SOCIAL RETURN ON INVESTMENT AND WATER USE VERIFICATION REPORT

COMMON GOOD WATER
ALFALFA WATER SAVINGS PROJECT-
2021 ANALYSIS FOR KINGS COUNTY FARM SITE

Kings County, California

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PRODUCED FOR AND FUNDED BY: COMMON GOOD WATER

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1.0 Executive Summary

This report contains the 2021 analysis of the economic, social, and environmental outcomes from the replacement of flood irrigation to using drip irrigation technology at the 87-acre Kings County Farm alfalfa farm site located near Hanford, California in the Central Valley area. The project was conducted on behalf of Common Good Water (CGW) and provides a Social Return on Investment (SROI) analysis. This report uses actual water use and crop yield data for the farm, using collected water meter and crop production records provided to EcoMetrics LLC Appendix II).

Coupled with the installation of the drip irrigation equipment is implementation of enhanced farming practices that result in more sustainable approaches to managing the crop. In regard to the overall concept of drip vs flood irrigation, a great amount of analysis was done prior to this study, the details of which will not be repeated herein. This prior work focused on the water savings and increased crop productivity. The primary benefit expected from this approach is a significant saving of water use, but other benefits include increased crop productivity on a tons per acre basis.

Another unique aspect of this project is the offering of “Conservation Contracts” to interested entities that wish to invest in water saving projects. Contract buyers are initially expected to be private sector companies with water use reduction or water positive goals but can eventually include any type of organization such as water districts, non-governmental organizations, non-profits, or any level of government. These contracts represent a volume of water saved and are sold to entities that wish to demonstrate water savings. The revenue from these contract sales is used to help compensate for the installation of the system and the ongoing management program. This innovative market-driven approach provides incentive for the technology and practices to the farmer with an additional financial motivation to make the business case for the investment. The contract buyer is provided with independently validated proof of the water savings and can use that information for ESG reporting or other sustainability-related goals and commitments. The farmer makes the investment for the installation, but the Conservation Contract helps improve the financial model that incentivizes that investment.

An EcoMetrics analysis is done for each site and year (“vintage”) to support the sale of the Conservation Contracts, benefit quantification and valuation information. This report for the 2021 Vintage is to support sales of contracts for savings generated. Results of this analysis revealed that there are significant water savings that also create additional value across a number of outcomes that impact a number of stakeholders. The initial goals of saving water and increasing crop yield are both verified, with positive value created in terms of the value of water saved as well as the crop value increase due to enhanced yield. Because water quantity is saved and runoff quality is improved via better practices, there is also value created in terms of community impact. More details of other benefits are listed in Section 1.1.

The study is not only to do an initial analysis of value created by this type of approach, but to establish an independent, verifiable, and credible ongoing mechanism to track water saved to support the conservation contracts program. Going forward, individual projects will be validated and verified per year of contracts to be sold. This report serves as the assessment of the 2021 production year at the Kings County Farm.

1.1 Social and Market Value Creation

The following major stakeholder groups benefit from the project:

- **Alfalfa farmers** – through lower operating costs due to water use-related savings, reduced risk of water scarcity, increased crop productivity, and enhanced resilience of the farm's viability.
- **Conservation Contract™ buyers** – ensuring water availability for the entire company value chain and its stakeholders, and in some cases restoring more water than the company uses. Also benefitting from reputational value and meeting internal goals by supporting water savings, improved marketing opportunities, and the market value of the carbon sequestered, and the nitrogen and phosphorus intercepted.
- **The Environment** – mainly due to water savings, but also due to improved soil formation, erosion control, water quality improvement (via natural treatment), support of pollinator populations, habitat creation and protection and the biologic control of invasive species.
- **Community at large** – via a multitude of benefits including water resource protection (quality and quantity); local economic stability through more sustainable farming practices; and social value of reducing demand on community infrastructure through flood protection, water supply conservation, and runoff water quality. Other benefits include air quality improvements, carbon sequestration, and wildfire risk reduction.
- **Dairy Farmers** – from a more reliable and more accessible high quality alfalfa source for cattle feed.
- **Agricultural supply chain** – generally speaking, the supply chain will benefit from having a key component supported by more sustainable and efficient practices.

The SROI analysis of the outcomes for each stakeholder group shows a positive social return associated with the project. An investment of $148,040 creates approximately $4,405,136 of net social impact in 2021, resulting in an indicative SROI ratio of 29.76:1 (Table 1). In other words, the SROI analysis presents evidence that substantiates that for every dollar invested in buying the conservation contracts, $29.76 is returned to all stakeholders in social value. Additionally, $802,212 in direct market value is returned to contract buyers largely from the value of enhanced reputation and license to operate, and a direct market return of $5.42 for every dollar invested (Table 1). In sum, with an initial investment of $148,040 in financial capital, the community and funding stakeholders see a return of $5,207,348 in 2021 (Table 1) for a total return on investment of 35.18:1. Figure 1 reflects value created sorted by Stakeholder type.

