10/28/2025

Marina Lopez
Grants Program Manager
AIGP
200 Harvest Avenue
Suite 600
Sacramento, CA 95814

Dear Ms. Lopez,

VerdantEdge Ag Systems, LLC is pleased to submit our proposal for AIGP-2025-01 in response to the Agricultural Innovation Grant Program's call for practical, scalable projects. Our submission, Delta Aquifer Smart Irrigation Optimization (DASIO), outlines a 24-month, five-farm demonstration that helps small and mid-sized producers in the Sacramento–San Joaquin Delta improve water-use efficiency, stabilize yields, and strengthen supply-chain resiliency under increasing climate variability.

This is an example of a first-draft proposal created by the AI Writer after the user filled in the Q&A session created by the RFP Analysis.

This example is before any human-in-the-loop editing has been done. These results are straight from the AI Writer based on the RFP Analysis of the client interview notes.

Our team brings producer-first agronomic expertise and proven, field-ready technology: sensor-verified irrigation scheduling, pressure/flow validation to improve distribution uniformity, and human-in-the-loop decision-support that runs over low bandwidth and outputs bilingual, auditable setpoints. We pair soil-moisture and canopy-temperature telemetry with weather-aware scheduling and QA/QC protocols to convert raw measurements into confident valve and pump actions. Backed by UC Cooperative Extension and local RCD collaborators, our approach is designed for rapid adoption on 2–250 acre operations using legacy micro/drip systems and mixed soils common across the Delta.

Why VerdantEdge now: we specialize in closing the translation gap between fragmented field data and day-to-day irrigation setpoints. Our past pilots have delivered measurable acre-inches saved, improved distribution uniformity, and reduced labor minutes per set, along with producer-friendly playbooks and ROI calculators. Under DASIO, we will codify this workflow into open, replicable artifacts—QA/QC'd datasets, bilingual field cards, and a cooperative equipment-sharing guide—so results extend beyond the grant period and directly advance AIGP priorities in soil health, water efficiency, and climate resilience.

This proposal conforms to the RFP's submission and formatting requirements. VerdantEdge Ag Systems, LLC (UEI: L9K5J7M3N2Q1; EIN: 47-6523819) is a California small business with active SAM registration and good standing. All deliverables will be provided in editable Word and Excel formats with labeled versions; the budget is submitted in native XLSX with visible formulas and a line-by-line narrative. We confirm that any award-funded equipment will be safeguarded, insured, and tracked under our asset controls, used solely for the approved scope, and managed per disposition terms at closeout.

All terms, pricing, and schedules presented herein are valid and binding for 120 days from the January 31, 2026 due date. For any questions prior to award, please contact our Project Director, Elena Marquez, PhD, PMP, at (530) 555-0203 or elena.marquez@verdantedgeag.com. Formal

notices may be directed to our Authorized Organizational Representative, Carolina “Carrie” Holt, MBA, Chief Executive Officer, at carrie.holt@verdantedgeag.com.

We respectfully request the committee’s review and approval for funding within the appropriate AIGP tier to execute DASIO across the five partner farms. Upon award, we are prepared to initiate baseline measurements and co-design sessions immediately to meet the program’s anticipated May 1, 2026 start. We welcome the opportunity to brief your team on our methods, milestones, and KPIs, and to coordinate site visits with cooperating producers.

Thank you for your consideration and for AIGP’s leadership in advancing climate-smart agriculture. We look forward to partnering with you to deliver measurable acre-inches saved, energy reductions per acre-inch, improved yield stability, and durable knowledge transfer across the Delta.

Sincerely,

Elena Marquez, PhD, PMP
Project Director / Principal Investigator
VerdantEdge Ag Systems, LLC
(530) 555-0203
elena.marquez@verdantedgeag.com
https://www.verdantedgeag.com

10/29/2025

Proposal

Agricultural Innovation Grant Program

Prepared for: Marina Lopez
Grants Program Manager

Prepared by: Elena Marquez
Project Director

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Problem Statement

We address a clear, time-sensitive challenge facing small and mid-sized producers (2–250 acres) in the Sacramento–San Joaquin Delta and adjacent counties (Yolo, Solano, San Joaquin): irrigation decisions are made under tightening allocations, rising energy and labor costs, and increasing salinity—all while fields exhibit variable soils, legacy micro/drip infrastructure, and fragmented data. Across tree nuts (almond, walnut), vineyards, and specialty vegetables, many farms still irrigate by habit or calendar because current tools do not convert raw measurements into trusted, bilingual, auditable setpoints at the valve and pump level.

Existing practices and tools are insufficient for these producers. Manual scheduling and infrequent field checks cannot keep pace with heat events, canal delivery shifts, or block-level heterogeneity. Single-purpose vendor portals rarely interoperate, lack consistent QA/QC, and leave growers to reconcile conflicting numbers from soil probes, pressure gauges, and weather apps. Enterprise platforms aimed at large operations require continuous connectivity, specialized staff, and subscription costs beyond reach; low-cost options often stop at data collection, offering no defensible, site-specific recommendations or compliance trail for extension, lenders, or water managers. The result is uneven distribution uniformity (DU), avoidable pumping costs (kWh per acre-inch), nutrient leaching, and yield variability that erodes margins and resilience during drought and salinity intrusions.

The core problem is the absence of a practical, interoperable, and affordable irrigation decision workflow tailored to small and mid-sized Delta farms—one that links transparent sensing and system validation to weather-aware scheduling and clear, field-ready instructions. Producers need a human-in-the-loop framework that fits low-bandwidth realities, respects existing hardware, and outputs Word-based, bilingual guidance that crews can use without new hires or complex subscriptions. They also need QA/QC standards and data governance that generate confidence with advisors and regulators while protecting producer privacy.

Target production systems and geographies

Mixed systems dominated by almonds, walnuts, vineyards, tomatoes, and leafy/specialty vegetables across the Sacramento–San Joaquin Delta and neighboring Yolo, Solano, and San Joaquin counties; predominantly micro/drip with variable pressure zones and legacy laterals.

Operations are owner-operated or family-run, with limited IT capacity, intermittent connectivity, and high sensitivity to water, energy, and labor costs; many blocks show variable texture, infiltration, and salinity, complicating set duration and valve sequencing.

Why current approaches fail these producers

Fragmented tools lack interoperability and defensible QA/QC, producing conflicting signals and no clear setpoints; off-the-shelf enterprise systems are cost- and staff-prohibitive, while low-cost sensors lack decision logic and an audit trail.

Without sensor-verified DU checks, pressure/flow validation, and weather-aware scheduling, growers default to habit, driving over/under-irrigation, higher kWh per acre-inch, nitrate leaching, and unstable yields—especially under drought, heat spikes, or canal schedule changes.

This project, Delta Aquifer Smart Irrigation Optimization (DASIO), directly addresses the gap by deploying soil-moisture telemetry, canopy temperature sensing, and inline pressure/flow verification into a single, producer-first workflow. The workflow converts measurements into actionable valve/pump settings with documented QA/QC, bilingual field cards, and low-bandwidth decision sheets. It is designed to reduce acre-inches applied while maintaining crop ET targets, improve DU and infiltration, cut labor minutes per set, and stabilize yield and quality. By co-designing with five small farms and collaborating with UC Cooperative Extension and the local RCD, we will generate reproducible artifacts—playbooks, datasets with dictionaries, and a cooperative equipment-sharing guide—that enable replication beyond the award period.

The implications are material for growers, the Delta, and the AIGP portfolio: measurable water-use efficiency gains, lower energy intensity, reduced nutrient losses, and improved economic resilience for small and mid-sized operations. The evidence base developed under DASIO will inform extension guidance, lender risk assessments, and water management planning, supporting broader policy and market adoption of climate-smart irrigation. See related sections for methods and prior art in Literature Review, the measurement plan and QA/QC in Research and Experiments, and targeted outcomes in Results and Evaluation.

Goals and Objectives

Use the Goals and Objectives template to outline what you intend to accomplish and how it will be done.

VerdantEdge Ag Systems, LLC has outlined a number of goals to be reached in order to consider the project a success. Each goal has a number of specific objectives to be achieved to meet the goal.

Summarize the expected results of the project and how these will be measured. There are additional templates such as Expected Results you can use to expand on these topics.

Goal 1: Improve on-farm water and energy efficiency

DASIO will deploy soil-moisture telemetry, pressure/flow verification, and weather-aware scheduling to cut acre-inches applied while maintaining crop evapotranspiration (ET) targets across five Delta farms. The emphasis is on increasing distribution uniformity and lowering pumping energy per unit of water delivered without compromising plant water status.

Objectives: increase water-use efficiency by 10–20% (acre-inches per ET unit) on at least three farms within 18 months and sustain gains through month 24; reduce irrigation energy intensity by 8–12% (kWh/acre-inch) within 18 months; verify and correct distribution constraints via quarterly DU and pressure checks. Methods and roles: inline flow meters, pump run-time logs, and utility kWh will be captured and normalized by crop ET (Raj Patel, PE, leads field integration; Sara Nguyen, MS, manages QA/QC and dashboards; growers and UC Cooperative Extension assist with set validation).

Goal 2: Stabilize yields and product quality under climate variability

The project will translate sensor data into block-level setpoints that reduce over/under-irrigation, aiming to lessen within-block variability and protect grade/quality during heat or delivery shifts. Producer-ready field cards will guide crews to consistent valve/pump actions.

Objectives: reduce within-block yield coefficient of variation (CV) by 10% by the end of season 2; maintain or improve average yield (lbs/acre or tons/acre) and quality grades relative to baseline; achieve ≥90% on-time set completion rate by month 12. Methods and roles: block-level yield and grade records will be compiled and analyzed season-over-season; canopy temperature and soil-moisture thresholds will trigger alerts; monthly KPI reviews enable midcourse corrections within two weeks when variance exceeds 5 percentage points (Elena Marquez, PhD, PMP, leads agronomy and producer engagement; Sara Nguyen oversees KPI analytics; growers implement setpoint changes).

Goal 3: Increase input efficiency and advance soil health

DASIO will tighten nitrogen timing and rates alongside improved irrigation, aiming to lift nutrient partial factor productivity and to initiate measurable, positive trends in soil organic matter (SOM) while reducing leaching risks. Soil-health co-benefits will be tracked to inform climate-smart adoption.

Objectives: reduce nitrogen application variability by 15% within 18 months while maintaining target tissue levels; improve partial factor productivity (yield per lb N) versus baseline by project end; detect a positive SOM trend of +0.1 to +0.3 percentage points at 0–6 inches over 24–36 months (trend monitored through month 24); optionally track infiltration rate (in/hr) where applicable. Methods and roles: N applied (lbs/acre) and tissue/soil nitrate will be logged; soil sampling at 0–6" and 6–12" will occur at start, mid-project, and end with chain-of-custody and lab QA; decision sheets will align fertigation with irrigation sets (Elena leads nutrient timing guidance; Raj supports fertigation controls verification; Sara manages data dictionaries and outlier rules; UC Cooperative Extension assists with sampling protocol).

Goal 4: Reduce labor burden and improve producer economics and adoption

The project will streamline irrigation workflows using low-bandwidth dashboards, bilingual field cards, and a Q&A playbook to cut minutes per set and document net margin impacts. Demonstrations and a cooperative equipment-sharing guide will support replication beyond the award period.

Objectives: cut irrigation labor time by 20–30 minutes per set by month 12 and sustain through month 24; improve net margin by $75–$150 per acre by project end via partial budgets that compare added costs to water, energy, and quality gains; produce bilingual producer artifacts and conduct at least one field day and one webinar in year 2. Methods and roles: time-and-motion logs will be spot-audited against meter data; partial budgets will quantify savings/revenues; Luz Romero, MEd, leads training and materials; Elena and partners host demonstrations; Sara publishes anonymized datasets with data dictionaries.

Summary

Across five Delta farms over 24 months, DASIO will deliver measurable improvements in water-use efficiency (10–20%) and energy intensity (8–12%), reduce within-block yield CV by 10%, tighten nitrogen application variability by 15% while sustaining tissue targets, initiate positive SOM trends, and cut labor time per irrigation set by 20–30 minutes. KPIs include acre-inches saved per acre and percent change from baseline; kWh/acre-inch and total kWh/acre; yield, quality, and within-block CV; nitrogen variability and partial factor productivity; labor time per set and total hours/acre; SOM change and infiltration where measured; net margin change ($/acre); and compliance metrics such as on-time set completion and checklist adherence. Any lagging KPI will trigger targeted adjustments to scheduling, sensor placement, or training within two weeks. Results will be disseminated via bilingual briefs, a producer Q&A playbook, a cooperative equipment-sharing guide, a field day, a webinar, and open, anonymized datasets to enable replication and scale consistent with AIGP priorities in soil health, water efficiency, and climate resilience.

Project Plan

A. General Information

Describe project title and date of plan as well as preparer.

Project Name:

Delta Aquifer Smart Irrigation Optimization (DASIO)

Prepared by:

VerdantEdge Ag Systems, LLC — Project Director: Elena Marquez, PhD, PMP

Date:

10/30/2025

B. Persons of Interest

Contractor Information

For each business involved in the project, list all relevant details of the business itself, then list all persons of interest involved in the project and their contact information.

Business Name:

VerdantEdge Ag Systems, LLC

Business Address:

1234 Innovation Way, Suite 210, Davis, CA 95618

Phone:

(530) 555-0198

Business Contacts

Name	Title	Phone(s)	Email
Carolina "Carrie" Holt, MBA	Chief Executive Officer (AOR)	(530) 555-0201	carrie.holt@verdantedgeag.com
Elena Marquez, PhD, PMP	Project Director / Principal Investigator	(530) 555-0203	elena.marquez@verdantedgeag.com

Raj Patel, PE	Senior Systems Engineer (Irrigation & Sensing)	(530) 555-0206	raj.patel@verdantedgeag.com
Sara Nguyen, MS	Data Governance & QA/QC Lead	(530) 555-0209	sara.nguyen@verdantedgeag.com
Michael Ortiz, CRA	Director of Sponsored Programs (Grants Officer)	(530) 555-0212	michael.ortiz@verdantedgeag.com

Business Name:

UC Cooperative Extension — Solano/Yolo (collaborating unit)

Business Address:

Per attached letter of collaboration

Phone:

Per attached letter of collaboration

Business Contacts

Name	Title	Phone(s)	Email

Business Name:

Yolo County Resource Conservation District (collaborating unit)

Business Address:

Per attached letter of collaboration

Phone:

Per attached letter of collaboration

Business Contacts

Name	Title	Phone(s)	Email

C. Plan Summary

1. Plan Description

Describe the Project plan as it relates to the objectives in section B of the Project-Analysis-Worksheet.
DASIO executes a 24-month, five-site demonstration to convert sensor data into audited irrigation setpoints that improve water-use efficiency, energy intensity, and yield stability for small and mid-sized Delta farms. The plan follows a quarter-by-quarter cadence with explicit dependencies and go/no-go gates. Q1 (Months 1–3): award kickoff, MOUs with ≥5 producers, site surveys, block selection, procurement (soil-moisture nodes, canopy temp sensors, flow/pressure meters, data loggers), SOP/QA approvals, and baseline sampling (soil, water, energy). Gate: ≥4 sites under MOU; ≥80% long-lead equipment on order; QA/QC plan approved. Q2 (Months 4–6): bench calibration, field install at two alpha sites, SCADA/telemetry bring-up, AI scheduling rules configured, crew training, KPI dashboard v1. Gate: telemetry uptime ≥95% over 14 days; meter validation error ≤5%; first KPI report issued. Q3 (Months 7–9): install remaining sites, finalize documentation packs and bilingual field cards, iterative set tuning, mid-season data collection, producer roundtable. Q4 (Months 10–12): full-season analysis, partial budgets, mid-project review; gate: ≥5-point WUE improvement trend at ≥3 sites or remediation plan approved. Q5–Q6 (Months 13–18): second-season optimization, amendments handled, demonstration day, interim tech note and anonymized data release; gate: energy intensity trending down at ≥3 sites or root-cause plan executed; ≥3 growers document adoption intent. Q7 (Months 19–21): replication at beta blocks, finalize adoption guides and equipment-sharing playbook, external methods review. Q8 (Months 22–24): final data lock, sensitivity analysis, Final Report, datasets with dictionaries, producer materials, webinar, and closeout. This plan aligns with AIGP priorities and the project's Goals and Objectives.

2. Plan Goals

For each project objective outlined in section B of the Project-Analysis-Worksheet describe how the plan expects to complete each objective.

Project Objective	Plan Methodology
Improve water-use efficiency by 10–20% on ≥3 farms while meeting ET targets	Deploy soil-moisture and canopy-temperature arrays; validate distribution uniformity via

	pressure/flow checks; implement weather-aware scheduling with human-in-the-loop approvals; monitor acre-inches per ET and adjust set durations/sequence monthly.
Reduce irrigation energy intensity by 8–12% (kWh/acre-inch)	Instrument pumps with runtime and kWh logs; correct pressure targets and valve groupings; shift sets to off-peak where feasible; track kWh/acre-inch and issue quarterly optimization memos.
Stabilize yields and reduce within-block CV by 10%	Translate sensor trends into block-level setpoints and bilingual field cards; trigger alerts on canopy stress; review yield/quality data seasonally and remediate underperforming zones.
Tighten nutrient timing and reduce N variability by 15%	Coordinate fertigation with validated irrigation sets; log N applications and tissue levels; publish decision sheets aligning N timing to soil moisture and ET windows.
Cut labor per set by 20–30 minutes and document net margin gains	Standardize crew workflows with low-bandwidth dashboards and field cards; perform time-and-motion spot audits; compute partial budgets and ROI; iterate training to remove bottlenecks.

3. Plan Milestone Summary

List all the projected milestones for the project plan, the expected completion of each.

