

White Wolf Subbasin Groundwater Sustainability Agency Regular Board Meeting of the Board of Directors

Agenda
June 6, 2023 at 1:00 p.m.

Public may attend in-person, via telephone, or Web-based service:

In Person: Wheeler Ridge-Maricopa Water Storage District Headquarters
12109 Highway 166
Bakersfield, CA 93313

Or Virtual Option:

Go To Meeting: <https://meet.goto.com/911605181>
Call by Phone: (872) 240-3311 Access Code: 911-605-181

Remote participation by a Director will also occur at:
5260 N Palm Suite #421
Fresno, CA 93704

- 1. Call to Order**
- 2. Recognition of Guests**
- 3. Approval of Minutes of the Regular Board Meeting of March 7, 2023**
- 4. Financial Accounting Report (Robert Velasquez)**
- 5. Updates on actions discussed or authorized on March 7, 2023 (EKI)**
 - a. Update on Groundwater Sustainability Plan (GSP) implementation activities
 - i. April and May 2023 groundwater levels
 - ii. Data gap filling activities
 - b. Grant Application Updates
 - i. SGMA Implementation Round 2
 - ii. Multibenefit Land Repurposing Program Round 2
 - c. Projects/Management Actions (P/MAs) Committee Update
 - d. DWR GSP Determinations Update
- 6. P/MA initiation: Mettler recharge basin operation (Nicholas)**
- 7. Discuss and Consider Land IQ Contract for Evapotranspiration Data to Support WY 2023-2025 Annual Report (Martin) – *Board Action Item***

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
Regular Board Meeting of the Board of Directors**

**Agenda
June 6, 2023 at 1:00 p.m.**

8. Correspondence

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. Closed Session – Anticipated litigation (Government Code Section 54956.9(d)(2))—1 item.

12. Report out of Closed Session

13. Adjourn

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**White Wolf Subbasin Groundwater Sustainability Agency
Wheeler Ridge-Maricopoa Water Storage District
12109 Highway 166, Mettler, CA 93313**

MINUTES OF THE REGULAR BOARD OF DIRECTORS MEETING

Date of Meeting: Tuesday, March 7, 2023

Location: Remote and In-Person

Meeting Commenced at 1:03 p.m.

DIRECTORS PRESENT: Tito Martinez, Jeff Mettler, Allen Lyda, Jon Reiter, Jeff Giumarra.

ALTERNATES: None

DIRECTORS ABSENT: None

PUBLIC AND STAFF: Brad DeBranch from Bolthouse, Anona Dutton, Sarah Grenday, and Christina Lucero, from EKI, Jeevan Muhar, and Sam Blue from AEWS, Nicole Bona, Eric McDaris, and Sheridan Nicholas with WRMWSD, Matt Brady from SVFNUTS, Dolores Salgado from Ardurra, Gabriel Gaeda from Six 33 Solutions, Maryse Suppiger from Manulife, Mike Beagle SunView Vineyards, Sean V., Tim Gobler with Trinitas, Laura Cattani KCWA, Lefty Delis, and Legal Counsel Alan Doud, were present.

President Martinez did a recognition of guests followed by the draft meeting minutes of the Regular Board Meeting of February 7, 2022, presented by Ms. Martin. On motion by Director Giumarra and seconded by Director Sheridan, the minutes were approved. The motion was unanimously approved by the board.

At this point Director Reiter joins the meeting.

Christina Lucero, and Anona Dutton, from EKI gave a presentation starting with an update on Groundwater Sustainability Plan (GSP) implementation activities. She presented the February water levels in the basin as well as MT exceedances. She provided information regarding protocols for no measurements. She went on to explain the Water Year 2022 Annual Report. Jeevan noted that even though year 2015 was a critically dry year it actually was a positive year for groundwater levels in the White Wolf Subbasin. Director Martinez asked for a bullet point regarding any exceedances in any of the monitoring wells. Director Reiter asked if there was any groundwater level rebound graph or chart. Christina also presented an update on round 2 Multibenefit Land Repurposing Program Grant and the application submission. She provided a summary on the kickoff P/MA Committee meeting. She talked about the Technical Committee recommendation to consolidate the Board Ad-Hoc Committee with the P/MA Committee to be more efficient and promote more substantial conversations between Board members and Landowners.

