda, Resolution No. 2017-03 was unanimously approved by the Board.

There was no public comment.

Chairman Martinez adjourned the meeting at 2:00 p.m.

_____

Angelica Martin, Secretary, White Wolf Subbasin GSA

Approved by: White Wolf Subbasin GSA Board of Directors Dated: March 20, 2018

EKI TECHNICAL PRESENTATION #3

WHITE WOLF GSA BOARD OF DIRECTORS

20 MARCH 2018

eki environment & water

AGENDA

- Proposition 1 Grant Application Status Update
- Statewide SGMA updates
- Kern Subbasin SGMA Compliance Update
- EKI Scope for GSP Development (adapted from Prop 1 application)
- Key Near-Term Efforts

eki

2

PROP 1 GRANT APPLICATION UPDATE

- Proposal submitted Nov 2017
- Draft grant award released 6 Feb 2018
  - White Wolf Subbasin grant application score: **18 / 19**
  - DWR draft funding recommendation**: full funding $557,998** (!)
- Comment period closed 28 February 2018
- Final awards expected end of March / early April

2017 SGWP Grant Solicitation Evaluation
CATEGORY 2

White Wolf Groundwater Sustainability Agency
White Wolf Groundwater Sustainability Plan Development

Number of Projects	1
Total Proposal Level Score	6
Total Project Level Score	12
Tie-Breaker Points from Program Preferences Section (If Applicable)	
Grand Total	18

Table 7 – Application Evaluation Criteria for Category 2

Q#	Questions	Attachment(s)	Possible Points	Score
Proposal Level Evaluation				
1	Does the Proposal Summary describe a well-coordinated Proposal including GSPs that encompass the entire basin or describes why a portion of the basin is not covered in the Proposal?	3	4	4
2	Collectively, do the Budget and Schedule demonstrate that all of the projects will be completed by the SGMA deadline for the respective basin (January 31, 2020 for critically overdrafted basins or January 31, 2022 for other high and medium priority basins)?	5, 6	2	2
Total Range of Possible Points			0-6	6

Q#	Questions	Attachment(s)	Possible Points	White Wolf Groundwater Sustainability Plan Development Score
Project Level Evaluation				
3	Has the applicant addressed all of the items requested in the Project Justification Section of Attachment 3 (i.e., Proposal Summary and Project Support)?	3	4	3
4	Does the applicant provide an explanation of the Technical Need for the project?	3	2	2
5	Does the application contain a detailed Work Plan that includes tasks for developing, preparing, and submitting a complete GSP?	4	4	4
6	Does the application contain a complete Budget that is reasonable to execute the Work Plan on the Schedule provided?	5	2	2
7	Given the level of effort described in the Work Plan, does the Schedule seem reasonable?	6	1	1
Total Range of Possible Points			0-13	12
				12

DWR TECHNICAL SUPPORT SERVICES GRANTS

- DWR Technical Support Services (TSS) webpage now live, application Portal expected Spring 2018
- In order to apply, a GSA must:
  - Contact DWR Regional Office and Headquarters
  - Submit initial notification of GSP development
- "Funding availability will need to be distributed based on demand"
  - DWR will also "assess overlap in current State funding"
  - The White Wolf Subbasin Prop 1 application did NOT include funding for activities that could be covered by TSS grants – so the White Wolf GSA's asks will not overlap

* https://www.water.ca.gov/Programs/Groundwater-Management/Assistance-and-Engagement

4

DWR TECHNICAL SUPPORT SERVICES INCLUDE

- Groundwater Level Monitoring Training
- Borehole Video Logging
- Geophysical Logging
- Geologic Logging
- **Monitoring Well Installation**
- Modeling Training and Support

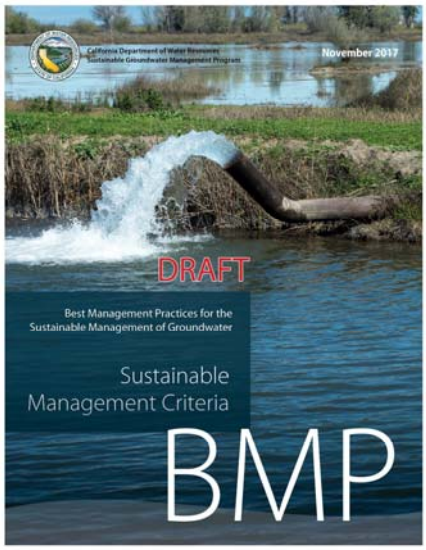
eki

* https://www.water.ca.gov/Programs/Groundwater-Management/Assistance-and-Engagement

5

DWR'S DRAFT BMP#6: SUSTAINABLE MANAGEMENT CRITERIA

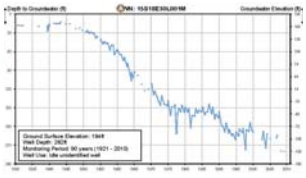
- Draft BMP publication offering guidance related to developing Sustainable Management Criteria
- Released 8 November 2017
- Comment period closed 8 January 2018
- Final BMP Anticipated mid-2018



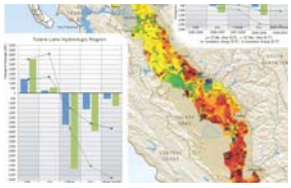
eki

6

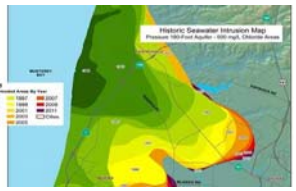
UNDESIRABLE RESULTS: Significant & Unreasonable…(1)



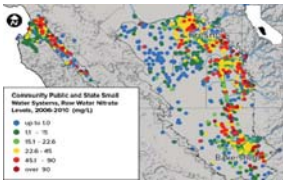
Lowering of Groundwater Levels



Reduction of Groundwater Storage

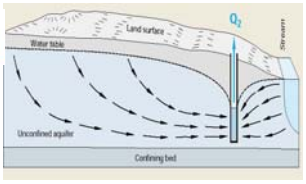


Seawater Intrusion



Groundwater Quality Degradation

Land Subsidence



Depletion of Interconnected Surface Water

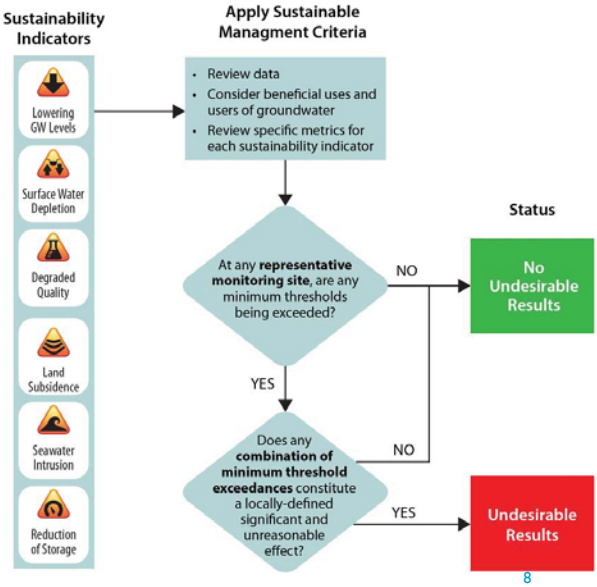
(1) CWC §10721(x)

Figure Sources: DWR California Water Plan (2013); Winter (1998)

7

SUSTAINABLE MANAGEMENT CRITERIA

- ***Sustainability Goal is*** applicable to the entire basin and should succinctly state the GSA's objectives and desired conditions of the groundwater basin, how the basin will get to that desired condition, and why the measures planned will lead to success
- ***Sustainability indicators*** (SIs) are the six effects that, when significant and unreasonable, become undesirable results
- ***Minimum thresholds*** (MTs) are the quantitative values representing groundwater conditions at a representative monitoring site that, when exceeded, may cause an undesirable result(s)
- SIs become ***undesirable results*** (URs) when a GSA-defined combination of minimum thresholds that cause "significant and unreasonable" effects is exceeded



8

SIGNIFICANCE TO WHITE WOLF SUBBASIN

- Sustainable Management Criteria (SMC) are the *heart* of the GSP
- Development of SMC is a data-driven process (also guilty until proved innocent)
- Scale and coordination are critical to defining Sustainability Indicators and Undesirable Results
- SMCs can be iteratively adjusted in future years
- State intervention can happen before 2042 if GSP is deemed inadequate or basin is underperforming relative to interim milestones

eki

9

SUSTAINABLE MANAGEMENT CRITERIA SCALE

Criterion	Scale		
	Basin	Management Area	Monitoring Site
Sustainability Goal	X		
Undesirable Results	X		
Minimum Thresholds, Interim Milestones, and Measurable Objectives			
Lowering of Groundwater Elevation			X
Groundwater Storage Reduction	X ~OR~	X	
Seawater Intrusion	X ~OR~	X	
Water Quality Degradation	X ~OR~	X ~OR~	X
Land Subsidence			X
Surface Water Depletion			X

eki

10

SUSTAINABILITY INDICATOR MEASUREMENT APPROACHES

Sustainability Indicator	Measurement Approach				
	GW Elevation	GW Sample	Volume/Extent Estimate	Rate Estimate	Isocontour Line
Lowering of Groundwater Elevation	X				
Groundwater Storage Reduction	X		X		
Seawater Intrusion	X	X			X
Water Quality Degradation	X	X ~OR~	X	~OR~	X
Land Subsidence	X		X ~AND~	X	
Surface Water Depletion(1)	X		X ~OR~	X	

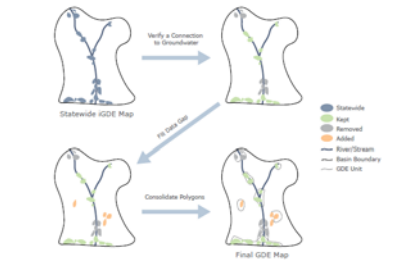
X = can be used as a proxy for measurement (1)

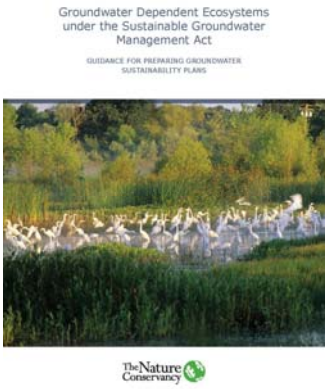
(1) DWR, 2017. Draft Sustainable Management Criteria BMP.

11

GROUNDWATER DEPENDENT ECOSYSTEMS (GDEs) UPDATES

- The Nature Conservancy (TNC) has released a *Guidance Document* to help GSAs effectively incorporate GDEs into their GSPs
- This document provides step-by-step advice for identifying, characterizing, mapping GDEs and developing sustainability criteria to protect GDEs from lowering groundwater levels, streamflow depletion
- DWR's own *Guidance Document* and *Statewide GIS Database* for GDEs is still in development, anticipated for release in Spring 2018





* https://www.water.ca.gov/Programs/Groundwater-Management/Assistance-and-Engagement

12

KERN SUBBASIN SGMA COMPLIANCE UPDATE

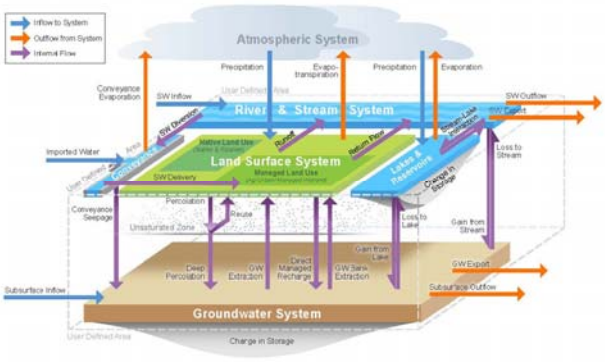
- KGA Umbrella GSP has become less extensive – more work will be required at the GSP chapter level
- KGA approved a limited number of Task Orders to initiate efforts related to high-level Basin Setting development, with deliverables anticipated in Spring 2018
- Kern Subbasin modeling efforts essentially at a standstill while waiting for new model update from DWR

eki

13

KERN SUBBASIN MODELING UPDATE

- Kern Subbasin GSAs planning to use updated DWR model (C2VSim) to "check the box" for basin-scale Current and Historical water budgets
- Model update not yet available from DWR
- Model may have limited applicability for water budgeting and evaluation of projects and management actions in the White Wolf Basin

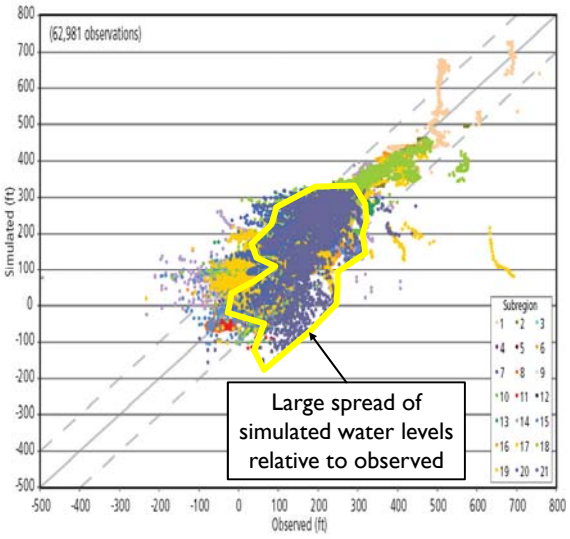


eki

14

SOME ISSUES WITH EXISTING C2VSIM MODEL

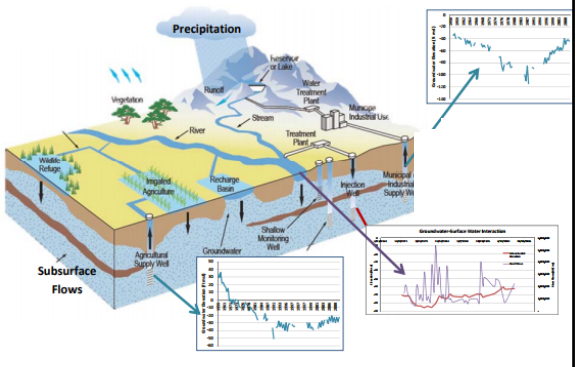
- Coarse resolution
- Poor calibration in the southern Central Valley
  - For simulated water levels RMSE = 94.1 feet (2nd worst of 21 subregions)
- Does not include water banking operations
- Known issues with certain parameter values



15

WHITE WOLF GSA PROP 1 APPLICATION INCLUDED ALL KEY GSP DEVELOPMENT EFFORTS

- Data Management System
- Groundwater Conditions Assessment
- Hydrogeological Conceptual Model (HCM)
- Water Budget
- Sustainable Management Criteria
- Monitoring Network
- Projects & Management Actions

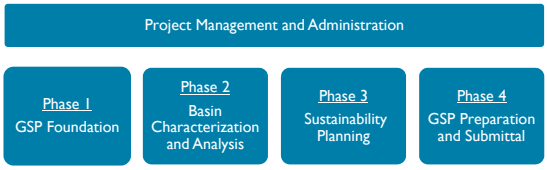


* 23-CCR Sections 354.16-20; www.water.ca.gov/groundwater/sgm/gsp.cfm

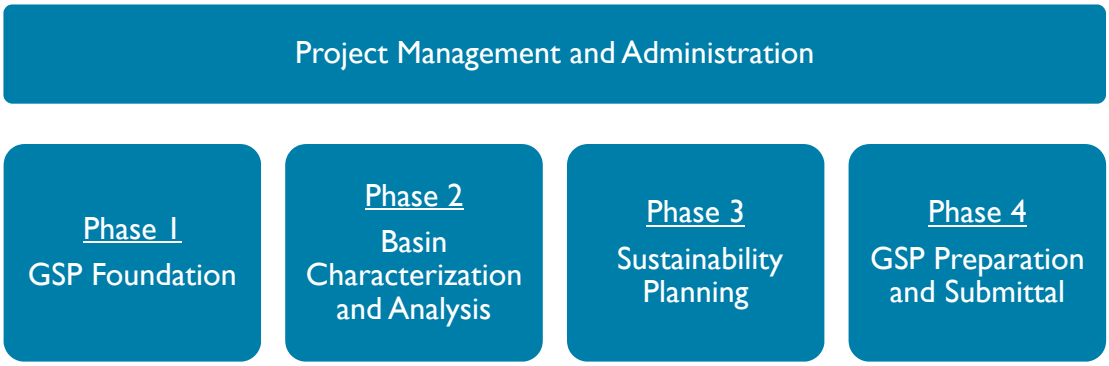
16

PROP 1 PROJECT WORK PRODUCTS

- **Final deliverable: SGMA-compliant GSP**
- Interim work products:
  - Technical presentations to the GSA and White Wolf Basin stakeholders
  - Draft technical memoranda (TMs) for review and comment by the GSA and, as appropriate, key stakeholders
  - TMs will be revised and incorporated into the GSP
  - Grant administration-related reports



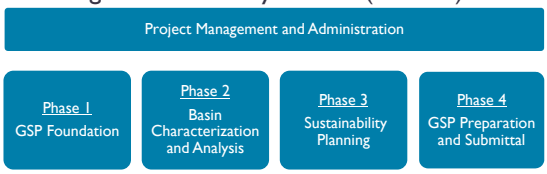
PROP 1 GRANT APPLICATION GSP DEVELOPMENT "PHASES"



18

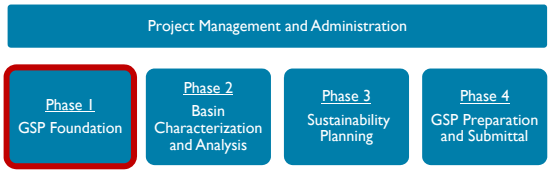
PROP 1 SCHEDULE

- Designed to submit a SGMA-compliant GSP by the 31 January 2022 deadline
- Phases 1 through 3 are accelerated with the objectives of:
  - Keeping pace with SGMA efforts in the adjacent Kern County Subbasin
    - Kern County Subbasin is in critical overdraft condition and thus subject to an accelerated SGMA compliance schedule
  - Supporting effective interbasin coordination
    - Particularly with respect to critical factors such as the water budget and numerical groundwater model development (Phase 2) and the development and vetting of sustainability criteria (Phase 3)



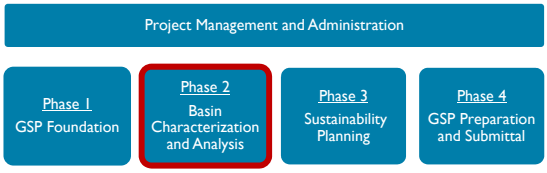
PHASE 1 – GSP FOUNDATION

- Key work efforts:
  - Development of a functional Data Management System (DMS)
  - Assessment of key data gaps for GSP development and suggestions for how to fill them
  - Evaluation of numerical groundwater modeling options
  - Development of a stakeholder communication and engagement plan



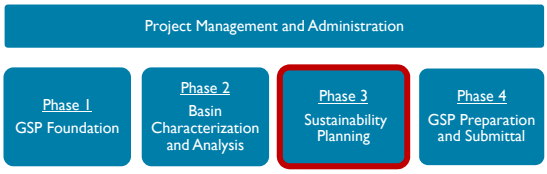
PHASE 2 – BASIN CHARACTERIZATION AND ANALYSIS

- Key work efforts:
  - Filling of selected data gaps identified in Phase 1
  - Development of a Hydrogeologic Conceptual Model (HCM)
  - Definition of groundwater conditions; development of a basin-wide water budget
  - Coordination with the Kern County Subbasin on modeling
  - Assessment of the existing monitoring network



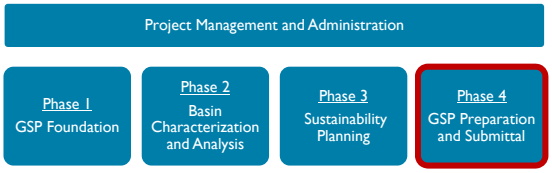
PHASE 3 – SUSTAINABILITY PLANNING

- Key work efforts:
  - Development of Sustainable Management Criteria
  - Identification of potential projects and management actions
  - Development of a GSP implementation plan
  - Finalization of a SGMA-compliant monitoring network and protocols



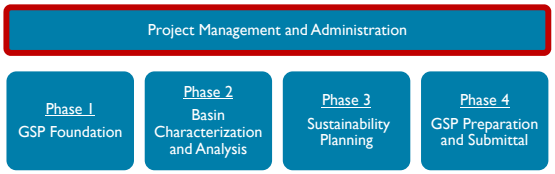
PHASE 4 – GSP PREPARATION AND SUBMITTAL

- Key work efforts:
  - Compilation of the complete draft GSP
  - Distribution of the draft GSP to stakeholders
  - GSP revision based on feedback received from stakeholders
  - Submission of the final GSP to DWR



PHASE PM – PROJECT MANAGEMENT AND ADMINISTRATION

- Key work efforts:
  - Development of a Quality Assurance/Quality Control (QA/QC) Plan
  - Support of the GSA in submission of required quarterly progress reports and a grant completion report
  - Project management of the full GSP development effort



EKI ADAPTED PROP 1 WORK PLAN INTO TASK ORDER

- EKI has adapted the Proposition 1 application Work Plan into a Task Order for Board approval
- Includes all efforts outlined in Prop 1 application, except those already completed (e.g., support for GSA formation)
- Slight changes in terminology

Prop 1 Application vs. Task Order Terminology

eki

25

EKI GSP DEVELOPMENT TASK ORDER FOR BOARD APPROVAL

- Task Order can be approved in full or in part
- We recommend approval of at least Tasks 1, 2, and 5 to initiate GSP development and keep the GSA on schedule for the January 2022 GSP submission deadline

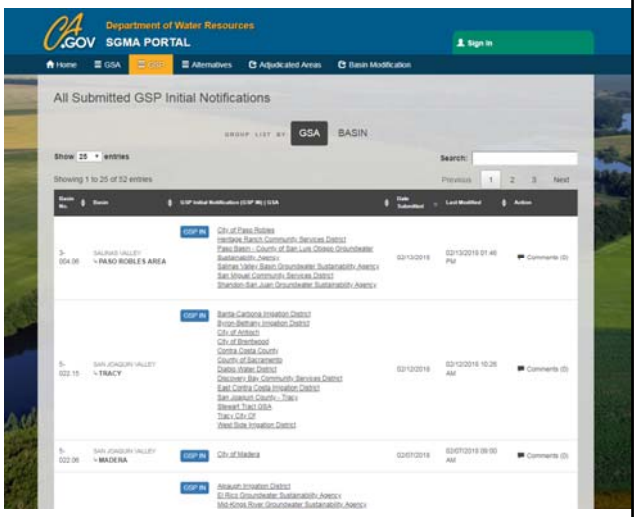
Task	Estimated Budget	Grant Reimbursable Amount	White Wolf GSA Amount
Task 1 – Conduct Foundational GSP Development Efforts	$133,300	$77,100	$57,100
Task 2 – Develop Basin Setting Information	$292,600	$120,000	$172,700
Task 3 – Develop Sustainable Management Criteria	$254,500	$126,500	$128,000
Task 4 – Prepare and Submit GSP	$102,200	$58,400	$43,800
Task 5 – Project Management and Grant Administration	$85,700	$48,900	$38,900
TOTAL:	**$869,300**	**$430,900**	**$438,500**

eki

26

KEY NEAR TERM EFFORTS – GSP INITIAL NOTIFICATION

- GSP Initial Notification required to "provides general information about the GSAs process for developing the GSP, including the manner in which interested parties may contact the GSA and participate in the development and implementation of the GSP."(1)
- GSP Initial Notification must be submitted prior to entering into Prop 1 grant agreement with DWR



(1) 23-CCR §353.6

27

QUESTIONS?

Anona Dutton, P.G., C.Hg.

adutton@ekiconsult.com

650-292-9100

www.ekiconsult.com
Burlingame, CA | Los Angeles, CA
Oakland, CA | Centennial, CO

28

eki environment & water

577 Airport Blvd. Suite 500
Burlingame, CA 94010
(650) 292-9100
ekiconsult.com

8 March 2018

To: Allen Lyda, Tejon-Castac Water District (TCWD)

Cc: Tito Martinez, White Wolf Groundwater Sustainability Agency (WWGSA)
Angelica Martin, TCWD
Jeevan Muhar, Arvin-Edison Water Storage District (AEWSD)
Steve Collup, AEWSD
Sheridan Nicholas, Wheeler Ridge-Maricopa Water Storage District (WRMWSD)
Robert Kunde, WRMWSD
Allen Christensen, Kern County

From: Anona Dutton, P.G., C.Hg., EKI Environment & Water, Inc. (EKI)

Subject: **Task Order to Develop a Groundwater Sustainability Plan**
Tejon-Castac Water District
Kern County, CA
(EKI B8-045)

Dear Mr. Lyda,

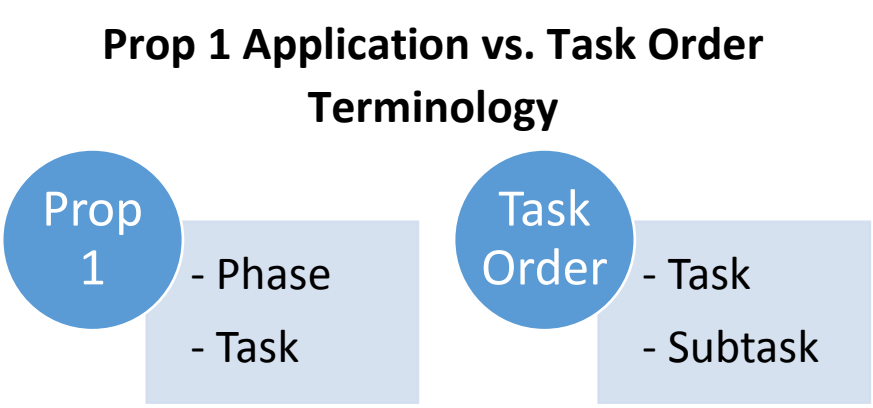
Tejon-Castac Water District (TCWD, District, or Client) has requested that EKI Environment and Water, Inc. (EKI) provide a scope to develop a Groundwater Sustainability Plan (GSP) for the White Wolf Subbasin (Basin) as part of compliance with the Sustainable Groundwater Management Act (SGMA).