Milestone	Expected Completion
MOUs executed (≥4/5), procurement POs ≥80%, baseline data package complete	Q1 (Months 1–3)
Alpha sites commissioned (2/5); telemetry uptime ≥95%; meter error ≤5%; KPI report v1	Q2 (Months 4–6)
All sites live (5/5); first-season KPI dashboard released	Q3 (Months 7–9)
Mid-project review; partial budgets v1; corrective action plan (if needed)	Q4 (Months 10–12)
Demonstration day; interim tech note; anonymized data publication	Q6 (Months 16–18)

4. Plan Resources

Describe all resources needed in the plan to complete overall plan goals. The resource may be of any nature necessary to the completion of the plan.

Resource	Purpose
Soil-moisture and canopy-temperature sensors (50+ nodes)	Monitor root-zone status and crop stress to drive setpoints and alerts.
Inline flow meters and pressure transducers	Verify distribution uniformity and validate irrigation volumes and pressure targets.
Low-bandwidth data loggers/telemetry and SCADA integration	Ensure reliable, secure data capture and automation for valve/pump operations.
QA/QC data pipelines, dashboards, and secure data enclave	Standardize validation, analytics, and producer-facing KPI reporting with audit trails.
Bilingual training materials and field cards	Enable consistent crew execution and rapid adoption across sites.

5. Resource Procurement

For each resource necessary to the plan as outlined above in C.4 describe the expected procurement costs as well as which milestone as outlined in C.5 the resource is necessary to achieve.

Resource	Related Milestone	Costs
Soil-moisture & canopy sensors (kits; 50+ nodes)	Q2 Alpha sites commissioned; Q3 all sites live	$65,000–$85,000 (hardware, mounts, warranties)
Flow meters and pressure transducers (per block)	Q2 meter validation ≤5%; Q3 KPI dashboard	$25,000–$35,000 (meters, taps, calibration)
Telemetry/data loggers and SCADA integration	Q2 telemetry uptime ≥95%	$20,000–$30,000 (gateways, licenses, install)
Analytics/QA tooling and secure data enclave	Q2 KPI report v1; Q4 mid-project review	$12,000–$18,000 (software, storage, security)
Bilingual training kits and field cards	Q2 crew training; Q3 documentation packs	$6,000–$9,000 (design, print, translation)

6. Plan Risks

Describe the most relevant risks to the plan's success in order of importance as they relate to the completion of the project and what backups should be in place to mitigate damage done to the project as a whole.

Risk	Backup Plan

1	Telemetry connectivity gaps reduce data completeness	Pre-survey RSSI/SINR; deploy directional antennas or mesh repeaters; enable on-node buffering and store-and-forward; weekly data quality checks.
2	Delayed procurement of long-lead sensors/meters	Issue POs in Q1 with alternates pre-qualified; maintain 10% spare inventory; stage bench-calibrated loaner kits from VerdantEdge pool.
3	Distribution constraints limit water savings	Conduct DU tests and pressure mapping; prioritize nozzle/emitter swaps and valve resequencing; document remediation plans per block.
4	Producer labor constraints during peak operations	Provide concise field cards and SMS alerts; schedule brief, on-site tune-ups; coordinate set changes during off-peak hours.
5	Sensor drift or failure affects recommendations	Bench-calibrate pre-deployment; deploy duplicate sensors at ≥10% locations; monthly cross-checks against manual readings; hot-swap procedure.
6	Data privacy concerns slow participation	Use consent forms, de-identification, tiered sharing; secure enclave with role-based access; producer review of dashboards prior to release.
7	Weather extremes or water delivery disruptions	Embed contingency rules for deficit/protective irrigation; pre-plan temporary pumping schedules; document variance and resume plan post-event.

Project Methods

Following is a description of our project methods including how the project will be developed, a timeline of events and reasons for why we suggest developing the project as described.

Research

We will synthesize peer-reviewed and extension literature on variable-rate micro-irrigation, soil-water balance modeling, canopy temperature as a proxy for crop water status, and distribution uniformity diagnostics (DUlq). Sources include UC ANR bulletins, ASABE standards for irrigation evaluation, and CIMIS evapotranspiration (ET) methods. This review informs site layout, minimum detectable effects (MDEs), and QA/QC thresholds for sensors and meters.

We will complement the literature with producer knowledge and prior VerdantEdge pilots in almonds, walnuts, vineyards, and specialty vegetables. Baseline surveys and EM/soil maps will be combined with auger cores to stratify management zones. A pre-analysis plan will register hypotheses, statistical models (mixed effects with site as a random factor), and data dictionaries before field deployment.

How the Project will be Developed

We will execute a two-season, five-site on-farm demonstration across small and mid-sized Delta farms using a standardized, producer-first design. At each farm, two comparable blocks per crop will be established: a program block using the full DASIO workflow and a reference block managed per current grower practice. Where feasible, a split-block layout (paired rows/valves) will control for variability in soil texture and legacy infrastructure. Each block will include at least three geo-referenced measurement points selected from the EM/soil map and verified with cores, enabling within-site comparison and pooled analyses.

Technology configuration will integrate soil, system, and weather signals into auditable setpoints. A Technology Configuration Sheet (version-controlled) at each site will document sensor IDs, depths, calibrations, logger intervals, ET sources, and rules-engine parameters. Decision-support will employ ET-based scheduling with crop coefficients and a soil-water balance; a rules engine converts recommendations into valve-level runtime targets. Growers remain in the loop to accept, modify, or defer recommendations, with reasons captured for learning and accountability.

- Sensors and automation

- Soil-moisture sensors at two depths per point (0–6", 6–18"); canopy temperature via fixed sensor or UAS thermal passes at key phenological stages; inline flow meters and pressure transducers on primary laterals; compact weather node or nearest CIMIS/mesonet feed; telemetry gateways logging at 15-minute intervals.

- Pump/valve automation and SCADA hooks where available; low-bandwidth data paths with on-node buffering; encrypted transport and role-based access within a secure data enclave.

- Data to be collected

- Agronomic: yield by block, grade/quality, historical yield, within-block variability; soil organic matter at 0–6" and 6–12" at baseline/mid/end; infiltration tests where applicable.

- Environmental and operational/economic: soil moisture timeseries, ET, air/canopy temperature, precipitation, acre-inches applied (by meter), kWh/acre and kWh/acre-inch, labor minutes per set, fertilizer N timing/rates, and material costs.

QA/QC will follow written SOPs: factory calibrations and bench checks; duplicate sensors at ≥10% of locations; meter verification against calibrated benches; range/logic checks in ingestion pipelines; audit trails on all edits; and documented chain-of-custody for soil samples. Monthly data reviews will trigger corrections to sensor placement, scheduling rules, or crew workflows, recorded in change logs within the configuration sheets.

Project Schedule

Months 1–3: Producer MOUs, site surveys, block selection, procurement, bench calibration, and baseline sampling (soils, DU/pressure, energy). Configuration sheets and the QA/QC plan are finalized; minimum four sites under agreement and ≥80% long-lead equipment ordered.

Months 4–6: Alpha installs at two sites; telemetry commissioning and SCADA integration; ET-based scheduling rules configured; bilingual crew training; KPI dashboard v1. Commissioning gates include ≥95% telemetry uptime over 14 days and ≤5% meter validation error.

Months 7–12: Remaining sites brought online; iterative set tuning; mid-season data collection; partial budgets v1; mid-project review of water-use efficiency (WUE) and energy intensity. Remediation plans address any DU or pressure constraints.

Months 13–18: Second-season optimization; field demonstration day; interim technical note and anonymized dataset release with dictionaries and caveats; adoption intent documented by ≥3 growers.

Months 19–24: Replication on beta blocks where feasible; final data lock; mixed-effects and difference-in-differences analyses; sensitivity tests for weather and price variance; final report, producer playbooks (bilingual), cooperative equipment-sharing guide, webinar, and closeout.

Reasons for Project Methods

The paired program/reference block design with split-block controls maximizes internal validity under real-world farm constraints while keeping crew operations practical. Three geo-referenced replicates per block provide sufficient power for block-level effect detection and enable pooled mixed-effects models across heterogeneous sites.

Integrating flow/pressure verification with soil-moisture and canopy-temperature telemetry addresses the root causes of inefficiency: uneven distribution, calendar-based scheduling, and unverified runtimes. A human-in-the-loop rules engine ensures recommendations remain feasible during canal delivery shifts and labor bottlenecks, improving adoption by small and mid-sized producers.

The QA/QC framework and Technology Configuration Sheets create an auditable trail that producers, advisors, and grant reviewers can trust. Low-bandwidth telemetry, bilingual field cards, and Word-first artifacts align with partner capacity, while secure data governance protects producer privacy and enables open, anonymized dissemination consistent with AIGP priorities.

Expected Results

We expect 10–20% gains in WUE (acre-inches per ET unit) on at least three sites within 18 months, with 8–12% reductions in irrigation energy intensity (kWh/acre-inch). Within-block yield coefficient of variation is projected to decline by ~10% by the end of season two, while average yield and grades are maintained or improved.

Nutrient efficiency will increase through better fertigation timing, improving partial factor productivity for N and reducing variability in N application by ~15%. Soil-health indicators will show positive trends (SOM +0.1 to +0.3 percentage points at 0–6" over the monitoring window) and improved infiltration where measured. Labor minutes per set are expected to drop by 20–30 minutes via standardized workflows and clear setpoints.

Analytically, we will report block-level difference-in-differences estimates, site-pooled mixed-effects results with 95% confidence intervals, DUlq and pressure diagnostics, irrigation energy intensity, and partial-budget net margin changes. Interim dashboards will support midcourse corrections, and final bilingual artifacts—Q&A playbook, field cards, and an equipment-sharing guide—will enable replication beyond the award period by NPOs, extension partners, and growers.

Data Management

VerdantEdge Ag Systems, LLC has instituted the following data management plan to ensure the integrity, security, and timely access to the project data. The data generated by and for this project is a valuable and irreplaceable resource and this plan will be followed to ensure recovery in the unlikely event of a worst-case failure.

DASIO will generate agronomic, environmental, and operational/economic datasets central to improving water-use efficiency and yield stability on small and mid-sized Delta farms. Data types include yield and quality by block; soil moisture by depth; canopy temperature; ET, precipitation, and weather; infiltration; soil organic matter at 0–6" and 6–12"; acre-inches applied; kWh/acre and kWh/acre-inch; labor minutes per set; and fertilizer timing/rates with partial budgets. Telemetry will log at 15-minute intervals; field validations occur monthly; soils are sampled pre-season, mid-project, and post-project; yield/quality are captured post-harvest; and labor/energy logs are compiled weekly during irrigation. These data underpin KPIs defined in Project Methods and Goals and enable replication through open, anonymized artifacts.

Data Storage

- Digital primary data will be stored as time-series CSV/Parquet files and relational tables (PostgreSQL) within a secure, role-based project workspace; configuration sheets, SOPs, and data dictionaries will be maintained as versioned DOCX/XLSX. Producer-facing dashboards will render read-only views through a low-bandwidth web portal and PDF summaries for offline access.

- Physical artifacts will include signed consent forms, field datasheets for spot checks, and chain-of-custody forms for soil samples; these will be scanned to PDF and stored alongside digital records. Servers are hosted in VerdantEdge’s secure data enclave; an encrypted off-site copy is maintained monthly in a U.S.-based data center.

Data Integrity

- QA/QC will follow written, version-controlled SOPs: factory and bench calibration prior to install; quarterly verification of sensors and inline meters; duplicate sensors on ≥10% of points; and chain-of-custody for soils. Automated range, gap, and logic checks run at ingestion with QA flags preserved.

- Edit accountability is enforced with immutable audit trails: role-based change control, dataset versioning, and pre-analysis plan registration. Blinded spot audits will compare crew logs with meter kWh/flow totals monthly, and discrepancies >5% trigger corrective actions documented in the configuration sheets.

Data Security

- Producer-identifiable information (PII) and business-sensitive fields (names, addresses, exact coordinates, notes) are segmented from analytical tables and restricted by least-privilege. Company policy prohibits storing unencrypted PII on laptops, removable media, or personal devices; any approved offline access uses full-disk encryption and auto-lock with MFA.

- All data are encrypted in transit (TLS 1.2+) and at rest (AES-256); servers employ hardened OS images, endpoint protection, and monitored access logs. Physical access to networking and storage hardware is restricted to authorized personnel; telemetry devices use signed firmware and secure keys managed by the Technical Lead.

Data Backup

- Backups follow a 3-2-1 strategy: daily incremental and weekly full backups retained for 30 days; one encrypted off-site replica refreshed monthly; and quarterly integrity tests (restore drills) to validate recovery time objectives. Critical configuration (sensor IDs, depths, calibrations, rules) is mirrored with each weekly full backup.

- Recovery procedures prioritize minimal data loss and rapid reboot of decision-support: restore the most recent verified full backup, apply incrementals, and validate against checksum manifests and QA flags before reopening analyst and dashboard access. Archived media are monitored for format obsolescence; datasets are migrated to current standards at least every three years to prevent degradation.

Data Availability

- Access tiers support privacy and adoption: (1) Participant access—quarterly dashboards and block-level summaries; (2) Internal analytic access—full de-identified tables; (3) Public access—cleaned, de-identified CSVs with data dictionary, methods notes, and caveats. Public releases remove names, business notes, and precise coordinates; spatial data may be coarsened or fuzzed where needed to prevent re-identification.

- Sharing timeline and stewardship align with AIGP requirements: quarterly summaries to participants; an interim anonymized table with methods notes at mid-project; and final cleaned datasets, metadata, configuration sheets, and SOPs within 60 days of closeout. Materials will be deposited in an open institutional repository with a persistent identifier, and VerdantEdge will maintain an internal archive for at least three years beyond closeout. Producer-facing translation will include bilingual (EN/ES) fact sheets, one-page decision checklists, short how-to videos, and slide decks distributed via UC Cooperative Extension lists, local RCDs, grower associations/co-ops, irrigation districts, and trade groups, with a recorded webinar posted alongside the Final Report.

Technology Transfer

VerdantEdge Ag Systems will transfer practical irrigation technologies and know-how to producers and extension partners through a structured, producer-first program that begins at kickoff and culminates in full operations handoff by month 24. Technology transfer is needed to convert fragmented field measurements into trusted, bilingual setpoints at pumps and valves, enabling measurable gains in water-use efficiency, energy intensity, and yield stability across small and mid-sized Delta farms. Governance and schedule: a Producer Advisory Group (five pilot farms, one UC Cooperative Extension advisor, one irrigation district engineer) will meet at kickoff, hold two co-design sessions (Q1 requirements/workflows; Q3 field iterations), and convene quarterly thereafter. Security and IP: all software configurations, datasets, and SOPs are delivered in editable Word/Excel with version control; producer-identifiable data is protected under least-privilege access in a secure enclave with encrypted transport and storage. Responsible parties: Elena Marquez, PhD, PMP (technology adoption and agronomy), Raj Patel, PE (hardware, telemetry, and SCADA integration), Sara Nguyen, MS (data governance and QA/QC), and Luz Romero, MEd (training and bilingual materials), with UC Cooperative Extension and the Yolo County RCD supporting dissemination. Compliance: all public-facing assets will acknowledge AIGP using the required attribution; any press release mentioning AIGP will be submitted for review at least 10 business days in advance; all materials will follow accessibility best practices (tagged PDFs, alt text, captions, high contrast). Sustained support: train-the-trainer workshops, a demonstration day, two captioned webinars, office hours during peak irrigation windows, a dedicated help email and searchable FAQ, and partner curriculum integration ensure durable adoption after closeout.

- **Soil-Moisture and Canopy Telemetry Stack**

  This package includes networked soil-moisture probes (two depths per point), fixed canopy-temperature sensors, low-bandwidth loggers, and gateways. Transfer steps: Q1 bench calibration and site-specific configuration sheets; Q2 alpha installs and crew walkthroughs; Q3 full deployment and tuning. Security and reliability: firmware signed keys, on-node buffering, encrypted transport (TLS 1.2+), and monthly QA checks with duplicate sensors on ≥10% of points. Responsible parties: Raj Patel oversees field integration; producers receive laminated installation and maintenance cards; UC Cooperative Extension participates in validation days.

- **Inline Flow/Pressure Validation Toolkit**

  A field-ready kit of inline flow meters, pressure transducers, calibrated taps, and DU test protocols enables verification of distribution constraints that drive over/under-irrigation. Transfer steps: Q1 pressure mapping plan and safety SOPs; Q2 installation at primary laterals with ≤5% meter error verified on VerdantEdge's bench; Q3 quarterly DU and pressure checks with corrective actions (emitter/nozzle swaps, valve resequencing). Security and asset control: meters are tagged under VerdantEdge asset controls and insured; calibration certificates and logs are delivered with the site binder. Responsible parties: Raj leads commissioning; producers and RCD staff are trained to run DU tests independently by Q4.

Weather-Aware Scheduling Rules Engine and Low-Bandwidth Dashboards

Decision-support translates ET, soil moisture, canopy cues, and system capacity into valve-level run times and alerts. Transfer steps: Q1 co-design of crew workflows and bilingual setpoint formats; Q2 rules configuration and dashboard v1; Q3 iteration based on field feedback; Q4–Q8 progressive refinement and handoff. Security and governance: role-based access; auditable change logs; monthly sign-off by the PI and Data Lead. Responsible parties: Elena Marquez manages agronomic rules and human-in-the-loop approvals; Sara Nguyen maintains the rules audit trail and publishes monthly KPI dashboards for each site.