This last item led to item number five in the Agenda which asked the Board to consider merging the Board Ad-hoc Committee with the P/MA Committee. On motion by Director Lyda, and seconded by Mettler, the motion was unanimously approved by roll-call vote.

Christina Lucero presented EKI Task #10 for WY 2023 GSP Implementation Support. Jeevan Muhar stated that some of the costs could be covered by the Grant if we were awarded. He also stated that we were trying to be efficient with meetings. After a brief discussion and on motion by Director Lyda, seconded by Director Giumarra, the motion was unanimously approved by roll-call vote.

There was correspondence to report. There had been several emails from different Landowners asking about water restrictions, or policy regarding groundwater pumping.

There were no public comments.

There was no closed session.

The White Wolf GSA meeting was adjourned at 1.36 p.m.

Angelica Martin, Secretary, White Wolf Subbasin GSA

Approved by: White Wolf Subbasin GSA Board of Directors

Dated: June 6, 2023

WHITE WOLF GSA FINANCIAL INFORMATION

| | July | August | September | October | November | December | January |
|------------------------------------|------|---------|-----------|---------|----------|----------|---------|
| FUNDING | - | 200,001 | - | - | - | - | - |
| INTEREST INCOME | 0 | 0 | 29 | 60 | 48 | 39 | 29 |
| TOTAL FUNDING | 0 | 200,001 | 29 | 60 | 48 | 39 | 29 |
| PROFESSIONAL SERVICES - CONSULTING | - | - | 80,747 | 15,749 | 41,593 | - | 19,900 |
| PROFESSIONAL SERVICES - LEGAL | 295 | - | 236 | 1,396 | 1,996 | - | - |
| FEES - OTHER | - | 31 | 76 | 147 | 54 | 46 | 44 |
| OTHER | - | - | - | 74 | - | - | - |
| TOTAL EXPENDITURES | 295 | 31 | 81,059 | 17,292 | 43,643 | 46 | 19,944 |

WHITE WOLF GSA - May 31, 2023

| | | | |
|--|-------------------|-----------------|------------|
| FUNDING | \$ 400,002 | EKI | \$ 291,241 |
| INTEREST INCOME | 406 | Young Woolridge | \$ 7,546 |
| TOTAL FUNDING | 400,408 | Bank Fees | \$ 790 |
| PROFESSIONAL SERVICES - CONSULTING | 291,241 | Other | \$ 288 |
| PROFESSIONAL SERVICES - LEGAL | 7,546 | | |
| FEES - OTHER | 790 | | |
| OTHER | 288 | | |
| TOTAL EXPENDITURES | 299,577 | | |
| | - | | |
| FUNDING AVAILABLE AT May 31, 2023 | \$ 100,831 | | |



White Wolf Groundwater Sustainability Agency

Arvin-Edison Water Storage District
 Tejon-Castac Water District
 Wheeler Ridge-Maricopa Water Storage District
 Kern County

AGENDA MEMORANDUM

Date: 30 May 2023

To: Board of Directors, White Wolf Groundwater Sustainability Agency (GSA)

From: Angelica Martin, Secretary, White Wolf GSA

Item: 7. Discuss and Consider Land IQ Contract for Evapotranspiration Data to Support WY 2023-2025 Annual Report

SUMMARY

Fiscal Impact: \$49,668 per year. Recommended cost breakdown by GSA-member District varies based on irrigated acreage, 50% split for overlap lands, and a three-way split for white area lands:

| District | Cost | Acres | Percent Split | Cost / Acre |
|----------|----------|---------|-------------------|-------------|
| WRMWSD | \$24,983 | 54,073 | 50.3% | \$0.46 |
| AEWSD | \$12,566 | 27,186 | 25.3% | \$0.46 |
| TCWD | \$12,119 | 26,273 | 24.4% | \$0.46 |
| | \$49,668 | 107,532 | Total Basin Acres | |

BACKGROUND

Annual Reports are required to include a summary of the Basin’s groundwater extraction data by water use sector. Unmetered agricultural pumping has historically been estimated by the Basin’s Soil Moisture Budget (SMB) Accounting model and input into the White Wolf Groundwater Flow Model (WWGFM). The SMB requires parcel-based crop evapotranspiration (ETc) estimates to calculate the agricultural demands. The SMB then estimates groundwater pumping by satisfying any unmet agricultural demand, after precipitation and applied surface water, and with consideration for irrigation efficiency. Agricultural pumping is also used in the WWGFM to estimate changes in storage.