Table 1: Social and Market Return on Investment Summary

Description	Value
Present Value of Total Social Value	$4,405,136.00
PV of Total Investment	$148,040.00
Social Return on Investment	29.76
PV of Total Market Value	$802,212.00
Market Return on Investment	5.42
PV Social + Market Value	$5,207,348.00

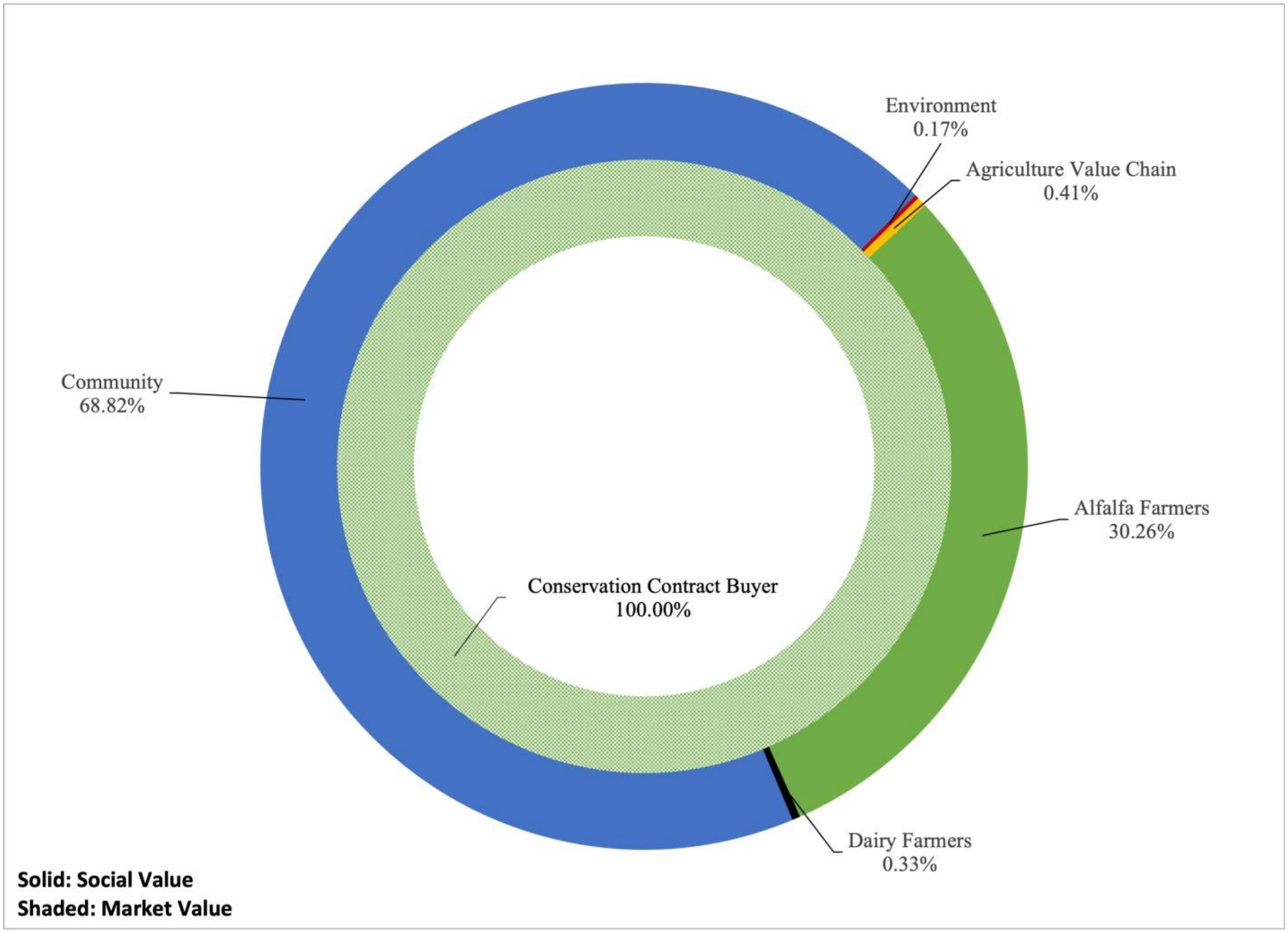

Figure 1: The Benefit of Action by Stakeholder

1.2 Site Specific Variables

In 2021, actual field data collected and provided to EcoMetrics indicated a crop yield of 9.54 tons/acre. Crops sold at $185.60/ton. Water meter readings indicated the site used a total 2.51-acre feet of water over 9 cuttings.

2.0 Social Return on Investment Background

2.1 Purpose of Social Return on Investment

This report contains the values of the economic, social, and environmental outcomes from the replacement of flood irrigation to using drip irrigation technology in an alfalfa farm pilot site located near Hanford, California in the Central Valley area. The project was conducted on behalf of CGW.

The objective of this report is to use the SROI methodology for the following purposes:

- Identify and engage key stakeholders affected significantly by this project – Understand what each stakeholder wants changed (objectives), what they contribute (inputs), what activities they do (outputs) and what changes for them (outcomes, intended or unintended) as a result of their involvement;
- Measure and value the social impacts of this project – Understand the value created as a result of the changes experienced by each stakeholder group by using indicators to measure the outcomes and financial proxies to value the outcomes; and
- Create an evaluative analysis that measures and evaluates the impacts of the project – Articulate the key drivers of social value and identify what data are needed to best measure and evaluate the impacts of activities. For this report, we focus on 2021.

To fully measure and evaluate the impacts of the project, this research incorporates scientific data on the objective social, environmental, and economic impacts of replacing flood irrigation with drip irrigation, supported by enhanced farming practices into the SROI evaluation. These data are directly tied to the outcomes identified by the key stakeholders and used to quantify the social value of changes. The SROI methodology presents these social values in terms of financial equivalents, which allows stakeholders across the board to evaluate the cost/benefit favorability or unfavorability of proposed projects and project alternatives. **Such valuation of outcomes will allow contract buyers to understand the internalized financial benefits and externalized societal benefits of making investments in the technology and best practices implementation. An important aspect of this value created is how a contract buyer supports the viability of the agricultural sector through the action of saving water.**

This report provides a brief overview of the SROI methodology, the analysis approach, the objectives and activities of the project, and the key findings and assumptions made when completing the analysis. Finally, this report includes a discussion of the SROI results and recommendations. The audience for this SROI report is CGW and contract buyers, although CGW can also use findings of this study to communicate the impact of the project to other interested stakeholders. **The data derived through this research was used to determine 2021 impacts and establish baseline data to assess and monitor the future impacts of the project.**

2.2 Social Return on Investment Approach

SROI is a framework for measuring and accounting for the broad concept of social value, a measure of change that is relevant to people and organizations that experience it. This concept of value goes beyond what can be captured in pure, market-based financial terms, seeking to reduce inequality and environmental degradation and improve wellbeing by incorporating social, environmental, and economic costs and benefits into project valuation (SROI Network, 2012). For analytical purposes, SROI converts non-financial values into their financial equivalents, using both subjective and objective research to estimate those values. EcoMetrics LLC believes this is what makes SROI different from other forms of social-impact analysis, and therefore more valuable to funders and supporters.