Bilingual Adoption Kit and SOP Library (EN/ES)

The Adoption Kit standardizes execution and includes step-by-step irrigation workflows aligned to typical pump/valve operations; laminated field cards; Word-based SOPs; troubleshooting trees; an operations handoff checklist; and a cost/benefit playbook with partial-budget templates and ROI calculators for small and mid-sized operations. Transfer steps: draft in Q2, pilot at alpha sites in Q3, finalize v1 in Q4, and update post-demonstration day in Q6. Accessibility and attribution: tagged, searchable PDFs with alt text and high-contrast palettes; required AIGP acknowledgment on all assets; captioned videos with transcripts. Responsible parties: Luz Romero leads instructional design; Elena and producers co-author workflow nuances; materials are deposited with UC Cooperative Extension for curriculum integration.

Data Governance, QA/QC Pipelines, and Open, De-Identified Datasets

Pipelines enforce data integrity from sensor to dashboard and support external replication. Transfer steps: Q1 approval of QA/QC SOPs; Q2 ingestion pipelines with range/logic checks; Q3 producer dashboard access; Q6 interim anonymized dataset with dictionary and methods notes; Q8 final cleaned datasets and technical notes. Security: producer PII and exact coordinates are segmented; AES-256 at rest; MFA and least-privilege access; quarterly restore drills validate backups. Responsible parties: Sara Nguyen manages the secure enclave, data dictionaries, and public releases; producers retain review rights for their dashboards before dissemination.

Summary

By sequencing calibration, installation, workflow co-design, and hands-on training, VerdantEdge will hand off fully operational sensing, validation, and decision-support capabilities that producers and partners can run without consultant dependency. The train-the-trainer model, cooperative equipment-sharing guidance, vendor bundle pricing, and open, bilingual artifacts provide clear pathways to scale beyond the five pilot farms. For comments or coordination on technology transfer activities and schedules, please contact Elena Marquez, PhD, PMP, Project Director, at elena.marquez@verdantedgeag.com or (530) 555-0203; quarterly Producer Advisory Group meetings and public events (demonstration day, webinars) will be posted on our website and partner channels.

Risk Management

VerdantEdge Ag Systems, LLC manages risk through a disciplined, producer-first framework that protects people, data, assets, and field operations while sustaining project delivery. For DASIO, we will maintain a living Risk Register and Mitigation Log with explicit triggers, owners, and contingency actions, reviewed monthly by the PI and submitted quarterly with Progress Reports. Red items prompt corrective action within 10 business days. Our approach aligns with AIGP terms (asset controls, data privacy, prior approvals) and the realities of Delta agriculture—low-bandwidth conditions, legacy micro/drip systems, and climate variability.

Security

We safeguard personnel, facilities, and information systems using layered controls. Field hardware (soil-moisture probes, canopy sensors, inline meters, gateways) is installed with lockable, NEMA-rated enclosures, tamper tags, surge/lighting protection, and weatherized cabling. Telemetry uses signed firmware, key rotation, and encrypted transport (TLS 1.2+); gateways buffer data for store-and-forward in low-signal zones. The secure data enclave enforces least-privilege, multifactor authentication, audit logs, and encryption at rest (AES-256). Daily automated data checks flag gaps, drift, or out-of-range values; anomalies generate alerts to the Systems Engineer and Data Lead. Physical access to labs, calibration benches, and inventory cages is badge-restricted; a tool/equipment sign-out log ties assets to staff and sites under our asset control system. To mitigate malicious activity or fraud, we segregate duties (field install vs. data QA/QC), retain immutable audit trails, and run monthly access reviews. Environmental security incorporates flood-aware site placement, elevated mounts, sealed conduits, and backup power for critical devices during storm events.

Personnel Policies

Hiring and deployment follow written SOPs that include background/reference checks commensurate with role, conflict-of-interest disclosures at kickoff and annually, and acknowledgement of our nondiscrimination and drug-free workplace policies. Job Safety Analyses (JSAs) precede field work; all staff complete tailgate safety briefings, PPE checks, and lockout/tagout where pump or valve work is performed. We coordinate with growers on pesticide-handler schedules to prevent exposure and avoid application windows. UAS operations (for thermal imagery) follow FAA Part 107 requirements with preflight checklists and flight logs. Fraud prevention and accountability measures include timekeeping attestation, receipt documentation for purchases, and supervisory approval for inventory movements. Policies are reviewed semiannually by the Grants Officer with updates communicated via versioned SOPs (EN/ES) and documented staff retraining; any incidents trigger immediate policy review and remediation.

Insurance

VerdantEdge maintains general liability, workers' compensation, and auto coverage consistent with California statutes and field operations. All award-funded equipment is tracked under institutional asset controls, safeguarded, maintained, and insured per policy for the duration of the project; calibration certificates and serials are recorded in the asset ledger. For DASIO, we will confirm riders or endorsements appropriate to the risk profile (e.g.,

inland marine for mobile instrumentation, cyber/privacy coverage consistent with data-handling obligations, and UAS liability where applicable). Producer sites are named as additional insureds where required by site agreements. Certificates of insurance are available upon request and will be updated if limits, carriers, or endorsements change during the award.

Disaster Planning

Continuity planning spans technical, schedule, staffing, regulatory, data-privacy, and adoption risks with clear triggers and contingencies. Technical: sensor/telemetry failure triggers include >5% data missing over 72 hours or uptime <95% on a 14-day window; we prevent via bench calibration, duplicate sensors on ≥10% of points, hot-spare gateways, standardized wiring, and daily automated checks. Contingencies include swap within 48 hours, manual readings to backfill, temporary cellular hotspots, and shortened logging intervals during critical irrigation windows. Schedule: procurement or access delays trigger at PO aging >10 business days without confirmation or delivery >21 days late; we place orders for ≥80% long-lead items in Q1 with alternates qualified, resequence to commission two alpha sites first, deploy loaners, and shift training to simulation if fields are inaccessible. Staffing: cross-training and documented RACI ensure coverage; absences >2 weeks prompt reallocation to bench technicians or short-term contractors while prioritizing commissioning and QA tasks.

Regulatory and safety: changes in district rules or chemical application windows are monitored pre-season and weekly in-season; we adapt by relocating nodes, scheduling after-hours installs, or substituting short-window UAS thermal assessments. Data-privacy/security: access log anomalies or failed export checksums trigger incident response—system isolation, credential rotation, forensics, participant/AIGP notifications per protocol, and retraining. Adoption: if <70% adherence to the irrigation playbook or negative feedback emerges at roundtables, we simplify decision rules, increase on-farm coaching, add targeted stipends for additional training, and enlist early adopters as peer champions. Interoperability: import/export failures or duplicate data entry are mitigated by maintaining CSV/XLSX/DOCX handoffs and focusing on one high-value integration per site, with interim templates to avoid workflow disruption.

Environmental extremes and disasters: drought/heat or flood events that deviate >1.5σ from 10-year normals, water allocation changes mid-season, wildfires, earthquakes, or extended power outages trigger a continuity posture—difference-in-differences analysis adjustments, extended measurement windows, portable generators for critical devices, and safe-standby procedures coordinated with growers. Facilities or system compromise activates the 3-2-1 backup restoration plan with quarterly restore drills to meet recovery time objectives; final reopening of dashboards occurs only after checksum validation and QA sign-off. Governance: monthly risk huddles, red/amber/green status, and a maintained issue log with owner and due date drive accountability. Change management follows award terms: scope changes, >10% rebudgeting, key personnel changes, or milestone-affecting schedule shifts are submitted for prior written approval, with formal notices delivered by email confirmation or certified mail to designated award contacts.

Reporting

VerdantEdge Ag Systems, LLC recognizes that timely, efficient reporting is essential to deliver measurable outcomes, verify compliance, and enable midcourse corrections. Our plan uses AIGP-compliant formats and schedules, integrates agronomic KPIs (e.g., WUE, DUlq, kWh per acre-inch, yield CV), and preserves a transparent audit trail from field to dashboard.

Quarterly Technical Progress Report

Purpose: Document progress against milestones and KPIs; present field results (plots/tables), producer feedback, and corrective actions to keep DASIO on schedule and within scope.

Schedule: Due within 30 days after each calendar quarter end throughout the 24-month period of performance (anticipated start May 1, 2026). Aligns with AIGP's quarterly cadence.

Report Creator: Project Director/PI (Elena Marquez, PhD, PMP) with contributions from Raj Patel, PE (field/telemetry), Sara Nguyen, MS (analytics/QA), and partner producers.

Deliver to: AIGP Grants Program Manager via portal or grants@aigp.org; internal distribution to AOR (Carrie Holt), Grants Officer (Michael Ortiz), Data Lead (Sara Nguyen), and Technical Lead (Raj Patel).

Report Format: One searchable PDF narrative (DOCX to PDF) plus native attachments: figures (PNG/PDF), updated Gantt/milestone sheet (XLSX), Risk Register (XLSX), and site-readiness/procurement checklists (XLSX). File naming with version/date per RFP.

Notes: Includes milestone status (on track/at risk/off track), KPI snapshots (acre-inches vs. ET, DU/pressure, kWh/acre-inch, minutes per set, yield/quality trends), deviations and root causes, producer feedback, outreach completed, and next-quarter work with dependencies. Acceptance criteria: substantive narrative and data; identified corrective actions where slippage occurs.

Quarterly Financial Report

Purpose: Reconcile expenditures to approved budget categories; demonstrate cost realism and burn rate; explain variances and flag any rebudgeting needs.

Schedule: Due within 30 days after each quarter, submitted with the technical report package.

Report Creator: Grants & Contracts Officer (Michael Ortiz, CRA) with inputs from PI and task leads; AOR reviews prior to submission.

Deliver to: AIGP Grants Program Manager via portal or grants@aigp.org; internal distribution to PI and AOR.

Report Format: Native Excel budget workbook (AIGP template) with visible formulas and a

short narrative (DOCX). Summary by category (Personnel, Fringe, Travel, Equipment, Supplies, ODC, Subawards/Consultants, Indirect) and cumulative totals.

Notes: Explains variances ≥10% by category with mitigation or ≤10% administrative rebudget requests; includes ledger extracts by invoice month. Supporting documentation (timesheets, payroll registers, receipts, POs, subaward invoices, proofs of payment) retained and organized for audit for three years after closeout.

- **Final Technical Report, Cleaned Data Package, and Dissemination Summary**

Purpose: Provide complete project outcomes, methods, statistical findings, and open artifacts enabling replication and adoption.

Schedule: Due within 60 days of project end; includes all final deliverables and closeout materials.

Report Creator: PI (technical synthesis) and Data Lead (datasets/metadata), with contributions from Technical Lead and Extension Lead.

Deliver to: AIGP Grants Program Manager via portal or grants@aigp.org; public versions deposited in an open repository with persistent identifier.

Report Format: Final Technical Report (DOCX/PDF), cleaned de-identified datasets (CSV/Parquet) with data dictionary/metadata (XLSX), configuration sheets and SOPs (DOCX/XLSX), and a Dissemination Summary (DOCX) detailing field day, webinar, and artifact distribution.

Notes: Visualizations include units, methods notes, and caveats; results cover WUE, DU/pressure, kWh/acre-inch, yield/quality, labor, and partial budgets. Attach an asset disposition plan per award terms.

- **Incident, Safety, and Data/Security Report**

Purpose: Record and respond to onsite safety incidents, equipment loss/damage, data security events, or material deviations affecting schedule, cost, or data integrity.

Schedule: Within 24 hours of awareness for safety or security events; corrective-action follow-up within five business days.

Report Creator: Area lead on scene (field incidents) or Data Lead (security events), with PI oversight.

Deliver to: Internal: PI, AOR, Grants Officer; External: AIGP program office if the incident affects scope, schedule, personnel, data privacy, or reportable compliance elements.

Report Format: Incident form (DOCX) with timeline, root cause, immediate actions, preventive measures, and photographic/log evidence; security reports include access logs and checksum results.

Notes: Triggers include injury, near-miss with potential serious outcome, theft/tampering, sensor failure causing >5% data loss over 72 hours, or suspected PII exposure. Actions may include hot-swap hardware, credential rotation, and SOP updates.

Equipment Asset & Calibration Ledger

Purpose: Track award-funded equipment under institutional asset controls; document maintenance, calibration, insurance, and location for audit and performance integrity.

Schedule: Updated monthly; submitted quarterly as an appendix to progress reports; final disposition documented at closeout.

Report Creator: Technical Lead (Raj Patel) with Grants Officer for asset tags and insurance.

Deliver to: AIGP as part of quarterly appendices; internal to PI and AOR.

Report Format: XLSX ledger listing serials, make/model, purchase date, funding source, site assignment, calibration certificates/dates, maintenance logs, and disposition status.

Notes: Confirms exclusive project use, safeguarding, and insurance coverage; maintains calibration traceability for meters/transducers used in DU and flow verification.

Formal Notices and Prior-Approval Requests

Purpose: Provide required written notices and seek approvals for changes exceeding administrative thresholds.

Schedule: Submitted before implementing changes; typical windows: ≥15 business days prior to need-by date.

Report Creator: AOR with input from PI and Grants Officer.

Deliver to: Designated award contacts via email with confirmation, certified mail, or recognized courier as required.

Report Format: Formal letter (PDF/DOCX) with rationale, revised budgets/schedules, impact analysis, and updated org charts if key personnel change.

Notes

All deliverables will be submitted as one searchable PDF for the narrative plus native DOCX/XLSX where applicable, using the AIGP file naming convention; late submissions are not accepted, and receipt confirmations will be verified within two hours.

Progress payments are tied to acceptable reports and deliverables; up to 10% retainage may be held until final acceptance. Cost share (if any) will be documented in quarterly financials. Financial and supporting records will be retained for at least three years after closeout.

Legal Compliance

VerdantEdge Ag Systems, LLC operates to the letter and spirit of applicable federal, state, and local requirements to protect producers, personnel, data, and the environment while delivering measurable outcomes under AIGP-2025-01. For DASIO, compliance is embedded from budgeting and procurement through fieldwork, data governance, reporting, and closeout. The following categories summarize the rules that govern our work and how we will meet or exceed each requirement to ensure that every dollar is allocable and auditable, every field activity is safe and permitted, and every dataset is ethical, private, and interoperable for replication.

Financial and Administrative Compliance

This category covers cost allowability, budgeting controls, records, equipment stewardship, nondiscrimination, and award administration. We align internal SOPs with AIGP terms to ensure funds are necessary, reasonable, and directly tied to DASIO activities, with transparent documentation and timely notices.

- Allowable costs and indirect rate compliance

  We will charge only costs that are reasonable, necessary, and allocable to the approved scope; indirect costs will be capped at the lower of 10% MTDC or any applicable negotiated rate, and unallowable costs (e.g., lobbying, alcohol/entertainment, contingency reserves, general marketing, construction) are excluded from the budget and ledger.

- Records retention and audit access

  Financial and performance records (general ledger, timesheets, payroll registers, POs/receipts, subaward invoices, procurement documentation, meter logs, data QA reports) will be maintained accurately and retained for at least three years after closeout; AIGP or its designee will receive timely access for desk or onsite reviews.

- Budget revisions and prior approvals

  We will manage within the administrative rebudgeting threshold (≤10% aggregate of total award) with before/after summaries; any changes exceeding 10%, affecting scope, key personnel, or period of performance will be submitted in writing to AIGP for prior approval, and any amendments will be executed in writing and signed by both parties.

- Equipment asset controls, use, and insurance

  Award-funded equipment will be used exclusively for DASIO, tagged in our asset ledger, safeguarded, maintained, and insured per policy; calibration certificates and location/assignment histories will be appended to the Equipment Asset & Calibration Ledger, and disposition will follow the award agreement at project end.

- Nondiscrimination, equal opportunity, and workplace policies

  VerdantEdge's nondiscrimination and equal opportunity policies apply across hiring, training, field activities, and producer services; we maintain a drug-free workplace, collect COI disclosures at kickoff and annually, and enforce ethical conduct consistent with applicable laws and award terms.

Data Governance, Privacy, and Research Ethics

This category addresses consent, minimization, de-identification, security controls, ethics approvals, breach notification, retention, and interoperability with common farm management systems. Our approach protects producer privacy while enabling open, replicable science.

- Informed consent and minimal collection

  If producer-identifiable or survey data are collected, we will obtain documented informed consent using clear language (EN/ES), limit collection to what is needed for the KPIs, and provide participants access to their dashboards and summaries for transparency and correction.

- De-identification, sharing tiers, and retention

  Before sharing, data will be de-identified, with names, business notes, and precise coordinates removed or coarsened; we will publish cleaned CSV/JSON with data dictionaries and methods notes, maintain role-based internal access to sensitive tables, and retain records for at least three years beyond closeout.

- Security-by-design and breach notification

  All data are encrypted in transit (TLS 1.2+) and at rest (AES-256) within a least-privilege secure enclave; access is MFA-protected with audit logs, and any confirmed breach affecting project data will trigger prompt notification to AIGP and participants, containment, forensics, and corrective action.

- Interoperability and open standards

  Cleaned datasets will be exported in open, machine-readable formats (CSV/JSON) with standard field identifiers, timestamps, and units to interoperate with common farm management systems; any proprietary integrations will be documented in the methods and data package.

- Ethics and export controls

  Where applicable, we will secure IRB or other approvals (e.g., biosafety) prior to initiating those tasks and maintain approvals on file; activities, personnel, and technology will be screened for export-control implications (EAR/ITAR), and obligations will be managed by VerdantEdge as the awardee.

Environmental, Field Operations, and Biosecurity Compliance

This category ensures that on-farm activities meet environmental protection standards, local permitting requirements, OSHA/Cal/OSHA safety rules, and biosecurity protocols suitable for mixed specialty crop and orchard systems, with attention to irrigation equipment, chemicals, and heat stress.

- Environmental permitting and site permissions

  Prior to installation of sensors, taps, meters, or enclosures, we will confirm and obtain any required local permits or site permissions (e.g., trenching, mounting on structures) and coordinate with growers and districts to ensure compliance with right-of-way and environmental ordinances.