EKI understands that the White Wolf Groundwater Sustainability Agency (GSA) intends to develop a GSP for the Basin by the submission deadline of 31 January 2022[1], and that the GSA intends to accelerate the development of certain portions of the GSP to foster effective communication and collaboration with the adjacent Kern County Subbasin (Kern Basin).

The GSA submitted an application for a Proposition 1 Sustainable Groundwater Planning Grant for the development of a GSP for the Basin. In February 2018 the California Department of Water Resources (DWR) released Draft Funding Recommendations that included a recommendation that the GSA's application be fully funded; final award announcements are expected in Spring

[1] The GSP submission deadline is 31 January 2022 for basins designated as high or medium priority and not designated as "critically over-drafted" in Bulletin 118 [CWC §10720.7], and the implementation deadline is 20 years thereafter.

2018. This Proposition 1 application, prepared by EKI with significant input form the GSA, included a Work Plan, Budget, and Schedule for GSP development for the Basin (Attachment A).



The following Tasks (equivalent to the "Phases" articulated in the Proposition 1 application) summarize the effort required to develop a GSP; additional details are more fully described in the attached Proposition 1 Work Plan.

A detailed schedule and budget that itemize the proposed Tasks and Substasks (equivalent to the "Tasks" in the Proposition 1 application) are also included herein (Attachments B and C, respectively).

We note that the following tasks can be approved together or in part. Should the GSA recommend approving only a portion of this scope, we recommend approval of Tasks 1, 2, and 5 to initiate GSP development and keep the GSA on schedule for the January 2022 GSP submission deadline.

SCOPE OF WORK

Task 1 – Conduct Foundational GSP Development Efforts[2]

Task 1 consists of preparing the data, information, technical tools, and funding and outreach plans needed to successfully perform subsequent tasks. Efforts under Task 1 align with portions of Articles 3, 4, 5-1, 5-2, and 8 of the GSP Regulations (23-California Code of Regulations [CCR] §352-354.18, §357-357.4). Key work efforts within this task will include development of a functional Data Management System (DMS); assessment of key data gaps for GSP development and suggestions for how to fill them; evaluation of numerical groundwater modeling options; and development of a stakeholder communication and engagement plan that will fulfill the SGMA requirements and is suited to the interested parties in the Basin.

[2] Foundational SGMA compliance efforts completed by EKI to date, which were included in the Proposition 1 application Work Plan, including supporting the White Wolf GSA's formation, development of a California Statewide Groundwater Elevation Monitoring (CASGEM) monitoring program, and preparation of the GSA's Proposition 1 application, are not included in this scope, as they were completed pursuit to another task order.

Task 2 – Develop Basin Setting Information

Task 2 focuses on developing a foundational understanding of the Basin to support SGMA compliance and to inform the sustainability planning efforts under Task 3. Efforts under Task 2 align with the Basin Setting and Monitoring Network sections of the GSP Regulations (23-CCR §354.12-18, §354.32-40). Key work efforts within this task will include filling of selected data gaps identified in Task 1; development of a Hydrogeologic Conceptual Model (HCM); definition of groundwater conditions; development of a basin-wide water budget; coordination with the Kern County Subbasin on modeling; and assessment of the existing monitoring network.

Task 3 – Develop Sustainable Management Criteria

Task 3 focuses on planning for the continued sustainable management of the Basin and aligns with portions of the Sustainable Management Criteria, Monitoring Network, and Project and Management Actions sections of the GSP Regulations (23-CCR §354.20-44). Key work efforts within this task will include the development of Sustainable Management Criteria; identification of potential projects and management actions; development of a GSP implementation plan; and finalization of a SGMA-compliant monitoring network and protocols.

Task 4 – Prepare and Submit GSP

Task 4 involves preparation of the GSP for submittal to DWR and aligns with requirements for GSP submission outlined in the GSP Regulations and in the California Water Code (CWC §10727-10728.6). Key work efforts within this task will include the compilation of the complete draft GSP; distribution of the draft GSP to stakeholders and revision based on feedback received; and submission of the final GSP to DWR.

Task 5 – Project Management and Grant Administration

Task 5 includes efforts related to general management of the entire GSP development process (i.e., through the January 2022 submission deadline). These efforts will be carried out concurrently with the execution of Tasks 1 through 4, and includes efforts consistent, where applicable, with the grant administration requirements outlined in the Proposition 1 Proposal Grant Agreement Template and the technical and reporting standards outlined in the GSP Regulations (23-CCR §352-352.6). Key work efforts within this task will include the development of a Quality Assurance/Quality Control (QA/QC) Plan; support of the GSA in submission of required quarterly progress reports and a grant completion report; and project management of the full GSP development effort.

PERSONNEL

EKI's staff members who will be available to work on this project include Anona Dutton, P.G., C.Hg. (Officer), Christopher Heppner, Ph.D., P.G. (Senior 1), Tori Klug, E.I.T (Grade 4), and Mauricio Osorio-Gonzalez (Grade 5); grades in parentheses are for purposes of billing in accordance with the attached Schedule of Charges (see Attachment D). Other EKI staff members

may be assigned to assist with the performance of the tasks as required to meet project commitments.

SCHEDULE

EKI is prepared to start work on the above Scope of Work immediately upon authorization to proceed. As shown in Attachment B, we anticipate that GSP chapter development will be largely complete by early 2021 which will support GSP submission by 31 January 2022. We will inform the GSA of any issues that arise that may affect the schedule for completion or impact the anticipated level of effort.

TERMS AND CONDITIONS

All work performed by EKI under this Task Order is anticipated to be performed pursuant to the Terms and Conditions of our existing Agreement with Tejon-Castac Water District.

COMPENSATION

Inasmuch as the exact level of effort required to complete the above Scope of Work cannot be known precisely, EKI proposes to perform the work on a time and materials expense reimbursement basis in accordance with our current Schedule of Charges. A breakdown of the estimated budget is provided in Table 1 below, and a detailed budget estimate is included as Attachment C.

Table 1. Total Estimated Budget[3]

Task	Estimated Budget	Grant Reimbursable Amount[4]	White Wolf GSA Amount
Task 1 – Conduct Foundational GSP Development Efforts	$133,300	$77,100	$57,100
Task 2 – Develop Basin Setting Information	$292,600	$120,000	$172,700
Task 3 – Develop Sustainable Management Criteria	$254,500	$126,500	$128,000
Task 5 – Prepare and Submit GSP	$102,200	$58,400	$43,800
Task 6 – Project Management and Grant Administration	$85,700	$48,900	$38,900
TOTAL:	**$869,300**	**$430,900**	**$438,500**

[3] Budget numbers are rounded to the nearest hundred; precise numbers by task and subtask can be found in Table 2.
[4] Grant reimbursable amount assumes full funding of the White Wolf GSA's Proposition 1 grant as recommended by DWR on 6 February 2018.

We are happy to discuss the proposed approach and anticipated level of effort for each task in more detail with you and look forward to working with you on this important project. If this Task Order meets with your approval, please sign where noted below. Please return a fully executed copy to our office to confirm your authorization to proceed.

We are pleased to have the opportunity to work with you on this very important project. Please call if you have any questions or wish to discuss this proposal in greater detail.

Very truly yours,

EKI Environment & Water, Inc.

Anona L. Dutton, P.G., C.Hg.
Vice President / Principal-In-Charge

AUTHORIZATION

TEJON-CASTAC WATER DISTRICT
(CLIENT)

By_____

Title_____

Date_____

Attachments

Attachment A	White Wolf GSA Proposition 1 Work Plan
Attachment B	Project Schedule
Attachment C	Cost Estimate to Develop a Groundwater Sustainability Plan Chapter
Attachment D	2018 Schedule of Charges

Attachment A

White Wolf GSA Proposition 1 Work Plan

BACKGROUND

The White Wolf Groundwater Subbasin (DWR 5-022.18, hereinafter "Basin") is a high priority basin and as such is required to comply with the Sustainable Groundwater Management Act (SGMA). Specifically, the Basin is required to be managed by one or more Groundwater Sustainability Agency (GSA) and to submit a Groundwater Sustainability Plan (GSP) by January 2022.

The Basin is collectively represented by one exclusive GSA, the White Wolf GSA (hereinafter "the GSA"), composed of Arvin-Edison Water Storage District (AEWSD), Tejon-Castac Water District (TCWD), Wheeler Ridge-Maricopa Water Storage District (WRMWSD), and Kern County. The Basin, GSA, and other relevant jurisdictional boundaries are shown in Figure 1. The GSA is governed by a Board of Directors (hereinafter "GSA Board") with two representatives each from AEWSD, TCWD, and WRMWSD, and one representative from Kern County. The GSA Board will select an ad hoc Technical Committee (hereinafter "TC") to guide and contribute to the efforts outlined in this Work Plan.

This Work Plan assumes that the GSA will do the work described herein directly through in-kind services of the TC or through contracts with a specialized consultant team. Specifically, this Work Plan assumes that the GSA will retain a qualified consultant team to complete the technical and stakeholder engagement work described herein and will be an active participant in the GSP development effort. This effort will include the TC providing data and in-kind support for Plan development, the GSA Board engaging in proactive and informed decision-making during GSA Board meetings, and both the GSA Board and the TC providing constructive feedback and timely reviews of work products produced by the consultant team.

Kern County received funding through the Sustainable Groundwater Planning (SGWP) Proposition 1 *Counties with Stressed Basins* solicitation for GSA formation, stakeholder outreach, water budget refinement, and coordination efforts in the Kern County Groundwater Subbasin (DWR 5-022.14, hereinafter "Kern Subbasin") and the Indian Wells Valley Groundwater Subbasin (DWR 6-054). The effort included in this Work Plan is being conducted for the White Wolf Subbasin and is not duplicative with efforts in the larger Kern Subbasin. All interbasin coordination efforts outlined herein will complement those being conducted by Kern agencies for the Kern Subbasin.

PROJECT OVERVIEW

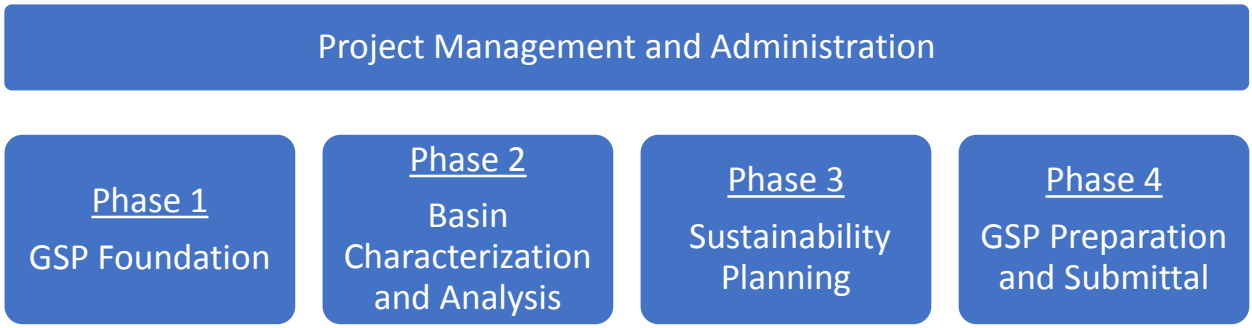
For the purposes of this Proposition 1 Grant Application, the "Project" is the development of a SGMA-compliant GSP for the Basin.

PROJECT OBJECTIVES

The main objective of this Project is to develop a complete GSP for the Basin that will comply with and meet all requirements of the GSP Emergency Regulations (23-CCR §350-358.4) and will provide a reasonable path forward for demonstrating sustainable groundwater management in the Basin by the SGMA implementation deadline of 2042. The Project is designed to meet all requirements for a Category 2, Tier 2 SGWP Proposition 1 grant outlined in the Groundwater Sustainability Plans and Projects Proposal Solicitation Package (PSP).

PROJECT PHASING

The Work Plan (and associated Budget and Schedule) divides the overall effort for GSP Development into four phases with a Project Management and Administration Phase (PM Phase) covering the entire GSP development process. As shown in the graphic below the four phases are: (1) GSP Foundation, (2) Basin Characterization and Analysis, (3) Sustainability Planning, and (4) GSP Preparation and Submittal. Each phase builds off efforts and results of the previous phases.



As shown in the attached Project Schedule, the four phases overlap temporally in cases where activities in a later phase can be initiated while activities in a previous phase are still ongoing. The work efforts of Phases 1 through 3 are accelerated with the objectives of

- **Keeping pace with SGMA efforts in the adjacent Kern Subbasin** (which is in critical overdraft condition and thus subject to an accelerated SGMA compliance schedule); and
- **Supporting effective interbasin coordination**, particularly with respect to critical factors such as the water budget and numerical groundwater model development (Phase 2) and the development and vetting of sustainability criteria (Phase 3).

INTERIM WORK PRODUCTS

The Work Plan will be implemented in a transparent and collaborative fashion to ensure the GSA and other Basin stakeholders, groundwater users, and the general public will be informed about the Project progress and will have ample opportunity to provide timely input. Specifically, the work effort of each major task described herein will be documented as follows:

- **Technical Presentations** that will be made on a regular basis to the GSA and Basin stakeholders to provide for an open and transparent process and significant opportunity for input as key elements of the GSP are being developed. This approach ensures that there is sufficient outreach when the Draft Technical Memoranda (see below) are reviewed and will streamline the review and revision process as major issues will have been vetted during the development stage by all parties; and
- **Draft Technical Memoranda** (TM) and associated tables and figures that will be submitted for review and comment by the GSA and in some cases additional key stakeholders. The TMs will reflect input received during the related technical presentations and will be drafted to support key elements of the GSP. The Draft TMs will not be finalized; rather the suggested revisions to the Draft TMs will be incorporated into chapters of the Draft GSP.

Selected work products, resources and underlying data will be made available for public review on the GSA website (http://www.whitewolfgsa.org/).

PROJECT DELIVERABLES

The deliverable for this Project is a complete and fully SGMA-compliant GSP, including all associated data and informational components (i.e., a functional Data Management System containing all preliminary data and a bibliography of sources used to develop the GSP; Numerical Model input/output files and documentation, project feasibility studies, etc.), submitted to the California Department of Water Resources (DWR) by the January 2022 deadline.

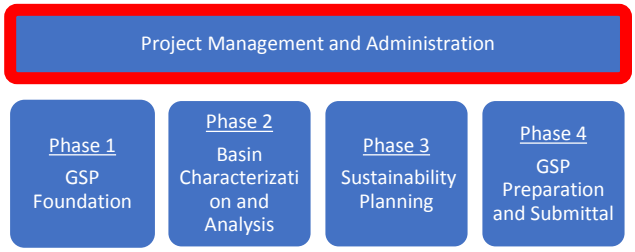
Additionally, the Project Applicant will submit all required grant administration-related reports to DWR – including quarterly progress reports and a final report – as established in the Grant Agreement that will be entered into by the Project Applicant and DWR.

SUMMARY WORK PLAN FOR GRANT ADMINISTRATION PURPOSES

Although the Project Work Plan has been developed in significant detail, it is assumed that, for purposes of grant administration, the Project Applicant will work with DWR to manage the grant at the Phase level. As such, a brief summary Work Plan that describes each Phase and the associated tasks and associated work products and deliverables is provided below. This information supports and is consistent with the level of detail presented in the Project Budget and Schedule.

A more detailed description of each Phase and Task follows thereafter in the "Detailed Project Work Plan".

PM PHASE - PROJECT MANAGEMENT AND ADMINISTRATION *(0% COMPLETE)*



The Project Management and Administration Phase (PM Phase) includes tasks related to general management of the entire GSP development process (i.e., through the January 2022 submission deadline). The PM Phase efforts will be carried out concurrently with the execution of Phases 1 through 4, and includes the following Tasks consistent, where applicable, with the grant administration requirements outlined in the PSP Grant Agreement Template and the technical and reporting standards outlined in the GSP Regulations (23-CCR §352-352.6):

Task 1. Proposition 1 Grant (Grant) Management, Administration, and Reporting
Task 2. Project Management (for GSP Development)
Task 3. Quality Assurance/Quality Control

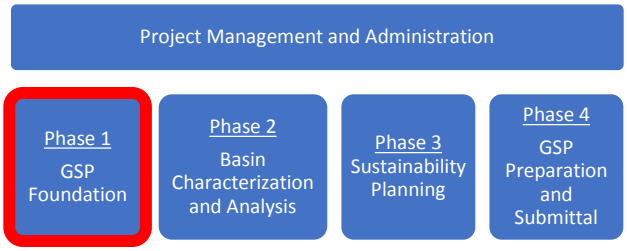
Anticipated work products under the PM Phase will include:

- Project Meeting agendas, minutes and presentations, as applicable;
- Project schedule, budget tracking and other management tools; and
- Draft and Final QA/QC Plan.

Deliverables to DWR under the PM Phase will include all submittals required by Proposition 1 grant requirements and agreed to in the Grant Agreement, including:

- Quarterly progress and accountability reports;
- A final Project Completion Report;
- A Grant Completion Report; and
- A Coordination Agreement (*as necessary*).

PHASE 1 – GSP FOUNDATION *(15% COMPLETE)*



Phase 1 of the Work Plan involves the following Tasks consistent, where applicable, with portions of Articles 3, 4, 5-1, 5-2, and 8 of the GSP Regulations (23-CCR §352-354.18, §357-357.4):

Task 4. Conduct Preliminary GSP Development Efforts
Task 5. Provide Initial Notification of GSP Development
Task 6. Select or Design a Data Management System (DMS)
Task 7. Gather and Compile Available Data into the DMS
Task 8. Gather and Compile Information on the Plan Area and Basin Management Activities
Task 9. Conduct Data Gaps Assessment
Task 10. Evaluate Numerical Groundwater Model Options
Task 11. Update GSP development Funding Plan
Task 12. Develop Stakeholder Communication and Engagement Plan (SCEP)
Task 13. Conduct Stakeholder Engagement Related to the GSP Foundation Phase
Task 14. Participate in Intrabasin and Interbasin Coordination Efforts

Efforts under Phase 1 will prepare the GSA with the data, information, technical tools (i.e., a selected numerical model), and funding and outreach plans needed to successfully perform the subsequent Basin Characterization and Analysis efforts under Phases 2 and 3. Anticipated work products from Phase 1 efforts include:

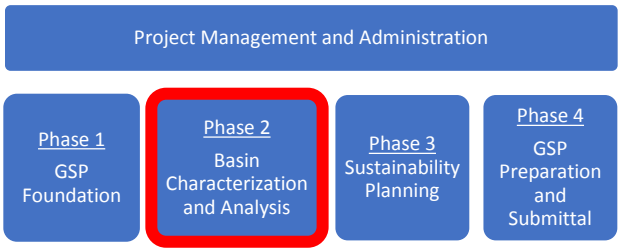
- A functional DMS containing all preliminary data and a living bibliography;
- Draft TM #1 – Data Management System Evaluation and Selection;
- Draft TM #2 – Data Compilation and Data Gaps Assessment;
- Draft TM #3 – Numerical Groundwater Model Evaluation and Selection;
- Draft TM #4 – GSP Development Funding Plan; and
- Draft TM #5 – Stakeholder Communication and Engagement Plan

Phase 1 will extend from the grant award date through July 2018[1]. Focused technical presentations will be made to the GSA Board and TC to present the data, methodology, and results from each task and to solicit feedback prior to drafting and submitting each Draft TM for review.

[1] Cost-sharing activities associated with Phase 1 efforts will encompass relevant work undertaken by the GSA and the entities comprising the GSA since January 2015 (the effective date of SGMA).

PHASE 2 - BASIN CHARACTERIZATION AND ANALYSIS *(0% COMPLETE)*

Phase 2 of the Work Plan focuses on technical analysis of Basin conditions, and includes the following Tasks consistent, where applicable, with portions of the Basing Setting and Monitoring Network sections of the GSP Regulations (23-CCR §354.12-18, §354.32-40):



Task 15. Implement Plan for Filling Data Gaps Needed for GSP Preparation
Task 16. Assess Groundwater Conditions and Develop Hydrogeologic Conceptual Model
Task 17. Coordinate Regarding C2VSim Modeling
Task 18. Develop a Basin-Wide Water Budget
Task 19. Assess Existing Monitoring Programs and Develop SGMA-Compliant Monitoring Network
Task 20. Conduct Stakeholder Engagement Related to Basin Characterization and Analysis
Task 21. (Continue to) Implement GSP Development Funding Plan
Task 22. (Continue to) Participate in Intrabasin and Interbasin Coordination Efforts

Efforts under Phase 2 will build towards a complete and coherent understanding of the Basin that will serve as the foundation for sustainability planning efforts under Phase 3. Anticipated work products from Phase 2 efforts include:

- Draft TM #6 – Groundwater Conditions and Hydrogeologic Conceptual Model;
- Draft TM #7 – Model Development and Calibration;
- Draft TM #8 – Water Budget and Preliminary Estimate of Sustainable Yield; and
- Draft TM #9 – Summary of Monitoring Network Assessment and Preliminary Monitoring Plan.

Phase 2 will extend from July 2018 to July 2019. Focused technical presentations will be made to the GSA and TC to present the data, methodology, and results from each task and to solicit feedback prior to drafting and submitting each Draft TM for review.

PHASE 3 - SUSTAINABILITY PLANNING *(0% COMPLETE)*

Phase 3 of the Work Plan focuses on planning for the sustainable management of the Basin, and includes the following Tasks consistent, where applicable, with portions of the Basin Setting, Sustainable Management Criteria, Monitoring Network, and Project and Management Actions sections of the GSP Regulations (23-CCR §354.20-44):

Task 23. Evaluate Potential Management Areas
Task 24. Develop Sustainable Management Criteria
Task 25. Identify Projects and Management Actions
Task 26. Create GSP Implementation Plan

Task 27. Finalize Monitoring Network and Protocols
Task 28. Conduct Stakeholder Engagement Related to Sustainability Planning
Task 29. (Continue to) Implement GSP Development Funding Plan
Task 30. (Continue to) Participate in Intrabasin and Interbasin Coordination Efforts

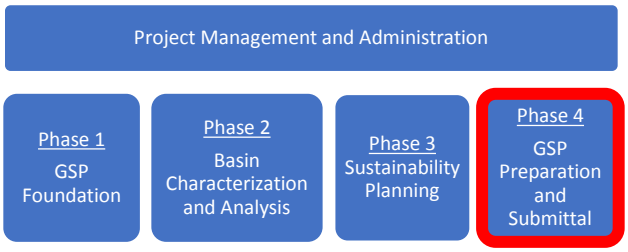
Anticipated work products from Phase 3 efforts include:

- Draft TM #10 – Establishment of Sustainability Criteria;
- Draft TM #11 – Proposed Projects and Management Actions;
- Draft TM #12 – GSP Implementation Plan; and
- Draft TM #13 – Proposed Monitoring Network and Protocols.

Phase 3 will extend from July 2019 to July 2020. Focused technical presentations will be made to the GSA and TC to present the data, methodology, and results from each task and to solicit feedback prior to drafting and submitting each Draft TM for review.

PHASE 4 - GSP PREPARATION AND SUBMITTAL *(0% COMPLETE)*

Phase 4 of the Work Plan involves preparation of the GSP for submittal to DWR, and includes the following Tasks consistent, where applicable, with requirements for GSP submission outlined in the GSP Regulations and in the California Water Code (CWC §10727-10728.6):



Task 31. Compile Complete Draft GSP
Task 32. Distribute Draft GSP and Revise (if necessary) per Stakeholder Feedback
Task 33. Submit Final GSP to DWR
Task 34. (Continue to) Participate in Intrabasin and Interbasin Coordination Efforts

Anticipated work products from Phase 4 efforts include:

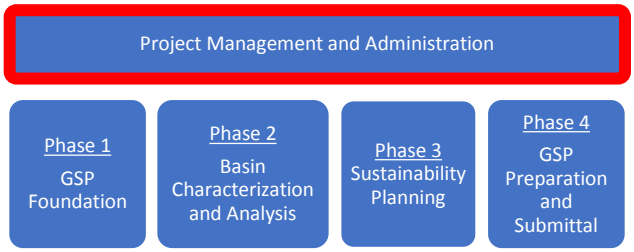
- A Final (written) GSP;
- Coordination Agreements (as applicable);
- A Data Management System, integrated with all existing data; and
- Numerical Model Inputs/Outputs.

It is anticipated that Phase 4 will extend from July 2020 through the GSP submission deadline of January 2022.

DETAILED PROJECT WORK PLAN

PM PHASE - PROJECT MANAGEMENT AND ADMINISTRATION *(0% COMPLETE)*

The Project Management and Administration Phase (PM Phase) includes tasks related to general management of the entire GSP development process (i.e., through the January 2022 submission deadline). The PM Phase efforts will be carried out concurrently with the execution of Phases 1 through 4.