There are two types of SROI analysis:

- Forecast, which is designed to understand and predict the desired impact and outcomes of a program or activity for significant stakeholders
- Evaluative, which is conducted retrospectively to validate a forecast or baseline SROI to understand if the impact sought was achieved

Forecast SROIs are especially useful in the planning stages of an activity. They can help show how investment can maximize social impact and are also useful for identifying what should be measured once the project is implemented (SROI Network, 2012).

SROI was developed from social accounting and cost-benefit analysis and is based on seven principles of social value (SROI Network, 2012):

1. Involve stakeholders – Inform what gets measured and how this is measured by involving stakeholders;
2. Understand what changes – Articulate how change is created and evaluate this through evidence gathered, recognizing positive and negative changes as well as those that are intended and unintended;
3. Value things that matter – Use financial proxies in order that the value of all outcomes can be recognized including those that are not traded in markets but are affected by project activities;
4. Only include that which is material – Determine what information and evidence must be included in the accounts to give a true and fair picture, such that stakeholders can draw reasonable conclusions about impacts;
5. Do not over-claim – Only claim the value that organizations are responsible for creating;
6. Be transparent – Demonstrate the basis on which the analysis may be considered accurate and honest, and show that it will be reported to and discussed with stakeholders; and
7. Verify the result – Ensure appropriate independent assurance.

The SROI process works by developing an understanding of the program being analyzed, how it meets its objectives, and how it works with its stakeholders. The SROI framework accounts for a broad concept of value and focuses on answering five key questions:

Table 2: Key Questions Addressed by SROI Framework

Question	Definition
Who changes?	Taking account of all the people, organizations, and environments affected significantly
How do they change?	Focusing on all the important positive and negative changes that take place, not just what was intended
How do you know?	Gathering evidence to go beyond individual opinion
How much is you?	Taking account of all the other influences that might have changed things for the better (or worse)
How important are the changes?	Understanding the relative value of the outcomes to all the people, organizations, and environments affected

SROI puts a value on the amount of change (impact) that takes place as a result of the program and looks at the returns to those who contribute to creating the change and others who benefit from it. It estimates a value for this change and compares this value to the investment required to achieve that impact, resulting in an SROI ratio. It takes standard measures of economic return a step further by placing a monetary value on social returns (Social Ventures Australia, 2011). The development of an impact map demonstrating the impact value chain for each stakeholder group is critical to this process. It links stakeholders' objectives to inputs (e.g., what has been invested), to outputs (e.g., number of acres preserved), through to the outcomes (e.g., increase in income through employment). The process then involves identifying indicators for the outcomes, so that we can measure if the outcome has been achieved. The next step is to use financial proxies to value the outcome.

It is then necessary to establish the amount of impact each outcome has had. Impact is defined in the SROI as an estimate of how much of the outcome would have happened without the project and the proportion of the outcome that can be isolated as being added by the activities being analyzed. A number of filters are utilized in the analysis to render additional validity and stability to the conversion of non-market social values into their financial equivalents. SROI uses four filters applied to each outcome to establish the impact of the activities:

- Deadweight – What would have happened anyway?
- Displacement – Were other outcomes displaced to create the outcome?
- Attribution – Who else contributed to the outcome?
- Drop-off – How much does the outcome drop-off each year?

Establishing impact is important as it reduces the risk of over-claiming and may also help identify any important stakeholders that may not have been included in the analysis.

2.3 SROI Research Approach for the Pilot Site

The comprehensive benefits of this project – which include social, economic, and environmental outcomes – were tracked, measured, and reported on, utilizing the EcoMetrics methodology. EcoMetrics incorporates the guiding principles of Social Value International's (SVI) SROI Methodology. The CGW project was analyzed using the initial capital investment for equipment, materials, and installation, investment for operating and harvesting costs, as well as support for implementing the sustainable farming best practices.

The 2021 evaluative SROI analysis of the Kings County Farm was undertaken in six stages. These stages and the activities completed in each of them are listed below:

1. Establish scope and identify stakeholders
    a. Define boundaries and time scale for analysis
    b. Define stakeholders
2. Map outcomes
    a. Engage with stakeholders to develop an impact map that shows the relationship between objectives, inputs, outputs and outcomes
3. Evidence outcomes and give them a value
    a. Synthesize data from stakeholder interviews into an impact map
    b. Identify relevant indicators and financial proxies to monetize the social outcomes, where possible
    c. Define the investment from the relevant stakeholders
    d. Conduct follow up interviews to verify evidence where required
    e. Test assumptions with key project team members
4. Establish impact
    a. Determine those aspects of change that would have happened anyway or are a result of other factors
5. Calculate the SROI

   a. Populate and use the EcoMetrics model to sum all the benefits, subtract any negatives and compare the result to the investment. This is also where the sensitivity of the results is tested.
6. Report
   a. Write a detailed report which describes the methodology, assumptions made, results and recommendations
   b. Complete summaries of the SROI analysis
   c. Report to stakeholders, communicate and use the results, and embed the SROI process in the organization

In addition to this 2021 analysis, the SROI analysis will be used to provide a baseline for ongoing creation and transactions of conservation contracts. The long-term strategy is to continue converting farms to drip irrigation and implement the related sustainable farming practices.