For the GSP and Water Year 2021 Annual Report, parcel-based satellite ETc data was obtained from the Irrigation Training and Research Center (ITRC) at Cal Poly State University, San Luis Obispo (“ITRC-METRIC”). For the Water Year 2022 Annual Report, retroactive parcel-based satellite ETc data was obtained from Land IQ.

Land IQ provides ground-truthed satellite ETc estimates at the field or parcel level for cropped and non-cropped lands (excluding urban areas). Arvin-Edison Water Storage District (AEWSD) has an existing contract with Land IQ for ETc data on parcels in the Kern County Subbasin and Wheeler Ridge-Maricopa

Water Storage District (WRMWSO) has an existing contract with Land IQ for ETc data on all WRMWSO irrigated parcels.

DISCUSSION

Until the GSA transitions to collecting metered groundwater extraction data, the GSA will need to obtain monthly ETc data to support Annual Reporting requirements.

The Technical Committee obtained a quote from Land IQ for Board consideration. Contracting with Land IQ will avoid duplicative costs for the areas that currently overlap existing contracts. Land IQ requires a three-year contractual commitment, and the attached proposal would therefore cover Water Years 2023 through 2025.

Given that Land IQ costs vary between crop and non-cropped acreage, the Technical Committee conducted a cost split analysis which examined three potential approaches for cost share distribution between the three districts. The recommended approach is based on a 50% WRMWSO, 25% AEWSD, and 25% TCWD acreage allocation, where costs within overlapping districts are split 50/50 and all white areas outside district service areas are split equally three-ways. See attached exhibit for the acreage analysis.

The GSA may want to consider transitioning to collecting metered pumping data instead of relying on ET data. Metered data is more accurate and may be more economical for the GSA. WRMWSO is planning to transition to metered pumping data soon, and AEWSD has installed and collects metered data on 50 wells (five within White Wolf Subbasin). The California Water Code (CWC) 10725.8(b) states that if a GSA requires metering, the metering equipment shall be paid for by the pumper;¹ the White Wolf GSA therefore has the authority to adopt a groundwater metering and reporting policy and would only be required to pay for ongoing operations and maintenance of a reporting system. Based on AEWSD's groundwater metering project costs adjusted for inflation, the estimated price for installing a groundwater meter on existing landowner facilities including manifold piping changes is approximately \$11,000.