Task 1: Proposition 1 Grant Management, Administration, and Reporting *(0% complete)*

This task includes all work efforts needed to comply with the Grant reporting and administration requirements, including accounting of expenditures of allocated grant monies, preparation of progress reports, invoices, and associated documentation, and as-needed communications with DWR Sustainable Groundwater Planning (SGWP) grant administration staff.

As specified in the PSP Grant Agreement Template, deliverables to DWR will include:

- Quarterly progress and accountability reports;
- A final Project Completion Report;
- A Grant Completion Report; and
- A Coordination Agreement (*as necessary*).

The requirements for this reporting shall be established in the grant agreement that will be entered into by the GSA and DWR.

Task 2: Project Management *(0% complete)*

This task includes overall project management activities, including management of project budgets, schedule, staff assignments, subconsultant/subcontractor management, records management, contract compliance, etc. This task will also cover routine communication between the consultant team and the TC and GSA, including the preparation of Project meeting agendas, presentations, minutes, etc.

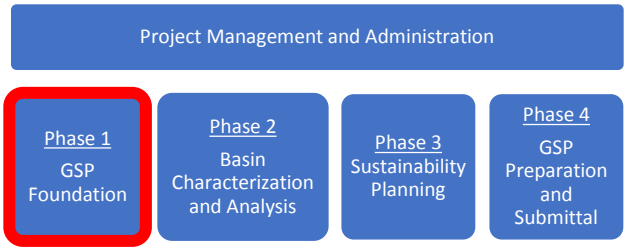
Task 3: Quality Assurance/Quality Control *(0% complete)*

Under this task, the GSA will develop and implement a QA/QC Plan to ensure that all work projects, deliverables, are developed using standardized methodologies appropriate to each individual work product, and undergo review for conformance with applicable standards. The methodologies covered under the QA/QC Plan will include those related to:

- Data collection and compilation;
- Maintenance of a project bibliography (i.e., document repository);
- Technical analyses including water budgets and numerical modeling;
- Preparation of graphics including map-based figures and others;
- Preparation of written work products (i.e., technical memoranda and reports); and
- Performance of project management activities.

PHASE 1 - GSP FOUNDATION *(15% COMPLETE)*

Efforts under Phase 1 will prepare the GSA with the data, information, technical tools (i.e., a selected numerical model), and funding and outreach plans needed to successfully perform the subsequent Basin Characterization and Analysis efforts under Phases 2 and 3. Phase 1 will extend through July 2018.



Task 4: Conduct Preliminary GSP Development Efforts *(100% complete)*

After SGMA was adopted on January 1, 2015, entities in the Basin initiated efforts to comply with SGMA. The following are specific efforts that have already been carried out:

- GSA formation;
- Basin Boundary Modification, which included the assessment and compilation of basin-wide data on geology, groundwater levels, aquifer properties, and boundary flows, and other information relevant to GSP preparation and basin characterization analyses;
- Efforts by the agencies that comprise the GSA to characterize the portions of the Basin that underlie their service area, including the development of preliminary Hydrogeologic Conceptual Models (HCMs), water budgets, and groundwater conditions assessments by AEWSD (completed) and WRMWSD (upcoming);
- Development and initiation a CASGEM monitoring program for the entire White Wolf Subbasin, an effort which involved assessing available groundwater level data and wells suitable for monitoring data collection;
- Initial assessment of potential undesirable results and data gaps based off publicly available data sources (see Figures 2 through 5);
- Modeling efforts planning;
- Stakeholder workshops;
- Development of SGMA/GSP Website (http://www.whitewolfgsa.org/); and
- Preparation of a grant application.

These efforts are included in the budget for this project, as they constitute foundational technical efforts that have contributed to GSP development for the White Wolf Subbasin. For example, for the HCM developed for AEWSD, the portion of the total cost of this effort that can be attributed to GSP

development for the White Wolf Subbasin is estimated using a proportion of the total AEWSD service area that overlies the White Wolf Subbasin.

Task 5: Provide Initial Notification of GSP Development *(0% complete)*

The GSP Regulations (23-CCR §353.6) require that each GSA shall notify DWR of their process for developing the GSP, including how interested parties can contact the GSA and participate in the development and implementation of the GSP. The GSA will prepare the required initial notification documentation and submit it to DWR via the online SGMA portal to commence GSP development. Additionally, the GSA will post all initial notification documentation on the GSA website (http://www.whitewolfgsa.org/).

Task 6: Select or Design Data Management System *(0% complete)*

The GSP Regulations (23-CCR §352.6) require that each GSA develop a DMS to enable the storage and reporting of information relevant to GSP implementation and monitoring of basin conditions. DWR's *BMP 2Monitoring Networks and Identification of Data Gaps* briefly discusses DMS requirements, and indicates that DWR intends to update BMP 2 with a suggested DMS data structure to facilitate data consistency, transparency, and sharing amongst basins and with DWR. Data to be included in the DMS must conform to the Data and Reporting Standards described in §352.4 of the GSP Regulations and must be consistent with the requirements of any inter- or intra-basin coordination agreements that address data consistency.

Evaluate Data Management Systems

The GSA will select or develop a DMS in accordance with the forthcoming update to the DWR's BMP guidance. The various options for the DMS will be evaluated and summarized for review and consideration by the GSA. The review will include potential "off-the-shelf" data management tools, or the development of a customized DMS. It is anticipated that the DMS will include both spatial and temporal data, and that the two data types will be linked through use of a Geographic Information System (GIS) geodatabase. Specifically, it is anticipated that:

- **Spatial data** will generally be stored as shapefiles or other graphical formats, as appropriate, and will include but not be limited to surficial soils and geology; topography; natural and artificial surface water features (i.e., rivers and streams, lakes, reservoirs, springs, wetlands, canals, recharge basins, etc.); wells, stream gauges, subsidence monitoring stations, and other monitoring sites, as applicable; various boundaries (i.e., basin, agency, GSA, Disadvantaged Community [DAC], and parcel boundaries); and
- **Temporal data** will be stored in a set of cross-referenced tables, and will include, but not be limited to climate and meteorological data; hydrology/streamflow; well-specific data on groundwater levels and quality; land use/cropping data; water use information (including groundwater pumping, imports and deliveries by water suppliers); and demographic/population data.

The DMS will be constructed to include QA/QC checks, in accordance with the QA/QC Plan developed under Task 3, so that all data entered into the DMS are valid and compatible for subsequent analyses necessary for GSP preparation and implementation. The DMS will be designed to allow for the accurate

and efficient export of information for GSP analysis as well as on-going reporting purposes. Also, the DMS shall readily provide for future addition of new data and GSA staff will be trained on use of the DMS as a part of Task 26.

Prepare Technical Presentation(s) and Draft Technical Memorandum

The options for DMS selection and/or development will be summarized in technical presentation(s) made to the GSA Board and TC and summarized in *Draft TM #1 – Data Management System Evaluation and Selection* for consideration by the GSA, which will then decide on what approach to utilize.

Task 7: Gather Available Data and Compile into DMS *(40% complete)*

Under Task 7, the GSA will gather and compile available existing data in support of subsequent GSP analyses (e.g., groundwater conditions assessment, hydrogeologic conceptual model [HCM], water budget analysis) into the Basin DMS.

The districts comprising the GSA have already compiled data from many of the above sources identified below as a part of the Basin Boundary Modification effort. These already compiled data will form the foundation of the data to be compiled into the DMS and will be updated and augmented with more recent data as available.

Compile Publicly Available Data

DWR has compiled many useful data sources and tools on its website, including the "*Sustainable Groundwater Management - Data, Tools, and Reports*" webpage. The GSA intends to frequently revisit DWR webpages and data repositories to ensure compilation of all applicable, publicly available data. Statewide or federal (i.e., non-local) public data sources that will also be mined for the purposes of populating the DMS for subsequent GSP analysis include the following:

- Groundwater Level Data:
    - DWR California Statewide Groundwater Elevation Monitoring Program (CASGEM);
    - DWR Groundwater Information Center (GIC); and
    - DWR Water Data Library (WDL).
- Surface Water Flow Data:
    - DWR California Data Exchange Center (CDEC);
    - DWR WDL;
    - United States Geological Survey (USGS) National Water Information System (NWIS); and
    - United States Bureau of Reclamation (USBR).
- Surface Water Diversion and Permitting Data:
    - State Water Resources Control Board (SWRCB) Electronic Water Rights Information Management System (eWRIMS) data
- Climatological / Meteorological Data:
    - DWR CDEC;
    - DWR California Irrigation Management Information System (CIMIS);
    - National Oceanic and Atmospheric Administration (NOAA) data; and
    - PRISM climate data.
- Groundwater Quality Data:

  - SWRCB Groundwater Ambient Monitoring and Assessment (GAMA) program;
  - SWRCB GeoTracker program;
  - SWRCB Division of Drinking Water (DDW); and
  - USGS NWIS.
- Topography: USGS
- Surficial Soils: United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)
- Surficial Geology:
  - USGS reports; and
  - California Division of Mines and Geology (CDMG) reports.
- Land Use:
  - GSA districts Land Use Surveys
  - DWR Land Use Surveys;
  - USGS National Land Cover Database (NLCD);
  - USDA; and
  - Any publicly available city- and/or county- wide land use surveys.
- Population:
  - DWR;
  - State Department of Finance; and
  - United States Census Bureau
- Water Use:
  - DWR Agricultural Land and Water Use Estimates; and
  - ITRC Evapotranspiration (ET) Data.
- Well Construction information
  - DWR Well Completion Report Map (*forthcoming);* and
  - California Department of Oil, Gas, and Geothermal Resources (DOGGR) logs.

Compile Local and Basin-Specific Data

To supplement the above public data sources, additional information from local sources (i.e., agencies within the Basin) will be gathered and compiled under Task 7. It is anticipated that this local information may include more detailed information on land use, water use, groundwater levels, and water quality in the Basin. Information will be entered into the Basin DMS and/or a document repository established in support of GSP development using the QA protocols established during DMS construction under Task 6. These local data sources include, but are not limited to, the following:

- Groundwater Management Plans (GWMPs) prepared by WRMWSD (2007) and AEWSD (2003) and accompanying annual updates;
- CASGEM Monitoring Network Plans prepared by AEWSD (2010) and the White Wolf GSA (2017);
- The Basin Boundary Modification Request submitted by AEWSD, TCWD, and WRMWSD and approved by DWR in 2016, and the associated White Wolf Subbasin Technical Study (EKI, 2016);
- AEWSD's recently developed HCM, water budget, and definition of groundwater conditions for its service area;
- WRMWSD's upcoming HCM, water budget, and definition of groundwater conditions for its service area;

- Agricultural Water Management Plans (AWMPs) prepared by WRMWSD (2015) and AEWSD (2015) and submitted to DWR;
- General Plans (discussed further under Task 8 below);
- Databases of well records, water level data, water quality data, operational data (e.g., deliveries of water to customers of each water supplier);
- Relevant data and information being developed in the adjacent Kern Subbasin as part of SGMA efforts (e.g., numerical flow model data inputs, etc.);
- Results of studies and investigations by individual entities within the Subbasin; and
- Any other available and relevant data and/or information.

Additionally, outreach to agencies and other stakeholders in the Basin will be conducted to collect additional relevant local data sources not yet identified by the GSA.

Prepare Technical Presentations(s) and Draft Technical Memorandum

Results of Task 7 will be presented pursuant to Task 9.

Task 8: Compile Information on the Plan Area and Basin Management Activities *(0% complete)*

The GSP Regulations (23-CCR §354.8) require that each GSP contain information on the Plan Area, including the following:

- Maps depicting the area covered by GSP, adjudicated areas, other agencies within the basin, and areas covered by an Alternative, jurisdictional boundaries of federal, state, tribal, city, county, and agencies with water management responsibilities, areas covered by relevant General Plans, existing land use designations, the density of wells per square mile, and locations of communities dependent on groundwater;
- A written description of the Plan area describing the features depicted on the above maps;
- Identification and description of water resource monitoring and management programs, how those programs may be incorporated into the Plan, and how they may limit operational flexibility in the basin;
- A description of conjunctive use programs, if any;
- A description of land use elements or topic categories of applicable General Plans, including a summary of those plans, how implementation of the GSP may change water demands or affect achievement of sustainability and how the GSP addresses those effects, how implementation of the GSP may affect the water supply assumptions of relevant land use plans and how land use plans outside the basin could affect the ability to achieve sustainable groundwater management within the basin;
- A summary of the permitting process for new or replacement wells in the basin; and
- Any additional elements determined to be relevant and appropriate.

Review Information on the Plan Area and Basin Management Activities

Under Task 8, the above information will be compiled, reviewed and summarized to the extent applicable. In addition, the required set of maps will be prepared. An extensive bibliography will be developed and maintained of relevant reports, documents, and web-based resources. The review will be necessary at

this stage to inform the subsequent basin analyses and sustainability planning to be performed under Phases 2 and 3 (i.e., the water budget, development of management actions and criteria, etc.).

Prepare Technical Presentations(s) and Draft Technical Memorandum

Results of Task 8 will be presented pursuant to Task 9.

Task 9: Conduct Data Gaps Assessment *(0% complete)*

The GSA has performed an initial compilation of existing, publicly available data on groundwater conditions in the Basin.[2] The results of this preliminary assessment are shown in Figure 2 through Figure 5 and are summarized as follows:

- ***Groundwater Elevations / Storage Change***. CASGEM Spring 2013 data included approximately 18 water level records within the Basin; water level data were noticeably absent along in the southern, western, and eastern portions of the Basin (see Figure 2); additionally, no aquifer-specific groundwater level information was readily available.
- ***Seawater Intrusion****.* No publicly available data exist regarding seawater intrusion conditions in the Basin; this is likely due to the Basin's location on the southern edge of the Central Valley, where seawater intrusion is not anticipated to occur at any significant rate.
- ***Water Quality***. Water quality data from AEWSD for calendar year 2016 are shown on Figures 3a through 3g, but are isolated to the AEWSD service area within the Basin. GAMA water quality data are minimal (only five wells for which there are few samples) and thus not included. For these 2016 data, Figure 3a shows that several wells near I-5 exceeded the Secondary Maximum Contaminant Level (MCL) for Total Dissolved Solids (TDS); Figure 3b shows that over half of the wells tested exceeded the Primary MCL for nitrate; Figure 3c shows that five of the wells tested exceeded the Primary MCL for arsenic; Figure 3d shows that several wells near I-5 had high boron levels that may reduce agricultural productivity; Figure 3e shows that several wells close to the boundary with the Kern Subbasin exceeded the Secondary MCL for iron; and Figure 3f shows that one well exceeded the Secondary MCL for manganese. GeoTracker records indicated the presence of two open contamination sites and another eight closed sites within the Basin (see Figure 3g). These limited data indicate that collection of additional water quality data will be necessary to characterize groundwater quality throughout the Basin.
- ***Land Subsidence.*** DWR's May 2015-May 2016 survey of *Land Subsidence in the San Joaquin Valley*[3] covers only a small portion of the Basin along the northern border. Two University Navigation Satellite Timing & Ranging Consortium (UNAVCO) continuous GPS stations are located in the Basin – one in the northwest and one along the southern border of the Basin (see Figure 4). These UNAVCO stations indicate that there has been little to no subsidence in the Basin since the stations were installed in 1999 and 2000.

[2] These data relate to potential Undesirable Results, which are defined and discussed in Task 24.

- ***Streamflow Depletion***. One USGS streamflow gauge is installed along the section of Tejon Creek in the eastern portion of the Basin (see Figure 5).

While some data exist near the boundary of the Basin with the Kern Subbasin, data are sparse further south, west, and east of the boundary for most sustainability indicators. These data gaps will need to be addressed to monitor for all sustainability indicators throughout the Basin; near-term efforts to address these data gaps are included in Task 15.

Refine Preliminary Data Gaps Assessment

Upon completion of data and information compilation tasks described above (Task 7 and Task 8), the GSA will conduct a more complete assessment of data gaps under Task 9. The purpose of this data gaps assessment will be to identify high priority data gaps that will need to be filled in the near term in order to prepare the GSP. The assessment will therefore focus on information pertinent to requirements under the GSP Regulations for the Plan area description, the HCM, the groundwater conditions, and the water budget. The assessment will generally be performed in accordance with GSP Regulations (23-CCR §354.38) and the flow chart included as Figure 4 of BMP 2.

Prepare Technical Presentation(s) and Draft Technical Memorandum

Results from this task (and prior Task 7 and Task 8) will be summarized in technical presentation(s) made to the GSA and TC and summarized in *Draft TM #2 – Data Compilation and Data Gaps Assessment* that includes a description of the data gaps analysis effort, a table summarizing and prioritizing the identified data gaps, and a description of potential activities that may be undertaken to address the data gaps. The potential plans to fill data gaps will describe the intended benefits/rationale, data collection methods, estimated costs, permitting and regulatory requirements, and other relevant considerations for each potential data gap filling activity. Costs to fill data gaps that have already been identified by the GSA are provided under Task 15 of the Project Budget, but are not included in the actual grant request as these may potentially warrant solicitation of DWR's Technical Support Services. Data gaps that the GSA has yet to identify may also warrant solicitation of DWR's Technical Support Services and/or any other applicable future funding sources that may become available throughout the course of GSP development and implementation.

Task 10: Evaluate Numerical Groundwater Model Options *(0% complete)*

The GSP Regulations require that the "best available science" be used to quantify the water budget for the Basin (23-CCR §354.18) and to support the definition of management actions (23-CCR §354.44). DWR's review of GSPs will include consideration of whether the "best available science" supports the assumptions, criteria, findings, and objectives of the Plan. While the use of a numerical groundwater and surface water model is not *required* under the GSP Regulations, the 23-CCR §354.18 states that "If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts to beneficial uses and users of groundwater, the Plan shall identify an equally effective method, tool, or analytical model to evaluate projected water budget conditions."

Conduct Groundwater Model Evaluation

It is likely that a numerical groundwater/surface water model will be required in order to develop future water budgets and to more fully represent and understand complexities inherent to certain conditions and fluxes within the Basin. These complexities include subsurface flows across the boundary with the Kern Subbasin along the White Wolf Fault.

Known numerical groundwater and surface water model options for GSP development for the White Wolf Subbasin include, but are not limited to:

- DWR's California Central Valley Groundwater and Surface Water Simulation Model (C2VSim);
- USGS's Central Valley Hydrologic Model (CVHM);
- WRMWSD's Bookman-Edmonston Model (specific to the White Wolf Subbasin); and
- A custom model developed for the White Wolf Subbasin for SGMA purposes.

The White Wolf GSA understands that GSAs in the adjacent Kern Subbasin are planning to use DWR's C2VSim Fine Grid Model. The White Wolf GSA intends to participate in the Kern Subbasin shared modeling effort to assist with water budget analysis for the Basin, assuming that the C2VSim model results are reasonably reflective of conditions within the Basin.

Since the new C2VSim Fine Grid Model has not yet been released, it is currently unknown how well it represents conditions in the Basin. Upon release of the model by DWR, the GSA will review the C2VSim Fine Grid Model with respect to the assumptions and parameterization in the White Wolf Subbasin, as well as review the other model options identified above, and make a final recommendation as to how to proceed with respect to modeling.

Prepare Technical Presentation(s) and Draft Technical Memorandum

The results of this numerical model evaluation task will be summarized in technical presentation(s) to the GSA and TC and *Draft TM #3 – Model Evaluation and Selection* for consideration by the GSA, which will then decide on which, if any, numerical modeling approach to use for GSP development.

Task 11: Update GSP Development Funding Plan *(0% complete)*

As a part of preparing this Work Plan and corresponding budget, the GSA has conducted a funding needs assessment that accounts for the estimated budget to develop the GSP, and the estimated amount of funding allocated from DWR through this SWGP Grant Solicitation, as well as estimates of local funding and in-kind services. If awarded a SGWP Grant, the GSA will update the funding plan as needed to account for the actual grant award amount.

To the extent that local funds are needed to fulfill the cost share requirements for this Project, the GSA will follow the required process for public notice and public hearings as documented in California Water Code 10730 and/or Proposition 218. To the extent that costs (e.g., for filling data gaps) exceed that which

is anticipated at the time of this Proposal, the GSA will investigate other options for financial or in-kind assistance, including DWR's Technical Assistance Program.

The results of this updated funding plan will be summarized in technical presentation(s) and in a *Draft TM #4 – Updated GSP Development Funding Plan* to document the GSA's final funding approach for GSP development.

Task 12: Develop Stakeholder Communication and Engagement Plan *(0% complete)*

The GSP Regulations (23-CCR §354.10) require a summary of the engagement and communication by the GSA leadership with other agencies and interested parties in the Basin. Specifically, the GSP Regulations (23-CCR § 354.10) prescribe "notice and communication" requirements for agencies preparing GSPs which require that a GSP include, among other things, a communication section that explains the GSA's decision-making process; describes opportunities for public engagement and how public input and response will be used; encourages active involvement of diverse social, cultural, and economic elements of the population within the Basin; and describes the methods for informing the public on GSP implementation progress. The GSA will develop a Stakeholder Communication and Engagement Plan (SCEP) to guide stakeholder engagement throughout the GSP development and implementation process.

The GSA intends to continue to engage with stakeholders in a similar process as demonstrated through the Basin Boundary Modification process carried out by WRMWSD, AEWSD, and TCWD and the GSA formation process carried out by the GSA. During the GSA formation process, beneficial users of groundwater were identified (as summarized below); an approach for engaging these specific stakeholders will be included in the SCEP.

- **Water suppliers -** AEWSD, TCWD, and WRMWSD are the key public agencies with water supply and management authority in the Basin; these agencies are actively involved in GSP development as entities that formed the GSA and through the presence of representatives on the GSA Board. The primary land use in the Basin is irrigated agriculture, comprising 41% of the total land area in the Basin in 2013. Collectively, WRMWSD and AEWSD provide water service to the majority of the agricultural water users in the Basin. Each water district maintains a list of landowners within its service area, and letters have been sent to the landowners with an invite to participate in GSP development for the Basin.
- **Commercial and industrial water users -** The Basin includes the Pastoria Energy Facility, Griffith Company, Tejon Ranch Company (TRC), and the oil and gas industry. A process for engaging with individuals from these entities will be included in the SCEP. Additionally, the TRC holds appropriative water rights to several of the ephemeral tributaries in the Basin. As a landowner, commercial water user, and water rights holder in the Basin, the TRC will be will be engaged during the development and implementation of the GSP.
- **Disadvantaged Communities -** The GSA notes that portions of Census Tracts 33.06 and 62.02, which are recognized as Disadvantaged Community Tracts, overly a portion of the Basin. Also, a portion of a census block group (a statistical division of a census tract) partially overlying the basin is identified as a Severely Disadvantaged Community Census Block Group and another census block group partially overlying the Basin is identified as a Disadvantaged Community Census Block

Group. There are no Disadvantaged Community Places identified within the Basin. Disadvantaged Communities (DACs) are identified based on having an average household income less than 80% of the State median, and Severely Disadvantaged Communities (SDACs) are identified based on having an average household income less than 60% of the State median (US Census American Community Survey, 2014). The White Wolf GSA will ensure within its SCEP that stakeholders in disadvantaged communities are invited and encouraged to participate in the GSP development and implementation process.

- **Federal / Tribal -** There are no identified federal lands or California Native American tribal lands within the Basin.

Develop an SCEP to Encompass GSP Development

Specifically, under Task 12, the GSA will develop its SCEP to include the specific sections required by the GSP regulations and to guide stakeholder engagement throughout the GSP development and implementation process.

In developing its SCEP, the GSA intends to document and frame its approach to engaging relevant stakeholders in the Basin with the goal of developing and implementing a GSP with broad support and improved groundwater-related outcomes for relevant stakeholders. The GSA's approach to stakeholder engagement will focus on open and effective communication, fostering constructive dialogues, and maximizing GSA and stakeholder time and resources through coordinated engagement opportunities and meetings. The SCEP will describe specific activities for informing interested members of the public, including periodic workshops, development of a website (already active) and mailings (email and post). Additionally, the GSA Board meetings are open to the public and include multiple opportunities for public comment and written meetings minutes are posted to the website (http://www.whitewolfgsa.org/).

The GSA will use the following as resources in refining its SCEP:

- DWR's *Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement;*
- The Community Water Center's *Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation;*
- DWR's *Outreach and Engagement: A Resource Management Strategy of the California Water Plan*
- The Institute for Local Government's (ILG) resources on public engagement; and
- Feedback from public workshops designed to generate input on effective outreach strategies and preferences among affected stakeholders.

The SCEP will identify a series of public meetings to be held throughout the GSP development process during which the GSA will present information and provide progress updates. These meetings will be venues for public dialogue and for receiving input on the work efforts and results of each phase. Meetings will also be used to outline and receive initial input on the tasks to be completed in the upcoming phase(s).

Prepare Technical Presentation(s) and Draft Technical Memorandum

The results of this updated SCEP will be summarized in technical presentation(s) and in a *Draft TM #5 – Stakeholder Communication and Engagement Plan* for consideration by the GSA, which will then authorize implementation of the SCEP. The SCEP will be managed adaptively throughout GSP development as the

GSAs discern which activities are most effective in engaging interested public and identify gaps in outreach efforts.