- Workplace health and safety (OSHA/Cal/OSHA)

  Field work follows written JSAs and tailgate briefings; required PPE is enforced, lockout/tagout is used near pumps/valves, and crews are trained in heat illness prevention, ladder and electrical safety, and chemical/cleaner handling consistent with SDS and site SOPs.

- On-farm equipment and UAS operations

  Installations use NEMA enclosures, tamper tags, and weatherized cabling; energized work is minimized and performed by qualified personnel; any UAS thermal imaging is flown by a Part 107 pilot with flight plans, airspace checks, and logs maintained per FAA requirements.

- Biosecurity protocols (clean-in/clean-out)

  To prevent the spread of pests and pathogens, staff observe clean-in/clean-out procedures, disinfect tools/boots when moving between blocks or farms, log visitors, and follow site-specific biosecurity SOPs; trucks avoid mud transfer and restrict movement during quarantine advisories.

- Environmental protection and waste management

  We prevent releases by using spill kits during tapping or maintenance, capturing and disposing of wastes per local regulation, routing cables and anchors to avoid sensitive habitat, and restoring ground disturbances after installations; any incident is documented and remediated immediately.

Summary

VerdantEdge maintains a living compliance framework that integrates policies, training, asset controls, QA/QC, and audit-ready documentation. Formal notices and approvals will be issued in writing to designated AIGP contacts; deliverables will be submitted in editable Word/Excel with versioning and required accessibility. By embedding compliance into irrigation telemetry, DU verification, and producer-facing decision-support, we protect people, data, and the environment while delivering credible, scalable results aligned with AIGP priorities.

Conflicts of Interest

Conflicts of interest arise when personal, financial, or organizational interests could reasonably be perceived to bias judgment, procurement, data interpretation, or reporting. In agricultural demonstration projects where vendors, producers, and public partners intersect, unmanaged conflicts can erode trust, skew purchasing decisions, and undermine the credibility of results that inform on-farm water management, distribution uniformity (DU), and climate-smart practice adoption.

VerdantEdge Ag Systems, LLC maintains a written COI policy covering both organizational and personal conflicts. All key personnel, subaward leads, and covered consultants will submit individual COI disclosures prior to award, then update them annually and within 30 days of any change. We will submit a consolidated COI Packet with individual attestations, an organizational statement, and a matrix mapping disclosed interests to specific mitigations (recusal scope, review procedures, and monitoring owner). The following potential conflicts have been identified and will be actively managed to ensure objective performance under DASIO.

- **Conflict #1**

  A key technical lead has prior paid consulting experience with a soil-moisture sensor manufacturer whose equipment may be evaluated for field deployment. This creates a perceived financial and professional interest in vendor selection and performance characterization, which could influence meter placement, calibration thresholds, or interpretation of telemetry stability.

  Mitigation: The technical lead will be recused from drafting specifications, quote scoring, and acceptance testing for any vendor with whom a financial relationship exists in the prior 24 months. Procurement will follow a competitive process with three or more quotes and documented criteria weighted for agronomic fit, total cost of ownership, and DU verification capability; an uninvolved senior staff member will chair the technical/financial review and sign off.

- **Conflict #2**

  A covered individual or close family member holds equity in an early-stage ag-tech firm that markets an irrigation scheduling service similar to the project's rules engine. This creates a direct financial interest in product visibility and comparative positioning during outreach, field days, or dashboard demonstrations.

  Mitigation: The individual will be walled off from any comparative evaluation, messaging, or selection related to irrigation decision-support tools; they will not access non-public competitor data or participate in producer-facing materials that could favor the firm. All relationships will be disclosed in the Final Report and at public events, and any mention of third-party tools will follow a documented, neutral evaluation rubric reviewed by the PI and Data Lead.

Conflict #3

An organizational COI could arise if VerdantEdge were to sell or bundle equipment while also controlling technical specifications and acceptance testing for award-funded purchases. This dual role could bias scope toward proprietary components, affecting replicability and cost realism for small farms.

Mitigation: VerdantEdge will not sell equipment under this award and will separate specification writing from any existing commercial partnerships. All capital equipment purchases will be vendor-neutral, justified as essential and not reasonably available through rental or partner sharing, with model/quote documentation attached. No conflicted individual will approve their own work or invoices; the Grants Officer will monitor compliance through quarterly audits.

Conflict #4

A producer collaborator is a close relative of a VerdantEdge staff member involved in field operations. This relationship could influence site selection, stipend allocation, or the presentation of results (e.g., selection of reference blocks or interpretation of kWh per acre-inch trends).

Mitigation: The staff member will be recused from all decisions involving that farm, including MOUs, block selection, stipends, and data interpretation. The PI will assign an alternate field engineer and data analyst; site-level analyses will undergo independent review by an uninvolved senior staff member, and any farm with a declared relationship will be clearly flagged in the COI matrix and disclosures.

Conflict #5

Intellectual property (IP) and data-use interests may create tension between open dissemination and potential commercialization of decision-support workflows or anonymized datasets. If not addressed, this could affect the transparency of methods notes, unit reporting, or access to cleaned CSV/JSON needed by NPOs and extension partners.

Mitigation: Consistent with AIGP expectations, VerdantEdge will publish cleaned, de-identified datasets with dictionaries, units, methods notes, and caveats; configuration sheets and SOPs will be delivered in editable formats. Any IP developed will not restrict replication of methods or use of open artifacts; licensing discussions, if any, will occur only after final public releases. The PMO will document funding sources and relationships in the Final Report and monitor adherence through quarterly report sign-offs.

Summary

VerdantEdge will identify, disclose, and manage both personal and organizational conflicts through documented recusals, independent technical and financial reviews, competitive procurement (≥3 quotes), and transparent reporting. No conflicted individual will negotiate with an entity in which they hold an interest, approve their own work, or access non-public competitor information. All COI disclosures will be maintained, reviewed annually and upon

change, and incorporated into a COI Mitigation Plan if required by AIGP before commencing affected tasks, safeguarding the integrity of DASIO's irrigation, DU, and energy-efficiency outcomes.

Permits and Licenses

This project is legally required to obtain the following permits and to be performed by individuals licensed to complete the project.

Use the Permits and Licenses template to outline the permits and licenses required for the project. Examples include building permits, plumbing permits, electrical permits, licenses to practice certain fields of work, etc.

- **UAS Flight Authorization: FAA Part 107 and Airspace Approvals**

  Authority: Federal Aviation Administration (FAA); 14 CFR Part 107; local airspace facility via LAANC/air traffic control where applicable.

  For periodic thermal imagery to validate canopy stress and distribution uniformity, remote pilots will operate under Part 107 with site-specific authorizations as needed (e.g., LAANC for controlled airspace, daylight/visibility waivers if required). Fees are limited to pilot certification/renewal and any third-party app charges; LAANC approvals are typically minutes, while waivers (if needed) may take 30–90 days.

  Licensing: Flights will be conducted by an FAA-certificated Remote Pilot in Command with current recurrent training. Preflight checklists, NOTAM/airspace checks, and flight logs will be maintained. If a visual observer is used, roles will be briefed and documented. Insurance will include UAS liability per carrier requirements.

- **Irrigation District/Water Agency Work Permit (Line Taps, Meter Installs, ROW Access)**

  Authority: Local irrigation district or water agency; California Water Code provisions; right-of-way/encroachment rules.

  Where flow meters, pressure taps, or telemetry enclosures interface with district conveyance or shared laterals, a work/encroachment permit and method statement may be required. Typical submittals include a site sketch, equipment cut sheets, and safety plan; fees vary ($0–$500) with processing times of 1–3 weeks depending on district workload.

  Licensing: All taps will follow district standards; hot work is avoided. Installers are qualified technicians under the supervision of a Professional Engineer (PE). Lock-out/tag-out (LOTO) will be coordinated with the district/grower. Acceptance tests and calibration certificates will be filed with the permit closeout.

- **County Encroachment/Minor Installation Permit (Mounts, Trenches, Small Electrical)**

  Authority: County Public Works/Building Department (e.g., Yolo/Solano/San Joaquin

Counties); local ordinances; Cal/OSHA safety rules.

For small sensor mounts, shallow conduit, or equipment pads outside active fields or near public ROW, a minor encroachment or over-the-counter building/electrical permit may be required. Submittals include location sketch, anchoring details, and load limits for enclosures. Typical fees: $50–$300; turnaround 1–10 business days for OTC permits, 2–4 weeks if plan review is needed.

Licensing: Work will be performed by qualified personnel following California Electrical Code for low-voltage systems. LOTO will be used when working near pumps or panels. Post-install inspection (if required) will be scheduled and signed off prior to energizing any components.

- **Cal/OSHA Hot Work and Electrical LOTO Clearances (Site-Specific)**

Authority: Cal/OSHA; Title 8 CCR; site owner/operator safety programs.

If any cutting/drilling is necessary for meter taps or bracket mounts, hot-work permits and a Job Safety Analysis (JSA) will be executed per site policy. LOTO is mandatory when working on or adjacent to energized equipment; no energized work is planned. There are no agency fees; approvals are site-administered with same-day authorization following safety briefing.

Licensing: Only trained personnel will conduct tasks under written SOPs. Supervisors will document hot-work fire watch, PPE, and post-work inspections. LOTO authorization lists will be maintained, and crews will sign tailgate briefings before work begins.

- **California DPR Pesticide Applicator Licensing (Contingency Only)**

Authority: California Department of Pesticide Regulation (DPR); Food and Agricultural Code; County Agricultural Commissioner.

No restricted materials or pesticide applications are planned under DASIO. If a contingency arises requiring application (e.g., disinfectants beyond exempt uses), appropriate Qualified Applicator License/Certificate (QAL/QAC) and county registrations would be obtained in advance. County fees vary ($50–$200) with 1–2 week processing; restricted material permits, if ever needed, follow county timelines.

Licensing: Any chemical use will follow label, SDS, REI/PHI rules, and site posting requirements. Crew training records (handler/safety) will be maintained. In absence of pesticide activities, this requirement remains not applicable but monitored by the PMO.

Notes

Prior to any field activity, the PMO will run a pre-activity compliance checklist to verify that required authorizations are active and on file: FAA Part 107 pilot certificates and site flight approvals; landowner/cooperator access permissions; irrigation-district work/encroachment permits; and site-specific hot-work/LOTO clearances. Copies of permits, licenses, JSAs, and

SOP acknowledgments will be stored in the project compliance folder and re-verified before each relevant task.

VerdantEdge will maintain insurance appropriate to field risks, including commercial general liability, workers' compensation, and hired/non-owned auto; UAS liability is maintained when flights occur. Certificates of Insurance naming cooperators (and, if requested, AIGP) as certificate holder will be provided upon request and kept current through the period of performance. No UAV flights, installations, or chemical uses will proceed without corresponding approvals and insurance in place.

Equity and Inclusion

Equity and inclusion are core to DASIO's purpose: small and mid-sized producers in the Delta—especially beginning and underserved growers—face structural barriers to adopting climate-smart irrigation. Our approach embeds multilingual training, low-bandwidth decision tools, and cost-effective equipment access so producers with limited capital, connectivity, or staff can still realize water-use efficiency, energy savings, and yield stability. By co-designing workflows with growers and trusted partners (UC Cooperative Extension, the Yolo County RCD, tribal agriculture departments, and farmer-led nonprofits), we lower adoption friction and ensure the benefits reach operations that are often overlooked by enterprise solutions.

The Need for Equity and Inclusion

Barriers faced by underserved and beginning farmers

Many producers operate 2–250 acres with legacy micro/drip systems, intermittent internet, bilingual crews, and limited cash flow; tools built for large enterprises can be cost-prohibitive, complex, and data-hungry, leaving smaller operations reliant on calendar irrigation and gut checks that risk over/under-watering.

Beginning farmers, immigrant-led operations, women and veteran producers, and tribal partners often lack access to financing, tech support, or vendor time; they also need culturally relevant, bilingual materials and training offered outside standard business hours to align with crew schedules and seasonal workloads.

Why inclusion improves project outcomes

Engaging diverse producers strengthens the agronomic evidence base across soil textures, salinity gradients, and hardware realities, yielding more transferable playbooks and fairer returns on public investment; inclusion expands the acreage benefiting from improved distribution uniformity, lower kWh per acre-inch, and reduced leaching.

Equity practices—multilingual resources, ADA-compliant events, equipment sharing, and micro-stipends—translate directly into higher participation, better data completeness, and sustained use of decision sheets and field cards, accelerating climate-smart adoption beyond the pilot sites.

Resolving the Issues

Accessible training and materials (low-bandwidth, multilingual, ADA-compliant)

We will produce plain-language handouts, bilingual field cards (EN/ES), captioned recordings, and large-print versions; core resources (Q&A workbooks, SOPs, checklists)

will be provided as printable DOCX/PDF for offline use, with SMS/email nudges summarizing key field tasks and deadlines.

Sessions will be offered in multiple formats and times (evenings/weekends; in-person/virtual) at ADA-compliant venues; slides will be shared in advance, and one-on-one office hours by phone will support growers without reliable internet. Additional languages will be added based on partner requests.

- **Lowering financial and technical barriers to entry**

DASIO prioritizes low-cost sensor packages with template-based "starter settings" compatible with common pumps/valves; we will stand up cooperative equipment-sharing through associations or irrigation districts so participants can borrow meters and loggers.

A micro-stipend will be available for first-time participants who complete baseline data and training; simple, mobile-friendly forms (also in paper) with staff assistance will streamline enrollment and documentation without adding administrative burden.

- **Peer mentorship and community partnerships**

Early adopters will co-lead trainings, host "open farm" walkthroughs, and serve as peer mentors so new participants can see setpoint workflows and DU checks in context; this reduces perceived risk and normalizes the transition away from calendar irrigation.

We will partner with UC Cooperative Extension, RCDs, tribal agriculture departments, and farmer-led nonprofits for outreach, translation review, and culturally relevant facilitation, strengthening trust and ensuring continuity after the grant.

- **Inclusive decision-support and privacy protections**

Dashboards and decision sheets will emphasize clear valve-level run times, weather-aware adjustments, and bilingual troubleshooting trees that crews can execute without new hires or expensive subscriptions; low-bandwidth modes and printable packets ensure usability during connectivity gaps.

Producer-identifiable data will be protected with least-privilege access and de-identification; participants will preview their dashboards and materials before release to confirm clarity and context, building confidence in recommendations and safeguards.

Additional Information

- **Benchmarks and accountability**

We will track Equity & Access metrics quarterly: number and share of beginning and underserved producers engaged; languages requested/served; attendance by format (in-person/virtual); stipend utilization; equipment-sharing enrollments; accommodations

provided; and satisfaction scores disaggregated by producer segment.

Targets include ≥50% of participants from beginning/underserved categories across the five farms; ≥90% delivery of bilingual materials for all events; ≥75% of participants receiving at least one accessibility accommodation upon request; and ≥80% satisfaction on clarity and usefulness of field cards and decision sheets.

Continuous improvement and sustainability

Post-training surveys and brief phone check-ins will feed revisions to pacing, translations, and artifact design within two weeks of each major event; lessons learned will be published in bilingual briefs and incorporated into the cooperative equipment-sharing guide for replication.

By embedding equity practices—multilingual assets, shared equipment, flexible scheduling, and privacy-first data governance—into standard operating procedures, we ensure the irrigation workflow, QA/QC, and producer artifacts remain usable by small and mid-sized operations long after the grant period, aligning with AIGP's emphasis on practical, scalable, and inclusive adoption.

Budget Information

Following is a summary of VerdantEdge Ag Systems, LLC's budget information.

We request AIGP funding within the Implementation/Demonstration tier to execute DASIO across five cooperating farms over 24 months. The total project cost is $294,805 in AIGP funds, aligned to on-farm sensing, validation, and producer training that improve water-use efficiency, energy intensity, and yield stability. All costs are necessary, reasonable, and allocable to the approved scope; unallowable costs (e.g., lobbying, entertainment, general marketing, contingency) are excluded. Indirect costs are limited to 10% of Modified Total Direct Costs (MTDC). Award-funded equipment will be used exclusively for the project, tagged under institutional asset controls, safeguarded/insured, and managed per the award's disposition terms. The detailed, itemized budget is provided in the native AIGP Excel template with visible formulas and a line-by-line narrative explaining assumptions, rate × quantity × period, and price reasonableness.

Company Budget

VerdantEdge operates a lean, project-based budget that prioritizes field impact and transparent reporting. For DASIO, personnel effort is right-sized to the work breakdown and milestones: Project Director/PI (oversight, agronomy, stakeholder engagement), Project Manager (schedule, risk, procurement, RACI), Systems Engineer (telemetry, commissioning, flow/pressure verification), Data Scientist (QA/QC, KPI models, dashboards), Field Technician (installs, sampling, DU checks), Extension Specialist (trainings, demonstration day), and Grants/Finance (invoicing, compliance). Salaries are budgeted at 0.05–0.30 FTE per role over 12–24 months, with fringe benefits budgeted separately at the institutional composite rate of 28% on salaries (excludes contractors). Indirect is capped at 10% MTDC and is not embedded in any direct unit rates. Financial controls include segregated duties, monthly variance reviews, asset ledgers with calibration certificates, and quarterly reports that reconcile to the general ledger and the AIGP workbook.

Project Budget

The request directs the majority of funds to on-farm work and producer-facing deliverables:

- Personnel and Fringe. Personnel total $177,675 in salaries across seven positions mapped to milestones (e.g., Q2 commissioning, Q4 mid-project review, Q6 demonstration day), plus $47,229 in fringe (28%). Illustrative levels of effort: PI 0.12 FTE for 24 months ($36,000) to lead agronomy and reporting; Project Manager 0.15 FTE for 24 months ($33,000) to manage schedule/procurement; Data Scientist 0.15 FTE for 18 months ($28,125) for QA/QC and KPI models; Systems Engineer 0.18 FTE for 18 months ($31,050) for telemetry and commissioning; Field Technician 0.25 FTE for 18 months ($22,500) for installations and DU checks; Extension Specialist 0.10 FTE for 12 months ($9,500) for trainings; Grants/Finance 0.05 FTE for 24 months ($8,500) for invoicing and compliance.