2.4 Challenges with Applying the SROI Methodology to Environmental Projects

Projects with environmental attributes are different than typical SROI-related projects. Benefits tend to focus on changes to the environment and natural ecosystems, which in turn have impact and provide benefits to, a variety of stakeholders. Applying the SROI methodology to environmental projects, however, poses unique challenges. The SROI methodology has historically been used by community organizations focused on social welfare programs which have a clearly defined period of investment and an associated commensurate period of benefits (Social Ventures Australia Consulting, 2011). With environmental projects, many of the benefits are often not readily or immediately apparent to stakeholders. For example, the assignment of carbon, nitrogen, and phosphorus impacts provide direct benefits to the funders and partners. However, the environmental value of carbon, nitrogen, and phosphorus for other stakeholders and society at large are generally not identified as outcomes through stakeholder engagement.

To account for these more intangible assets, the environment is considered as a stakeholder, as though it were a person or an organization. The specific outcomes associated with the environment were derived from the scientific literature and research and interviews with government agency officials that are responsible for environmental factors. The results of this research can be considered outcomes that will accrue to various stakeholder groups in the future. However, environmental benefits also have ancillary benefits to other stakeholders and those are also noted and accounted for herein.

2.5 Who Worked on the Report?

This report was performed by EcoMetrics LLC staff and retained contractors.

3.0 Project Background

3.1 Regional Demographics

This study assesses the social value of the drip irrigation technology use at the alfalfa farm in Kings County, California (Figure 2). The site is slightly south of the community of Hanford, and about 140 miles southeast of San Jose. This area is known as part of the Central Valley and is characterized by agriculture providing a significant portion of food crop products to the United States.

According to the US Census Bureau, in 2020 Hanford had a population of approximately 57,990 people. In the ten-year period between 2010 and 2020, the city of Hanford saw a population increase of 7.5%. In 2019, Hanford experienced a civilian workforce unemployment rate of 7.2%. At the same time, the city's per capita income was above the value for Kings County, but below the value for the state of California and the United States. The city's per capita income change between 2010 and 2019, tabulated at an increase of 21.7%, is illustrative of a community experiencing growth (Table 3; U.S. Census Bureau, 2010, 2019, 2020).

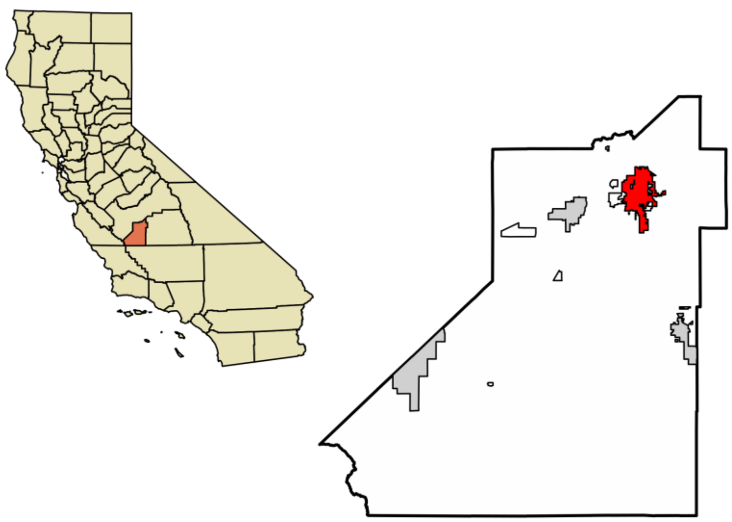

Figure 2: Project Location (wikimedia)

Table 3: Regional Demographics for Project Area

Spatial Extent	Population			Unemployment Rate (Civilian)			Per Capita Annual Income		
	2010	2020	Percent Change 2010-2020	2010	2019	Percent Change 2010-2019	2010	2019	Percent Change 2010-2019
Hanford, California	53,967	57,990	7.5%	11.1%	7.2%	-35.1%	$21,526.00	$26,207.00	21.7%
Kings County, California	152,982	152,486	-0.3%	12.0%	7.6%	-36.7%	$17,875.00	$22,373.00	25.2%
California (State)	37,253,956	39,538,223	6.1%	9.0%	6.1%	-32.2%	$29,188.00	$36,955.00	26.6%
United	308,745,538	331,449,281	7.4%	7.9%	5.3%	-32.9%	$27,334.00	$34,103.00	24.8%

States									

3.2 An Important Focal Point for Water

In addition to being a strategic agricultural source region for the US and other parts of the world, this part of California is also faced with significant water challenges. California is plagued by both flooding and drought, depending on exact location and time of year. That, combined with a large population, puts a significant strain on water resources. Compounding this further, is that agriculture is a very significant consumer of water and represents a key element of the state's economy. This creates a "perfect storm" causing drought induced emergencies and requiring aggressive resource management, as well as finding other sources of water. The state's water groundwater basins become extremely important, and their long-term sustainability is a key element for maintaining the economic and social fabric of the state.

Competition for the water resource can be fierce, and anything that can be done to increase the resilience of supply will contribute to stability and security. This project reduced the demand on the local aquifer by less pumping. The more efficient of use of water will reduce the impact of high-water use crops like alfalfa, by leaving more water in the aquifer per unit crop produced. When combined with the ancillary benefits of the technology, crop productivity increases, thereby resulting in more alfalfa with less water.