Task 13: Conduct Stakeholder Engagement Related to the GSP Foundation Phase *(0% complete)*

Under Task 13, the GSA will begin to implement the SCEP. As a first step, the GSA will invite the beneficial users identified during the GSA formation processes (i.e., agricultural water users, TRC, DAC representatives, municipalities, etc.) to participate in an initial stakeholder workshop focused on identifying their interests, concerns, and priorities; the best tools for communicating with them (i.e., e-mail, direct mail, newsletters, social media, etc.); what issues or concerns they would like to see addressed in the GSP development process; and who else they think should be involved in the GSP development and implementation process.

Stakeholder engagement during Phase 1 is anticipated to include dissemination of information (through appropriate modes of communication, as discussed above) regarding the data compilation, numerical model evaluation, and data gaps assessment efforts. Additionally, the GSA will communicate and accept input on the tasks to be completed in Phase 2.

Task 14: Participate in Intrabasin and Interbasin Coordination Efforts *(0% complete)*

Successful GSP development hinges on effective intra- and inter-basin coordination, and the GSA has made such coordination a priority.

Participate in Intrabasin Coordination

Coordination amongst the public agencies comprising the GSA (AEWSD, TCWD, WRMWSD, and Kern County) will be essential throughout the GSP development process. The GSA Board will appoint the TC, composed of staff from each public agency that will meet regularly to coordinate GSP development and implementation in the Basin. Currently, the GSA meets quarterly, and it is assumed that the TC will meet monthly. During the GSP Foundation Phase, intrabasin coordination will be conducted related to decisions regarding the DMS selection and development, compilation of data and information into the DMS and document repository, numerical model options and selection, data gap filling efforts, development of a GSP funding plan, and stakeholder engagement activities.

Participate in Interbasin Coordination

To support SGMA implementation, the GSA may want to enter into formal or informal agreements with GSAs in the adjacent Kern County Subbasin (DWR 5-022.14) to "establish compatible sustainability goals and understanding regarding fundamental elements of the Plans of each Agency as they relate to sustainable groundwater management" (CCR § 357.2). Interbasin coordination will be especially useful when deriving water budget components relating to cross-boundary surface/subsurface flows (see Task 18 for further clarification).

The GSA has expressed an interest in accelerating the development of certain portions of the GSP development to foster effective communication with the neighboring Kern Subbasin, which is critically

overdrafted and thus has an accelerated SGMA compliance timeline. This accelerated timeline is reflected in the Project Schedule.

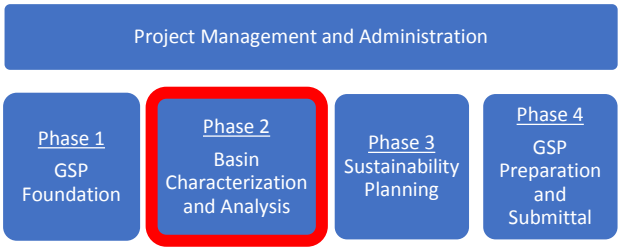
A key factor in this on-going coordination will be the attendance at pertinent meetings and review of technical documents produced by entities in adjacent basins. It is anticipated that the following coordination activities will occur:

- Attendance at regularly, scheduled SGMA-related public meetings in the Kern Subbasin, assumed to occur monthly;
- As-needed meetings between technical counterparts in the Kern Subbasin; and
- Review and comment on significant work products produced in the Kern Subbasin.

AEWSD, WRMWSD, and Kern County all overlie both the White Wolf Subbasin and the Kern Subbasin. Due to this connection, the GSA will be able to easily stay abreast of key developments in the Kern Subbasin.

PHASE 2 - BASIN CHARACTERIZATION AND ANALYSIS

As described further below, Phase 2 of the Work Plan focuses on technical analysis of Basin conditions and will build towards a complete and coherent understanding of the Basin that will serve as the foundation for sustainability planning efforts under Phase 3. Phase 2 will extend from July 2018 to July 2019.



Task 15: Implement Plan for Filling Data Gaps Needed for GSP Preparation *(0% complete)*

Based on results from the data gaps assessment performed under Task 9 above, the GSA will perform selected data collection activities to fill high-priority data gaps in support of improving the Phase 2 work effort.

Based on the preliminary data gaps assessment that has already been initiated as a part of Task 9 (see Figure 2 through Figure 5), the GSA has identified the following data gap filling actions to be taken:

- Processing and analysis of DWR well completion reports for in-Basin wells;
- Pump tests to better understand principal aquifer characteristics and boundary conditions;
- Groundwater quality sampling and analysis; and
- Groundwater elevation data collection.

These efforts will be focused on filling data gaps relevant to understanding the Basin setting during Phase 2, which will set the groundwork for Phase 3 efforts to develop sustainable management criteria and identify projects and management actions that will be instrumental to achieve the Basin's sustainability goal. The technical consultant will work with the GSA and landowners to identify and gain access to desired wells for testing. Results from this analysis will be incorporated into the DMS and will support subsequent work efforts in Task 16 through Task 18.

Process and Analyze DWR Well Completion Reports

As part of Task 15, the GSA will compile, digitize, process, and analyze all available well completion reports provided by DWR in its Well Completion Report Map Application (*forthcoming).* Data extracted from well reports will include:

- General well information (type, location, capacity, status, etc.);
- Well screening intervals; and
- Well log data (i.e. lithologic units), as available.

This information will be used to bolster understanding of subsurface lithology under the Basin, to help characterize wells by the principal aquifer(s) they pump from, to identify candidate wells to include in a SGMA compliant monitoring network (further discussed in Task 19 and Task 27), and to perform selected data gap filling analyses (see below).

Conduct Pumping Tests

In order to understand key characteristics of the principal aquifers in the Basin, the GSA will conduct up to three (3) pump tests at select locations throughout the Basin. These pump tests will utilize existing well infrastructure and will be designed and implemented to achieve various objectives, such as:

- Quantifying aquifer parameters (hydraulic conductivity, transmissivity, storativity, etc.); and
- Testing boundary conditions and verifying the lateral/ vertical extent of discrete aquifer units.

Sample and Analyze Groundwater Quality

As shown on Figure 3a through Figure 3g, groundwater quality data are not readily available throughout the Basin. In order to more comprehensively understand water quality in the principal aquifers and throughout the Basin, a "snap shot" of water quality samples will be collected from 10 wells and analyzed for general chemistry and minerals, metals, as well as stable and reactive isotopes for conducting recharge source and age dating analyses.

Collect Groundwater Elevation Data

As shown on Figure 2, groundwater elevation data are only available near the northern boundary of the Basin and are not well characterized by aquifer unit. In order to more comprehensively understand groundwater elevation in principal aquifers and throughout the Basin, two "snap shots" of groundwater elevation data will be collected from 10 wells.

Task 16: Assess Groundwater Conditions and Develop Hydrogeologic Conceptual Model *(0% complete)*

The GSP Regulations (23-CCR §354.14 and §354.16) require the assessment of groundwater conditions in the Basin and the development of a HCM. The efforts described in Task 16 will be coordinated given that insight related to the Basin's groundwater conditions and the HCM are interconnected.

As noted in Task 4, AEWSD has already developed and WRMWSD is currently developing HCMs and definitions of groundwater conditions for their service areas. The service areas of these two districts collectively overlie the majority of the White Wolf Subbasin, with substantial overlap. These work

products and the data supporting their development will form the basis of the efforts of the GSA to assess groundwater conditions and develop a HCM for the White Wolf Subbasin.

Assess Groundwater Conditions

The GSP Regulations (23-CCR §354.16) require each GSP to include a description of groundwater conditions in the Basin, including the following:

- Groundwater elevations, spatially, with depth, and over time;
- Estimated change in storage by water year type and cumulatively over time;
- Seawater intrusion conditions;
- Groundwater quality issues, including known contamination sites and plumes;
- Land subsidence;
- Interconnected surface water; and
- Groundwater dependent ecosystems.

Under Task 16, the GSA will assess groundwater conditions with respect to the above topics. This assessment will be based on the data compiled into the Basin DMS under Phase 1 and Task 15. The assessment will include preparation of representative maps and graphs (i.e., groundwater elevation contour maps and hydrographs, graph(s) of change in groundwater storage, and map(s) showing groundwater quality issues, subsidence, interconnected surface water, and groundwater dependent ecosystems). Updated data sources from DWR shall be incorporated into the groundwater conditions assessment as they become available.

Develop Hydrogeologic Conceptual Model

The GSP Regulations (23-CCR §354.14) describe the requirements for a HCM to be included in a GSP. Further guidance is contained within *BMP 3Hydrogeologic Conceptual Model*. An HCM is a conceptual representation of the physical basin characteristics that affect and/or control the occurrence, movement, and quality of groundwater in a basin. The HCM describes how a basin functions and how water moves through the system, and serves as a foundation for further quantitative and data-driven analyses of sustainability and planning efforts. The HCM necessarily includes both narrative and graphical components.

Building upon the data compilation efforts completed under Phases 1 and Task 15, and upon work completed to date within the Basin (e.g., through the development of GWMPs, AWMPs, UWMPs, and CASGEM Monitoring Network Plans), a preliminary HCM will be developed under Task 16 that includes all elements required under the GSP Regulations, including:

- Regional geologic setting;
- Basin boundaries, both laterally and vertically;
- Principle aquifers, including formation names, physical properties, general water quality, primary uses of each aquifer and data gaps/uncertainty;
- Two scaled cross sections depicting major stratigraphic and structural features; and
- A set of maps depicting topography, surficial geology, soil characteristics, recharge areas, surface water bodies, and points of delivery for imported water supplies.

BMP 3 describes data sources that may be of use in developing the HCM. These data include, but are not limited to DWR, USGS, and CDMG maps and reports on geology; USCEPA, USGS, SWRCB, and DOGGR maps

and information on the base of fresh water and definable bottom of the Basin; and USGS and SWRCB information on physical properties and water quality within principle aquifers, supplemented by local information from aquifer testing and sampling, as available. The HCM will cover all required aspects listed in the GSP Regulations, but will also aim to focus on the most significant issues and questions facing the White Wolf Subbasin (based on GSA's current understanding of the Basin), including

- Assessment of aquifer parameters and their spatial and vertical extent, hydrogeologic flow barriers, and the degree of confinement in the aquifer system;
- Identification of potential sites for groundwater recharge projects;
- Identification of potential land subsidence areas; and
- Analysis of groundwater quality for each principal aquifer in the Basin.

Prepare Technical Presentation(s) and Draft Technical Memorandum

Results from Task 16 will be summarized in technical presentation(s) to the GSA and TC and in a *Draft TM#6 – Groundwater Conditions and Hydrogeologic Conceptual Model* that includes narrative/descriptive and graphical components of the HCM and groundwater conditions, including maps, charts and other graphics, tables, and supporting documentation as appendices, as appropriate.

Task 17: Coordinate Regarding C2VSim Modeling *(0% complete)*

As stated above under Task 10, the White Wolf GSA intends to participate in the Kern Subbasin shared modeling effort which will use the C2VSim Fine Grid Model, assuming that upon release of that model by DWR and review by the White Wolf GSA it is determined to be reasonably representative of conditions in the White Wolf Subbasin. Under Task 2.3, the White Wolf GSA will coordinate with the GSAs in the Kern Subbasin regarding the use of C2VSim for SGMA purposes. This coordination will entail the following:

- Communication with Kern Subbasin GSAs regarding the modeling effort, including defining the historical and current water budget scenarios;
- Provision of key data to support model refinement, as necessary, in the White Wolf Subbasin;
- Obtaining and processing model input and output for the White Wolf Subbasin from the C2VSim shared modeling effort; and
- Any other necessary support.

The C2VSim Fine Grid Model results will be used to support the water budget analysis described under Task 2.4 below.

Task 18: Develop Basin-Wide Water Budget *(0% complete)*

The GSP Regulations (23-CCR §354.18) spell out the requirements for water budgets that must be included in a GSP. Guidance on water budget development, including a partial listing of GSP-related uses, is provided in *BMP 4 Water Budget*. Per the GSP Regulations, the water budget must assess the following:

- Current, historical (at least 10 years) and projected (projecting forward based on 50 years of hydrology) water budgets;
- Quantification of total surface water entering and leaving the basin;

- Inflows and outflows to/from the groundwater system, including (but not limited to) subsurface inflows/outflows, infiltration of applied water and precipitation, and groundwater extraction;
- Change in storage between seasonal high conditions;
- Overdraft during a period when water supply conditions approximate average conditions;
- Water year types; and
- An estimate of the sustainable yield of the basin.

As noted in Task 4, AEWSD has already developed a water budget for its service area and WRMWSD is currently developing a water budget for their service areas. Furthermore, a preliminary water budget was developed by the member agencies comprising the White Wolf GSA for the entire Basin as part of the Basin Boundary Modification effort. The service areas of these two districts collectively overlie the majority of the Basin, with substantial overlap. The water budget framework developed in these efforts will form the basis of the preliminary water budget for the Basin, and the data already compiled will populate the water budget and be updated as appropriate.

Develop Preliminary Water Budget Based on Empirical Storage and Flux Relationships

Under Task 18, the GSA will develop a preliminary historical and current water budget for the Basin based on a simple "bucket model", whereby the various storage components (e.g., atmosphere, land surface, root zone, unsaturated zone, and saturated zone) are represented as "buckets", each subject to mass balance requirements and connected to the other buckets by various flux relationships.

The fluxes between storage components will be quantified using commonly used and accepted analysis methods (e.g., the crop coefficient method of evapotranspiration estimation, Darcy's Law for groundwater flow through a cross section, soil moisture accounting model for deep percolation, etc.), supported by the best available information compiled under Phases 1 and 2. The preliminary "bucket model" will then be calibrated through strategic adjustment of certain parameters employed within these empirical flux relationships (e.g., hydraulic conductivity, storativity, runoff curve numbers, etc.) to better align simulated groundwater elevations (i.e., changes in groundwater storage) with current and historical water level measurements collected from in-Basin wells.

Considering the high density of irrigated lands within the Basin, the GSA will want to pay special attention to reviewing and selecting the most appropriate methodology for estimating basin-wide agricultural water demands. Additionally, recognizing the ephemeral nature of most of the Basin's surface water features, the water budget will need to address the short- and long-term temporal dynamics and variability in streamflow conditions throughout the Basin and to quantify associated contributions of surface water seepage to the groundwater table.

The GSA understands that the GSAs in the adjacent Kern Subbasin intend to construct a water budget beginning in 1994 and extending through 2016 (a 23-year period), which fulfills the requirement for a historical water budget "starting with the most recently available information and extending back a minimum of 10 years" (CCR §354.18). To ensure that interaction between the White Wolf Subbasin and the Kern Subbasin is accurately represented in both water budgets being prepared for both subbasins, the GSA intends to use the same 1994 – 2016 period for the historical water budget.

Extract Water Budget Information from C2VSim Fine Grid Model

After developing the "bucket model", historical and current water budget information will be extracted from the C2VSim Fine Grid Model. The preliminary historical and current water budget developed through the "bucket model" approach will then be used to further inform and/or verify analogous water budget components calculated through the C2VSim Fine Grid Model. Water budget components extracted from the C2VSim Fine Grid Model that differ significantly from the analogous "bucket model" prediction will be identified and further investigated to determine the nature of the discrepancy and to adjust assumptions/inputs as necessary.

Determine Sustainable Yield of the White Wolf Subbasin

Once the historical and current water budgets produced by the conceptual "bucket model" and C2VSim Fine Grid Model are in acceptable agreement (based on a pre-defined criteria), the C2VSim Fine Grid Model will be further employed (in coordination with the GSAs in the adjacent Kern Subbasin) to evaluate the availability and reliability of past surface water supply and demand trends "as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information" (23-CCR §354.18(c)(2)(A)). The C2VSim Fine Grid Model will then be employed to establish "baseline conditions" and to derive a metric of "sustainable yield" within the Basin in accordance with the requirements described in the GSP regulations (23-CCR §354.18(b)(7), (c)(3)).

The sustainable yield of a groundwater basin is defined as "the 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" (CWC §10721(w)). The sustainable yield will be calculated as the long-term net annual groundwater supply into the Basin based on the historical period of observation outlined above.

Develop Projected (Future) Water Budget Baseline and Uncertainty Scenarios

Once the C2VSim Fine Grid Model is sufficiently calibrated, the White Wolf GSA will use the model to develop a "baseline condition" for the Basin to simulate projected (future) water budget conditions and to "evaluate future scenarios of uncertainty" in accordance with the requirements described in the GSP Regulations (23-CCR §354.18(c)(3)). This effort will proceed independently from efforts to model future conditions in the Kern Subbasin, as those efforts have not been defined at this time. The baseline condition shall be represented by:

1. 50 years of historical hydrology (e.g. precipitation, evapotranspiration, streamflow information)
2. Water demands based on the most recent land use, evapotranspiration, and crop-coefficient information
3. Surface water supply based on the most recent water supply information (as applicable)

The baseline condition will be evaluated using the C2VSim Fine Grid Model to derive a projected (future) water budget for the Basin. The baseline condition will also be used to evaluate future scenarios of uncertainty related to climate, local land use planning, population growth, surface water supply availability/reliability, and any other factors of particular concern identified by the GSA. This uncertainty analysis will help establish a range in projected water supply and demand conditions which will help to define appropriate sustainability criteria (e.g. minimum thresholds, measurable objectives) and quantify

a "reasonable margin of operational flexibility" for these criteria during later stages of GSP development (see Phase 3 efforts for greater detail).

To inform the development of future scenarios related to land use, population growth, and surface water supply availability including the volume of imports into the Basin, the GSA intends to use data and reports compiled in Task 7. The GSA also understands that DWR will release a guidance document for uncertainty analysis related to climate change, which the GSA intends to use to inform climate uncertainty scenarios.

Prepare Technical Presentation(s) and Draft Technical Memorandum

Results from the water budget analysis will be documented in technical presentations(s) and in a *Draft TM#8 – Water Budget and Preliminary Estimate of Sustainable Yield* that includes a narrative description of the water budget as well as tables and graphical depictions of historical, current and projected future water budget components, following the examples (i.e., paired bar water budget graphs) provided in BMP 3.

Task 19: Assess Existing Monitoring Programs and Develop SGMA-Compliant Monitoring Network *(0% complete)*

As described in GSP Regulations (23-CCR §354.34-36) and BMP 2, each basin's monitoring network must be designed to allow for the collection of data sufficient to provide representative information on groundwater conditions and trends within a basin. The GSP must describe monitoring objectives that, when implemented, will allow for characterization of all relevant sustainability indicators, quantification of progress towards achieving measurable objectives and sustainability goals, and quantification of water budgets and impacts to beneficial uses or users in the basin. Achieving these objectives will require a monitoring network with sufficient spatial and temporal coverage that can directly measure or provide an appropriate representative (i.e. "proxy") measurement to adequately characterize each relevant sustainability indicator throughout the Basin.

Develop Recommended Monitoring Network

Under Task 19, the GSA will assess the existing monitoring programs and infrastructure for their ability to achieve the basic objectives outlined above. Currently there exists two CASGEM monitoring entities within the Basin – AEWSD and the White Wolf GSA. The assessment of monitoring programs under Task 19 will build off the efforts of these agencies to date, as well as any efforts related to the California Irrigated Lands Regulatory Program, and will be conducted in parallel with the HCM development and groundwater conditions assessments, focusing on the sustainability indicators that are determined through those efforts to apply to the Basin.

As described in Task 9 above, preliminary data gaps assessment has shown a generally sporadic record of water level information and a lack of water quality and land subsidence data throughout Basin.

Maps of existing monitoring sites will be developed for each relevant sustainability indicator, allowing for the preliminary evaluation of spatial data gaps. Each existing monitoring site will be screened against the data and reporting standards contained in the GSP Regulations (23-CCR S352.4), and deficiencies summarized in a table.

As recommended in BMP 2, the GSA intends to follow the Data Quality Objective (DQO) process described in the US EPA's *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA, 2006) in developing the Basin's GSP monitoring network. The 8-step DQO process serves as a guide to developing a data collection and QA/QC program that will meet the intended purposes.

Prepare Technical Presentation(s) and Draft Technical Memorandum

The monitoring network assessment will be summarized in technical presentation(s) to the GSA and TC and in a *Draft TM #9 – Summary of Monitoring Network Assessment and Preliminary Monitoring Plan*) that describes the planned monitoring network and plans to address relevant sustainability indicators and requirements under the GSP Regulations. To the extent that the monitoring plan identifies deficiencies, the GSA will work on plans to rectify those deficiencies prior to submittal of the GSP to DWR, or to address them as part of Plan implementation.

Task 20: Conduct Stakeholder Engagement Related to Basin Characterization and Analysis Phase *(0% complete)*

In accordance with the SCEP developed under Task 12, the GSA will hold at least one public workshop with stakeholders during the Phase 2. The workshop will be focused on presenting and receiving feedback on the preliminary HCM, water budget, definition of groundwater conditions, and the data gaps evaluation and plans to fill them. Additionally, during this workshop, the GSA will outline and receive initial input on the tasks to be completed in the Sustainability Planning (Phase 3) portion of this Work Plan.

Throughout this process, quarterly GSA Board meetings will continue to provide a forum for interested members of the public to track GSP development and provide ongoing input.

Task 21: Implement GSP Development Funding Plan *(0% complete)*

The GSA will continue to implement the GSP Development Funding Plan created in Phase 1.

Task 22: Participate in Intrabasin and Interbasin Coordination Efforts *(0% complete)*

The GSA will follow the developments of basin characterization and analysis in the Kern Subbasin, to ensure that assumptions and estimates of projected values of the major components of interaction between the basins (e.g., groundwater inflow/outflow and stream inflow/outflow) align, or to resolve any differences.

Participate in Intrabasin Coordination

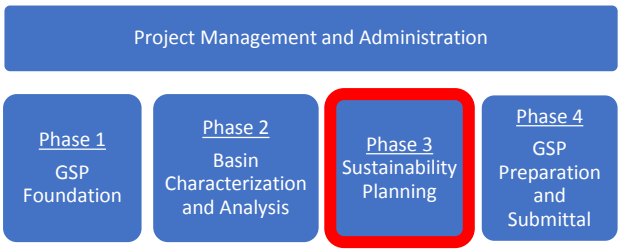
The TC will continue to organize and convene regularly scheduled monthly meetings to foster timely and effective discussion of the Phase 2 tasks associated with GSP development and ongoing data-sharing.

Participate in Interbasin Coordination

The GSA will continue to foster interbasin dialogues through targeted meetings, integrated participation at GSA Board meetings and ongoing data-sharing to support GSP development, with a particular focus on the water budget and sustainable yield estimates and application of the Numerical Model.

PHASE 3 - SUSTAINABILITY PLANNING

As described further below, Phase 3 of the Work Plan focuses on planning for the sustainable management of the Basin. Phase 3 will extend from July 2019 to July 2020.



Task 23: Evaluate Potential Management Areas *(0% complete)*

Based on the understanding of the Basin gained through stakeholder engagement efforts and technical analyses completed in Phases 1 and 2, the GSA will consider whether defining separate management areas within the Basin will facilitate implementation of the GSP and provide an increased ability to achieve Basin-wide sustainable groundwater management (per 23-CCR §354.20). Based on initial GSA and stakeholder input from the GSA and TC meetings held to date, and considering the size, hydrogeology, and groundwater conditions within the Basin, it is unlikely the GSA will consider the use management areas in the GSP. However, should management areas be defined, the GSP will define distinct minimum thresholds, measurable objectives, and monitoring requirements for each management area and will describe how the use of these tailored management criteria will help foster sustainable management across the entire Basin.

Task 24: Develop Sustainable Management Criteria *(0% complete)*

Task 24 will involve developing sustainable management criteria, including the Sustainability Goal for the Basin, as well as Undesirable Results, Minimum Thresholds, Measurable Objectives, and Interim Milestones for the Basin and/or specific management areas. Per the GSP regulations (23-CCR §354.24-30), the GSA will select the Sustainability Goal, Minimum Thresholds, and Measurable Objectives to avoid causing Undesirable Results within the Basin or in adjacent basins, or affecting the ability of adjacent basins to achieve sustainability goals.

The GSA understands that DWR will release a sixth BMP related to developing Sustainable Management Criteria, and will use this document to further inform methodologies for selecting appropriate criteria for the Basin.

Define Sustainability Goal

Per the GSP Regulations (23-CCR §354.24), the GSA will develop a Sustainability Goal for the Basin that culminates in the absence of Undesirable Results and the operation of the Basin within its sustainable yield by 2042. Definition of the Sustainability Goal will be based in part on information on the basin setting,

HCM, groundwater conditions, and water budget developed during Phase 2. Stakeholder input will also be critical to defining the Sustainability Goal.

Define Undesirable Results and Minimum Thresholds

Per the GSP Regulations (23-CCR §354.26), Undesirable Results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the Basin. Minimum Thresholds are the numeric values for each sustainability indicator that, if exceeded, may cause Undesirable Results. As demonstrated by their regulatory definitions, Undesirable Results and Minimum Thresholds are closely linked, and therefore must be developed in concert with each other. Furthermore, the meaning of "significant and unreasonable" is subject to local interpretation and will thus need to be defined with ample stakeholder input. As described in the GSP Regulations, an Agency may need to evaluate multiple Minimum Threshold values to determine whether and Undesirable Result is occurring. This suggests that an iterative approach, where whereby multiple potential values are considered before determining a final value, may be required.