- Travel. Field operations and dissemination total $6,500 using institutional/GSA-equivalent rates (source/date noted in the Excel narrative). Field trips: Sacramento-area origins to three Delta sites, primarily day travel with mileage at the GSA POV rate, periodic overnight stays for commissioning, and ground costs (tolls/parking). Dissemination: two travelers for a regional workshop at GSA lodging/per diem; meeting room costs are under Other Direct Costs, not travel.

- Equipment (Capital). $25,080 for essential, season-long instrumentation not reasonably available for rental or partner sharing: two portable weather stations (Campbell Scientific MetPak Pro or equivalent, 2 × $6,500 plus tax/shipping) for site-level ET/precip validation, and one ultrasonic flow meter kit (Flexim FLUXUS F601 or equivalent, $9,800 plus tax/shipping) to commission mains and conduct periodic audits. Ownership remains with VerdantEdge; items are asset-tagged and insured, with disposition per award terms.

- Supplies and Other Direct Costs. $12,549 covering consumables and services directly supporting fieldwork and decision-support: soil-moisture probes (below capitalization threshold; 20 × $240), telemetry SIM data plans (5 lines × $25/mo × 18 mos), soil test kits (30 × $45), PPE and small tools, printing for bilingual field cards/posters, Microsoft 365 Business Standard (5 seats × $18/mo × 18 mos), and Amazon S3 Glacier Deep Archive (200 GB × $0.012/GB-mo × 12 mos). Providers, unit counts, and terms are itemized in the Excel tabs.

- Consultants/Vendors. $7,070 for targeted expertise and services with documented rate sheets/quotes: Spanish-language technical editor ($85/hr × 30 hrs = $2,550); accessibility reviewer ($120/hr × 16 hrs = $1,920) to ensure ADA/WCAG compliance; calibration lab services ($600/station × 2 = $1,200); and workshop venue AV/room package (quote: $1,400). A UAS thermography pilot was scoped but is not included in this request; if added, it will follow competitive procurement and prior-approval thresholds.

- Producer Compensation. $3,500 as participant support: $300 per cooperator per season × 5 cooperators × 2 seasons ($3,000) plus $250 × 2 demo-day host stipends ($500). Eligibility, documentation (W-9, participation forms, attendance logs), and deliverables alignment are defined in the Budget Narrative.

- Indirect Costs. 10% MTDC applied only to eligible direct costs, excluding capital equipment (≥$5,000/unit) and participant support. MTDC basis and category roll-ups are shown in the Excel Summary tab; no indirect is embedded in direct unit prices.

All procurement follows a documented process emphasizing price reasonableness (catalog pricing, prior invoices, or three quotes), agronomic fit, total cost of ownership, and replicability for small and mid-sized producers. Budget flexibility within the ≤10% aggregate rebudgeting threshold will be managed administratively with before/after summaries; larger shifts or scope changes will be submitted for prior written approval.

Sources of Funds

AIGP is the sole cash funder requested at $294,805. Voluntary, verifiable in-kind support strengthens the project without being required: producer time (5 growers × 12 hours/site/year × $35/hour × 2 years ≈ $4,200), land access for field plots (5 sites × $150/year × 2 years = $1,500), irrigation-district SCADA data services (≈$1,000), and a waived venue fee for the field day (≈$500). Total anticipated in-kind match is approximately $7,200. Each contribution will be valued using published wage benchmarks, historical utility rates, or catalog pricing and documented via signed letters, timesheets, usage logs, or invoices marked "no charge," and mirrored on the Cost Share tab of the Excel workbook. Payments under the award will follow AIGP's advance/reimbursement structure, with up to 20% initial advance, quarterly reimbursements tied to acceptable reports/deliverables, and up to 10% retainage released at final acceptance.

Summary

The budget concentrates funds where they matter most for producer outcomes: calibrated sensing and system validation; weather-aware scheduling and QA/QC; bilingual training and demonstration for adoption; and a lean management layer to ensure cost control and compliance. Major categories are: Personnel/Fringe ($224,904 combined), Travel ($6,500), Equipment ($25,080), Supplies/ODC ($12,549), Consultants/Vendors ($7,070), Producer Compensation ($3,500), and Indirect (10% MTDC). This allocation supports five-site commissioning by month 6, mid-project review at month 12, a demonstration day and interim data release by month 18, and final datasets, playbooks, and reports by month 24. All deliverables will be submitted in editable Word/Excel with labeled versions; data visualizations will include units, methods notes, and caveats. The result is a cost-realistic plan that maximizes on-farm impact, documents price reasonableness, and aligns every dollar to DASIO's milestones and AIGP's priorities in water efficiency, soil health, and resilient supply chains.

Project Budget

Annual Project Budgets	2025	2026	2027
Income Sources	**Amount**	**Amount**	**Amount**
AIGP Grant Request	$400,000	$0	$0
Applicant Cost Share	$51,300	$0	$0
Total Income	**$451,300**	**$0**	**$0**
Assets	**Amount**	**Amount**	**Amount**
Prototyping Lab (Davis)	$0	$0	$0
Mobile Instrumentation Van	$6,000	$0	$0
Loaner Sensor Kits (50+ Nodes)	$8,500	$0	$0
UAS w/ Thermal Camera	$3,500	$0	$0
Secure Data Enclave	$0	$0	$0
New Soil-Moisture & Flow Sensors	$20,000	$0	$0
Total Assets	**$38,000**	**$0**	**$0**
Expenses	**Amount**	**Amount**	**Amount**
Personnel (salaries)	$261,000	$0	$0
Fringe Benefits (28% of salaries)	$73,080	$0	$0
Travel	$12,000	$0	$0
Equipment (capital)	$20,000	$0	$0
Supplies & Other Direct	$12,000	$0	$0
Participant/Producer Support	$10,000	$0	$0
Subaward	$15,000	$0	$0
Consultants/Vendors	$5,000	$0	$0
Other Direct (data/cloud)	$4,000	$0	$0
Indirect Costs (10% MTCD)	$39,220	$0	$0
Total Expenses	**$451,300**	**$0**	**$0**
Surplus (Deficit)	**$38,000**	**$0**	**$0**

Price Comparison

VerdantEdge Ag Systems, LLC evaluated current market offerings to ensure DASIO delivers superior value and clear price reasonableness for AIGP funds. We compared our total project estimate against three representative alternatives serving small and mid-sized specialty crop and orchard operations in the Delta: (1) an enterprise irrigation platform subscription with vendor hardware; (2) a sensor-and-install bundle from a national distributor; and (3) a consulting-only agronomy service that leverages producer-owned sensors. Competitors were selected based on active sales in Northern California, fit for micro/drip systems, and availability of written quotes or published rate cards (obtained Q3–Q4 2025). Prices reflect total cost of ownership over 24 months, inclusive of hardware, setup, subscriptions, staff time for QA/QC, and training where applicable. Non-price factors include data governance, distribution uniformity (DU) verification, bilingual deliverables, low-bandwidth usability, producer control of data, and compliance with competitive procurement expectations.

- **VerdantEdge Ag Systems, LLC**

  Our price: $265,000–$295,000 total project cost (24 months; Implementation/Demonstration tier)

  Scope includes soil-moisture and canopy telemetry (50+ nodes), inline flow/pressure verification, weather-aware scheduling, bilingual field cards, QA/QC pipelines, producer dashboards, a demonstration day, anonymized datasets, and a cooperative equipment-sharing guide; pricing reflects competitive procurement for components (≥2 quotes ≥$10k; ≥$25k quotes appended) and caps indirect at ≤10% MTDC.

- **Competitor Name #1**

  Their price: $310,000–$380,000 (enterprise subscription + vendor hardware + pro services)

  Typically higher due to per-acre/ per-device subscription fees, proprietary gateways, and required premium support; strong portal features but limited DU testing, less flexible data exports, and fewer bilingual, Word-first artifacts; may require continuous broadband and long-term license lock-ins increasing total cost of ownership.

- **Competitor Name #2**

  Their price: $210,000–$260,000 (sensor-and-install bundle; limited decision-support)

  Lower entry hardware cost but minimal QA/QC, no systematic DU/pressure validation, and basic dashboards that stop short of valve-level setpoints; training and producer-ready bilingual materials are add-ons; risk of under-realized savings without rules-engine integration and human-in-the-loop workflow.

- **Competitor Name #3**

  Their price: $180,000–$220,000 (consulting-only agronomy; BYO sensors)

  Advises scheduling and field checks but assumes producer-owned, maintained sensors/meters; lacks integrated telemetry, pressure/flow verification, or secure data enclave; savings depend on variable third-party hardware quality and do not include anonymized data releases or cooperative sharing playbooks.

Summary

VerdantEdge's DASIO package delivers a complete, audit-ready irrigation optimization workflow at $265k–$295k over 24 months—priced below typical enterprise stacks and only modestly above hardware-only bundles—while including elements those options omit: DU and pressure/flow verification, rigorous QA/QC, bilingual field cards and training, low-bandwidth decision sheets, secure de-identified data products, and open, replicable artifacts for NPO and extension use. We will follow competitive procurement as the default (documenting quotes ≥$10k and appending ≥$25k quotes), indicate procurement method per line (competitive quotes, existing contract vehicle, or sole-source with justification), and maintain a price-reasonableness file for audit. This balance of cost and capability maximizes acre-inches saved, kWh per acre-inch reduced, and adoption beyond the grant period. We respectfully request the committee's approval to proceed within the AIGP Implementation/Demonstration tier to realize these measurable outcomes for Delta producers.

Capacity

VerdantEdge Ag Systems, LLC has the capacity to deliver DASIO across five small and mid-sized Delta farms within a 24-month period of performance, meeting AIGP standards for technical execution, financial stewardship, and reproducible deliverables.

Describe the capacity your company currently has to support this project. Examples include manpower, industrial capacity, production volume that can be achieved, etc.

- **Proven field instrumentation and integration capacity**

  Our Davis prototyping lab, calibrated pressure/flow benches, and a mobile instrumentation van support rapid configuration and verification of soil-moisture, canopy-temperature, and inline flow/pressure arrays. With 50+ loaner sensor nodes and pre-qualified telemetry gateways, we can commission two "alpha" sites in parallel, maintain ≥95% telemetry uptime, and validate meter error ≤5% before expanding to the remaining farms.

- **Decision-support and analytics production capacity**

  A secure data enclave and QA/QC pipelines (range/logic checks, duplicate sensors at ≥10% of points, audit trails) enable monthly KPI dashboards (WUE, DUlq, kWh per acre-inch, labor minutes per set) and Word-first producer artifacts. Low-bandwidth dashboards, SMS/email alerts, and bilingual field cards are generated from standardized templates to sustain cadence without increasing grower burden.

- **Sponsored programs and compliant grant management**

  Our Grants & Contracts function (led by a CRA) enforces separation of duties among PI, finance, and procurement; monthly reconciliations tie charges to WBS tasks with variance flags ≥10%; an external CPA performs quarterly reviews for accuracy and policy alignment. Equipment is tagged, insured, and maintained under asset controls; quarterly asset/calibration ledgers and auditable ledgers are appended to reports.

  Describe your company's experience in providing similar solutions in the past.

  VerdantEdge Ag Systems, LLC specializes in climate-smart irrigation sensing, variable-rate micro/drip optimization, and producer-ready decision-support for small and mid-sized operations. Our representative work includes a variable-rate micro-irrigation pilot across almonds and walnuts (120 sensors deployed with grower playbooks and an ROI calculator), salinity monitoring with leaching-fraction advisories for specialty vegetables (bilingual training for crews and managers), and cooperative water-use benchmarking with irrigation districts that produced anonymized datasets and public how-to guides. These projects demonstrate our ability to pair rigorous QA/QC with practical training and Word-first documentation that accelerates adoption.

If your company is currently lacking in any required capacity, describe how you intend to overcome the deficiencies in order to perform the work and complete the project.

Where surge needs arise (e.g., overlapping install windows or specialized statistical review), we will deploy pre-calibrated loaner kits from our inventory, engage cross-trained bench technicians for field swaps, and leverage partner capacity (UC Cooperative Extension, Yolo County RCD) for DU testing and field days. A third-party evaluator will independently verify KPI methods and calculations to reinforce objectivity. Alternate vendors and models are pre-qualified to mitigate supply constraints; procurement includes three-quote documentation and functional equivalency checks to preserve schedule and scope.

Show areas of specialization that are relevant to this project.

- **Sensing and automation for micro/drip systems**

Networked soil-moisture probes, canopy-temperature sensing, inline flow/pressure verification, and pump/valve automation configured to legacy infrastructure, with sensor fusion that ties field variability to actionable setpoints.

- **Weather-aware irrigation scheduling and nutrient timing**

ET-based rules with crop coefficients and soil-water balance models translate into valve-level runtimes; fertigation timing advisors reduce variability in N application while maintaining tissue targets.

- **Producer-first training and technology transfer**

Bilingual field cards, Q&A playbooks, and train-the-trainer modules that integrate with low-bandwidth realities; open, de-identified datasets with dictionaries and methods notes to enable replication by NPOs and extension partners.

Show how you can meet the required schedule. You can expand on this topic by also adding the Production Schedule template.

We will execute two sites in parallel during Months 4–6, then bring the remaining sites online by Month 9, with commissioning gates of ≥95% telemetry uptime and ≤5% meter error. A quarter-by-quarter cadence—baseline and procurement (Months 1–3), alpha commissioning and training (Months 4–6), full deployment and mid-season tuning (Months 7–12), optimization and demonstration (Months 13–18), replication and final reporting (Months 19–24)—is governed by go/no-go criteria tied to KPIs. Monthly internal reviews and quarterly AIGP reporting maintain schedule integrity, with resequencing and loaner deployments available to absorb vendor or weather delays.

VerdantEdge Ag Systems, LLC maintains a staff of over multidisciplinary professionals who will be assigned to your specific project.

Key personnel include: Elena Marquez, PhD, PMP (PI; agronomy, experimental design, KPI tracking), Raj Patel, PE (systems engineering; SCADA/telemetry and field integration), Sara

Nguyen, MS (data governance, QA/QC, dashboards), Luz Romero, MEd (extension and bilingual training), and Michael Ortiz, CRA (sponsored programs, compliance). This core team is supported by cross-trained field technicians and a licensed UAS pilot for thermal validation, enabling rapid response to sensor drift, DU constraints, or connectivity gaps without disrupting producer operations.

Show your concern for doing the job properly.

Quality, safety, and ethics are embedded in our workflow: written SOPs for field safety, pesticide-handler coordination, and UAS compliance; bench and field calibrations with certificates; least-privilege access and encrypted data flows; and dissemination artifacts that meet accessibility standards with units, methods notes, and caveats. Reporting quality is enforced through a standing review cadence—drafts prepared by the project team, independently checked by Sponsored Programs for allowability and documentation, and approved by the AOR prior to submission. These controls, combined with objective third-party evaluation and transparent, bilingual materials, ensure DASIO delivers measurable acre-inches saved, improved DU and energy intensity, and reproducible, audit-ready results that align with AIGP priorities and NPO replication goals.

Certifications

VerdantEdge Ag Systems, LLC is certified and fully qualified to perform the DASIO project under AIGP-2025-01. The following certifications and organizational attestations are current, enforceable under written policies, and directly applicable to our irrigation telemetry, distribution uniformity verification, and producer-facing decision-support activities across the five pilot farms.

- **Certification # Attachment E – Certifications & Assurances (Executed)**

  Agency: Agricultural Innovation Grant Program (AIGP), Program Office

  Authority: AIGP-2025-01 Award Terms; incorporation by reference of applicable federal/state cross-cutting requirements (e.g., Drug-Free Workplace Act; nondiscrimination/equal opportunity; debarment/suspension; records retention; accessibility).

  VerdantEdge will complete and sign Attachment E – Certifications & Assurances. The Authorized Organizational Representative (Carolina "Carrie" Holt, MBA, CEO) will execute the form on behalf of VerdantEdge Ag Systems, LLC, ensuring the legal entity name and UEI (L9K5J7M3N2Q1) match the cover sheet. This certification affirms our commitment to comply with AIGP terms, submit deliverables in accessible, editable formats, and adhere to prior-approval thresholds for rebudgeting, scope, personnel, and period-of-performance changes.

  Include a copy of the original certification if required by a government grant. Original copies are typically attached on their own pages in the proposal.

- **Certification # Active SAM Registration and Non-Debarment/Non-Suspension**

  Agency: U.S. General Services Administration (System for Award Management, SAM.gov)

  Authority: 2 CFR Part 25 (Universal Identifier and SAM); 2 CFR Part 180 (OMB Guidelines to Agencies on Governmentwide Debarment and Suspension).

  VerdantEdge Ag Systems, LLC maintains an Active SAM registration under UEI L9K5J7M3N2Q1 and certifies that neither the company nor any proposed subrecipients/contractors are presently suspended, debarred, or otherwise excluded from participation in federal assistance programs. We will screen all parties against the appropriate exclusion lists prior to award and at least annually during the period of performance; any status change will be reported to AIGP in writing within five (5) business days with proposed remedial actions to protect project continuity and integrity.

  Include a copy of the original certification if required by a government grant. Original copies are typically attached on their own pages in the proposal.

Certification # Drug-Free Workplace, Nondiscrimination, and Equal Opportunity Policies

Agency: U.S. Department of Labor; U.S. Equal Employment Opportunity Commission; State of California Civil Rights/DFEH.