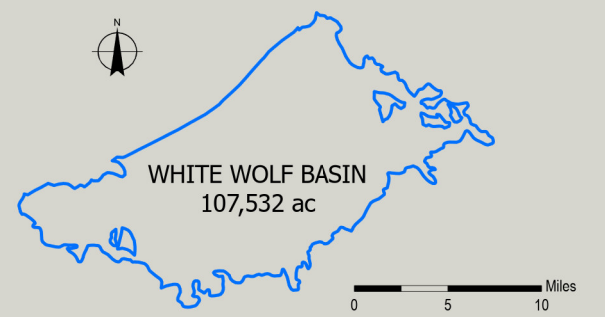
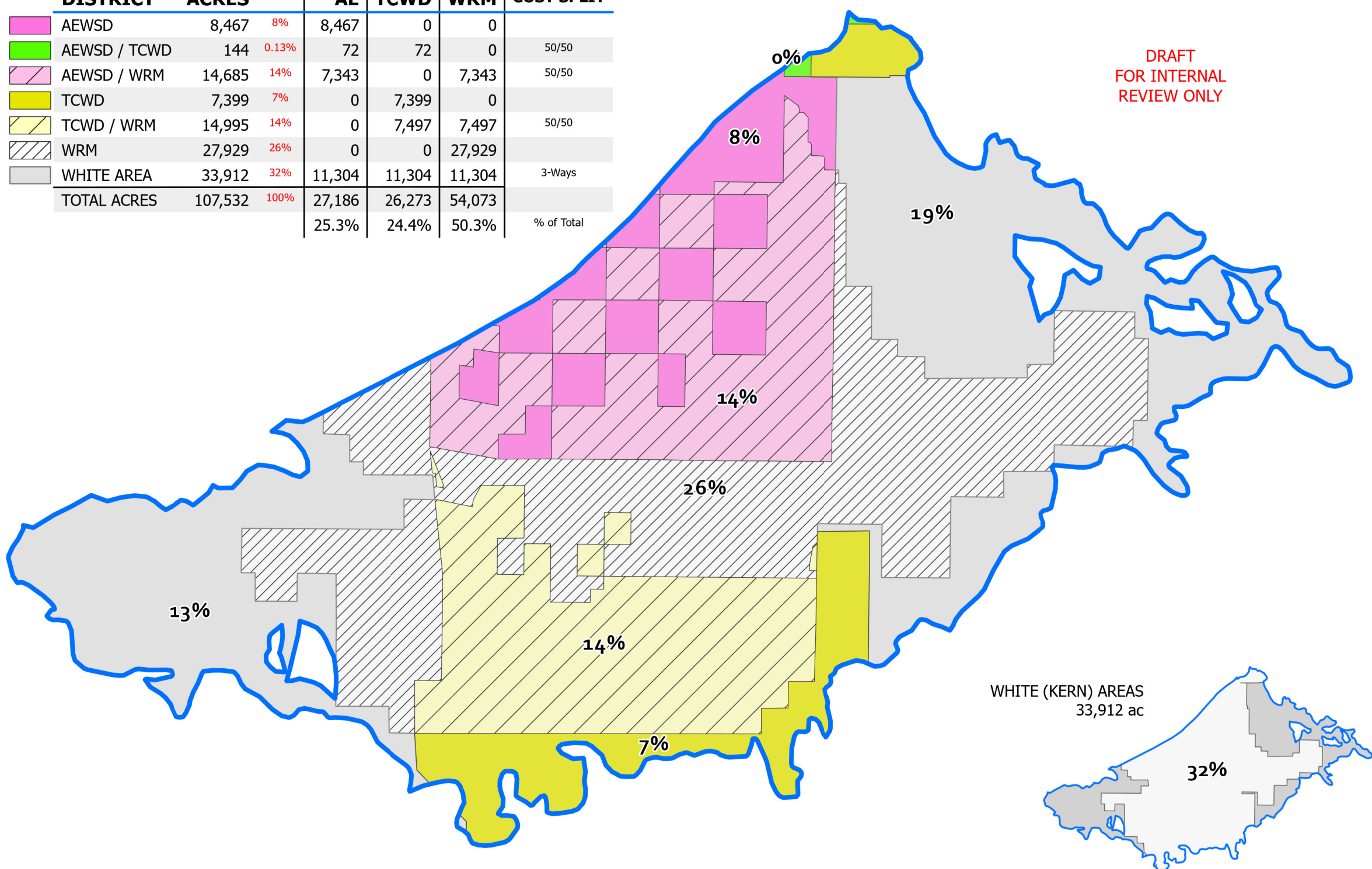
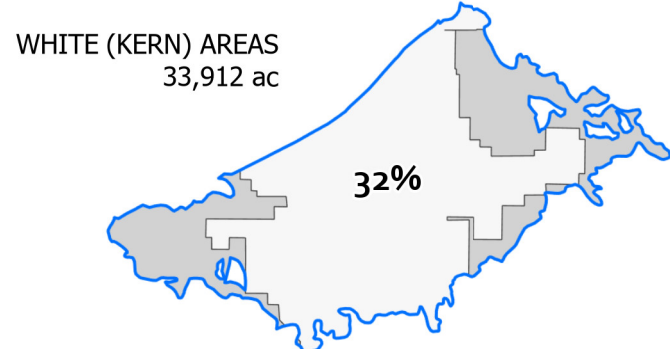
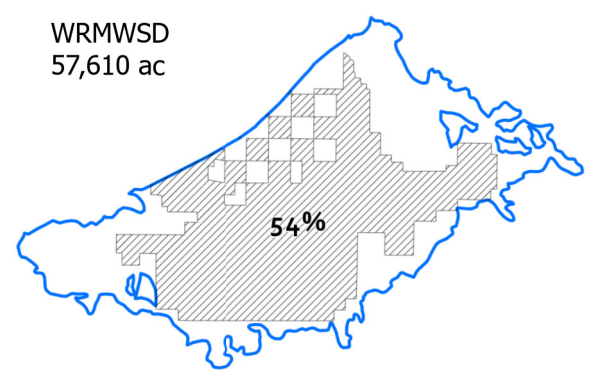
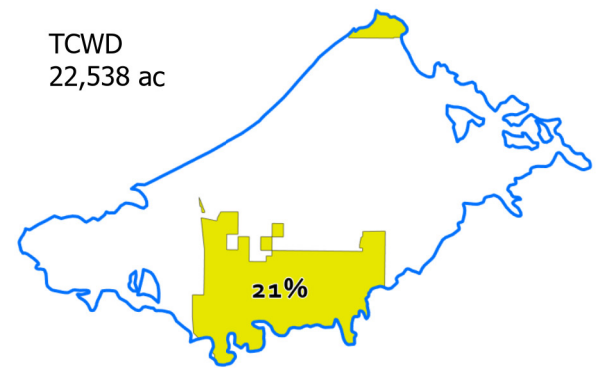
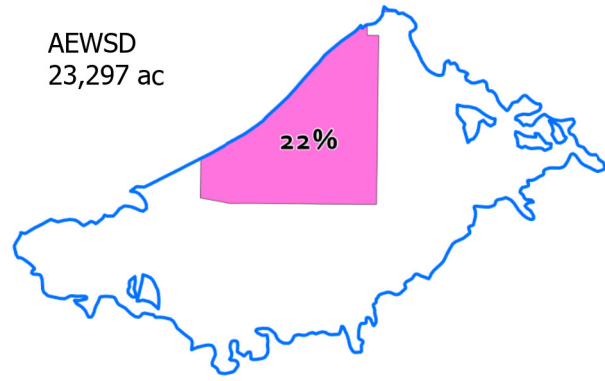
Attached:

- Split Cost Analysis Exhibit
- Scope of Work Proposal Land IQ Data Driven Method (LDDM) for Evapotranspiration, Precipitation, and Crop Type at the Field Level – White Wolf Subbasin dated 18 January 2023

¹ CWC 10725.8. (b): All costs associated with the purchase and installation of the water-measuring device shall be borne by the owner or operator of each groundwater extraction facility. The water measuring devices shall be installed by the groundwater sustainability agency or, at the groundwater sustainability agency's option, by the owner or operator of the groundwater extraction facility. Water-measuring devices shall be calibrated on a reasonable schedule as may be determined by the groundwater sustainability agency.

DRAFT
FOR INTERNAL
REVIEW ONLY

| DISTRICT | ACRES | | AE | TCWD | WRM | COST SPLIT |
|--------------|---------|-------|--------|--------|--------|------------|
| AEWSD | 8,467 | 8% | 8,467 | 0 | 0 | |
| AEWSD / TCWD | 144 | 0.13% | 72 | 72 | 0 | 50/50 |
| AEWSD / WRM | 14,685 | 14% | 7,343 | 0 | 7,343 | 50/50 |
| TCWD | 7,399 | 7% | 0 | 7,399 | 0 | |
| TCWD / WRM | 14,995 | 14% | 0 | 7,497 | 7,497 | 50/50 |
| WRM | 27,929 | 26% | 0 | 0 | 27,929 | |
| WHITE AREA | 33,912 | 32% | 11,304 | 11,304 | 11,304 | 3-Ways |
| TOTAL ACRES | 107,532 | 100% | 27,186 | 26,273 | 54,073 | |
| | | | 25.3% | 24.4% | 50.3% | % of Total |



Split Cost Analysis

Option 1

TOTAL cost split by percent allocation of distributed area.

Overlapping districts split cost equally 50/50
WHITE (Kern) Areas split cost equally 3-ways



LAND IQ DATA DRIVEN METHOD (LDDM) FOR EVAPOTRANSPIRATION, PRECIPITATION, AND CROP TYPE AT THE FIELD LEVEL – WHITE WOLF SUBBASIN

TO: Angelica Martin/Tejon Castac Water District
Jeevan Muhar/Arvin Edison Water Storage District
Sheridan Nicholas/Wheeler Ridge Maricopa Water Storage District
Christina Lucero/EKI

FROM: Joel Kimmelshue/Land IQ
Casey Gudel/Land IQ

DATE: January 18, 2023

INTRODUCTION

This scope of work proposal was developed at the request of the stakeholder entities for the purpose of developing a monthly field by field estimate of actual evapotranspiration (ET) occurring within the White Wolf Subbasin. Included in the deliverables will also be field by field precipitation, and twice-yearly field by field crop mapping and permanent crop age. A web tool will be used to relay the results each month.