Recognizing that Undesirable Results and associated Minimum Thresholds may differ from one location to another within the Basin, the GSA will develop a systematic process for evaluating the occurrence of Undesirable Results across the entire Basin, which may include:

1. **Chronic lowering of groundwater levels** indicating a significant and unreasonable depletion of supply over the planning and implementation horizon;
2. Significant and unreasonable **reduction of groundwater storage**;
3. Significant and unreasonable **seawater intrusion**;
4. Significant and unreasonable **degraded water quality**;
5. Significant and unreasonable **land subsidence** that substantially interferes with surface land uses; and
6. **Depletions of interconnected surface water** that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

These will be defined based on the groundwater conditions assessment performed under Phase 2. For each sustainability indicator, the GSA will identify the primary cause(s) of groundwater conditions occurring throughout the Basin that would lead to or has led to Undesirable Results, and will consider potential effects of Undesirable Results on beneficial uses and users of groundwater. Last, per 23-CCR §354.30, the GSA will determine whether it wants to include in its GSP Measurable Objectives to address Undesirable Results that occurred before, and have not been corrected by, January 1, 2015.

The GSA will then develop Minimum Thresholds for each sustainability indicator, which are quantifiable metrics for each applicable sustainability indicator at each monitoring site or representative monitoring site. The GSA will base its Minimum Thresholds definition on the GSP Regulations (23-CCR §354.28(c)) and the understanding of the Basin generated during Phase 2. Specifically, the GSA will base its Minimum Thresholds definitions on the following analyses:

- ***Chronic Lowering of Groundwater Levels*.** The GSA will calculate the rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the Basin. Additionally, the GSA will consider the potential effects of groundwater level on other sustainability indicators. The Minimum Threshold will be set as the elevation indicating a depletion of supply at a given location that would lead to Undesirable Results.

- ***Reduction of Groundwater Storage*.** The GSA will calculate the sustainable yield of the Basin based on historical trends, water year type, and projected water use in the Basin. The Minimum Threshold will be set as the volume of water that can be withdrawn from storage without causing conditions that may lead to Undesirable Results.
- ***Seawater Intrusion.*** The GSA will base its assessment of seawater intrusion on 1) any existing maps and cross sections that document chloride concentrations within each principal aquifer, and 2) any other existing information or public knowledge that documents the presence of elevated chloride levels within the Basin that could have resulted from an advancing seawater front. The Minimum Threshold would be defined using a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to Undesirable Results. Seawater intrusion is not anticipated to occur at any significant rate due to the Basin's location on the southern edge of the Central Valley.
- ***Degraded Water Quality*.** The GSA will base the Minimum Threshold for degradation of water quality on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the GSA to be of concern for the Basin. The Minimum Threshold will be set as the degradation of water quality that may lead to Undesirable Results.
- ***Land Subsidence*.** The GSA will base the Minimum Threshold for land subsidence on 1) the land uses and property interests that have been or are likely to be affected by land subsidence, and 2) generating maps and graphs showing the extent and rate of land subsidence in the Basin. The Minimum Threshold will be set as the rate of subsidence that substantially interferes with surface land uses and may lead to Undesirable Results.
- ***Depletions of Interconnected Surface Water*.** The GSA will use the analyses from Phase 2 (including, potentially, the groundwater and surface water model from Task 17) to quantify surface water depletion and will identify the location, quantity, and timing of depletions of interconnected surface water, if present. The Minimum Threshold will be set as the rate or volume of surface water depletion that has adverse impacts on beneficial uses of surface water and that may lead to Undesirable Results.

The GSA will evaluate whether groundwater levels, and the Minimum Threshold defined for this sustainability indicator, can serve as a proxy for other sustainability indicators, as allowed for under the GSP Regulations (23-CCR §354.28(d)).

Define Measurable Objectives and Interim Milestones

Measurable objectives refer to "specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions" (23-CCR §351(s)), and can be considered as indicators of progress towards achieving the long-term sustainability goal for the Basin. The GSA will define Measurable Objectives by applying both qualitative and quantitative optimization techniques using the same metrics and monitoring sites as are used to define the Minimum Thresholds for the Basin, as described above. The Measurable Objectives will be defined based on the 20-year Sustainability Goal and will include the definition of Interim Milestones in increments of five years. The GSA will identify triggers that, when comparing Interim Milestones to actual basin conditions, will prompt corrective actions.

The GSA will provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty defined in the Basin Setting section of the GSP. The margin of operational flexibility will be informed, in part, by the results of the uncertainty analyses related to projected surface water supply reliability, climate, land use planning, and population growth dynamics performed under Task 18. This will likely involve defining proportionality criteria for successive interim milestones relative to the sustainability goal and then approximating reasonable measurable objectives for each sustainability indicator for both the "baseline", "low uncertainty", and "high uncertainty" scenarios developed in Task 18.

Prepare Technical Presentation(s) and Draft Technical Memorandum

Results from Task 24 will be summarized in technical presentation(s) and in a *Draft TM #10 – Establishment of Sustainability Criteria* that includes a narrative description of the sustainable management criteria and which is supported by maps, charts and other graphics, tables, and supporting documentation as appendices, as appropriate.

Task 25: Identify Projects and Management Actions *(0% complete)*

Given an understanding of the sustainable management criteria relevant to the Basin, the GSA will identify projects and management actions that will need to be carried out in order to meet the Sustainability Goal by 2042 (California Water Code 10727.2(d)(3)).

- **Potential projects** may include any efforts designed to increase available groundwater supplies within the Basin (e.g., WRMWSD has investigated the potential for a groundwater storage and recovery project), while
- **Potential management actions** may include any efforts designed to reduce groundwater demands within the Basin (e.g., AEWSD is implementing a pilot groundwater metering project as part of the Agricultural Water Conservation and Efficiency Program).

Identify and Analyze Projects and Management Actions

Projects and management actions will be identified through careful consideration and engagement with Basin stakeholders, as described by the SCEP developed in Task 12. The potential impacts of these projects and management actions will be assessed using appropriate quantitative and qualitative analytical techniques.

Consistent with DWR's GSP Checklist, the description of projects and management actions in the GSP will include:

- Description of projects and management actions that will help achieve the basin's sustainability goal;
- Measurable objective that is expected to benefit from each project and management action;
- Circumstances for implementation;
- Public noticing;
- Permitting and regulatory process;
- Time-table for initiation and completion, and the accrual of expected benefits;
- Expected benefits and how they will be evaluated;

- How the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included;
- Legal authority required;
- Estimated costs and plans to meet those costs; and
- Management of groundwater extractions and recharge.

Prepare Technical Presentation(s) and Draft Technical Memorandum

Results from Task 25 will be summarized in technical presentation(s) and in a *Draft TM #11 – Proposed Projects and Management Actions* that includes a narrative description of the projects and management actions, supported by maps, charts and other graphics, tables, and supporting documentation as appendices, as appropriate.

Task 26: Create GSP Implementation Plan *(0% complete)*

The GSP must include a plan for implementation, including an estimate of GSP implementation costs, schedule, plan for required annual reporting, and process for required periodic evaluations of the GSP. Task 26 will involve developing this plan for inclusion in the GSP.

Create Programmatic GSP Implementation Plan

The GSA will develop a programmatic plan for GSP implementation outlining the framework and general processes associated with meeting SGMA compliance beyond the GSP submission deadline of January 2022. This programmatic plan will include elements related to:

- Annual Reporting, per the GSP Regulations (23-CCR §356.2);
- Periodic (5 Year) Plan Evaluations per the GSP Regulations (23-CCR §356.4); and
- Maintenance of the DMS (including documentation and training for use by GSA staff.

Create Plan for Implementation of GSP Projects and Management Actions

The GSA will develop a foundational plan to support implementation of projects and management actions identified in Task 25 in order to ensure that the GSAs will have the legal, funding, and permitting authority to enact these measures, if needed. This implementation plan will outline all efforts related to:

- Conducting feasibility studies for identified projects and/or management actions;
- Performing CEQA and other environmental impact analyses;
- Initiating development/construction efforts for any projects involving built infrastructure; and
- Supporting development of a funding plan (see below).

Develop Funding Plan for GSP Implementation

After assessing GSP implementation costs, the GSA will identify potential funding sources and develop a plan to fund GSP implementation. Funding sources may include grants from federal, state, or local governments, as well as monies raised through the collection of fees on Basin landowners levied by the GSA. Should it be decided that fees will be levied, the GSA will follow the required process for public notice and public hearings as documented in California Water Code 10730. This effort may require retention of a rate consultant and/or economics consultant.

Prepare Technical Presentation(s) and Draft Technical Memorandum

Results from Task 26 will be summarized in technical presentation(s) and in a *Draft TM #12 – GSP Implementation Plan*.

Task 27: Finalize Monitoring Network and Protocols *(0% complete)*

Designate Final Monitoring Network and Protocols

Per the GSP Regulations (23-CCR §354.34(b)), the GSA must develop a monitoring network fit to achieve the following:

- Demonstrate progress toward achieving measurable objectives described in the Plan;
- Monitor impacts to the beneficial uses or users of groundwater;
- Monitor changes in groundwater conditions relative to Measurable Objectives and Minimum Thresholds; and
- Quantify annual changes in water budget components.

Given the results of the preliminary assessment of the monitoring network in Task 19, the understanding of the Basin generated in the Phase 2, and the development of sustainable management criteria completed in Task 24, the GSA will finalize the monitoring network and protocols. The monitoring network will be designed to leverage existing infrastructure to the extent possible and appropriate and such that the data collected will allow for assessment of the sustainability indicators with respect to the Measurable Objectives and Minimum Thresholds.

Table 1 shows the infrastructure/approach, measurement type, and temporal, spatial, and other considerations corresponding to data collection for each undesirable result. As shown in Table 1, monitoring wells are the main infrastructure used for data collection for groundwater levels, groundwater storage, seawater intrusion, and water quality. There are several options of relevant infrastructure land subsidence and surface water depletion data collection. The GSA will consider which monitoring infrastructure options are most appropriate for the Basin and the sustainable management criteria.

Given the understanding of the Basin generated in Phase 2, the GSA may designate representative monitoring sites at which the sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined (23-CCR §354.36).

Consistent with DWR's GSP Checklist, the documentation of the Monitoring Network in the GSP will include the following:

- Description of monitoring network;
- Description of monitoring network objectives;
- Description of how the monitoring network is designed to demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features; estimate the change in annual groundwater in storage; monitor seawater intrusion; determine groundwater quality trends; identify the rate and extent of land subsidence; and calculate depletions of surface water caused by groundwater extractions;
- Description of how the monitoring network provides adequate coverage of Sustainability Indicators;

- Density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends;
- Scientific rational (or reason) for site selection;
- Consistency with data and reporting standards;
- Corresponding sustainability indicator, minimum threshold, measurable objective, and interim milestone;
- Location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used; and
- Description of technical standards, data collection methods, and other procedures or protocols to ensure comparable data and methodologies.

To document the use of representative monitoring sites, if applicable, the GSP will include:

- Description of representative sites;
- Demonstration of adequacy of using groundwater elevations as proxy for other sustainability indicators; and
- Adequate evidence demonstrating site reflects general conditions in the area.

To document the assessment and improvement of the monitoring network, the GSP will further include:

- Review and evaluation of the monitoring network;
- Identification and description of data gaps;
- Description of steps to fill data gaps; and
- Description of monitoring frequency and density of sites.

Prepare Technical Presentation(s) and Draft Technical Memorandum

Results from Task 27 will be summarized in technical presentation(s) and in a *Draft TM#13 – Proposed Monitoring Network and Protocols* that includes a narrative description of the plans to implement a monitoring network, supported by maps, charts and other graphics, tables, and supporting documentation as appendices, as appropriate.

Task 28: Conduct Stakeholder Engagement Related to Sustainability Planning *(0% complete)*

The Sustainability Planning Phase of GSP development is expected to generate the most interest among Basin stakeholders, and therefore will require substantial stakeholder engagement. We anticipate holding at least two workshops during this phase.

The first workshop will be focused on presenting and receiving feedback on the sustainable management criteria.

The second workshop will be focused on presenting and receiving input on the sustainable management criteria and identifying potential projects and management actions. Additionally, during this workshop, the GSA will outline and receive initial input on the tasks to be completed in the GSP Preparation (Phase 4) portion of this Work Plan.

Throughout this process, GSA Board meetings will continue to provide a forum for interested members of the public to track GSP development and provide ongoing input.

Task 29: Implement GSP Development Funding Plan *(0% complete)*

The GSA will continue to implement the GSP Development Funding Plan created in Phase 1.

Task 30: Participate in Intrabasin and Interbasin Coordination Efforts *(0% complete)*

The GSA will continue to follow developments in the Kern Subbasin, with particular attention paid to the development of sustainable management criteria.

Participate in Intrabasin Coordination

The TC will continue to organize and convene regularly scheduled, monthly meetings to foster timely and effective discussion of the Phase 3 tasks associated with GSP development and ongoing data-sharing.

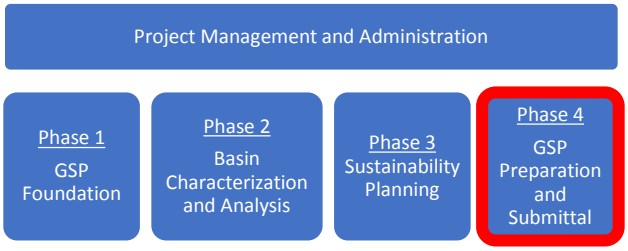
The GSA will also initiate work on a long-term governance framework to guide Plan implementation.

Participate in Interbasin Coordination

The GSA will continue to foster interbasin dialogues through targeted meetings, integrated participation at GSA Board meetings and ongoing data-sharing to support Phase 3. The GSA will develop Interbasin Agreements if necessary. Attendance at public meetings of GSAs in the Kern Subbasin, meetings with technical counterparts in the Kern Subbasin, and review and comment on significant work products produced in the Kern Subbasin will continue.

PHASE 4 - GSP PREPARATION AND SUBMITTAL

Phase 4 of the Work Plan involves preparation of the GSP and associated deliverables for use by the GSA in adopting the GSP, with subsequent submittal to DWR. It is anticipated that Phase 4 will extend from July 2020 to January 2022.



Task 31: Compile Complete Draft GSP *(0% complete)*

Most of the major GSP components will have been developed and included, in whole or in part, in the TMs prepared in previous tasks of this Work Plan. These previously prepared elements include:

- Data Management System;
- Plan Area Information;
- Data Gaps Assessment;
- Stakeholder Communication and Engagement Plan;

- Hydrogeological Conceptual Model;
- Current and Historical Groundwater Conditions;
- Water Budget Information, including an Estimate of Sustainable Yield of Basin;
- Sustainable Management Criteria;
- Projects and Management Actions, and Plans for Implementation and Funding; and
- Monitoring Network and Protocols.

Under Task 31, these existing GSP components will be compiled and reworked into a full GSP along with additional components such as Administrative Information (23-CCR §354.4–354.6), documentation of notice and communication (23-CCR §354.10), and "additional plan elements" (as applicable, and listed in CWC §10727.4). The GSP will be structured to conform with the GSP regulations, GSP Annotated Outline, and Preparation Checklist for GSP Submittal.

An Administrative Draft will be prepared for TC and GSA review. After comments have been received, a revise draft GSP will be released for public review.

Task 32: Distribute Draft GSP and Revise (if necessary) per Stakeholder Feedback *(0% complete)*

As required by CWC §10728.4, the GSA will distribute a draft GSP to Basin stakeholders and hold a public hearing to receive feedback on the draft GSP. Per CWC §10728.4, the public hearing will be held at least 90 days after providing notice to a city or county within the area of the proposed plan. As necessary, the GSA will revise the draft GSP to reflect stakeholder feedback.

Task 33: Submit Final GSP to DWR *(0% complete)*

The GSA will submit the final GSP to DWR, after which DWR is to establish a period of at least 60 days to receive comments on the adopted Plan (per 23-CCR §355.2). Final deliverables to DWR will include:

- The Final (written) GSP;
- Coordination Agreements (as applicable);
- A Data Management System, integrated with all existing data; and
- Numerical Model Inputs/Outputs.

DWR will then have up to two years to review the Final GSP, after which it will be given the status of approved, incomplete, or inadequate. Should the GSA's GSP be deemed incomplete, the GSA will take corrective actions, revise, and resubmit the GSP within 180 days of DWR's assessment, as required.

Task 34: Participate in Intrabasin and Interbasin Coordination Efforts *(0% complete)*

The GSA will continue follow developments in the neighboring Kern Subbasin.

Participate in Intrabasin Coordination

The TC will continue to organize and convene regularly scheduled, monthly meetings to foster timely and effective discussion of the Phase 4 tasks associated with GSP development and ongoing data-sharing.

If not completed under Phase 3, the GSA will also continue and adopt a long-term governance framework to guide Plan implementation.

Participate in Interbasin Coordination

The GSA will continue to foster interbasin dialogues through targeted meetings, integrated participation at public meetings, and ongoing data-sharing to support GSP development.

List of Tables

Table 1 Summary of Monitoring Network Considerations

List of Figures

Figure 1 White Wolf Subbasin Jurisdictional Boundaries
Figure 2 Evaluation of Available Data and Assessment of Sustainability Indicators #1 and #2– Groundwater Elevation Change and Contours
Figure 3a Evaluation of Available Data and Assessment of Sustainability Indicator #4 – Groundwater Quality – Total Dissolved Solids
Figure 3b Evaluation of Available Data and Assessment of Sustainability Indicator #4 – Groundwater Quality – Nitrate
Figure 3c Evaluation of Available Data and Assessment of Sustainability Indicator #4 – Groundwater Quality – Arsenic
Figure 3d Evaluation of Available Data and Assessment of Sustainability Indicator #4 – Groundwater Quality – Boron
Figure 3e Evaluation of Available Data and Assessment of Sustainability Indicator #4 – Groundwater Quality – Iron
Figure 3f Evaluation of Available Data and Assessment of Sustainability Indicator #4 – Groundwater Quality – Manganese
Figure 3g Evaluation of Available Data and Assessment of Sustainability Indicator #4 – Groundwater Quality – GeoTracker Sites
Figure 4 Evaluation of Available Data and Assessment of Sustainability Indicator #5 – Land Subsidence
Figure 5 Evaluation of Available Data and Assessment of Sustainability Indicator #6 – Groundwater Dependence

WORK PLAN REFERENCES

This Work Plan has been prepared in accordance with the requirements, recommendations, and guidance contained in the following documents:

- "Attachment 4. Work Plan", from the Groundwater Sustainability Plans and Projects Proposal Solicitation Package, dated September 2017;
- GSP Emergency Regulations (California Code of Regulations Title 23 [23-CCR], Division 2, Chapter 1.5, Subchapter 2; herein referred to as the "GSP Regulations"), approved by the California Water Commission on 18 May 2016;
- Groundwater Sustainability Plan (GSP) Emergency Regulations Guide, dated July 2016;
- Best Management Practices (BMPs) published by the Department of Water Resources (DWR), dated December 2016, including:
    - BMP 1: Monitoring Protocols, Standards, and Sites;
    - BMP 2: Monitoring Networks and Identification of Data Gaps;
    - BMP 3: Hydrogeologic Conceptual Model;
    - BMP 4: Water Budget; and

  - BMP 5: Modeling; and
  - BMP 6: Sustainable Management Criteria, DRAFT dated November 2017.
- Guidance documents published by DWR, including:
  - Preparation Checklist for GSP Submittal, dated December 2016;
  - GSP Annotated Outline, dated December 2016;
  - Engagement with Tribal Governments, DRAFT dated June 2017; and
  - Stakeholder Communication and Engagement, DRAFT dated June 2017.

Table 1
Summary of Monitoring Network Considerations

Undesirable Result	Infrastructure / Approach	Measurement Type	Temporal Considerations	Spatial Considerations	Other Considerations

Chronic Lowering of Groundwater Levels	Monitoring Wells	Groundwater Level	• Must be measured at a minimum twice per year during the seasonal high and low;
			• Must be measured more frequently in the case of:
			  • A shallow/unconfined aquifer;
			  • Rapid groundwater flow and recharge;
			  • More groundwater pumping; or
			  • More variable climatic conditions.
				• Density per 100 square miles could be 0.2 to 10 wells;
				• Density should be greater in areas of greater pumping and undesirable results;
				• Well screens should be aquifer-specific;
				• Proximity to pumping wells, basin boundaries, and significant recharge areas should be considered.	

Reduction of Groundwater Storage	Monitoring Wells	Groundwater Level	See above.	See above.	Use of water levels to estimate storage requires assumptions about thickness, porosity, and connectivity of units.
	Remote Sensing	Differential Gravity			"Should be used cautiously as they tend to be regional in nature and may not provide the level of accuracy necessary to fully determine conditions within the basin" (BMP, p. 14)
Seawater Intrusion	Monitoring Wells	Groundwater Quality	Must be measured "at least quarterly" (BMP, p. 15) and more frequently during initial characterization.	Must be: • Accompanied by groundwater elevation monitoring; • Adequate to map isocontour of chloride; • From each aquifer that is currently, or may be in the future, impacted by degraded water quality; • Able to define the three-dimensional extent of existing seawater intrusion; • Sufficient for mapping movement of seawater or degraded water quality; and • Sufficient to assess groundwater quality impacts on beneficial uses and users. May be optimized by: • Including geophysical techniques to identify the preferential pathways controlling seawater intrusion; and • Targeting critical connections to existing water supply wells and mitigation efforts.	• Must analyze for chloride concentration; • Additional analytes may be desirable; and • Use of a surrogate (e.g., electrical conductivity) must be demonstrated through correlative analysis.

Table 1
Summary of Monitoring Network Considerations

Undesirable Result	Infrastructure / Approach	Measurement Type	Temporal Considerations	Spatial Considerations	Other Considerations
Degraded Water Quality	Monitoring Wells	Groundwater Quality	Must be measured at times generally correlated to seasonal high and low, or more frequent as appropriate.	Must be: • Adequate to map or supplement mapping of known contaminants; • From each aquifer that is currently, or may be in the future, impacted by degraded water quality; • Able to define the three-dimensional extent of existing degraded water quality; • Sufficient for mapping movement of degraded water quality; • Sufficient to assess groundwater quality impacts to beneficial uses and users; and • Adequate to evaluate whether management activities are contributing to water quality degradation.	Supplement to existing monitoring under regulatory programs (i.e., contaminant plumes); Additional may be needed to address unregulated contaminant plumes and naturally occuring water quality impacts
Land Subsidence	Level Surveys	Elevation	Should reflect results of initial screening level analysis for subsidence.	Should reflect results of initial screening level analysis for subsidence, which should include review of: • The Basin's HCM and understanding of grain-size distributions and potential for subsidence to occur; • Any known regional or correlative geologic conditions where subsidence has been observed; • Historic range of groundwater levels in the principal aquifers of the Basin; • Historic records of infrastructure impacts, including, but not limited to, damage to pipelines, canals, roadways, or bridges, or well collapse potentially associated with land surface elevation changes; • Remote sensing results such as InSAR or other land surface monitoring data; and • Existing CGPS surveys.	Following Caltrans Surveys Manual and tied to known benchmarks.
	Borehole Extensometers	Change in Elevation			Following extensometry principles and methods used by the USGS.
	CGPS Locations	Elevation			Following Caltrans Surveys Manual.
	Remote Sensing	InSAR data			Requires data (some available for free) and processing is "not a trivial task" (BMP, p. 20).
	Monitoring Wells	Groundwater Level			Correlation of subsidence to groundwater level must be demonstrated.

Table 1
Summary of Monitoring Network Considerations

Undesirable Result	Infrastructure / Approach	Measurement Type	Temporal Considerations	Spatial Considerations	Other Considerations
Depletions of Interconnected Surface Waters (b)	Modeling	Calculated Exchange between Surface Water and Groundwater			Requires input parameters and assumptions to be made which should be based on empirical observations.
	Stream Gauges	Surface Water Flow		Must account for surface water diversions and return flows or gauging locations must be selected over which no diversions or return flows exist.	Measurements should be in accordance with USGS WSP 2175, Volumes 1 and 2.
	Monitoring Wells	Groundwater Level	Adequate to capture seasonal pumping conditions in vicinity-connected surface water bodies.	Network should: • Extend parallel and perpendicular to connected streams; and • Identify and quantify timing and volume of groundwater pumping within approximately 3 miles of stream or as appropriate for the flow regime.	
	Visual Observation	Flow Cessation			Qualitative evaluation of timing and position of cessation of flow in ephemeral streams may contribute to understanding of surface water depletion.
	Other Methods for Initial Characterization	Stream Bed Conductance Surveys; Aquifer Testing; Isotopic / Geochemical Studies; Geophysical Techniques			May help to establish an appropriate monitoring method that would best provide parameters for a model or another technique to estimate depletion of surface water.