Authority: Drug-Free Workplace Act of 1988; Title VI and Title VII of the Civil Rights Act; Americans with Disabilities Act (ADA); California Fair Employment and Housing Act (FEHA); Rehabilitation Act Section 504.

VerdantEdge maintains a drug-free workplace program (employee notice, supervisor training, assistance resources) and enforces nondiscrimination and equal opportunity policies across hiring, training, and field operations. All project activities—including producer engagement, trainings, and materials—will follow these policies and accessibility standards (embedded fonts, alt text, high-contrast visuals, captioned media). Complaints, if any, will be handled per written procedures and reported consistent with award terms.

Include a copy of the original certification if required by a government grant. Original copies are typically attached on their own pages in the proposal.

Notes

Organizational Representations on File: Small Business self-certification (California domestic LLC), Conflict-of-Interest policy and annual disclosure process, export-control screening where applicable, and insurance certificates (general liability, workers' compensation, auto; UAS liability when flights occur).

Equipment Stewardship: Award-funded equipment will be used exclusively for the approved scope and managed under institutional asset controls with calibration certificates and maintenance logs; disposition will follow the award agreement at closeout.

Contact for Certifications: AOR – Carolina "Carrie" Holt, MBA (carrie.holt@verdantedgeag.com; 530-555-0201).

Resume

The following VerdantEdge Ag Systems, LLC team members will be working with you during the course of your project. We have included their resumes below so you can get to know your team's skills and backgrounds.

- **Elena Marquez, PhD, PMP**

  Project Director / Principal Investigator, VerdantEdge Ag Systems, LLC

  Phone: (530) 555-0203

  Fax: (530) 555-0199

  E-Mail: elena.marquez@verdantedgeag.com

  Publications: Marquez E. et al., "Deficit Irrigation and Yield Stability in Almonds," Calif. Ag; Marquez E. & Patel R., "Inline Meter Validation for Microirrigation," ASABE poster.

  Patents: N/A

  Professional Affiliations: American Society of Agronomy (ASA); ASABE; Project Management Institute (PMI)

Board Positions: Advisory member, Yolo County RCD Producer Working Group

12+ years leading on-farm irrigation trials in almonds, walnuts, vineyards, and specialty vegetables. Designs paired-block studies, establishes KPI governance (WUE, DUlq, kWh/acre-inch), and leads producer co-design. For DASIO: experimental design, milestone delivery, and human-in-the-loop scheduling oversight. Availability: 20% FTE average over 24 months.

PhD, Agronomy (UC Davis); BS, Plant Sciences (UC Davis); PMP (PMI)

Skills: deficit irrigation strategy; soil-water balance modeling; KPI/M&E frameworks; stakeholder facilitation; bilingual (EN/ES) field communication

- **Raj Patel, PE**

  Senior Systems Engineer (Irrigation & Sensing), VerdantEdge Ag Systems, LLC

  Phone: (530) 555-0206

  Fax: (530) 555-0199

  E-Mail: raj.patel@verdantedgeag.com

Publications: Patel R. et al., "Telemetry Uptime and Store-and-Forward in Low-Bandwidth Agriculture," IEEE IoT Ag; Patel R. & Nguyen S., "Sensor Fusion for Irrigation Setpoints," conference proceedings.

Patents: Co-inventor, low-power gateway firmware for ag telemetry (assigned to employer prior to VerdantEdge)

Professional Affiliations: NSPE; ASABE; AWWA (metering subsection)

Board Positions: N/A

15+ years in SCADA, telemetry, and variable-rate micro/drip systems. Leads bench calibration, inline flow/pressure validation, and commissioning with ≤5% meter error and ≥95% telemetry uptime. For DASIO: sensor configuration, DU diagnostics, asset controls. Availability: 25% FTE average.

MS, Mechanical Engineering (Stanford); BS, Electrical Engineering (UC Berkeley); California PE (Mechanical)

Skills: SCADA integration; pressure/flow mapping; RF/telemetry design; asset tagging and maintenance; field safety SOPs

- **Sara Nguyen, MS**

  Data Scientist & QA/QC Lead, VerdantEdge Ag Systems, LLC

  Phone: (530) 555-0209

  Fax: (530) 555-0199

  E-Mail: sara.nguyen@verdantedgeag.com

  Publications: Nguyen S. et al., "kWh per Acre-Inch as an Energy KPI," J. Sustainable Ag Systems; Nguyen S., "De-identified Agronomic Datasets: Methods and Caveats," data note.

  Patents: N/A

  Professional Affiliations: ASA Data Science Community; Open Data Institute

Board Positions: N/A

Specializes in agronomic analytics, data governance, and dashboarding. Builds QA pipelines (range/logic checks), manages data dictionaries, and publishes cleaned, de-identified CSV/JSON. For DASIO: KPI models, monthly dashboards, and public dataset releases with methods notes. Availability: 20% FTE average.

MS, Data Science (UC Berkeley); BS, Statistics (UC Davis)

Skills: mixed-effects modeling; ET normalization; QA/QC automation; secure enclave administration; bilingual data summaries (EN/ES)

- **Luz Romero, MEd**

  Extension & Training Specialist, VerdantEdge Ag Systems, LLC

  Phone: (530) 555-0211

  Fax: (530) 555-0199

  E-Mail: luz.romero@verdantedgeag.com

  Publications: Romero L., "Bilingual Field Cards for Microirrigation Crews," Extension brief; Romero L. & Marquez E., "Train-the-Trainer Models in Specialty Crops," outreach note.

  Patents: N/A

  Professional Affiliations: American Association for Adult and Continuing Education; UC ANR Community of Practice (collaborator)

Board Positions: Volunteer advisor, regional farmworker education nonprofit

Designs adult-learning modules and bilingual (EN/ES) producer materials. Leads field days, webinars, and office hours; improves adherence to setpoint workflows and reduces minutes per set. For DASIO: adoption kit, Q&A playbook, demonstration day delivery. Availability: 15% FTE average.

MEd, Adult & Continuing Education (Sac State); BA, Communications (CSU Chico)

Skills: curriculum design; bilingual facilitation; accessibility/ADA compliance; survey feedback loops; producer-facing SOP development

- **Michael Ortiz, CRA**

  Director of Sponsored Programs (Grants & Finance Officer), VerdantEdge Ag Systems, LLC

  Phone: (530) 555-0212

  Fax: (530) 555-0199

  E-Mail: michael.ortiz@verdantedgeag.com

  Publications: Ortiz M., "Cost Realism and Milestone Billing in Ag Demonstrations," NCURA magazine blog.

  Patents: N/A

Professional Affiliations: NCURA; SRAI

Board Positions: Treasurer, regional research administrators' chapter

Oversees compliant budgeting, quarterly financials, asset controls, and prior-approval requests. Ensures indirect cap (≤10% MTDC), excludes unallowables, and manages retainage and audit readiness. For DASIO: financial reporting, equipment ledger, and rebudget approvals within ≤10% threshold. Availability: 10% FTE average.

BA, Economics (UC Santa Cruz); Certified Research Administrator (CRA)

Skills: federal terms and conditions; MTDC/indirect policy; asset management; audit preparedness; milestone invoicing

Diego Alvarez

Field Technician (Installations & Sampling), VerdantEdge Ag Systems, LLC

Phone: (530) 555-0214

Fax: (530) 555-0199

E-Mail: diego.alvarez@verdantedgeag.com

Publications: N/A

Patents: N/A

Professional Affiliations: N/A

Board Positions: N/A

Experienced in sensor installation, trenching for low-voltage conduit, emitter/nozzle swaps, DU testing, and soil/water sampling with chain-of-custody. For DASIO: installs and commissions nodes/meters, conducts quarterly DU/pressure checks, and executes safety SOPs. Availability: 50% FTE (seasonal peaks up to 75%).

AAS, Electronics Technology (Los Rios CC); OSHA-10; First Aid/CPR; Forklift certification

Skills: bench calibration; meter tapping under supervision; UAS visual observer; tailgate safety leadership; bilingual crew support (EN/ES)

Summary

The DASIO team blends agronomy, controls engineering, analytics, field operations, extension, and compliant grants administration to deliver auditable irrigation setpoints,

improved distribution uniformity, and measurable gains in water-use efficiency and energy intensity across five Delta farms.

Each member's past performance maps directly to DASIO milestones and acceptance criteria: Elena (experimental design/KPI governance), Raj (commissioning/DU checks), Sara (QA/QC and KPI dashboards), Luz (training/adoption artifacts), Michael (financial controls/asset ledger), and Diego (installations/sampling/safety), with availability aligned to the 24-month schedule for reliable delivery.

Intellectual Property

VerdantEdge Ag Systems, LLC recognizes that parties to this project possess certain intellectual property rights, and promises to do the following to protect those rights.

We will safeguard proprietary and creative works contributed by VerdantEdge, producers, partners, and third parties while enabling transparent, replicable methods that accelerate adoption of climate-smart irrigation. Our approach balances producer privacy, open dissemination of methods and anonymized results, and lawful, documented use of any background IP, third-party content, or trademarks appearing in deliverables. All project materials will be clearly marked for ownership, license, and permitted uses; access will follow least-privilege principles, and public releases will include units, methods notes, and caveats to ensure responsible reuse.

Background IP Register and Access Controls

VerdantEdge may rely on limited background IP essential to execution: (a) sensor firmware configuration scripts and device drivers; (b) data-cleaning pipelines and feature-engineering notebooks; and (c) visualization stylesheets used in internal dashboards. We will maintain an IP Register (title, owner, description, version/date, license) that distinguishes proprietary from open-source assets and specifies usage within DASIO.

Project deliverables will not require distribution of source code for proprietary background IP. Instead, we will provide executable outputs, parameter files, configuration sheets, and method documentation sufficient to reproduce analyses and results. Where practical, we will supply method-equivalent, open alternatives (e.g., CSV transformation recipes, pseudocode, or Python/R scripts using permissive licenses) to enable replication by producers, NPOs, and extension partners.

Foreground IP and License to AIGP

Foreground IP created under DASIO (e.g., training materials, decision sheets, SOPs, anonymized datasets, and non-embedded code snippets expressly developed for dissemination) will be owned by the creator(s) consistent with award terms. Unless otherwise specified, AIGP will receive a nonexclusive, royalty-free license to use project materials for noncommercial program administration, reporting, and outreach.

We will version and time-stamp all public artifacts and submit them in editable formats (DOCX/XLSX) with clear licensing statements (e.g., CC BY 4.0 for documents where feasible). Any commercialization of foreground software components will not limit access to methods notes, data dictionaries, or de-identified results needed for replication and policy learning.

Third-Party Content, Datasets, and Trademarks

VerdantEdge will secure and document permissions for all third-party content included in

deliverables (imagery, maps, datasets, software libraries, photographs, brand assets). The Publications & IP Checklist at each gate will confirm source attribution, license type, scope of permitted use, and redistribution limits.

For paid or restricted datasets, we will maintain proof of license and ensure outputs include only permitted derivatives (aggregated, de-identified summaries). Producer-supplied photos/testimonials will use signed consent forms specifying allowed uses. No copyrighted or trademarked content will appear in public artifacts without written permission; any content lacking clear rights will be replaced with royalty-free or original material before submission.

Producer Data Rights and Privacy

Producer-identifiable data and business-sensitive notes remain the property of the originating producer and will be handled per written consent and sharing tiers. Analytical releases will be de-identified, with names and precise coordinates removed or coarsened to mitigate re-identification risk.

Participants will preview their dashboards and materials prior to release. Access to identifiable data will be limited to approved project personnel under role-based controls; all extracts will be logged, encrypted in transit and at rest, and retained consistent with award and policy requirements.

Open Methods and Replicability Artifacts

To support NPOs, extension, and small farms, we will release open, method-equivalent artifacts: configuration templates, QA/QC SOPs, data dictionaries, CSV schemas, and transformation recipes that document every calculation from raw sensor inputs to KPIs (e.g., WUE, DUlq, kWh per acre-inch).

Dashboards and decision sheets will be delivered with bilingual field cards and printable summaries to ensure low-bandwidth accessibility. Where any visualization relies on proprietary stylesheets, we will also provide a neutral stylesheet and static figure exports with units, methods notes, and caveats to ensure portability.

Subawards, Consultants, and Partner Contributions

Each collaborator will disclose background IP in their subaward/consulting agreement and grant VerdantEdge and AIGP the rights necessary to perform and report the work. Partner-developed materials intended for public release will include explicit license terms and attribution language aligned with the overall IP framework.

Acceptance testing, calibration data, and DU/pressure protocols contributed by partners will be documented in the IP Register with ownership and sharing status. No implied license is granted beyond the permissions stated in the award and partner agreements.

Notes

All IP assets will be marked in-line within documents and data packages (ownership, year, license). Confidential business information, if unavoidable, will be clearly labeled and minimized; public versions will redact such content while preserving scientific integrity.

Any export-controlled technology or restricted cryptographic material is out of scope for public release; if encountered, we will screen and manage per policy and law. Formal notices related to IP will be issued in writing to designated award contacts. Public artifacts will acknowledge AIGP support and include citation guidance for reuse.

References

The following partners have agreed to serve as references for VerdantEdge Ag Systems, LLC. To protect producer privacy and streamline scheduling, please request contact details through <<CompanyContactEmail>> and we will provide the designated reference within one business day. For additional case summaries, see: https://www.verdantedgeag.com/references

- **Yolo County Resource Conservation District — Variable-Rate Micro-Irrigation Pilot (2023–2024)**

  Organization: Yolo County Resource Conservation District (RCD)

  Primary Reference: Available upon request (program manager assigned to irrigation/soil health)

  Title: Program Manager, Irrigation & Soil Health

  Phone: Available upon request

  E-mail: Available upon request

  Website: https://yolorcd.org

  Scope & Outcomes: Deployed ~120 soil-moisture, canopy-temperature, and inline flow/pressure sensors across three nut orchards (almond/walnut); validated weather-aware scheduling and improved distribution uniformity (DU); delivered grower playbooks, bilingual field cards, and an ROI calculator. Data deliverables included cleaned datasets with dictionaries and adoption guidance aligned to RCD technical assistance.

- **UC Cooperative Extension — Salinity Monitoring & Leaching-Fraction Advisory for Specialty Vegetables (2022–2024)**

  Organization: UC Cooperative Extension — Solano/Yolo

  Primary Reference: Available upon request (UCCE advisor for vegetable crops/irrigation)

  Title: UCCE Advisor (Vegetable Crops & Irrigation)

  Phone: Available upon request

  E-mail: Available upon request

  Website: https://cesolano.ucanr.edu

  Scope & Outcomes: Established salinity baselines and instrumented test blocks; delivered leaching-fraction advisories and bilingual trainings for crews and managers. Produced

anonymized CSV/JSON data exports, producer fact sheets, and training modules. Relevance to AIGP: extension-oriented technology transfer, equity-minded materials, and low-bandwidth options that enable adoption by small and mid-sized producers.

- **Regional Irrigation Districts (Two Districts) — Cooperative Water-Use Benchmarking (2021–2023)**

  Organization: Two Northern California irrigation districts (names and contacts available upon request)

  Primary Reference: Available upon request (district water conservation/operations leads)

  Title: Water Conservation/Operations Leads

  Phone: Available upon request

  E-mail: Available upon request

  Website: https://www.verdantedgeag.com/references

  Scope & Outcomes: Aggregated on-farm telemetry and meter data to benchmark acre-inches applied, pumping energy intensity (kWh per acre-inch), and turnaround times; published anonymized dashboards, decision sheets, and public how-to guides. Demonstrated multi-stakeholder collaboration, strong data governance, and scalable dissemination consistent with AIGP criteria.

Notes

These references reflect completed, producer-facing projects with measurable outcomes (e.g., DU improvements, acre-inches saved, reduced kWh per acre-inch) and producer-ready artifacts (playbooks, bilingual field cards, ROI/partial-budget tools). Full contact details and confirmation letters are provided in Attachment D per AIGP submission instructions.

VerdantEdge maintains least-privilege data governance; reference engagements adhered to QA/QC standards (factory/bench calibration, meter verification ≤5% error, duplicate sensors on ≥10% points) and delivered cleaned datasets with dictionaries to enable replication by NPOs, extension, and water-agency partners.

Partners

VerdantEdge Ag Systems, LLC has formed strategic partnerships with the following individuals and organizations. Leveraging our relationships with these leading resources will ensure that the end result of the project is more successful.

Describe the partners you have allied yourself with and how these partnerships will benefit the project. Examples could be partners that increase your distribution, provide added benefits to customers, or add capabilities you cannot provide yourself.

- **UC Cooperative Extension — Solano/Yolo (UCCE)**

  UCCE provides research-based agronomic advisement, on-farm trial design, and producer education; services include irrigation evaluation (DUlq), soil and tissue sampling protocols, and bilingual outreach.

  Subrecipient partnership under DASIO: UCCE will co-lead experimental design, conduct producer trainings, and support evaluation of irrigation scheduling and nutrient timing, with a formal statement of work, detailed budget, and flow-down compliance. Selected for its regional reach, credibility with small and mid-sized growers, and extension mandate aligned to climate-smart irrigation.

  Advantages: Strengthens scientific rigor and adoption through trusted advisors; accelerates co-design of field cards and decision sheets; expands dissemination via UCCE lists and meetings, increasing replication beyond the five pilot farms.

  https://cesolano.ucanr.edu/ (Solano) | https://ceyolo.ucanr.edu/ (Yolo)

- **Yolo County Resource Conservation District (RCD)**

  The RCD delivers conservation planning, grower recruitment, and field logistics; services include irrigation system walk-throughs, practice integration (e.g., salinity management, soil health), and coordination of demonstration events.

  Subrecipient partnership under DASIO: The RCD will recruit and support producer cooperators, schedule field installations and DU checks, and co-host the demonstration day and train-the-trainer activities. Selected for deep grower trust, knowledge of local infrastructure, and ability to integrate conservation practices with telemetry and validation.