For example, prior work done by CGW and GAR Bennett revealed that a typical flood-irrigated alfalfa field would use on the order of 5 acre-feet of water per acre of crop and would yield approximately 6.8 tons per acre of alfalfa. With the new technology, on an annual basis, yield can increase to approximately 12.8 tons/acre and uses only 2.37 ac ft per acre. The 5-ac ft per acre is based on work presented in the Congressional Research Service 2015 report, which in turn reviewed information from the United States Geological Survey and United States Department of Agriculture (Johnson and Cody, 2015). The 5-ac ft value is based on projected total water applied and is not corrected for evapotranspiration or other factors. This total water applied is a more realistic representation of withdrawals from the aquifer.

It is also important to note that an annual alfalfa crop may utilize both flood irrigation from surface water as well as drip irrigation from groundwater withdrawal. The mix is dependent of water availability at the time needed. We assume 100% drip irrigation use for 2021 and that metered pumped water represents all water used for irrigation.

By changing the way water is used, opportunities exist to enhance farming practices which help reduce operating and harvesting costs, and more importantly, improve crop yield. Farmers then realize both cost savings of using less water and increased revenue of higher crop yield.

3.3 Project Partners

The primary client for the EcoMetrics study was CGW. CGW administers the management of the conservation contracts program. Other key partners include Netafim, a global agriculture equipment and service provider who is providing the drip irrigation technology. GAR Bennett did the installation of the equipment and provides ongoing support to the farmer to help leverage the new technology and implement sustainable farming practices and accurate monitoring of water use. Finally, the alfalfa farmer is a key partner in that they are the users of the technology and grow the crop.

3.4 Project Description

This report contains the 2021 analysis of the economic, social, and environmental outcomes from the replacement of flood irrigation to using drip irrigation technology at the 87-acre Kings County Farm alfalfa farm site located near Hanford, California in the Central Valley area. The project was conducted on behalf of CGW and provides a Social Return on Investment (SROI) analysis. This report uses actual water use and crop yield data for the farm, using collected water meter and crop production records provided to EcoMetrics LLC Appendix II).

Results of this analysis revealed that there are significant water savings that also create additional value across a number of outcomes that impact a number of stakeholders. The initial goals of saving water and increasing crop yield are both verified, with positive value created in terms of the value of water saved as well as the crop value increase due to enhanced yield. Because water quantity is saved and runoff quality is improved via better practices, there is also value created in terms of community impact.

Coupled with the installation of the drip irrigation equipment is implementation of enhanced farming practices that result in more sustainable approaches to managing the crop. In regard to the overall concept of drip vs flood irrigation, a great amount of analysis was done prior to this study, the details of which will not be repeated herein. This prior work focused on the water savings and increased crop productivity. The primary benefit expected from this approach is a significant saving of water use, but also includes increased crop productivity on a tons per acre basis. Another unique aspect of this project is the offering of "Conservation Contracts" to interested entities that wish to invest in water saving projects. Contract buyers are initially expected to be private sector companies with water use reduction or water positive goals, but can eventually include any type of organization such as water districts, non-governmental organizations, non-profits, or any level of government. These contracts represent a volume of water saved and are sold to entities that wish to demonstrate water savings. The revenue from these contract sales is used to help compensate for the installation of the system and the ongoing management program. This innovative market-driven approach provides incentive for the technology and practices to the farmer with an additional financial motivation to make the business case for the investment. The contract buyer is provided with independently validated proof of the water savings and can use that information for ESG reporting or other sustainability-related goals and commitments. The farmer makes the investment for the installation, but the Conservation Contract helps improve the financial model that incentivizes that investment.

The amount of planting and harvests per year can vary based on several factors, but for this work, we validated nine cycles as per the information provided. This is up from six to seven typical for flood irrigated sites, thereby contributing to increased crop productivity. The project is an active alfalfa farm with an associated dairy farm operation. The project itself involves the use of drip irrigation technology and related practices.

The study is not only to do an analysis of value created by this type of approach, but to establish an independent, verifiable, and credible ongoing mechanism to track water saved and related impacts to support the conservation contracts program. For this report, only actual water use and crop yield data for 2021 were used.

3.5 Ecological Overview

The site exists in the Central Valley area of California and the immediate area is characterized by numerous farms and small communities. The general area is flat and arid, bordered on both long sides by mountain ranges. Figure 3 is an aerial photograph of the site.