Calculation of ET can be performed accurately using weighing lysimeters and eddy correlation monitoring techniques. These methods are limited, however, because they provide point values of ET for a specific location and fail to provide the ET on a regional scale. This limitation has motivated the development of using remotely sensed (RS) data from satellites to evaluate ET over large areas. Satellite data are well suited for deriving spatially continuous ET surfaces that can be sometimes pared down to the field scale because of their temporal and spatial characteristics. However, the most accurate use of RS models require calibration to actual surface measurements and work from the field level originally. The approach proposed for the tasks in this scope of work includes a combination of high-density, specific ground measurements and remotely sensed modeling, calibrated with those field measurements.

STAFFING RESOURCES AND PROJECT COOPERATORS

Staff expected to work on this project from Land IQ have been involved in various aspects of evapotranspiration modeling, agricultural remote sensing, and regulatory support for the last 4 to 26 years, and are listed below. Other appropriately qualified staff may also participate to facilitate completion of any tasks approved by the Agencies as a part of this proposed scope of work.

- Principal In Charge and Principal Agricultural Scientist – Joel Kimmelshue, PhD
- Project Manager/Client Relations – Casey Gudel, MS
- Senior Remote Sensing Analyst – Diya Chowdhury, MS
- Remote Sensing Analyst – Juan Geng, MS
- Remote Sensing Analyst – Zhehan Tang, PhD
- Biometeorologist – Frank Anderson, MS

- Agricultural Scientist – Seth Mulder, MS
- GIS Analyst – Justin Sitton, BS
- Agricultural Scientist/Field Technician – JB Buller, BS
- Support Staff – Various as needed

Land IQ also welcomes input and collaboration with the associated stakeholders (Districts, Ranches, etc) staff and intends on integrating staff into continued instrumentation efforts, data collection, and monitoring programs as the on-the-ground, local component of the team, if desired and feasible for the stakeholders. This is not a requirement of the work efforts, however.

TASKS

This scope of work has been developed based on individual task discussions and requests from the stakeholders. These tasks include:

- **Task 1** – Monthly Field by Field ET, Precipitation, and Semiannual Crop Mapping
- **Task 2** – Monthly Reporting Via a Web-Based Tool
- **Task 3** – Station Management and Maintenance
- **Task 4** – Outreach

Each of these tasks is discussed in detail below and includes schedule and deliverables. A cost summary for all work is provided.

TASK 1. MONTHLY FIELD BY FIELD ET, PRECIPITATION, AND SEMIANNUAL CROP MAPPING

Scope of Work: The Land IQ Data Driven Method (LDDM) (ground truthing, remote sensing, and rigorous QA/QC) will be used. It was developed and is currently used for approximately 30 GSAs/Irrigation Districts beginning in 2016. The LDDM is used to interpret image data and leverages robust and repeated ground station data to be implemented within the Agencies as well as a more direct image analysis. The approach yields more accurate results when repeated and representative ground calibration data are available as compared to RS ET estimates without ground truthing.

Because the LDDM establishes calibration and validation data at the field-level and also analyzes at the field-level, the result is field-level consumed water which can then be rolled up to any regional area desired. This is unique to the LDDM RS method as compared to other RS approaches and models.

This method does, however, require robust ground truthing data, which is proposed as part of this work effort for the Agencies. This effort will employ Landsat 8, Landsat 9, Sentinel 2, and purchased high resolution satellite imagery (contracted by Land IQ and included in the overall cost). Satellite data will be screened for cloud cover and terrain corrected. Ground measurements from monitored eddy covariance (EC), surface renewal (SR), Land IQ stations, and precipitation stations will be used to generate hourly ET data correlated to the satellite image overpasses and then used as a dependent variable in the modeling process.

Deliverables: None

Schedule: Individual analyses will be completed monthly, and results delivered (Task 2) to the Agencies within approximately 30 days from the end of the previous month. This work will be completed for 36 months.

TASK 2. MONTHLY REPORTING VIA A WEB-BASED TOOL

Scope of Work: Monthly reports will be developed. The first of the 12 monthly reports will begin on the 1st of the month following completion of recording of 30 days of climatic data and will be delivered within approximately 30 days of the end of the previous month. Results will be delivered in both report and web-based format. The web tool will contain all fields, field boundaries, current crop mapping, coverages of field-by-field ET and precipitation as well as a download link for all results and reports. The web-based tool is designed to be used at the GSA level. The tool is not currently designed for individual grower access, however, can be developed at additional cost not included in this scope of work.