  Advantages: Increases producer participation and reduces installation downtime; embeds climate-smart practices into day-to-day operations; provides a neutral forum for peer learning that lifts adoption and data completeness across sites.

  https://yolorcd.org/

- **DataCommons Lab (open analytics partner)**

DataCommons Lab specializes in open, replicable analytics, data pipeline hardening, and prototype dashboards that operate under low-bandwidth conditions and export to CSV/JSON for common farm systems.

Subrecipient or contractor (finalized per scope): DataCommons will harden ingestion/QA pipelines and build lightweight dashboards aligned to VerdantEdge's rules engine, with documented methods, data dictionaries, and audit trails. Selected for its commitment to open standards and reproducible analytics essential to scale.

Advantages: Ensures defensible KPIs (acre-inches/ET, kWh per acre-inch, DU/pressure diagnostics, labor minutes per set) with transparent QA/QC; lowers total cost of ownership for producers and NPOs; enables rapid replication through open artifacts.

https://www.datacommonslab.org/

Summary

VerdantEdge (prime) is accountable for scope, schedule, budget, and compliance; the PI owns milestone delivery, the Grants Officer manages fiscal integrity, and the AOR executes official correspondence. Subrecipients will certify eligibility, carry required insurance, and accept flow-down terms; contractors will be procured competitively under VerdantEdge's written policy with documented price reasonableness and conflict-of-interest checks. Cost allocation follows the work breakdown: VerdantEdge ~55% (program management, engineering, analytics), UCCE ~18% (training, evaluation), RCD ~15% (outreach, field coordination), DataCommons ~8% (dashboards), and Producer Stipends ~4% (plot fees/participation). Producer cooperators (five small farms, 2–250 acres) will receive micro-subawards and in-kind support to host test blocks, provide labor for installations, and participate in feedback sessions; their inclusion ensures practical valve-level setpoints, credible partial budgets, and durable adoption consistent with AIGP priorities in water efficiency, soil health, and climate resilience.

Stakeholders

DASIO is built with producers and local partners at the center. From inception, we convened co-design sessions and pre-season design sprints to surface constraints (labor windows, set length, pressure zones), align methods with accepted agronomic standards, and define adoption pathways that fit small and mid-sized Delta farms. A Stakeholder Advisory Group will meet quarterly (and ad hoc around planting/harvest) to review protocols, prioritize usability, and guide dissemination. Stakeholders will receive milestone updates via bilingual briefs and dashboards; advisory members will vote on protocol changes, training priorities, and technology transfer sequencing. The list below reflects entities who shape needs, host fieldwork, validate findings, and sustain adoption beyond the grant period.

- **Producer Cooperators (Five Small and Mid-Sized Farms, 2–250 acres)**

  These growers host pilot blocks, provide operational insight, and validate practicality through weekly check-ins during deployment weeks. They co-define irrigation workflows, test bilingual field cards, and document labor time per set, water volumes, and yield/quality outcomes. To protect privacy, individual contacts are maintained under consent agreements; coordination flows through the Project Director (Elena Marquez, PhD, PMP; elena.marquez@verdantedgeag.com; (530) 555-0203).

- **UC Cooperative Extension — Solano/Yolo**

  Extension advisors translate research goals into field-ready protocols, ensure DU and sampling methods align with UC ANR and ASABE standards, and independently review agronomic and economic KPIs. They co-lead field days and the train-the-trainer handoff. Contact: per attached letter of collaboration; coordination via VerdantEdge PD for scheduling and materials.

- **Yolo County Resource Conservation District (RCD)**

  The RCD recruits additional small-farm participants, coordinates logistics, and administers bilingual producer surveys at each milestone. Staff are trained to run DU tests and help maintain equipment-sharing lists so specialized meters and loggers can be pooled. Contact: per attached letter of collaboration; general inquiries coordinated through VerdantEdge and the RCD office.

- **Designated Tribal Agriculture Liaison**

  A tribal representative advises on culturally appropriate engagement, site access timelines, and data sovereignty expectations. The liaison reviews consent language, sharing tiers, and any local protocols that affect installation or data dissemination. Contact will be confirmed at kickoff via the tribal agriculture department; communications are routed through the VerdantEdge PD to respect protocols.

- **Local Producer Cooperatives and Associations**

  Regional grower groups help amplify outreach, host peer-to-peer walkthroughs, and pilot the equipment-sharing MOU that lowers upfront costs for sensors and validation kits. They provide feedback on ROI calculators and decision checklists to ensure materials work for operations with limited staff and connectivity. Contact: coordinated through the RCD and UC Cooperative Extension networks; association leads will be listed in event notices.

- **VerdantEdge Ag Systems, LLC (Applicant and Integrator)**

  VerdantEdge designs the sensing and decision-support stack, maintains asset controls and QA/QC pipelines, and delivers producer-facing artifacts (bilingual quick-start guides, field cards, SOPs, videos). The firm convenes the Advisory Group and operates office hours during peak irrigation weeks. Primary contacts: Carolina "Carrie" Holt, MBA (AOR; carrie.holt@verdantedgeag.com; (530) 555-0201) and Elena Marquez, PhD, PMP (Project Director; elena.marquez@verdantedgeag.com; (530) 555-0203).

Summary

These stakeholders co-own the project's success: producers shape the problem and verify field practicality; Extension assures methodological rigor and evaluation; the RCD and cooperatives extend reach and enable shared access to tools; the tribal liaison safeguards cultural and data considerations; and VerdantEdge integrates technology, QA/QC, and training. Quarterly advisory meetings, bilingual materials, decision checklists, ROI calculators, and a train-the-trainer model ensure that improved WUE, DU, and labor savings persist beyond the grant period and scale across the Delta's small and mid-sized operations.

RACI Matrix

VerdantEdge Ag Systems, LLC will execute DASIO with clear lines of ownership to keep on-farm activities timely, auditable, and adoption-focused. This matrix assigns who drives field work, who signs off, who is consulted for agronomic/technical input, and who is informed to maintain budget and compliance alignment with AIGP-2025-01. Roles reflect our producer-first workflow across sensor deployment, DU/pressure verification, weather-aware scheduling, QA/QC, reporting, and dissemination.

Responsible

Team members designated R lead day-to-day execution for the task, from fieldwork and configuration to draft artifacts and initial QA.

Accountable

Individuals designated A approve scope, timing, and quality; they own delivery and variance management for the task.

Consulted

C roles provide required expertise or stakeholder input (e.g., agronomy, telemetry, analytics, or producer constraints) prior to key decisions.

Informed

I roles receive status and outcomes to coordinate procurement, compliance, schedules, and downstream activities.

Project Task	AOR (Carolina "Carrie" Holt, MBA)	Project Director/PI (Elena Marquez, PhD, PMP)	Technical Lead (Raj Patel, PE)	Data Lead (Sara Nguyen, MS)
Producer MOUs & Site Selection (blocks, access, safety)	A	R	C	C
Equipment Procurement, Bench Calibration & Field Installation (sensors, meters, telemetry)	A	C	R	C

DU/Pressure Verification and System Tuning (emitters/valves, pressure targets, remediation)	I	A	R	C
Data Pipeline, QA/QC & Dashboard Commissioning (ingest, range/logic checks, uptime & validation)	I	A	C	R
Weather-Aware Scheduling & On-Farm Implementation (setpoints, alerts, season-by-season tuning)	I	A	R	C
Training, Field Day & Adoption Artifacts (bilingual field cards, SOPs, playbooks)	I	A	C	R
Reporting, Budget & Compliance (quarterly tech/financials, asset controls, prior approvals)	A	R	C	C
Open Data Releases & Closeout (cleaned datasets, dictionaries, final report, disposition)	I	A	C	R

See the Responsibilities, Accountability, Consulted, and Informed sections for role details, and cross-reference Project Plan, Project Methods, Data Management, Reporting, and Technology Transfer for task-specific procedures and acceptance criteria.

Key Personnel

VerdantEdge Ag Systems, LLC brings a tightly integrated team with the agronomy, controls engineering, data governance, and extension experience required to deliver measurable water-use efficiency, energy intensity reductions, and adoption across small and mid-sized Delta farms. Each key person leads a defined workstream tied to DASIO milestones and KPIs, ensuring QA/QC from sensor to dashboard to bilingual field cards. The team's producer-first approach and track record in micro/drip systems, DU diagnostics, and low-bandwidth decision-support align directly with AIGP's focus on practical, scalable climate-smart solutions.

- **Elena Marquez, PhD, PMP — Project Director / Principal Investigator**

  Elena is an agronomist specializing in deficit irrigation, soil health, and on-farm trial design. She leads experimental design, crop ET scheduling logic, producer engagement, and KPI accountability. Responsibilities include site selection and paired-block layouts; pre-analysis planning; integration of canopy temperature and soil-moisture thresholds into valve-level setpoints; quarterly technical reporting; and oversight of extension artifacts to ensure recommendations are agronomically sound, auditable, and crew-ready.

- **Raj Patel, PE — Senior Systems Engineer (Irrigation & Sensing)**

  Raj is a controls and SCADA engineer with extensive experience in telemetry, variable-rate systems, and inline flow/pressure verification. He owns sensor/automation configuration, meter commissioning (≤5% error), DU/pressure diagnostics, and uptime reliability (≥95% store-and-forward). He maintains the asset and calibration ledger, supervises field installs, and ensures safety (LOTO, NEMA enclosures) while translating system constraints into executable runtimes that reduce kWh per acre-inch without sacrificing distribution uniformity.

- **Sara Nguyen, MS — Data Governance & QA/QC Lead**

  Sara directs data ingestion, QA/QC pipelines, dashboards, and de-identified public releases. She manages data dictionaries, range/logic checks, duplicate-sensor validation, and audit trails; publishes monthly KPI dashboards (acre-inches vs. ET, DUlq/pressure, kWh per acre-inch, labor minutes per set); and leads the anonymized dataset and methods notes at mid-project and closeout. She co-authors the rules audit log with the PI and supports partial-budget analyses to document net margin impacts.

- **Luz Romero, MEd — Extension & Training Specialist**

  Luz designs and delivers bilingual (EN/ES) training, field-day curricula, and producer-ready adoption kits. She co-develops the Q&A playbook and laminated field cards, runs train-the-trainer sessions with partners, and ensures accessibility (low-bandwidth, ADA-aware materials). Luz coordinates time-and-motion validations with growers, captures feedback

loops for rapid iteration, and supports cooperative equipment-sharing guidance for scale-up beyond the pilot.

- **Carolina “Carrie” Holt, MBA — Chief Executive Officer (Authorized Organizational Representative)**

  Carrie provides executive oversight, risk and compliance review, and official communications with AIGP. She ensures budget integrity, cost allowability, and adherence to prior-approval requirements, and she supports vendor-neutral procurement for capital equipment. As AOR, she signs formal notices, executes amendments, and confirms insurance and asset controls for award-funded equipment.

- **Michael Ortiz, CRA — Director of Sponsored Programs (Grants & Contracts Officer)**

  Michael oversees award administration, quarterly financials, native Excel budget submissions, and compliance documentation. He manages rebudgeting within the ≤10% aggregate threshold, assembles prior-approval packages when changes exceed limits or affect scope/key personnel, and maintains audit-ready records (timesheets, POs/receipts, subaward files) consistent with AIGP terms and institutional policy.

Additional Information

We acknowledge that any substitution of the Project Director/PI or substantive changes to key personnel, ownership/control, or operational capacity require AIGP’s prior written approval. VerdantEdge’s change-control procedure triggers immediate internal notification to the AOR and Grants Officer and submission to AIGP within five business days of a change request package containing an impact statement, updated resumes, a revised organizational chart/RACI, and a continuity plan with task reassignments and milestone implications; personnel transitions will not proceed until a countersigned amendment is in place.

For continuity during temporary absences, qualified deputies are pre-designated: Raj Patel serves as interim technical lead for field execution, commissioning, and DU/pressure verification; Sara Nguyen serves as interim lead for data reporting, dashboards, and QA/QC. This structure preserves decision-support reliability, data integrity, and producer service levels while formal approvals are secured. Contact points for formal notices follow the Applicant Profile: PI (technical), AOR (official), and Grants Officer (administrative).

Disclosures

VerdantEdge Ag Systems, LLC (UEI L9K5J7M3N2Q1; EIN 47-6523819) provides the following disclosures in connection with AIGP-2025-01 for the Delta Aquifer Smart Irrigation Optimization (DASIO) project. These statements address multi-award limits, cost integrity, equipment stewardship, data governance, conflicts, and required communications, ensuring transparent, auditable performance across five producer sites in the Delta.

Multiple Awards and Funding Overlap

The applicant currently holds no active AIGP awards under this RFP and will not exceed the limit of two concurrent awards or the $500,000 cumulative cap. Any related or overlapping projects will be disclosed with title, sponsor, award number, period, funded scope, personnel, and budget categories.

Prior to award and quarterly thereafter, the Project Director and Grants/Finance Officer will review scopes and effort allocations to prevent overlap, double-charging, or over-commitment. If potential overlap is identified, we will submit a written mitigation plan (scope delineation, budget realignment, or effort redistribution) for AIGP approval before incurring costs.

No Double-Charging Certification and Cost Segregation

All costs charged to DASIO are unique to the approved scope, necessary, and allocable; no costs will be duplicated on other awards. Internal controls include discrete project task codes, timesheet certification by employee and supervisor, pre-approval of purchases against the project WBS, and quarterly cross-checks of ledgers across sponsored projects.

If circumstances change (e.g., co-funded activities affecting irrigation telemetry, DU checks, or analytics), VerdantEdge will notify AIGP in writing within five business days with documentation of task partitioning by personnel effort and cost category and request guidance or prior written approval as needed.

Equipment Use, Asset Control, and Insurance

Any award-funded equipment (e.g., soil-moisture nodes, inline flow meters, pressure transducers, telemetry gateways) will be used exclusively for the approved project and tracked in our institutional asset ledger with serials, locations, calibration certificates, and maintenance logs.

All equipment will be safeguarded, maintained, and insured per policy for the project duration; disposition at closeout will follow the award agreement. Capital purchases will be justified as essential and not reasonably available via rental or partner sharing, with manufacturer/model and quotes on file.

Indirect Cost Rate and Unallowable Costs

Indirect costs will be capped at the lower of 10% MTDC or any applicable negotiated rate; the MTDC base will be defined per policy and will exclude items such as equipment and participant support where applicable.

Unallowable costs (e.g., lobbying, alcohol/entertainment, contingency reserves, general marketing, building construction, land acquisition, debt service, general-purpose admin equipment) are excluded from the budget and ledger; all expenses will be necessary, reasonable, and allocable to DASIO activities.

Budget Revisions, Prior Approvals, and Match

Administrative rebudgeting within an aggregate 10% of the total award may be requested with before/after summaries and narrative rationale; larger shifts, scope changes, or key personnel changes will be submitted for prior written approval before implementation.

Any pledged cash or in-kind match (e.g., producer time, land access, equipment use, lab analyses) will be documented with valuation method, contributor, timing, and records; material reductions will be reported for prior written approval and may affect funding.

Data Privacy, De-identification, and Sharing Tiers

Producer-identifiable data will be stored in segmented projects with least-privilege access; all data are encrypted in transit and at rest with audit trails. Public releases will be cleaned and de-identified (e.g., removal/coarsening of names and precise coordinates) and accompanied by data dictionaries, units, methods notes, and caveats.

Access tiers include participant dashboards (block-level summaries), internal analytic tables (de-identified), and public datasets suitable for replication. We will verify consent and honor reasonable producer requests to correct errors in dashboards or summaries before dissemination.

Conflict of Interest and Organizational Independence

All key personnel and covered consultants will disclose personal and organizational conflicts prior to award, update annually, and upon change. Identified conflicts (e.g., vendor ties, family relationships with collaborators, potential IP interests) will be mitigated via recusals, competitive procurement (≥3 quotes), independent technical/financial review, and documentation in a COI matrix.

VerdantEdge will not sell equipment under this award; specifications will be vendor-neutral to protect replicability and cost realism for small and mid-sized producers. No conflicted individual will approve their own work or access non-public competitor information.

Pre-Award Costs and Milestone-Based Payments

Pre-award costs incurred within 90 days prior to the award date will be at VerdantEdge's risk and only when necessary for timely start-up (e.g., long-lead meters or sensors). Such costs will adhere to allowability and allocability rules and be fully documented.

Awards are reimbursed on a milestone/expense basis with potential retainage up to 10% pending final acceptance. We will submit timely technical and financial reports, including backup documentation, to support reimbursements.

Formal Notices, File Formats, and Accessibility

Formal notices under the award will be issued in writing to designated contacts via email with confirmation, certified mail, or recognized courier, as required by the agreement.

All deliverables will be provided in editable Word/Excel with clear filenames and version dates; the native Excel budget will retain visible formulas. Materials will follow accessibility best practices (embedded fonts, bookmarked headings, alt text, and legible color contrast).

Methods, Limitations, and Performance Variability

Reported KPIs (e.g., acre-inches saved, DUlq, kWh per acre-inch, yield CV) will include methods notes and confidence intervals where applicable. Site heterogeneity, weather variability, and system constraints may affect results; remediation steps will be documented when targets are not met.

Producer-facing decision sheets and field cards translate telemetry and ET models into practical valve run times; however, outcomes are influenced by distribution constraints, labor adherence, and exogenous stress (e.g., heat waves, delivery shifts). Results may vary by block and season.

Summary

VerdantEdge certifies compliance with AIGP limits on concurrent awards and funding overlap, affirms no double-charging through robust internal controls, and commits to rigorous equipment stewardship, privacy-by-design data sharing, COI mitigation, and required notices in accessible, editable formats. These disclosures ensure transparent, auditable execution of DASIO's irrigation telemetry, DU verification, and weather-aware scheduling to deliver measurable, producer-validated water and energy efficiencies across the Delta.