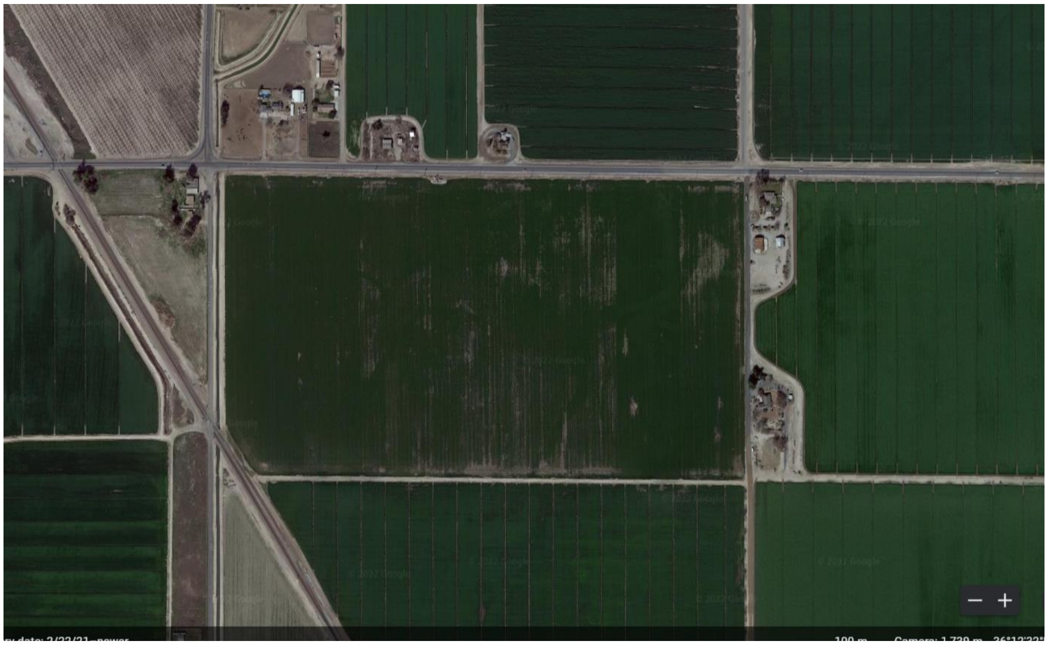

Figure 3: Site Aerial Photograph

4.0 Stakeholder Engagement Methodology

4.1 Meetings and Field Visits

The stakeholder engagement for this phase of the project was limited to two key stakeholders, the owner of GAR Bennett, and the owner of Kings County Farm, the alfalfa farmer who has implemented drip irrigation. GAR Bennett is the company that installs the drip irrigation equipment and will be providing ongoing support to the farmer to help leverage the technology and implement sustainable farming practices and accurate monitoring of water use. The interviews were done via Zoom on February 25 and April 22, 2022, by the EcoMetrics team.

The EcoMetrics team was able to garner significant insight into both the anticipated outcomes for landowners/farmers and the perspective of project implementers and how they promote and administer the management of conservation contracts to other landowners in the area.

Table 4: Date(s) of Stakeholder Engagement Activity

Date	Meeting Type	Location	Parties Present
2/25/2022	Zoom interview	Remote	EcoMetrics LLC, GAR Bennett and Michael Burney, CGW
4/22/22	Zoom interview	Remote	EcoMetrics LLC, Owner and farmer of Kings County Farm

4.2 Outreach Strategies

The two interviewees were recommended by CGW as critical initial stakeholders for the EcoMetrics team to interview for this study. As noted, this SROI analysis was some select stakeholders in order to gain preliminary insight into value created to support the rollout of the conservation contracts program. Once the contracts program is expanded, and there is a better sense of who is interested and who would be involved, a more comprehensive stakeholder outreach process will be initiated to interview critical stakeholders representing different perspectives and aspects of the conservation contracts process and the related water savings garnered from these contracts. For example, at this stage, there is only one location being assessed, and no contract buyers are identified. As that broader stakeholder engagement occurs, results of this initial assessment will be updated, and the report ultimately submitted to SVI for certification.

5.0 Theory of Change

A theory of change describes and summarizes the objectives, inputs, outputs, and outcomes of programs and activities on different stakeholder groups (Social Ventures Australia, 2011). It is additionally a pathway linking the activities of these programs and activities to short-term, medium-term, and long-term outcomes experienced by these stakeholder groups (Ireland, 2013). The theory of change delineates how varying stakeholder groups experience and perceive material change resulting from the impacts of the project.

Collected data was carefully analyzed to anticipate the changes to be experienced by stakeholder groups and their interrelations. As previously described, the primary input is the installation of the drip irrigation system coupled with enhanced farming practices. As such, the theory of change for each stakeholder group other than contract buyers is derived from the relationship between the operation of the farm and the respective outcome for each stakeholder group.

The results of the qualitative portion of this research revealed that there were differences in the ways that groups of people are potentially impacted by the project. The development of the theory of change highlights these differences and identifies those outcomes unique to each stakeholder group. Based on observation, past experience, and initial data gathering, relevant stakeholder groups were identified as acknowledged in this report.

Because the analysis at the current stage was exploratory with limited stakeholder engagement, the theory of change will continue to evolve as the project expands and more stakeholders are engaged. For example, a key stakeholder is the contract buyer, of which none are yet identified. Secondly, the farmer is the next most important stakeholder, and those are unique to the site. As future sites are chosen, more stakeholders are identified.

6.0 Analysis of outcomes

6.1 Stakeholders Outcome Identification and Justification

EcoMetrics uses a set of questions designed to learn from stakeholders how they perceive the change from prior or current conditions and what they expect from the project. This questioning is intended to learn what impacts are expected from the project and what they mean to the specific stakeholder. A variation of this question set was used with the interviewees and will be done more formally during the full stakeholder engagement.

Stakeholder groups who will benefit from this project include:

- Alfalfa farmers
- Conservation Contract buyers
- The Environment
- Community at large
- Dairy Farmers
- Agricultural value chain

These groups represent the ultimate broader scope of stakeholders to be interviewed as the program expands. Once the roll out of the Conservation Contract program is underway, EcoMetrics has identified these key stakeholder groups and plans to conduct traditional EcoMetrics stakeholder outreach which includes either group or one-on-one interviews to inform likely benefits that would affect these future stakeholders.

6.2 Outcomes Identified by Stakeholders

Environment

- Impacts were noted mainly due to water savings, but also as a result of improved soil formation, erosion control, water quality improvement (via natural treatment), support of pollinator populations, habitat creation and protection and the biologic control of invasive species.

It is clear that the environment will benefit from the Conservation Contract program in a number of ways. The transition from traditional irrigation and crop rotation practices to a drip irrigation system installed for alfalfa production will significantly reduce water needs from approximately 5 acre-feet of water to an average of 2.37 acre-feet. For the Kings County Farm site in 2021 this value was actually 2.51. Overall, this will result in the improvement of erosion control and water quality due to the natural treatment alfalfa provides. A reduction in erosion will also promote improved soil formation.