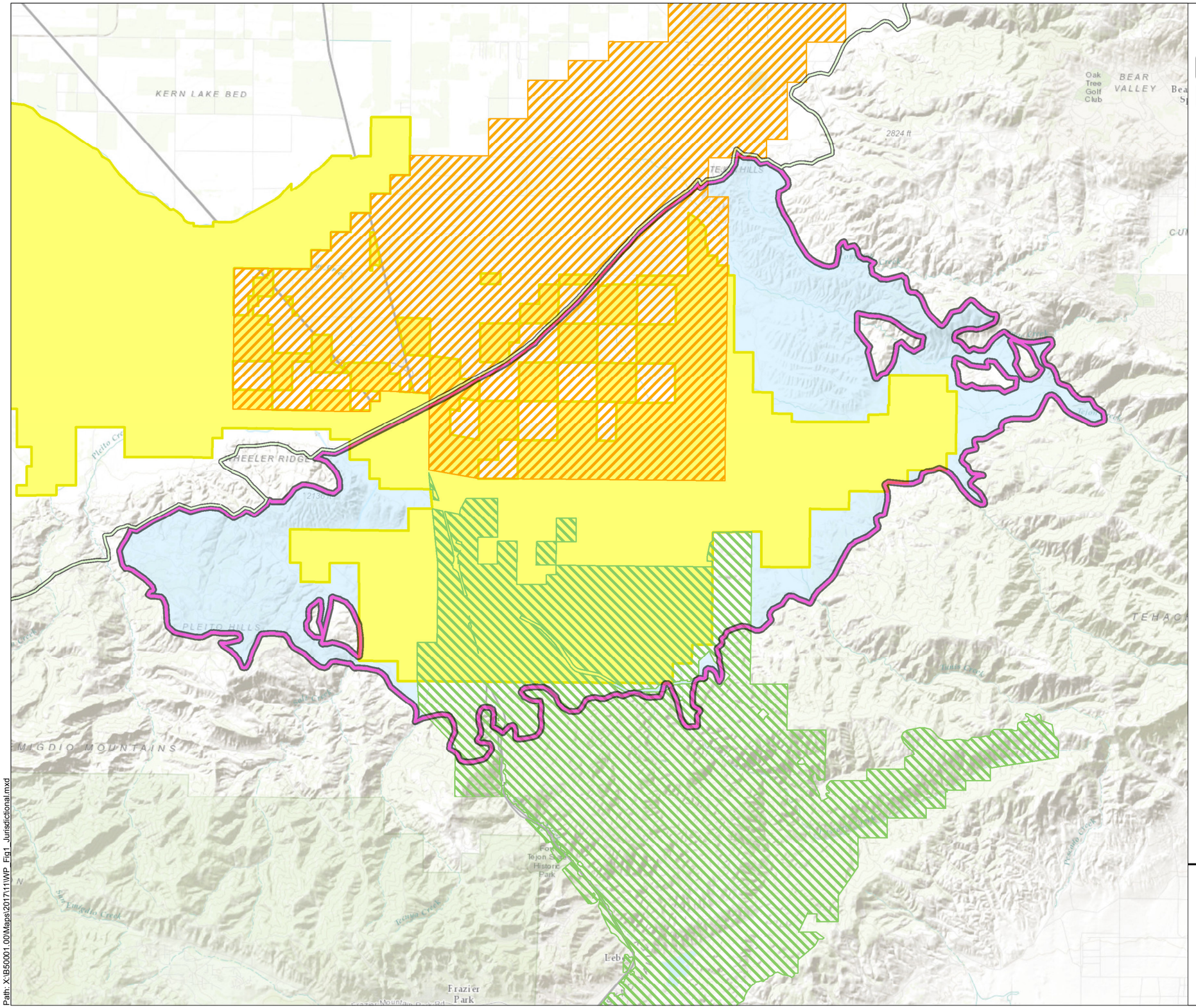
Abbreviations

BMP = Best Management Practices
Caltrans = California Department of Transportation
CGPS = continuous global position system
DWR = California Department of Water Resources
InSAR = interferometric synthetic aperture radar
USGS = United States Geological Survey
WSP = Water Supply Paper

Notes

(a) This table has been created as a summary of the guidance provided in DWR's *Best Management Practices for the Sustainable Management of Groundwater: Monitoring Networks and Identification of Data Gaps* document, referred to herein as "BMP".

(b) Several infrastructure / approach options will have to be utilized to characterize and monitor potential depletion of interconnected surface water(s); use of a model would require data collection for input parameters.



Legend

Groundwater Subbasin

- White Wolf
- Kern County

Service Area

- AEWSD Service Area
- TCWD Service Area
- WRMWSD Service Area
- Kern County (outside of other GSA parties' jurisdictions)

Abbreviations

AEWSD	=	Arvin-Edison Water Storage District
DWR	=	California Department of Water Resources
TCWD	=	Tejon-Castac Water District
WRMWSD	=	Wheeler Ridge-Maricopa Water Storage District

Notes

1. All locations are approximate.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 November 2017.
2. DWR groundwater basins are based on the Final 2016 Basin Boundaries, dated 18 October, 2016.

N

0 2.5 5

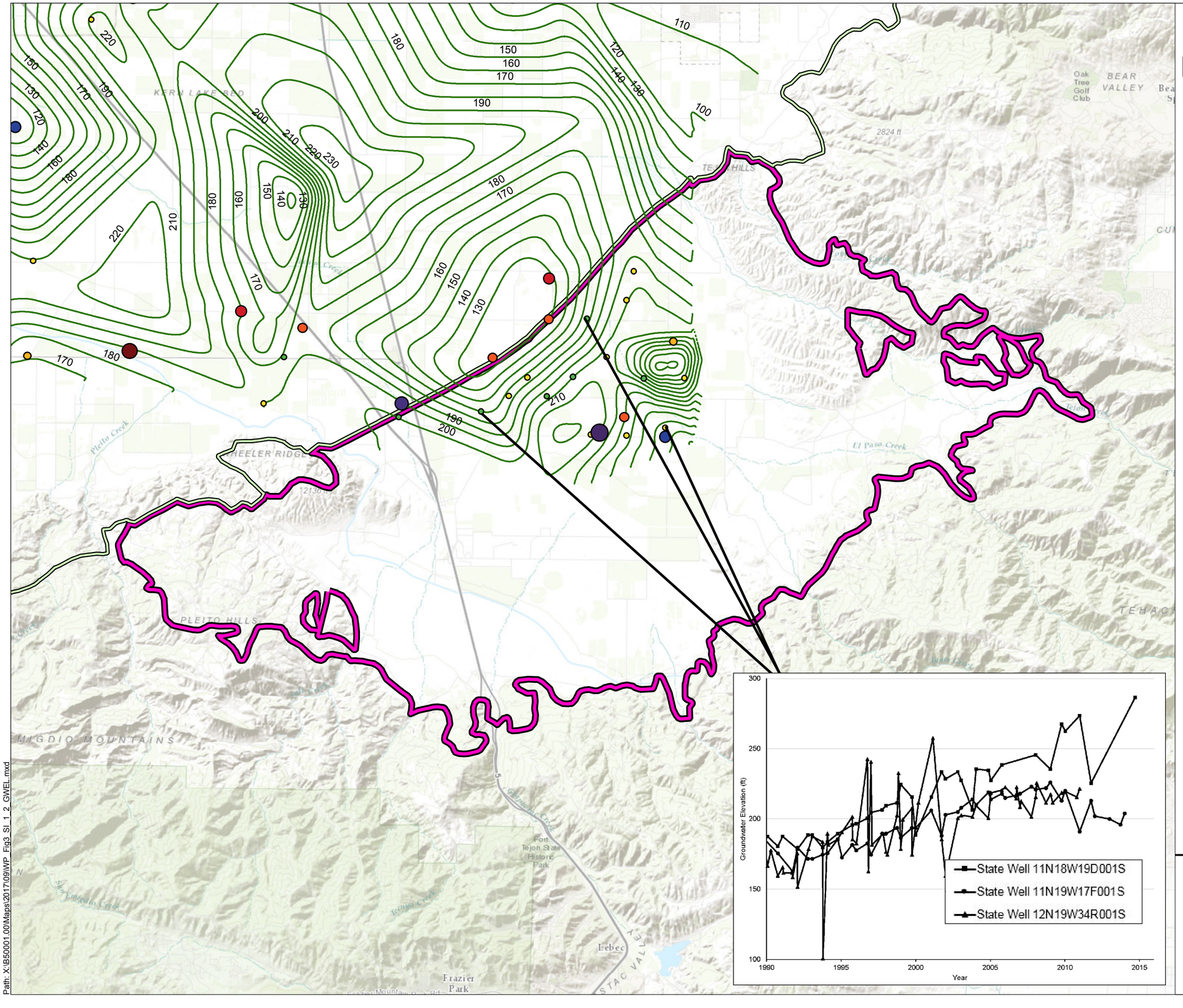
(Scale in Miles)

White Wolf Subbasin
Jurisdictional Boundaries

Tejon-Castac Water District
Kern County, CA
November 2017
EKI B50001.04
Figure 1

eki environment & water

Path: X:\B50001.00\Maps\2017\11\WP_Fig1_Jurisdictional.mxd



Legend

Groundwater Subbasin

- White Wolf
- Kern County
- DWR Groundwater Elevation Contours

CASGEM Point Data

- > 60 foot decline
- 50 - 60 foot decline
- 40 - 50 foot decline
- 30 - 40 foot decline
- 20 - 30 foot decline
- 10 - 20 foot decline
- 0 -10 foot decline
- 0 - 10 foot increase
- 10 - 20 foot increase
- 20 - 30 foot increase
- 30 - 40 foot increase
- 40 - 50 foot increase
- 50 - 60 foot increase
- > 60 foot increase

Abbreviations

CASGEM	= California Statewide Groundwater Elevation Monitoring
DWR	= California Department of Water Resources
GSA	= Groundwater Sustainability Agency
GWE	= Groundwater Elevation
UR	= Undesirable Result

Notes

1. All locations are approximate.
2. Countour lines represent a 10-ft interval of GWE for Spring 2013.

Sources

1. DWR groundwater basins are based on the Final 2016 Basin Boundaries, dated 18 October, 2016.
2. The White Wolf GSA area is the same as the White Wolf Subbasin.
3. Groundwater elevation contours obtained from the DWR Groundwater Information Center.
4. Groundwater elevation change point and hydrograph data from the CASGEM public portal.
5. Topographic map provided by ESRI's ArcGIS Online, obtained 27 September 2017.

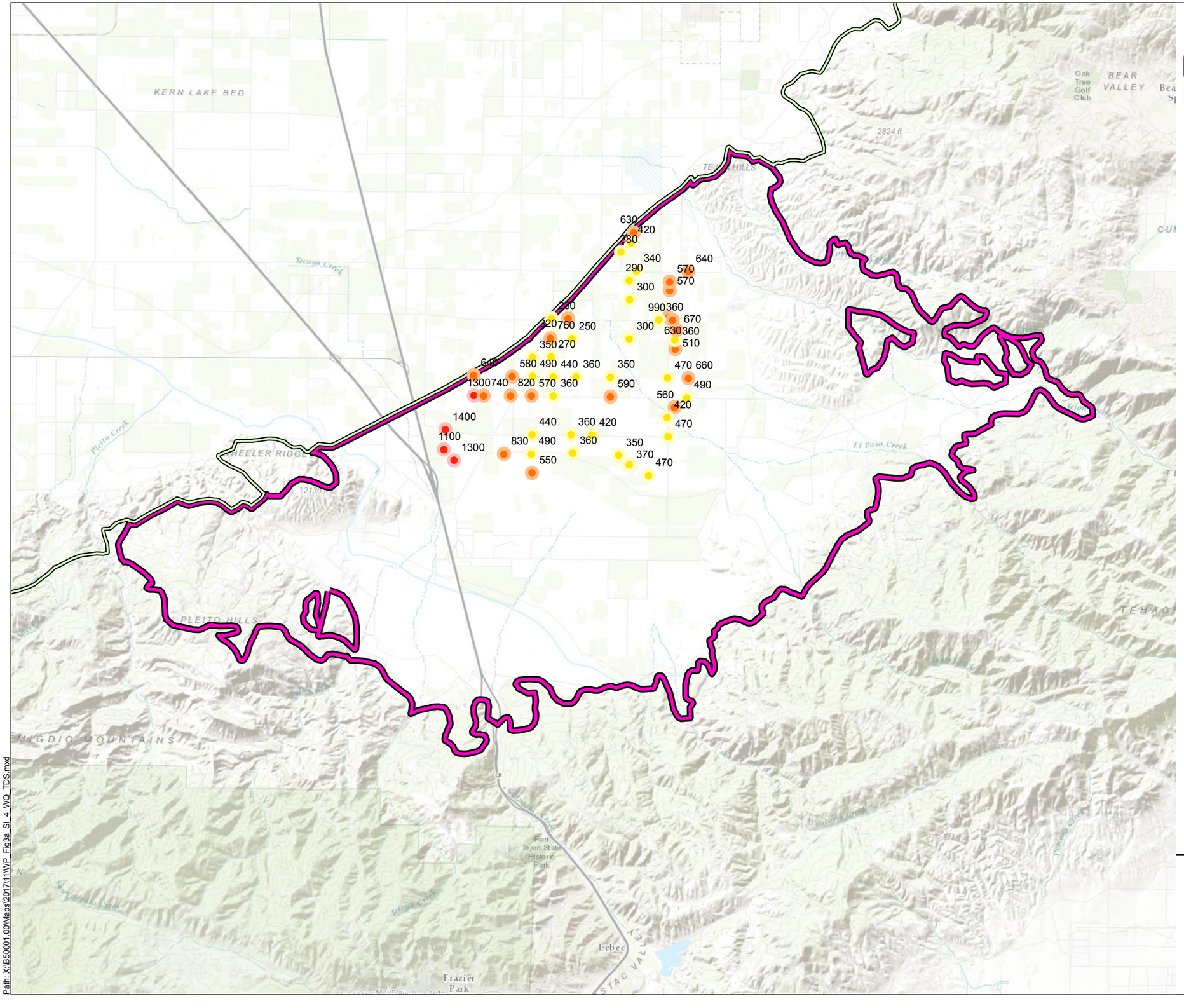
Evaluation of Available Data and Assessment of Sustainability Indicators #1 and #2 - Groundwater Elevation Change and Contours

Tejon-Castac Water District
Kern County, CA
November 2017
EKI B50001.04

Figure 2

eki environment & water

Path: X:\B50001.00\Maps\2017\09\WP_Fig3_SI_1_2_GWEL.mxd



Legend

Groundwater Subbasin

- White Wolf
- Kern County

Total Dissolved Solids Concentration (mg/L)

- 33 - 200
- 200 - 500
- 500 - 1000
- > 1000

Abbreviations

AEWSD	=	Arvin-Edison Water Storage District
CCR	=	California Code of Regulations
DWR	=	California Department of Water Resources
EPA	=	United States Environmental Protection Agency
MCL	=	Maximum Contaminant Level
mg/L	=	milligrams per Liter
TDS	=	Total Dissolved Solids
UR	=	Undesirable Result

Notes

1. All locations are approximate.
2. For a given well, reported water quality values represent the latest sample collected during the 2016 calendar year.
3. Water quality data provided by AEWSD.
4. TDS measurements obtained using EPA-160.1 method, with a detection limit of 33 mg/L.
5. CCR 22-4 Table 64449-B lists "Upper" Secondary MCL for TDS at 1000 mg/L.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 November 2017.
2. DWR groundwater basins are based on the Final 2016 Basin Boundaries, dated 18 October, 2016.
3. Water quality data obtained from AEWSD on 3 April 2017.

N

0 2.5 5

(Scale in Miles)

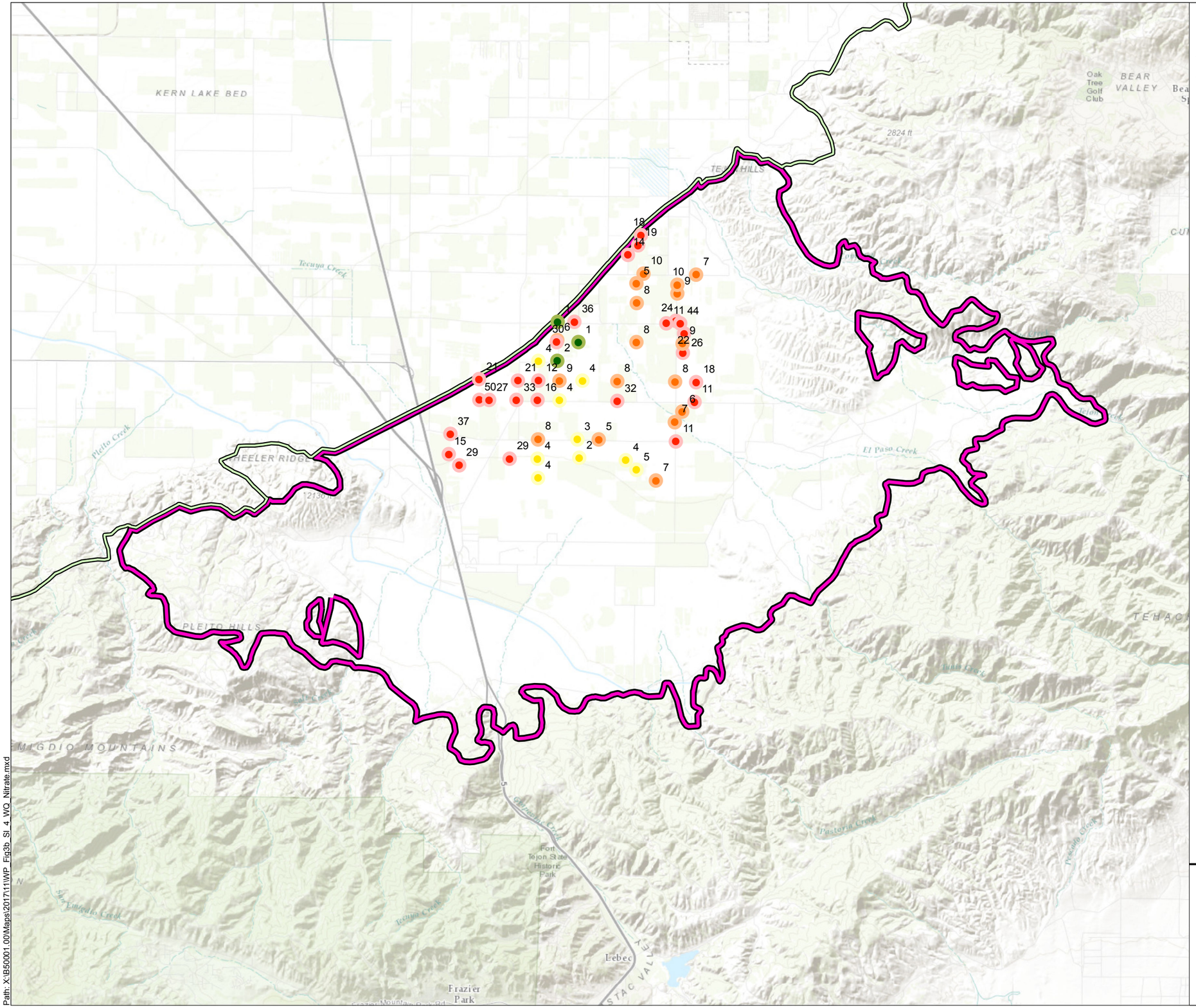
Evaluation of Available Data and Assessment of Sustainability Indicator #4 - Water Quality - Total Dissolved Solids

Tejon-Castac Water District
Kern County, CA
November 2017
EKI B50001.04

Figure 3a

eki environment & water

Path: X:\B50001.00\Maps\2017\11\WP_Fig3a_SI_4_WQ_TDS.mxd



Legend

Groundwater Subbasin

- White Wolf
- Kern County

Nitrate (as N) Concentration (mg/L)

- ND (< 0.1)
- 0.1 - 2
- 2 - 5
- 5 - 10
- > 10

Abbreviations

AEWSD	=	Arvin-Edison Water Storage District
CCR	=	California Code of Regulations
DWR	=	California Department of Water Resources
EPA	=	United States Environmental Protection Agency
MCL	=	Maximum Contaminant Level
mg/L	=	milligrams per Liter
ND	=	Not Detected
UR	=	Undesirable Result

Notes

1. All locations are approximate.
2. For a given well, reported water quality values represent the latest sample collected during the 2016 calendar year.
3. Water quality data provided by AEWSD.
4. Nitrate measurements obtained using EPA-300.0 method, with a detection limit of 0.1 mg/L.
5. CCR 22-4 Table 64431-A lists Primary MCL for Nitrate (as N) at 10 mg/L.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 November 2017.
2. DWR groundwater basins are based on the Final 2016 Basin Boundaries, dated 18 October, 2016.
3. Water quality data obtained from AEWSD on 3 April 2017.

N

0 2.5 5

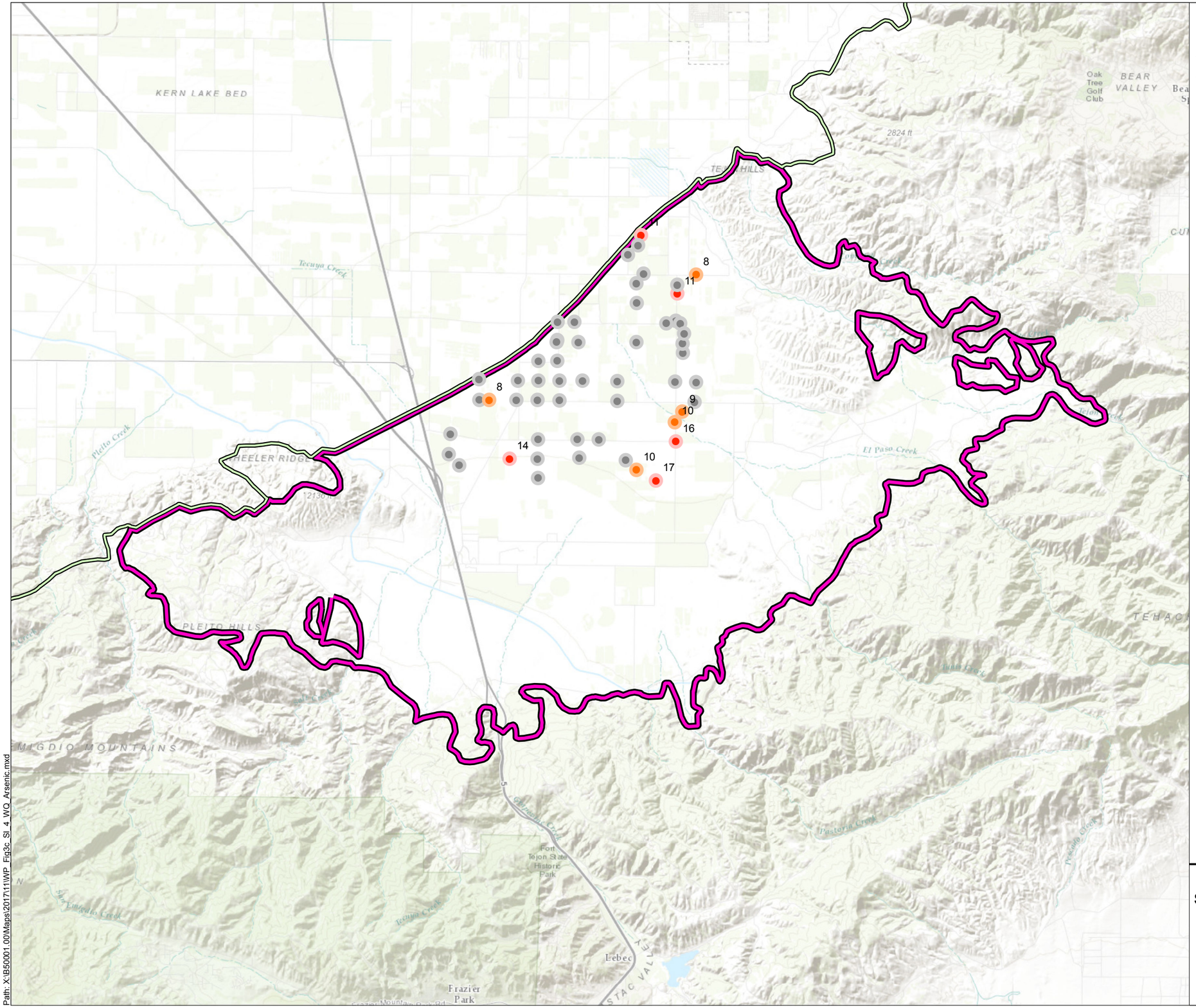
(Scale in Miles)

Evaluation of Available Data and Assessment of Sustainability Indicator #4 - Water Quality - Nitrate

Tejon-Castac Water District
Kern County, CA
November 2017
EKI B50001.04
Figure 3b

eki environment & water

Path: X:\B50001.00\Maps\2017\11\WP_Fig3b_SI_4_WQ_Nitrate.mxd



Legend

Groundwater Subbasin

- White Wolf
- Kern County

Total Recoverable Arsenic Concentration (ug/L)

- ND (< 7.8)
- 7.8 - 10
- > 10

Abbreviations

AEWSD	=	Arvin-Edison Water Storage District
CCR	=	California Code of Regulations
DWR	=	California Department of Water Resources
EPA	=	United States Environmental Protection Agency
MCL	=	Maximum Contaminant Level
ug/L	=	micrograms per Liter
ND	=	Not Detected
UR	=	Undesirable Result

Notes

1. All locations are approximate.
2. For a given well, reported water quality values represent the latest sample collected during the 2016 calendar year.
3. Water quality data provided by AEWSD.
4. Arsenic measurements obtained using EPA-200.7 method, with a detection limit of 7.8 ug/L.
5. CCR 22-4 Table 64431-A lists Primary MCL for Arsenic at 10 ug/L.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 November 2017.
2. DWR groundwater basins are based on the Final 2016 Basin Boundaries, dated 18 October, 2016.
3. Water quality data obtained from AEWSD on 3 April 2017.