Legal Eligibility

Organization Status

VerdantEdge Ag Systems, LLC (UEI: L9K5J7M3N2Q1; EIN: 47-6523819) is a California domestic limited liability company and a U.S. small business serving the agricultural sector. Under AIGP-2025-01 eligibility, VerdantEdge qualifies as a "small business serving the agricultural sector" and will collaborate with eligible partners, including UC Cooperative Extension–Solano/Yolo (accredited university extension) and the Yolo County Resource Conservation District (501(c)(3)), alongside five producer cooperators. Our SAM registration is active, we are authorized to do business in our state of organization, and we are in good standing with state and federal authorities.

Eligibility alignment and scope of participation

The DASIO project is U.S.-led and U.S.-focused, advancing AIGP priorities in water-use efficiency, soil health, and climate resilience for small and mid-sized producers using micro/drip systems. All investigators participate through their employing eligible organizations; no individual applies in a personal capacity.

Certifications and exclusions status

VerdantEdge and its principals are not suspended, debarred, or otherwise excluded from federal funding. Subrecipients and key vendors will be screened against SAM and related exclusion lists prior to award and at onboarding.

Existence

VerdantEdge can document its legal existence and continuous good standing. As a California domestic LLC headquartered at 1234 Innovation Way, Suite 210, Davis, CA 95618, VerdantEdge maintains formation, tax, and registration records necessary to enter into binding grant agreements and to steward award-funded equipment and data.

Evidence of organization and registration

Articles of Organization (California Secretary of State) and current Certificate of Status; EIN assignment letter from the IRS; active SAM registration associated with UEI L9K5J7M3N2Q1; and internal governance documents identifying authorized signatories.

Operational readiness and insurance

Proof of general liability, workers' compensation, and auto coverage; asset-control policies; and facility/equipment inventories (prototyping lab, calibration benches, mobile

instrumentation, secure data enclave) supporting on-farm sensing, DU verification, and producer training.

Upon request, we will provide certified copies of formation documents, certificates of good standing, insurance certificates, and any required state or local business licenses. Letters of collaboration from UC Cooperative Extension, the Yolo County RCD, and producer sites are included in the proposal package.

Authority

VerdantEdge possesses the legal authority to contract with AIGP as the lead applicant and fiscal agent for the Delta Aquifer Smart Irrigation Optimization (DASIO) project (24-month period of performance). The Chief Executive Officer, Carolina "Carrie" Holt, MBA, serves as the Authorized Organizational Representative (AOR) and authorized signatory for agreements, certifications/assurances, and formal notices. The Project Director/PI, Elena Marquez, PhD, PMP, is delegated programmatic authority to manage technical performance, subrecipient oversight, and reporting.

Contracting authority and notices

The AOR will execute binding agreements and certifications; formal notices will be issued in writing to the contacts designated in the award via email with confirmation, certified mail, or recognized courier, consistent with RFP terms. Subawards and consultant agreements will follow competitive, documented processes and incorporate AIGP flow-downs (allowable costs, IP/dissemination, data standards, and prior-approval thresholds).

Compliance commitments under award terms

Award-funded equipment will be used exclusively for project scope, safeguarded, maintained, insured, and tracked under institutional asset controls; disposition will follow the award agreement at closeout. Indirect costs will not exceed 10% of MTDC (or a lower negotiated rate, if applicable). All deliverables will be submitted in editable formats (Word/Excel) with units, methods notes, and caveats; quarterly technical and financial reports will document KPIs (e.g., acre-inches per ET, DU/pressure, kWh per acre-inch) and cost alignment.

VerdantEdge affirms that any multi-state collaboration (if sites are added beyond California) will be justified by shared production systems and water-scarcity conditions, with explicit roles, data harmonization, and U.S.-benefit focus. International entities, if any, will participate only as unpaid advisors with benefits accruing to U.S. producers. All parties will comply with conflict-of-interest policies, non-debarment certifications, and data privacy protections, ensuring the legal and ethical execution of DASIO under AIGP-2025-01.

Compliance Matrix

The following Compliance Matrix demonstrates how VerdantEdge Ag Systems, LLC will meet AIGP-2025-01 requirements through DASIO's producer-first design, with clear ownership, artifacts, and schedules tailored to Delta specialty crop and orchard systems.

Index	Y/N	RFP Requirement	Satisfaction of Requirement
1	Y	Submit one searchable PDF plus native Word and Excel with required naming conventions.	One searchable PDF for the Technical Proposal and attachments, plus native DOCX forms and the XLSX budget with visible formulas; filenames per AIGP convention; version dates embedded. Owner: Grants & Contracts (Michael Ortiz, CRA).
2	Y	Meet deadline and method: portal upload or email to grants@aigp.org by 5:00 PM PT, Jan 31, 2026; late submissions not accepted.	Submission via portal (preferred) with receipt confirmation within two hours; virus scan prior to send; single application per email if used. Owner: Michael Ortiz, CRA.
3	Y	Formatting and accessibility: ≤20 pages technical; ≥11 pt font; 1" margins; bookmarks, embedded fonts, alt text, legible contrast.	Conforming layout and accessible figures; ADA-aligned color palettes; bookmarked headings and alt text on all visuals. Owner: Editorial Lead (Luz Romero, MEd).
4	Y	Eligibility and representations: U.S. small business in good standing; active SAM/UEI; debarment certification.	VerdantEdge (UEI L9K5J7M3N2Q1; EIN 47-6523819) with active SAM; signed certifications/assurances and debarment statement included.

			Owner: AOR (Carolina “Carrie” Holt, MBA).
5	Y	Measurable objectives and KPIs aligned to AIGP priorities.	Time-bound targets: WUE +10–20%, kWh/acre-inch −8–12%, yield CV −10%, N variability −15%, labor minutes per set −20–30; KPI table and tracking plan included. Owner: PI (Elena Marquez, PhD, PMP).
6	Y	Methods: demonstration design, tech configuration, data to collect, analytics.	Paired program/reference blocks across five farms; soil-moisture/canopy telemetry, inline flow/pressure verification, ET-based scheduling, mixed-effects and DiD analysis; Technology Configuration Sheets and SOPs. Owner: Technical Lead (Raj Patel, PE) with Data Lead (Sara Nguyen, MS).
7	Y	Work plan: WBS, Gantt, RACI, quarterly milestones, procurement/site readiness.	Quarter-by-quarter plan with gates (telemetry uptime ≥95%, meter error ≤5%); MOUs, procurement, installs, and events sequenced; RACI embedded. Owner: PMO (Michael Ortiz, CRA).
8	Y	Risk management covering technical, schedule, staffing, regulatory, privacy, adoption.	Living Risk Register with triggers/owners; duplicate sensors on ≥10% of points, loaner kits, incident response, COOP for weather/water disruptions, and adoption coaching.

			Owner: PI with Data Gov Lead (Sara Nguyen, MS).
9	Y	Data management and dissemination: QA/QC, storage/backup, privacy/consent, sharing tiers, producer-facing materials.	2-page DMP (Attachment F); secure enclave with AES-256/TLS, least-privilege; 3-2-1 backups; de-identified CSV/JSON with dictionaries and methods notes; bilingual factsheets and videos. Owners: Sara Nguyen, MS; Luz Romero, MEd.
10	Y	Quarterly technical and financial reporting; variance explanation (≥10%); reimbursement tied to deliverables.	Quarterly progress package with KPIs/plots, updated Gantt, Risk Register, and Excel financials; administrative rebudgeting ≤10% with before/after; retainage acknowledged. Owners: PI; Grants & Contracts (Michael Ortiz, CRA).
11	Y	Final deliverables within 60 days: report, cleaned datasets with dictionaries, adoption guidance.	Final Technical Report, de-identified datasets (CSV/Parquet), configuration sheets, SOPs, Dissemination Summary, and asset disposition plan delivered in editable formats. Owners: PI; Data Lead (Sara Nguyen, MS).
12	Y	Budget, indirects, procurement, and equipment controls: XLSX template; indirect ≤10% MTDC (or lower NICRA); competitive quotes; asset tracking and insurance.	Native Excel budget with visible formulas and narrative; unallowables excluded; ≥3 quotes ≥$10k or sole-source justification; indirect capped per RFP; award-funded equipment tagged, insured, used solely for

			DASIO, and disposed per award. Owner: Grants & Contracts (Michael Ortiz, CRA) with Technical Lead (Raj Patel, PE).

This matrix cross-references proposal sections and internal owners to ensure every AIGP requirement is satisfied with auditable artifacts, agronomic rigor, and producer-ready technology transfer for small and mid-sized Delta farms.

Commitment Letters

The following letters demonstrate firm, roles-based commitments from conservation, extension, producer, and cooperative partners critical to DASIO's irrigation telemetry, distribution uniformity verification, low-bandwidth decision-support, and producer adoption across small and mid-sized Delta farms.

Yolo County Resource Conservation District (RCD)

Ava Delgado, Executive Director

Phone: (530) 555-0321

E-mail: adelgado@yolocd.org

https://www.yolorcd.org

In-kind support equivalent to 0.20 FTE conservation technician effort over 24 months for producer outreach, site coordination, field data collection; host one on-farm Demonstration Day; promote to ≥100 local producers via established channels; participate in quarterly progress reviews; facilitate safe field access and bilingual materials; adhere to agreed data governance with de-identification prior to public use.

LETTER OF COMMITMENT

Dated November 3, 2025, confirming RCD participation contingent on award and final scope; RCD will coordinate landowner scheduling, apply safety protocols, and contribute to producer-facing materials aligned with DASIO's QA/QC and privacy standards.

UC Cooperative Extension — Solano/Yolo

Marisol Peña, PhD, County Director and Farm Advisor

Phone: (530) 555-0410

E-mail: mpena@ucanr.edu

https://ucanr.edu/solanoyolo

Experimental design guidance; validation of field protocols; independent evaluation of irrigation uniformity (DU), water-use efficiency, and yield stability; development of bilingual fact sheets; delivery of two hands-on field labs for growers/irrigators; compliance with data management, accessibility, and attribution; readiness to serve as a subrecipient with detailed budget, scope, and assurances.

LETTER OF COMMITMENT

Dated November 3, 2025, affirming institutional commitment contingent on timely execution of a subaward; UCCE will provide third-party methods review, training, and outcome assessments that strengthen rigor and producer trust.

- **Riverbend Orchards, LLC (Producer Site)**

  Diego Alvarez, Operations Manager

  Phone: (530) 555-0677

  E-mail: dalvarez@riverbendorchards.com

  https://www.riverbendorchards.com

  Provision of a 20-acre walnut block for sensors, pressure/flow verification, and scheduled irrigation trials; crew time estimated at 120 hours over two seasons for installation support and routine checks; safe site access for project staff and a public Demonstration Day; sharing of anonymized operational data (sets, volumes, timing) for analysis; participation stipends, if any, to follow budget documentation requirements.

  LETTER OF COMMITMENT

  Dated November 3, 2025, committing participation contingent on award, mutually agreed schedules, and adherence to standard farm safety protocols; confirms de-identification of producer data in public materials.

- **Delta Valley Vegetables Cooperative (Producer Network)**

  Kiana Brooks, General Manager

  Phone: (916) 555-0882

  E-mail: kbrooks@deltavalleyveg.co

  https://www.deltavalleyveg.co

  Recruitment of up to three member farms (10–40 acres each) for pilot participation; in-kind coordination/logistics (0.10 FTE for 18 months); distribution of project updates and bilingual guidance via member newsletter and meetings; collaboration on ROI calculators and decision checklists tailored to diversified vegetable operations; support for training attendance tracking and post-event surveys; assurance that any member data shared aligns with privacy/consent protocols.

  LETTER OF COMMITMENT

  Dated November 3, 2025, confirming network partnership contingent on award and member availability; the co-op will accelerate adoption pathways and feedback loops for diversified vegetable growers.

Lead Applicant Acknowledgment: VerdantEdge Ag Systems, LLC confirms alignment of these commitments with DASIO's scope and AIGP requirements. Upon award, roles, budgets, subaward terms, and data governance will be formalized in written agreements. Primary contacts remain as listed in the Applicant Profile.

Summary

Collectively, these partners contribute field access, independent evaluation, outreach at scale, bilingual training, and measurable in-kind effort that de-risks sensor deployment, strengthens DU verification, and speeds adoption of weather-aware scheduling on small and mid-sized farms.

Their commitments directly support AIGP outcomes by enabling acre-inches saved, improved kWh per acre-inch, stabilized yields, and open, de-identified datasets and playbooks that NPOs and extension agents can replicate beyond the grant period.

Report

The Final Report for Delta Aquifer Smart Irrigation Optimization (DASIO) will deliver reproducible methods, transparent datasets, and producer-ready adoption guidance that translate field measurements into defensible irrigation setpoints. Prepared within 60 days of project end, the package will be accessible (EN/ES), audit-ready, and machine-readable to accelerate replication across small and mid-sized Delta farms and partner networks.

Purpose and Scope

Objective and alignment

The report synthesizes goals, site configurations, QA/QC, and outcomes tied to AIGP priorities in soil health, water-use efficiency, and resilience. It serves grant compliance, NPO replication, and day-to-day farm decision-making with equal emphasis on rigor and usability.

Coverage and period

Content spans 24 months across five farms and paired blocks (program vs. reference) in almonds, walnuts, vineyards, and specialty vegetables. It includes baseline-to-endline comparisons, mid-season adjustments, and documentation of any corrective actions.

Methods Synthesis

Experimental design and instrumentation

Paired/split-block designs, three geo-referenced points per block, and standardized Technology Configuration Sheets document sensor IDs, depths, calibrations, and rules-engine parameters. Instrumentation includes soil-moisture probes (0–6", 6–18"), canopy temperature sensors, inline flow meters, pressure transducers, and weather feeds (CIMIS/local nodes) at 15-minute intervals.

QA/QC and analytics

Factory/bench calibrations, duplicate sensors on ≥10% of points, meter verifications (≤5% error), and automated range/logic checks ensure data integrity. Analyses employ mixed-effects models and difference-in-differences, with clearly stated assumptions, confidence intervals, and sensitivity bounds.

Results and Outcomes

- **Water, energy, and distribution performance**

  Reported KPIs include WUE (acre-inches per ET unit), irrigation energy intensity (kWh/acre-inch), and DU/pressure diagnostics by block and season. Findings are contextualized with weather anomalies and delivery constraints, with figures carrying units, methods notes, and caveats.

- **Yield stability, input efficiency, and labor**

  Results cover yield/quality, within-block CV, nitrogen timing variability, and labor minutes per set with partial-budget impacts ($/acre). Variance triggers and midcourse corrections are documented to show causality between workflow changes and outcomes.

Cleaned Datasets and Reproducibility Artifacts

- **Machine-readable data and metadata**

  Deliverables include de-identified CSV/Parquet tables, normalized timestamps, units, and codes, plus an XLSX data dictionary (field names, definitions, units, ranges, derivations). A README inventories files, provenance, QA flags, and version dates; a codebook maps raw-to-analytic transformations.

- **Executable analyses and transparency**

  Reproduction notebooks (R/Python) and/or Excel workbooks generate published tables and figures from seeded environments. Version stamps, checksum manifests, and minimal example datasets are provided to let reviewers and NPOs replicate results without proprietary tools.

Cost/Benefit and Sensitivity Analysis

- **Partial budgets and assumptions**

  Farm-scale partial budgets quantify net margin change using site-reported water prices, energy tariffs, labor rates, and amortized capital/service costs. Baseline practices and counterfactuals are explicit, with scenario notes for deficit or protective irrigation during heat or allocation shocks.

- **Sensitivity and thresholds**

  A tornado-style summary tests ±20% swings in water price, yield, and labor, and pressure/DU remediation costs. Threshold analysis identifies break-even acreage and runtime reductions needed for positive $/acre under differing tariff and delivery conditions.

Limitations and Lessons Learned

Data and operational constraints

Limitations address telemetry gaps, sensor drift, access windows, and heterogeneity in legacy laterals that affect DU and runtime feasibility. Each limitation is paired with mitigation guidance (e.g., resequencing valves, emitter/nozzle swaps, alternate thresholds for saline zones).

External validity and replication

We discuss transferability across soils, crops, and connectivity levels, noting prerequisites for success and where adaptations are necessary. Recommendations prioritize low-bandwidth and cooperative equipment-sharing pathways suitable for NPO-led scale-up.

Producer Adoption Guide (EN/ES)

Implementation steps and settings

Stepwise checklists cover planning (zone stratification), commissioning (bench/field calibration), scheduling (ET and soil-water balance thresholds), and operations (valve-level runtime targets). Equipment settings include logger intervals, alert thresholds, pressure targets, and DU test cadence with acceptance criteria.

Workflows, maintenance, and troubleshooting

Data workflow diagrams map collection → QA → storage → dashboard/report exports, with CSV/XLSX templates for farms without integrations. Maintenance schedules and troubleshooting trees address common issues (low signal, clogged emitters, pressure drops) with safety notes and escalation contacts.

Accessibility, Governance, and Submission

Formatting, privacy, and asset controls

All files are delivered as DOCX/PDF and XLSX/CSV with embedded fonts, alt text, tagged structure, and legible contrast; filenames include version dates. Data are de-identified per consent and stored under least-privilege access; award-funded equipment usage, calibration, and disposition are logged in the asset ledger.

Acceptance and archive

Acceptance criteria are met when methods and scripts reproduce published results; datasets are complete, machine-readable, and documented; and adoption guidance is actionable for producers and partners. The package is archived in the project repository with a persistent link and submitted via the AIGP portal or grants@aigp.org within 60 days of closeout.

VerdantEdge Ag Systems, LLC

1234 Innovation Way
Suite 210
Davis, CA 95618

(PH) (530) 555-0203