Additionally, alfalfa is considered a significant carbon sink, providing an opportunity for carbon emission reductions with minimal carbon output for planting and management.

Overall, the water use reduction is identified as the biggest benefit to the environment, providing an opportunity for any unused water to replenish the critical aquifers via groundwater recharge to be used elsewhere as needed.

Alfalfa Farmers

- Most significantly through lower operating costs due to water use-related savings, reduced risk of water scarcity, increased crop productivity, and enhanced resilience of the farm's viability.

The Central Valley is considered the most productive agricultural land in the world related to production by acre. The northern one-third of the Central Valley is known as the Sacramento Valley and the southern two-thirds is known as the San Joaquin Valley. Approximately 16% of the total produce in the United States originates from the San Joaquin Valley. Operating agricultural farms in a geography that is experiencing increased water scarcity has introduced variables which threaten the livelihoods of many farmers in the Central Valley. The Conservation Contract program offers farmers an opportunity to successfully farm using drip irrigation applications which significantly reduce water use. This results in lower operating costs, and a reduced risk of water scarcity, improving the overall viability of the farmer's operation.

Conservation Contract Buyers

- Gaining reputational value and meeting internal goals by supporting water savings, but also improved marketing opportunities, the market value of the carbon sequestered, and the nitrogen and phosphorus intercepted.

These projects can provide a mechanism from which Conservation Contract buyers i.e., companies or operations with a large water footprint to accelerate water savings operations in an agriculture intensive, water-scarce areas. The tremendous benefits of water savings and water conscious investments allow contract buyers and farmers to achieve aligned goals.

Community at large

- Due to a multitude of benefits including water resource protection (quality and quantity); local economic stability through more sustainable farming practices; and social value of reducing demand on community infrastructure through flood protection, water supply conservation, and runoff water quality. Other benefits include air quality improvements, carbon sequestration, and wildfire risk reduction.

Overall, the stakeholders in this broad group benefited in a number of ways from the water resource protection the Conservation Contract program will provide. The community at large benefited from improved water quality and quantity due to farmers' participation in water conservation contracts with CGW. With increased risks associated with water scarcity in the region due to drought and longer dry periods, significant reductions in water use throughout the Central Valley would result in local economic stability via more conscientious water use by farmers. The local communities in the Central Valley would also see intrinsic social value being created for their stakeholders through a reduction in the demands on community infrastructure. There is significant social value generated via the water stewardship of local farmers and farming operations.

Dairy Farmers

- From a more reliable and more accessible high quality alfalfa source for cattle feed.

Alfalfa is a critical crop source for cattle feed. Providing a reliable and sustainable source of alfalfa which is less water intensive is beneficial to dairy farmers dependent on the crop for their operations.

Agricultural Supply Chain

- Overall, the supply chain will benefit from having a key component supported by more sustainable and efficient practices.

The Conservation Contract program will introduce an innovative mechanism which will positively "disrupt" the agricultural supply chain, providing an alternative to water intensive farming practices. By introducing a common-sense approach to integrating more sustainable and efficient water use practices into traditional farming applications, this contract program will assist in transitioning traditional, resource heavy agricultural paradigms towards more sustainable and efficient practices (where possible).

Table 5: Stakeholder Identified Outcomes and Supporting Statements

Outcomes	Statements from Stakeholder Affirming Outcomes
• Strengthening of California Ag Economy	• There are definitely regional and county benefits because these contracts will be keeping land in production with residual benefits and trickle-down impacts to the local banks, hay producers, etc. • Farmers have increased production significantly – yield is still site specific but chemical savings and biodiversity is on the whole
• Water Regulation	• Drip irrigation has been proven all over the world to conserve applied water in all crops. • If you could apply drip irrigation installations throughout the western United States it would exponentially reduce water demand on agriculture operations and would significantly reduce demands on the river.
• Biological Control – Herbicide Use Reduction • Operating Cost Savings	• In all projects we have done farmers have increased production significantly (yield is still site specific), but chemical savings and biodiversity is being demonstrated on the whole

7.0 SROI Mapping

7.1 Introduction to SROI Mapping

As noted in Section 2.2, the SROI approach is one that starts with input information and feedback from stakeholders and ends with a compilation of quantified and valued outcomes. The process is illustrated and documented in an SROI Map. For this report, we have integrated the SROI Map into a series of progressive tables that start with basic inputs and progress to a table that gives final, corrected and adjusted values for each outcome identified.

In EcoMetrics, we divided the SROI Map into four stages, and sections 7.2, 7.3, 7.4, and 7.6 reflect these stages. Each section includes a table that contains the relevant data from the subject stages. Section 7.5 is devoted to explaining the various SROI corrections that must be applied to initial outcome values in order to get a more accurate and truer picture of value created by the project. Figure 4 is a conceptual flow diagram illustrating the SROI Mapping process. Because this is an initial analysis, these results will evolve over time as the projects mature.

Figure 4: Conceptual SROI Mapping Flow Diagram

***STAGE numbers refer to SVI SROI Mapping and noted in report tables 6, 7, 9, and 12**

7.2 Inputs and Outputs – SROI Map Stages 1 and 2

There are two basic types of inputs for the project. There is direct financial input from the conservation contract buyer. In addition, the farmer has inputs such as installation of the system and operating expenses as well as human labor. Table 6 reflects Stages 1 and 2 as defined above in Section 7.1 and represent the specific stakeholder types, and how they relate to inputs and expected outputs. These outputs lead to the impacts, which include benefits, to be attributed to the stakeholders.