Deliverables: Monthly results will be delivered in both shape file and report formats.

In addition to ET, Land IQ will provide field by field crop type mapping for the Agencies in electronic and summary form at least 2 times per year. These data will be the same crop mapping detail that are provided to the State of California, Department of Water Resources as Land IQ is the contractor for that dataset, however this is a special request product and some very slight differences may occur. The delivery of the crop mapping will be approximately July and November of each year and may be modified based on crop rotations and timing. Field-by-field precipitation will also be delivered as spatially interpolated from rain gauges on Land IQ climatic stations and other publicly available and reliable gauges (e.g. CIMIS stations, airports, municipalities, etc). Land IQ will also deliver 2x/year, permanent crop age, with the crop mapping deliverable.

The four deliverables include:

- Monthly field-by-field ET
- Monthly field-by-field precipitation
- Field-by-field crop mapping (2 times per year)
- Permanent crop age

All electronic vector and raster GIS files are available upon request.

Schedule: Individual analyses and reporting will be completed monthly, and results delivered within approximately 30 days of the end of the previous month being analyzed. Crop mapping data will be delivered on or about July and November of each year.

TASK 3. STATION MANAGEMENT AND MAINTENANCE

Scope of Work: This effort installs, manages, and continuously maintains ground truthing climatic stations of eddy covariance and/or surface renewal approaches to collect instantaneous ET ground data at select locations representing crop production within the Agencies. At times, and depending on crop type/location shift, it should be expected that some stations may need to be moved. However, with some permanent crops within the Agencies, some stations will stay within those permanent crops and are not expected to be moved. Regardless, all costs are included in the overall cost. Participating grower cooperation is required for station siting.

The data collected by these stations will be used to calibrate the LDDM RS models for ET and create ET estimates across all fields within the Agencies to get a complete estimate of Agencies-wide ET and ET by crop type by field. Data stations are fully telemetered by cellular communication systems to Land IQ servers. The system incorporates data flagging protocols to identify any inconsistencies in collection or outages. Land IQ will conduct approximately monthly site visits in coordination with stakeholder personnel (if desired) to verify proper functionality and perform any necessary or seasonal adjustments.

Deliverables: None

Schedule: Continuous

TASK 4. OUTREACH AND PRESENTATIONS

Scope of Work: This task accounts for up to four meetings per year to assist with or participate in outreach meetings with growers and/or stakeholder representatives.

Deliverables: Presentation materials

Schedule: As needed or directed by the stakeholder entities.

TOTAL COST AND PAYMENT TERMS

According to records developed through the stakeholders (and verified by Land IQ) land use mapping the cropped and non-cropped acreage within the White Wolf Subbasin are summarized (Table 2). Urban areas are excluded from this analysis.

Table 1 shows the cost per acre expected for the subbasin. The per acre charge includes all equipment, labor, expenses, supplies, project management, and all other associated costs. These costs are consistent with the Kern Subbasin grant costs for the 2023, 2024, and 2025 water years.

Table 1. Cost Per Acre

| Area | Cropped Acreage | Non-Cropped Acreage |
|---------------------|------------------|---------------------|
| White Wolf Subbasin | \$0.63/acre/year | \$0.38/acre/year |

Table 2. Acreage and cost summary for White Wolf area only.

| | Acreage | Annual Cost | Annual Cost by Member Entity | Total Monthly Cost | Monthly Cost by Member Entity |
|-------------|---------|--|------------------------------|--------------------|-------------------------------|
| Cropped | 36,313 | \$22,877.19 | \$7,625.73 | \$1,906.43 | \$635.48 |
| Non-Cropped | 70,503 | \$26,791.14 | \$8,930.38 | \$2,232.60 | \$744.22 |
| Urban | 716 | Urban areas are not included in the analysis | | | |
| Total | 107,532 | \$46,668.33 | \$46,668.33 | \$4,139.03 | \$1,379.70 |

A three-year contract commitment is required. It should be noted that costs are estimates at this time and unforeseen variables and/or efficiencies may occur which may alter costs up or down. Also, annual escalations (e.g. 1-5%) to account for increases in labor costs may or may not be implemented at the beginning of each calendar year.