N

0 2.5 5

(Scale in Miles)

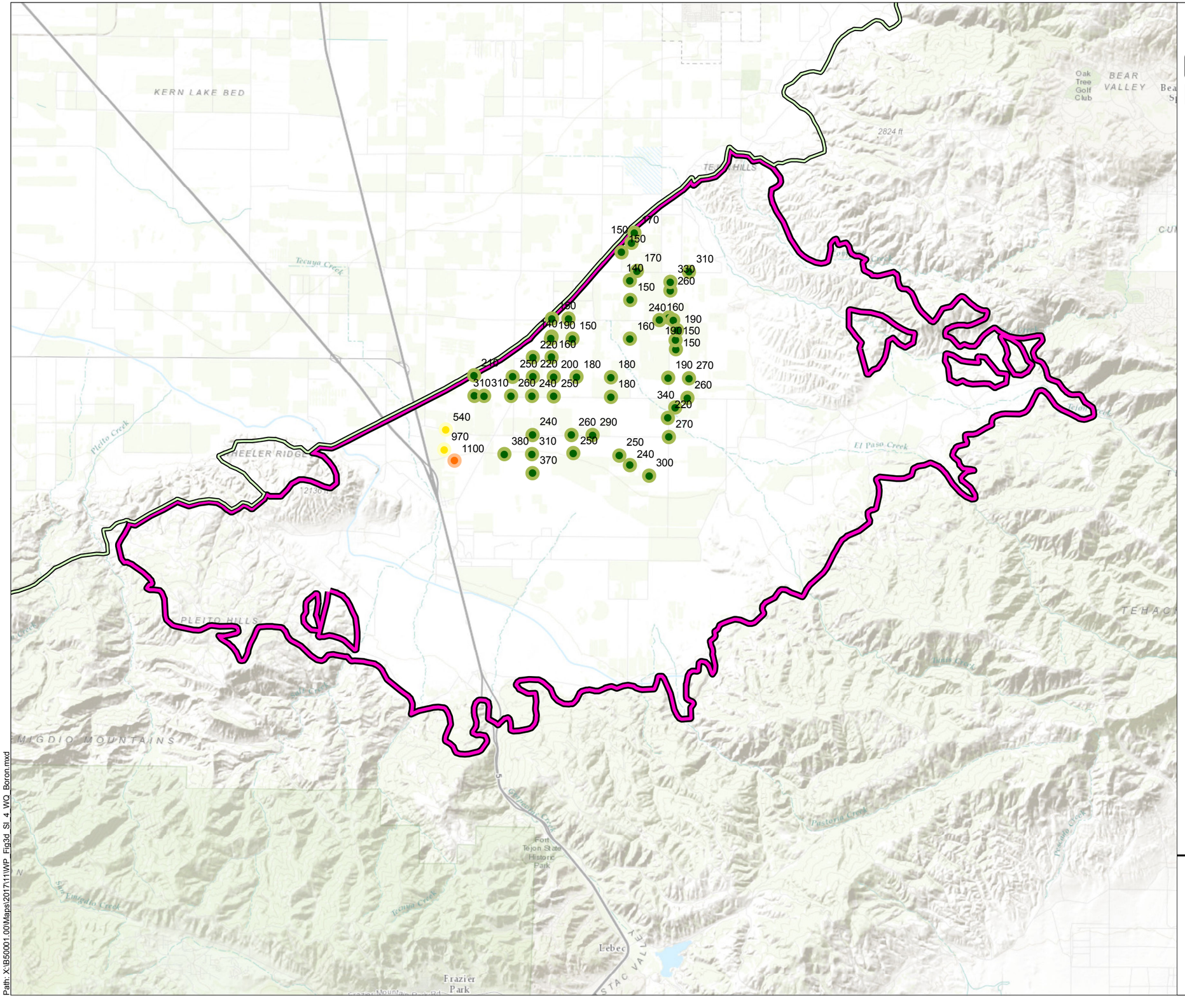
Evaluation of Available Data and Assessment of Sustainability Indicator #4 - Water Quality - Arsenic

Tejon-Castac Water District
Kern County, CA
November 2017
EKI B50001.04

Figure 3c

eki environment & water

Path: X:\B50001.00\Maps\2017\11\WP_Fig3c_SI_4_WQ_Arsenic.mxd



Legend

Groundwater Subbasin

White Wolf

Kern County

Total Recoverable Boron Concentration (ug/L)

10 - 400

400 - 1000

1000 - 2000

> 2000

Abbreviations

AEWSD	=	Arvin-Edison Water Storage District
CCR	=	California Code of Regulations
DWR	=	California Department of Water Resources
EPA	=	United States Environmental Protection Agency
MCL	=	Maximum Contaminant Level
ug/L	=	micrograms per Liter
ND	=	Not Detected
UR	=	Undesirable Result

Notes

1. All locations are approximate.
2. For a given well, reported water quality values represent the latest sample collected during the 2016 calendar year.
3. Water quality data provided by AEWSD.
4. Boron measurements obtained using EPA-200.7 method, with a detection limit of 10 ug/L.
5. Boron levels >700-2000 ug/L can exhibit slight to moderate restrictions on agricultural productivity, depending on crop type.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 November 2017.
2. DWR groundwater basins are based on the Final 2016 Basin Boundaries, dated 18 October, 2016.
3. Water quality data obtained from AEWSD on 3 April 2017.

N

0 2.5 5

(Scale in Miles)

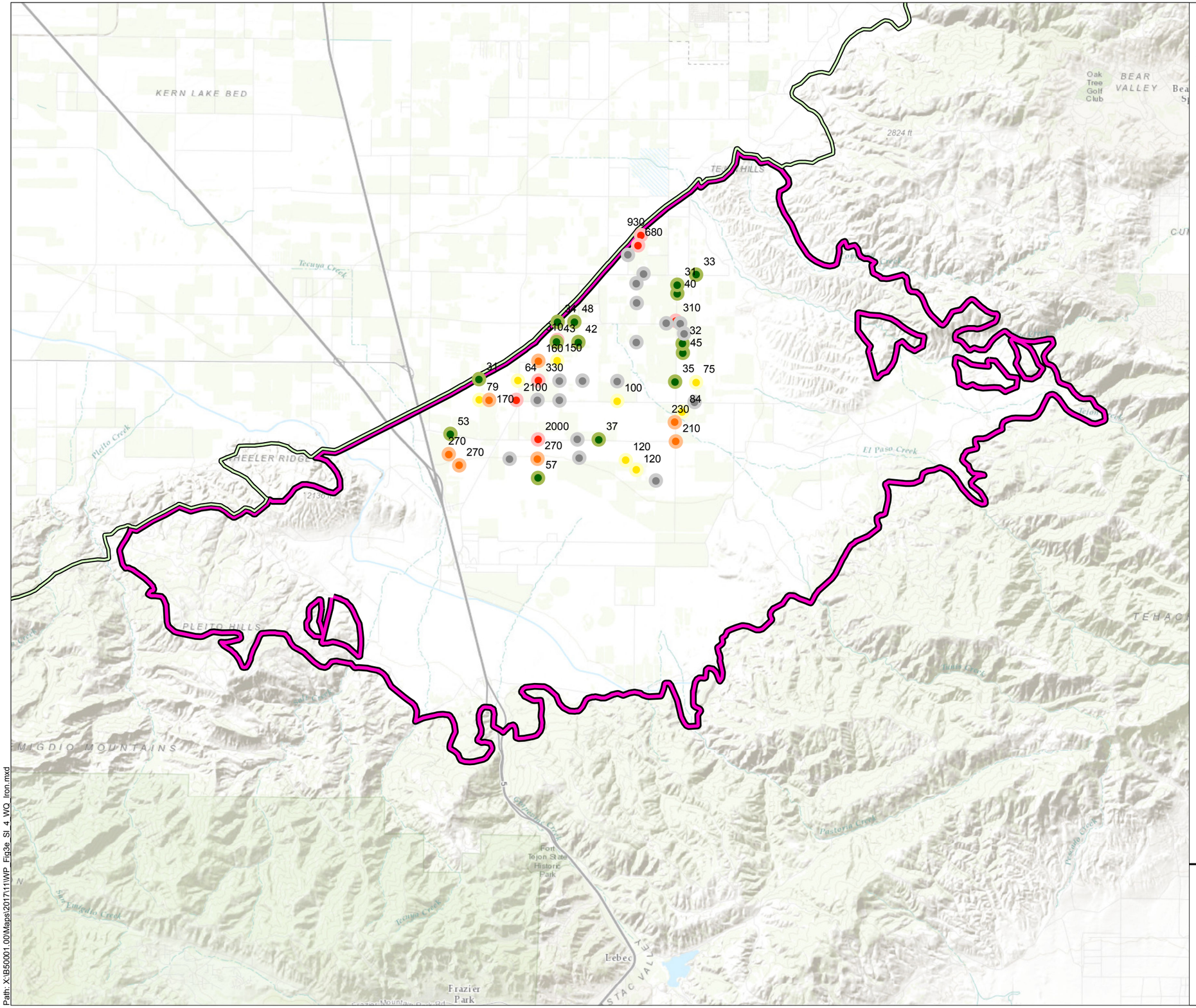
Evaluation of Available Data and Assessment of Sustainability Indicator #4 - Water Quality - Boron

Tejon-Castac Water District
Kern County, CA
November 2017
EKI B50001.04

Figure 3d

eki environment & water

Path: X:\B50001.00\Maps\2017\11\WP_Fig3d_SI_4_WQ_Boron.mxd



Legend

Groundwater Subbasin

- White Wolf
- Kern County

Total Recoverable Iron Concentration (ug/L)

- ND (<30)
- 30 - 60
- 60 - 150
- 150 - 300
- > 300

Abbreviations

AEWSD	=	Arvin-Edison Water Storage District
CCR	=	California Code of Regulations
DWR	=	California Department of Water Resources
EPA	=	United States Environmental Protection Agency
MCL	=	Maximum Contaminant Level
ug/L	=	micrograms per Liter
ND	=	Not Detected
UR	=	Undesirable Result

Notes

1. All locations are approximate.
2. For a given well, reported water quality values represent the latest sample collected during the 2016 calendar year.
3. Water quality data provided by AEWSD.
4. Iron measurements obtained using EPA-200.7 method, with a detection limit of 30 ug/L.
5. CCR 22-4 Table 64449-A lists Secondary MCL for Iron at 300 ug/L..

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 November 2017.
2. DWR groundwater basins are based on the Final 2016 Basin Boundaries, dated 18 October, 2016.
3. Water quality data obtained from AEWSD on 3 April 2017.

N

0 2.5 5

(Scale in Miles)

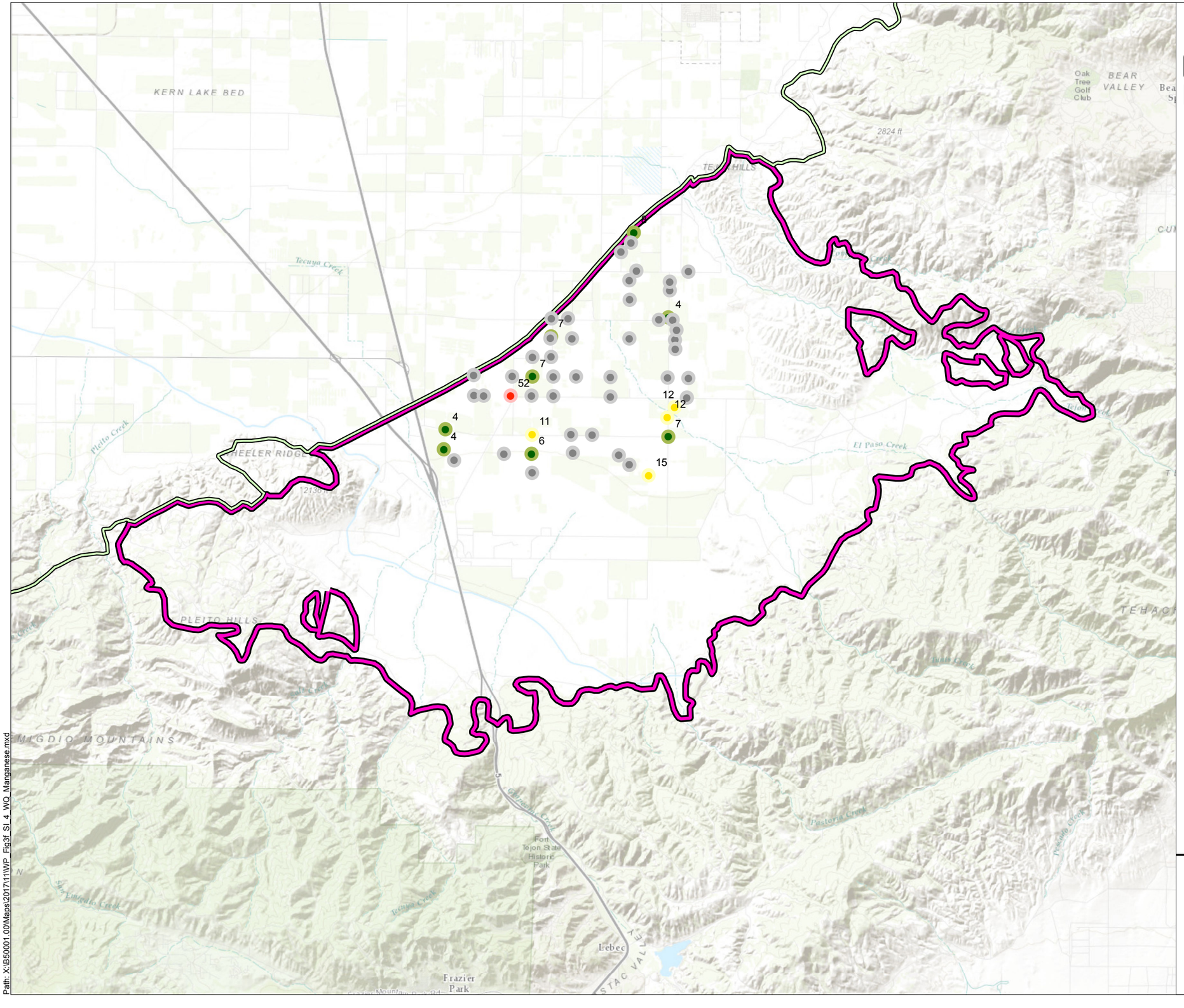
Evaluation of Available Data and Assessment of Sustainability Indicator #4 - Water Quality - Iron

Tejon-Castac Water District
Kern County, CA
November 2017
EKI B50001.04

Figure 3e

eki environment & water

Path: X:\B50001.00\Maps\2017\11\WP_Fig3e_SI_4_WQ_Iron.mxd



Legend

Groundwater Subbasin

- White Wolf
- Kern County

Total Recoverable Manganese Concentration (ug/L)

- ND (< 4)
- 4 - 10
- 10 - 25
- 25 - 50
- > 50

Abbreviations

AEWSD	=	Arvin-Edison Water Storage District
CCR	=	California Code of Regulations
DWR	=	California Department of Water Resources
EPA	=	United States Environmental Protection Agency
MCL	=	Maximum Contaminant Level
ug/L	=	micrograms per Liter
ND	=	Not Detected
UR	=	Undesirable Result

Notes

1. All locations are approximate.
2. For a given well, reported water quality values represent the latest sample collected during the 2016 calendar year.
3. Water quality data provided by AEWSD.
4. Manganese measurements obtained using EPA-200.7 method, with a detection limit of 4 ug/L.
5. CCR 22-4 Table 64449-A lists Secondary MCL for Manganese at 50 ug/L.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 November 2017.
2. DWR groundwater basins are based on the Final 2016 Basin Boundaries, dated 18 October, 2016.
3. Water quality data obtained from AEWSD on 3 April 2017.

N

0 2.5 5

(Scale in Miles)

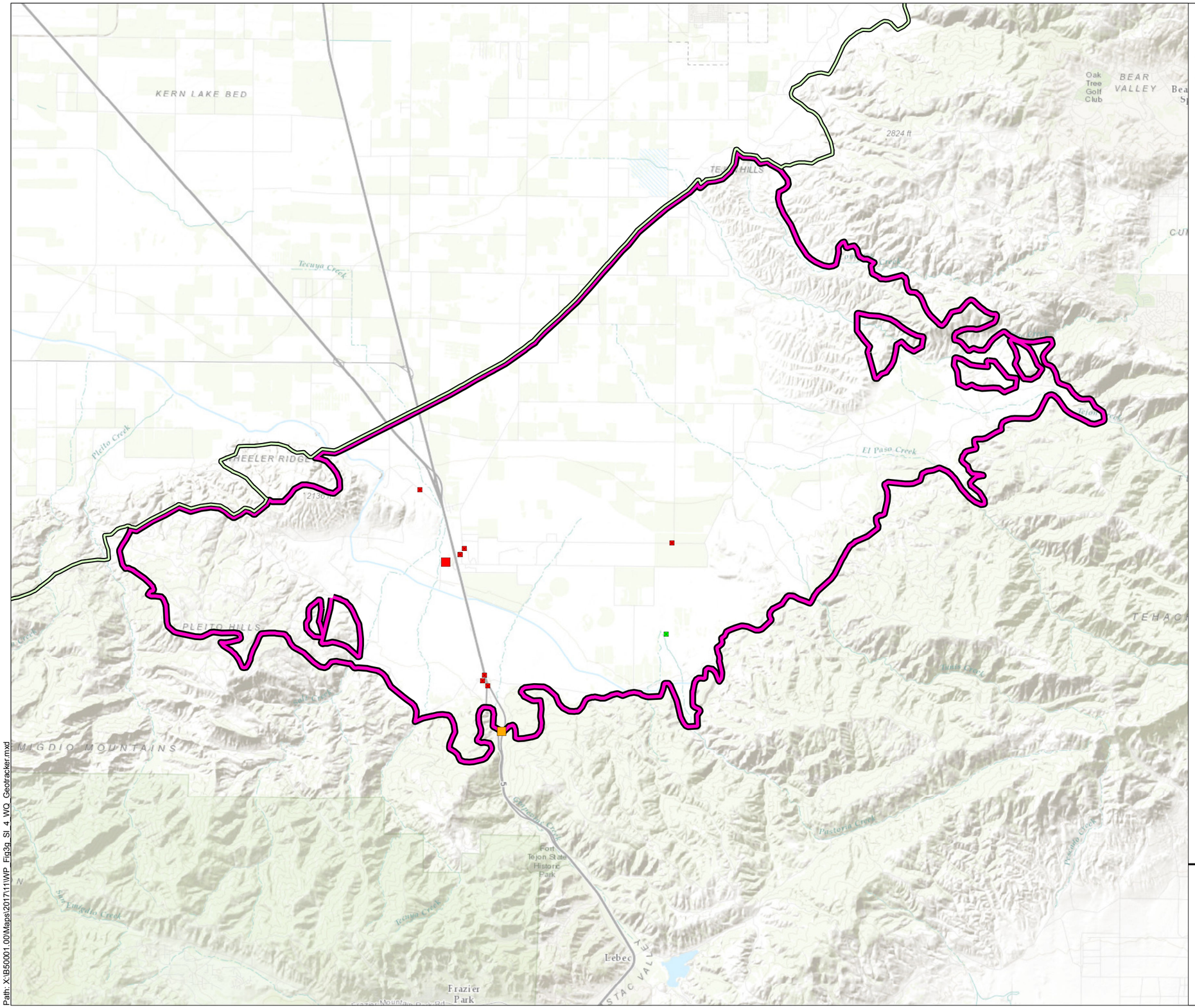
Evaluation of Available Data and Assessment of Sustainability Indicator #4 - Water Quality Manganese

Tejon-Castac Water District
Kern County, CA
November 2017
EKI B50001.04

Figure 3f

eki environment & water

Path: X:\B50001.00\Maps\2017\11\WP_Fig3f_SI_4_WQ_Manganese.mxd



Legend

Groundwater Subbasin

- White Wolf
- Kern County

GeoTracker Sites

- Cleanup Program Site, Open
- Cleanup Program Site, Closed
- LUST Cleanup Site, Open
- LUST Cleanup Site, Closed
- Military/UST Site, Open
- Military/UST Site, Closed
- Land Disposal Site, Open
- Land Disposal Site, Closed

Abbreviations

DWR	=	California Department of Water Resources
LUST	=	Leaking Underground Storage Tank
SWRCB	=	State Water Resources Control Board
UR	=	Undesirable Result
UST	=	Underground Storage Tank

Notes

1. All locations are approximate.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 November 2017.
2. DWR groundwater basins are based on the Final 2016 Basin Boundaries, dated 18 October, 2016.
3. Locations of contamination sites from SWRCB GeoTracker website (http://geotracker.waterboards.ca.gov/datadownload), accessed 31 August 2017.

N

0 2.5 5

(Scale in Miles)

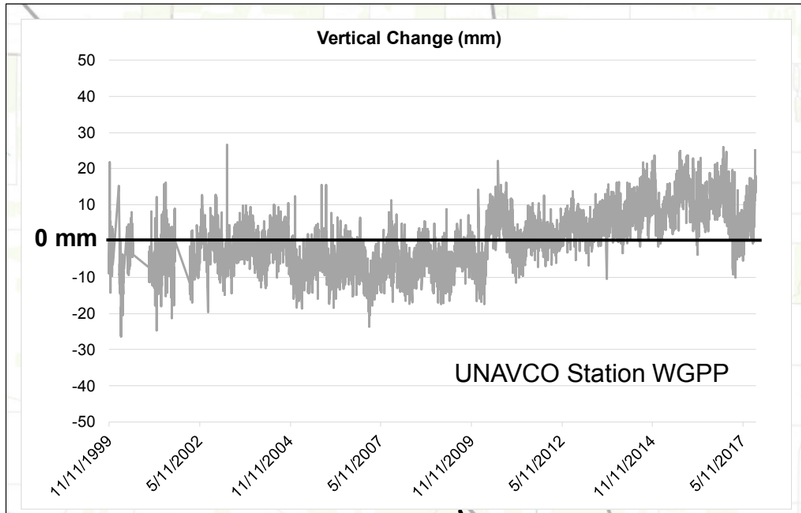
Evaluation of Available Data and Assessment of Sustainability Indicator #4 - Water Quality
GeoTracker Sites

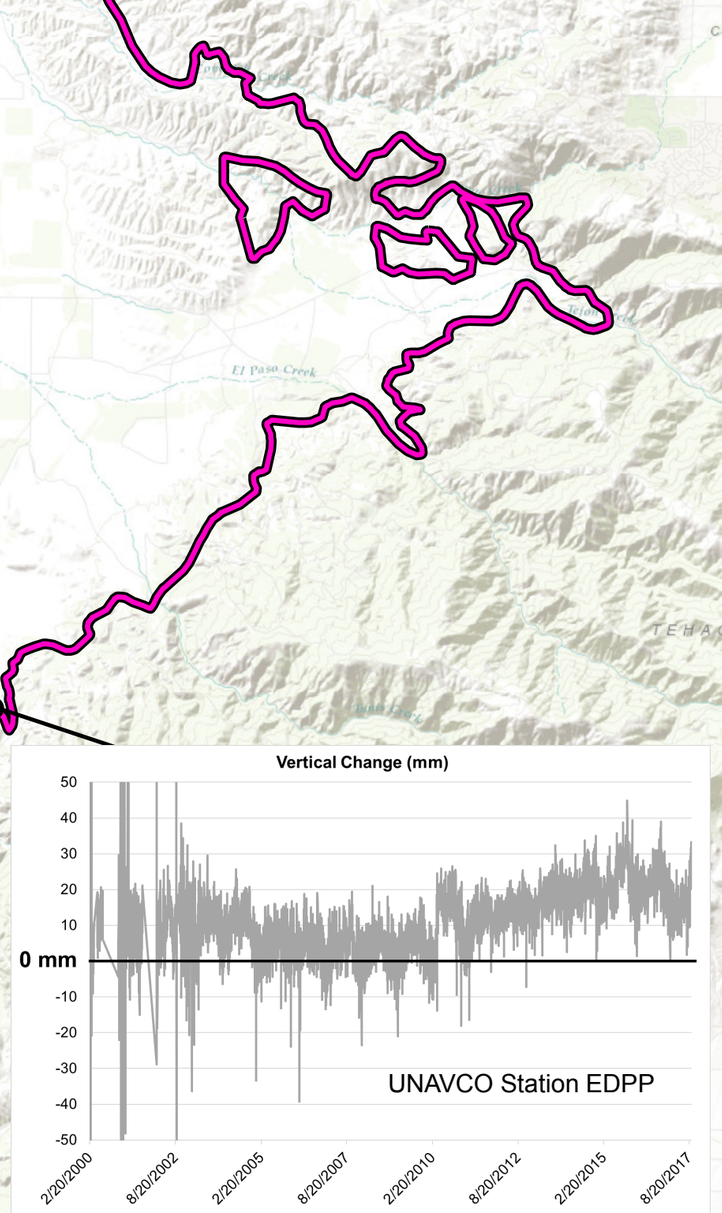
Tejon-Castac Water District
Kern County, CA
November 2017
EKI B50001.04

Figure 3g

eki environment & water

Path: X:\B50001.00\Maps\2017\11\WP_Fig3g_SI_4_WQ_Geotracker.mxd





Legend

Groundwater Subbasin

- White Wolf
- Kern County
- UNAVCO Station

Abbreviations

DWR = California Department of Water Resources
mm = millimeters
UR = Undesirable Result

Notes

1. All locations are approximate.
2. Vertical change in millimeters measured with respect to initial elevation on first measurement date. For UNAVCO Station WGPP (northwest portion of the White Wolf Subbasin), the first measurement was taken on 11 November 1999. For UNAVCO Station EDPP (southern border of the White Wolf Subbasin), the first measurement was taken on 20 February 2000.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 November 2017.
2. DWR groundwater basins are based on the Final 2016 Basin Boundaries, dated 18 October, 2016.
3. Land subsidence data acquired from UNAVCO's Plate Boundary Observatory database on 18 September 2017.

N

0 2.5 5

(Scale in Miles)

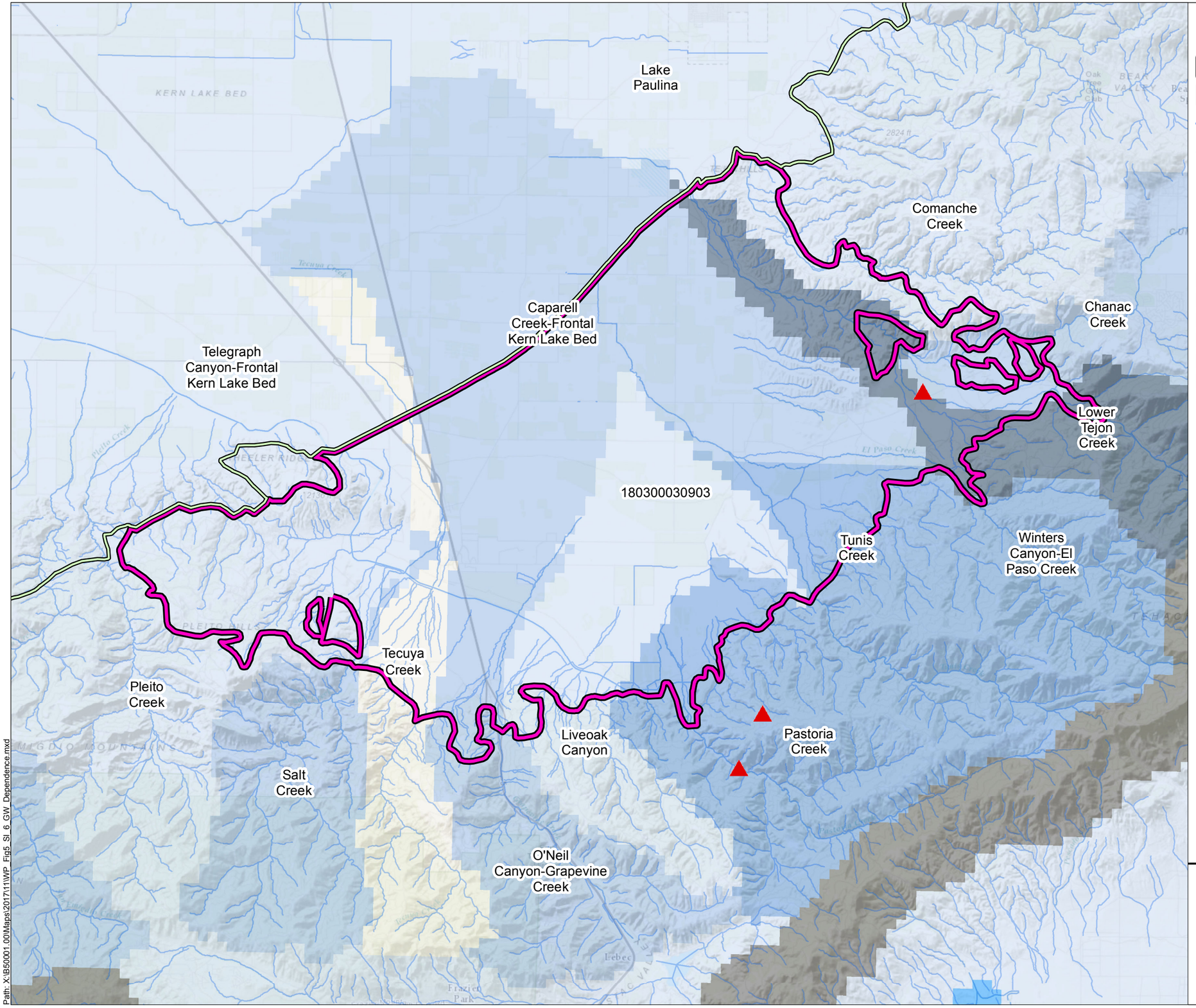
Evaluation of Available Data and Assessment of Sustainability Indicator #5 - Land Subsidence

Tejon-Castac Water District
Kern County, CA
November 2017
EKI B50001.04

Figure 4

eki environment & water

Path: X:\B50001.00\Maps\2017\11\WP_Fig4_SI_5_Land_Subsidence.mxd



Legend

Groundwater Subbasin

- White Wolf
- Kern County

- Major Rivers / Creeks
- Minor Creeks
- Tributaries

Stream Gauges

- USGS Streamflow Gauge

Groundwater Dependence by Watershed

- None
- Very Low
- Low
- Medium
- High
- Hydrogologic Divide Line

Abbreviations

DWR	= California Department of Water Resources
NHD	= National Hydrography Dataset
TNC	= The Nature Conservancy
USGS	= United States Geological Survey

Notes

1. All locations are approximate.
2. "Groundwater Dependence by Watershed" as defined by TNC is based on the following factors (see Source 3):
   (1) density of springs and seeps
   (2) areal extent of wetlands and vegetation
   (3) baseflow index (% groundwater in stream discharge)
3. Small watersheds labelled based on NHD name.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 November 2017.
2. DWR groundwater basins are based on the Final 2016 Basin Boundaries, dated 18 October, 2016.
3. Streams and watersheds obtained from NHD.
4. Howard, J. and Merrifield, M. 2010. Mapping Groundwater Dependent Ecosystems in California. TNC.

N

0 2.5 5

(Scale in Miles)

Evaluation of Available Data and Assessment of Sustainability Indicator #6 Groundwater Dependence

Tejon-Castac Water District
Kern County, CA
November 2017
EKI B50001.04

Figure 5

eki environment & water

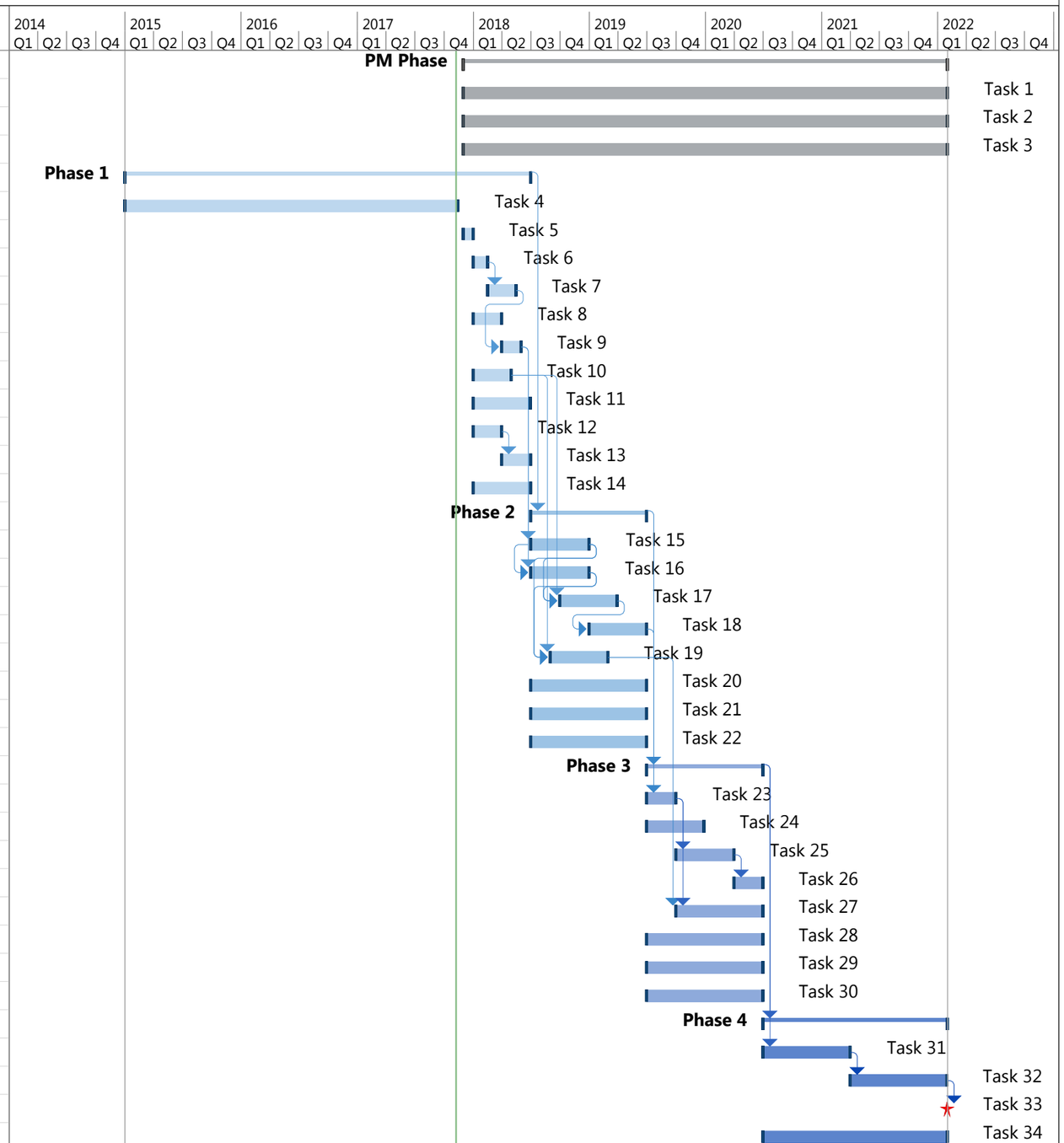
Path: X:\B50001.00\Maps\2017\11\WP_Fig5_SI_6_GW_Dependence.mxd

Attachment B

White Wolf GSA Proposition 1 Schedule

Attachment 6 - Project Schedule

ID	Phase/Task #	Phase/Task Name	Start	Finish	Duration
1	**PM Phase**	**Project Management**	**Fri 12/1/17**	**Mon 1/31/22**	**1087 days**
2	Task 1	Prop 1 Grant Management, Administration, and Reporting	Fri 12/1/17	Mon 1/31/22	1087 days
3	Task 2	Project Management	Fri 12/1/17	Mon 1/31/22	1087 days
4	Task 3	Quality Assurance/Quality Control	Fri 12/1/17	Mon 1/31/22	1087 days
5	**Phase 1**	**GSP Foundation**	**Thu 1/1/15**	**Sat 6/30/18**	**913 days**
6	Task 4	Conduct Preliminary GSP Development Efforts	Thu 1/1/15	Mon 11/13/17	748 days
7	Task 5	Provide Initial Notification of GSP Development	Fri 12/1/17	Sun 12/31/17	22 days
8	Task 6	Select or Design Data Management System	Mon 1/1/18	Thu 2/15/18	34 days
9	Task 7	Gather Available Data & Compile into DMS	Fri 2/16/18	Tue 5/15/18	63 days
10	Task 8	Compile Info on Plan Area & Basin Mgmt. Activities	Mon 1/1/18	Sat 3/31/18	66 days
11	Task 9	Conduct Data Gaps Assessment	Sun 4/1/18	Thu 5/31/18	45 days
12	Task 10	Evaluate Numerical Groundwater Model Options	Mon 1/1/18	Mon 4/30/18	86 days
13	Task 11	Update GSP Development Funding Plan	Mon 1/1/18	Fri 6/29/18	130 days
14	Task 12	Develop Stakeholder Communication & Engagement Plan	Mon 1/1/18	Sat 3/31/18	66 days
15	Task 13	Conduct Stakeholder Engagement Re: GSP Foundation	Sun 4/1/18	Sat 6/30/18	67 days
16	Task 14	Participate in Intrabasin & Interbasin Coordination Efforts	Mon 1/1/18	Sat 6/30/18	131 days
17	**Phase 2**	**Basin Characterization and Analysis**	**Sun 7/1/18**	**Sun 6/30/19**	**262 days**
18	Task 15	Implement Plan for Filling Data Gaps Needed for GSP Preparation	Sun 7/1/18	Mon 12/31/18	132 days
19	Task 16	Assess Groundwater Conditions & Develop HCM	Sun 7/1/18	Mon 12/31/18	132 days
20	Task 17	Coordinate Regarding C2VSim Modeling	Mon 10/1/18	Fri 3/29/19	130 days
21	Task 18	Develop Basin-Wide Water Budget	Tue 1/1/19	Sun 6/30/19	130 days
22	Task 19	Assess Existing Monitoring Programs & Develop SGMA Network	Sat 9/1/18	Thu 2/28/19	130 days
23	Task 20	Conduct Stakeholder Engagement Re: Basin Char. & Analysis	Sun 7/1/18	Sun 6/30/19	262 days
24	Task 21	Implement GSP Development Funding Plan	Sun 7/1/18	Sun 6/30/19	262 days
25	Task 22	Participate in Intrabasin & Interbasin Coordination Efforts	Sun 7/1/18	Sun 6/30/19	262 days
26	**Phase 3**	**Sustainability Planning**	**Mon 7/1/19**	**Tue 6/30/20**	**262 days**
27	Task 23	Evaluate Potential Management Areas	Mon 7/1/19	Mon 9/30/19	66 days
28	Task 24	Develop Sustainable Management Criteria	Mon 7/1/19	Fri 12/27/19	130 days
29	Task 25	Identify Projects and Management Actions	Tue 10/1/19	Tue 3/31/20	131 days
30	Task 26	Create GSP Implementation Plan	Wed 4/1/20	Tue 6/30/20	65 days
31	Task 27	Finalize Monitoring Network & Protocols	Tue 10/1/19	Tue 6/30/20	196 days
32	Task 28	Conduct Stakeholder Engagement Re: Sustainability Planning	Mon 7/1/19	Tue 6/30/20	262 days
33	Task 29	Implement GSP Development Funding Plan	Mon 7/1/19	Tue 6/30/20	262 days
34	Task 30	Participate in Intrabasin & Interbasin Coordination Efforts	Mon 7/1/19	Tue 6/30/20	262 days
35	**Phase 4**	**GSP Preparation & Submittal**	**Wed 7/1/20**	**Mon 1/31/22**	**414 days**
36	Task 31	Compile Complete Draft GSP	Wed 7/1/20	Wed 3/31/21	196 days
37	Task 32	Distribute Draft GSP & Revise per Stakeholder Feedback	Thu 4/1/21	Sun 1/30/22	218 days
38	Task 33	Submit Final GSP to DWR	Mon 1/31/22	Mon 1/31/22	1 day
39	Task 34	Participate in Intrabasin & Interbasin Coordination Efforts	Wed 7/1/20	Mon 1/31/22	414 days

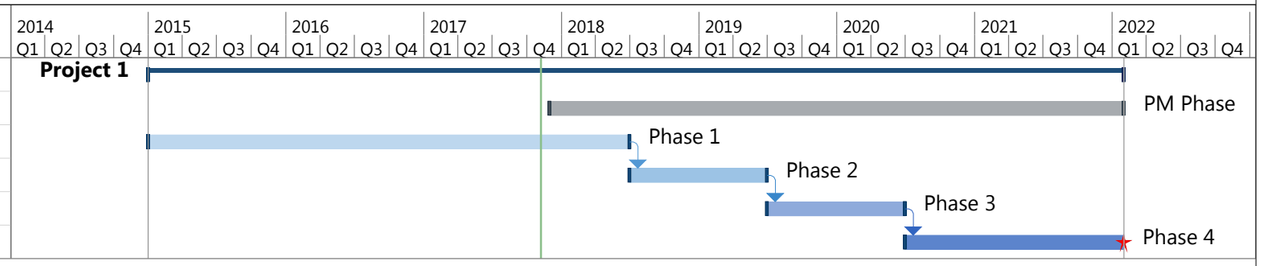


White Wolf Subbasin Groundwater Sustainability Plan Development
November 2017

Phase — Task — Milestone ★

Attachment 6 - Proposal Schedule

ID	Phase/Task #	Phase/Task Name	Start	Finish	Duration
1	**Project 1**	**GSP Development Project**	**Thu 1/1/15**	**Mon 1/31/22**	**1848 days**
2	PM Phase	Project Management	Fri 12/1/17	Mon 1/31/22	1087 days
3	Phase 1	GSP Foundation	Thu 1/1/15	Sat 6/30/18	913 days
4	Phase 2	Basin Characterization and Analysis	Sun 7/1/18	Sun 6/30/19	262 days
5	Phase 3	Sustainability Planning	Mon 7/1/19	Tue 6/30/20	262 days
6	Phase 4	GSP Preparation & Submittal	Wed 7/1/20	Mon 1/31/22	414 days



Attachment C

Cost Estimate to Develop a Groundwater Sustainability Plan Chapter

TABLE 2
COST ESTIMATE TO DEVELOP A GROUNDWATER SUSTAINABILITY PLAN CHAPTER
Tejon-Castac Water District
EKI B8-045

Task	Total Budget	Grant Reimbursable Amount (a)	White Wolf GSA Amount
Task 1 - Conduct Preliminary GSP Development Efforts	**$134,282**	**$77,133**	**$57,149**
Subtask 1.1 Provide Initial Notification of GSP Development	*$1,761*	*$1,002*	*$759*
Subtask 1.2 Select or Design Data Management System (DMS)	*$8,688*	*$4,943*	*$3,745*
Subtask 1.3 Gather Available Data and Compile into DMS	*$13,233*	*$7,803*	*$5,430*
Subtask 1.4 Compile Information on the Plan Area and Basin Management Activities	*$11,209*	*$6,560*	*$4,649*
Subtask 1.5 Conduct Data Gaps Assessment	*$33,387*	*$19,270*	*$14,117*
Subtask 1.6 Evaluate Numerical Groundwater Modeling Options	*$10,654*	*$6,062*	*$4,592*
Subtask 1.7 Update GSP Development Funding Plan	*$5,426*	*$3,087*	*$2,339*
Subtask 1.8 Develop Stakeholder Communication and Engagement Plan	*$15,827*	*$9,005*	*$6,822*
Subtask 1.9 Conduct Stakeholder Engagement Related to GSP Foundation	*$6,856*	*$3,901*	*$2,955*
Subtask 1.10 Participate in Intrabasin & Interbasin Coordination Efforts	*$27,242*	*$15,500*	*$11,742*
Task 2 - Develop Basin Setting Information	**$292,614**	**$119,964**	**$172,650**
Subtask 2.1 Implement Plan for Filling Data Gaps Needed for GSP Preparation	*$83,217*	*$0*	*$83,217*
Subtask 2.2 Assess Groundwater Conditions & Develop Hydrogeologic Conceptual Model	*$40,879*	*$23,806*	*$17,073*
Subtask 2.3 Coordinate Regarding C2VSim Modeling	*$12,630*	*$7,186*	*$5,444*
Subtask 2.4 Develop Basin-Wide Water Budget	*$74,233*	*$42,329*	*$31,904*
Subtask 2.5 Assess Existing Monitoring Programs & Develop SGMA-Compliant Monitoring Network	*$29,822*	*$17,150*	*$12,672*
Subtask 2.6 Conduct Stakeholder Engagement Related to Basin Characterization and Analysis	*$13,711*	*$7,802*	*$5,910*
Subtask 2.7 Implement GSP Development Funding Plan	*$1,340*	*$762*	*$577*
Subtask 2.8 Participate in Intrabasin & Interbasin Coordination Efforts	*$36,783*	*$20,929*	*$15,854*

TABLE 2
COST ESTIMATE TO DEVELOP A GROUNDWATER SUSTAINABILITY PLAN CHAPTER
Tejon-Castac Water District
EKI B8-045

Task	Total Budget	Grant Reimbursable Amount (a)	White Wolf GSA Amount
Task 3 - Develop Sustainable Management Criteria	**$254,542**	**$126,514**	**$128,028**
Subtask 3.1 Evaluate Potential Management Areas	*$6,947*	*$3,998*	*$2,949*
Subtask 3.2 Develop Sustainable Management Criteria	*$76,265*	*$43,713*	*$32,553*
Subtask 3.3 Identify Projects and Management Actions	*$56,200*	*$32,295*	*$23,904*
Subtask 3.4 Create GSP Implementation Plan	*$33,713*	*$0*	*$33,713*
Subtask 3.5 Finalize Monitoring Network & Protocols	*$29,584*	*$17,015*	*$12,569*
Subtask 3.6 Conduct Stakeholder Engagement Related to Sustainability Planning	*$13,711*	*$7,802*	*$5,910*
Subtask 3.7 Implement GSP Development Funding Plan	*$1,340*	*$762*	*$577*
Subtask 3.8 Participate in Intrabasin & Interbasin Coordination Efforts	*$36,783*	*$20,929*	*$15,854*
Task 4 - Prepare and Submit GSP	**$102,174**	**$58,409**	**$43,765**
Subtask 5.1 Compile Complete Draft GSP	*$27,535*	*$15,940*	*$11,595*
Subtask 5.2 Distribute Draft GSP and Revise per Stakeholder Feedback	*$23,596*	*$13,426*	*$10,170*
Subtask 5.3 Submit Final GSP to DWR	*$1,622*	*$923*	*$699*
Subtask 5.4 Participate in Intrabasin & Interbasin Coordination Efforts	*$49,421*	*$28,120*	*$21,301*
Task 5 - Project Management and Grant Administration	**$85,731**	**$48,871**	**$36,860**
Subtask 5.1 Proposition 1 Grant Management, Administration, and Reporting	$27,693	$15,757	$11,936
Subtask 5.2 Project Management	$48,483	$27,586	$20,897
Subtask 5.3 Quality Assurance/Quality Control	$9,556	$5,528	$4,028
TOTAL	**$869,343**	**$430,891**	**$438,452**

Abbreviations:

C2VSim = California Central Valley Groundwater-Surface Water Simulation Model
DMS = Data Management System
DWR = California Department of Water Resources
GSA = Groundwater Sustainability Agency
GSP = Groundwater Sustainability Plan
HCM = Hydrogeologic Conceptual Model

Notes:

(a) Assumes full funding of the White Wolf GSA's Proposition 1 grant as recommended by DWR on 6 February 2018.

Attachment D

2018 Schedule of Charges

Client/Address: **Tejon-Castac Water District**
Mr. Allen Lyda

Proposal/Agreement Date: 8 March 2018 **EKI Project # B8-045**

SCHEDULE OF CHARGES FOR EKI ENVIRONMENT & WATER, INC. [1] **1 January 2018**

Personnel Classification	Hourly Rate
Officer and Chief Engineer-Scientist	280
Principal Engineer-Scientist	270
Supervising I, Engineer-Scientist	260
Supervising II, Engineer-Scientist	250
Senior I, Engineer-Scientist	238
Senior II, Engineer-Scientist	225
Associate I, Engineer-Scientist	213
Associate II, Engineer-Scientist	199
Engineer-Scientist, Grade 1	185
Engineer-Scientist, Grade 2	175
Engineer-Scientist, Grade 3	160
Engineer-Scientist, Grade 4	140
Engineer-Scientist, Grade 5	124
Engineer-Scientist, Grade 6	109
Technician	100
Senior GIS Analyst	128
CADD Operator / GIS Analyst	113
Senior Administrative Assistant	125
Administrative Assistant	99
Secretary	82

Direct Expenses

Reimbursement for direct expenses, as listed below, incurred in connection with the work will be at cost plus fifteen percent (15%) for items such as:

a. Maps, photographs, reproductions, printing, equipment rental, and special supplies related to the work.
b. Consultants, soils engineers, surveyors, drillers, laboratories, and contractors.
c. Rented vehicles, local public transportation and taxis, travel and subsistence.
d. Special fees, insurance, permits, and licenses applicable to the work.
e. Outside computer processing, computation, and proprietary programs purchased for the work.

A Communication charge for e-mail access, web conferencing, cellphone calls, messaging and data access, file sharing, local and long distance telephone calls and conferences, facsimile transmittals, standard delivery U.S. postage, and incidental in-house copying will be charged at a rate of 4% of labor charges. Large volume copying of project documents, e.g., bound reports for distribution or project-specific reference files, will be charged as a project expense as described above.

Reimbursement for company-owned automobiles, except trucks and four-wheel drive vehicles, used in connection with the work will be at the rate of sixty cents ($0.60) per mile. The rate for company-owned trucks and four-wheel drive vehicles will be seventy-five cents ($0.75) per mile. There will be an additional charge of thirty dollars ($30.00) per day for vehicles used for field work. Reimbursement for use of personal vehicles will be at the federally allowed rate plus fifteen percent (15%).

CADD Computer time will be charged at twenty dollars ($20.00) per hour. In-house material and equipment charges will be in accordance with the current rate schedule or special quotation. Excise taxes, if any, will be added as a direct expense.

Rate for professional staff for legal proceedings or as expert witnesses will be at a rate of one and one-half times the Hourly Rates specified above.

The foregoing Schedule of Charges is incorporated into the Agreement for the Services of EKI Environment & Water, Inc. and may be updated annually.

[1] Formerly known as Erler & Kalinowski, Inc.