Table 6: SROI Mapping Stages 1 and 2 – The Stakeholders, Inputs, and Outputs

Stakeholders	Intended / Unintended Changes	Materiality of Changes to Stakeholder Group	Inputs	Value	Outputs
Environment	Positive changes to various environmental parameters especially water	improved environmental conditions benefit stakeholders such as water quantity and quality, and air quality	Natural	improved agricultural practices and water resource resilience	enhanced environmental conditions
Conservation Contract buyers	Purchase of contracts which support implementation of practices	reduced water risk for the company's entire value chain, enhanced reputation for supporting the development and operation of water saving agricultural practices and generating benefits that may be eligible for markets.	Funding	dollars per contract	Positive Return on Investment
Agriculture supply chain	Enhanced marketing opportunities and support of ag industry through pollinator support	increased stability and resilience of the sector	participate in the value chain	as part of the supply chain	stronger market position
Alfalfa farmers	More efficient use of water, more productive acreage	improved operations and increased resilience economically	installation of system, following new practices	value of systems and labor	less costs, more productivity
Dairy Farmers	nutrient density of feed	better nourished cows	use of alfalfa	value of cows and milk	healthier, better nourished cows, better milk production
Community at large	Numerous, mainly around improved water resources and stronger	better area, enhances quality of life	reside in the area and use the produced	monetary as purchase of goods and services, providing a labor force, local	A more resilient local agricultural economy and a more sustainable

	agriculture economy		products	infrastructure	water resource

***Key, Description of columns:**
Stakeholder: Who do we have an effect on? Who has an effect on us?
Stakeholder Subgroup: Can the stakeholder group be broken down into easily quantifiable subgroups?
Intended/unintended changes: What do you think will change for them?
Materiality to subgroup: Relevance/significance of change to stakeholder groups. Consistent with materiality
Inputs: What?: What do they invest?
Value: What is the value of the inputs by description or in currency?
Outputs: What changes as a result of the inputs?

7.3 Outputs and Outcomes – SROI Map Stage 2 (Continued)

Once we know the outputs, we can determine what changes as informed by research, direct observation, and stakeholder input. These are the impacts or outcomes. Table 7 builds on Table 6 by identifying the outcomes sorted by the stakeholder they benefit.

Table 7: SROI Mapping Stage 2 Cont. – Identifying Outcomes by Stakeholder

Stakeholders	Outcome
Environment	Soil Formation
	Soil Erosion Control
	Water Quality Enhancement
	Regulating Water Quantity Runoff
	Nutrient Cycling
	Habitat Creation/Preservation
	Biological Control- Herbicide Use Reduction
Agriculture Value Chain	Pollinator Populations Support
	Enhanced Marketing Opportunities
Alfalfa Farmers	Soil Compaction Reduction
	Increased Crop Revenue
	Operating Costs Savings
	Share of Contracts Sales
	Opportunities for Sustainable Agriculture Grant Funding
	Drought Resilience
	Property Value of Cropland Preservation
Dairy Farmers	Nutrition Density Improvement

Community	Enhanced Community and Municipal Resources
	Food Security - Localizing Food Production
	Strengthening of California Ag Economy
	Local Jobs Created
	Preservation of Heritage Farmlands
	Cultural and Scenic Value
	Valuing the Water Resource
	Env Impact of Sustainable Farm Practices
	Wildfire Risk Reduction
	Carbon Sequestered as Social Cost of Carbon
	Phosphorus Retention as Reduced Impact to Infrastructure
	Nitrogen Retention as Reduced Impact to Infrastructure
	Water Quantity Improvement as Cost Benefit to Consumers
	Air Quality - Dust Particulates Reduction
	Air Quality - Oxygen Production
	Air Quality - Other Greenhouse Gases Reduction
	Air Quality - Carbon Emission Reduction from Operations
Conservation Contract Buyer	Reduced Water Risk for Entire Value Chain, Improved License to Operate from Enhanced Reputation
	Market Value of Carbon Credits
	Market Value of Nitrogen Credits
	Market Value of Phosphorus Credits

7.4 Valuing Outcomes – SROI Map Stage 3

In order to be able to quantitatively assess outcomes, there are a number of assumptions necessary. Some of these are basic project facts, while others are financial proxies which are defined in more detail below. These are all listed in Table 8.

For attaching values to outcomes, our goal was to find the most up to date peer-reviewed materials to use for the calculation of financial proxies across outcomes (Tables 9 and 10). Where possible, we looked for the most regionally specific calculations beginning from the local area to the broader community, to the local region, to the state and regional level, and finally, where there was no regionally specific information, to the U.S. national or global level. Peer-reviewed figures from federal and state agencies were prioritized, depending on dates they were produced. Where these criteria could not be met for peer-reviewed proxies, recent reports were used to make calculations. Many of these values were drawn from data sources that have met the standard of social value as established by SVI and priority was given to projects that have been assured by this organization.

The values were then adjusted by EcoMetrics LLC to reflect the circumstances of the CGW project and the social conditions of rural areas surrounding the croplands and California. Specific details on how the references were used to determine the financial proxies are reflected in Table 10.

A total value is provided for each outcome which is based on the quantity of the outcome times the value per unit quantity for 2021.

Notes on specific assumptions:

Establishment of a baseline scenario: In order to understand the magnitude of an impact, the baseline scenario is critical to establish. In this project, there are two distinct alternative scenarios for the calculation of impact as a result of adopting a drip irrigation system:

a. Continuing to rely on flood irrigation practices
b. The fallowing of land as a result of the inability to afford high water costs and/or lack of availability due to drought

Non-Nitrogen Fertilizer Applications: Conservation based farming practices deployed here include low field disturbance and adaptive application of fertilizers. Given the nature of the alfalfa plant, nitrogen-based fertilizers are avoided, thus the calculation for nitrogen retention and its associated social value reflects no additional input, high soil retention and a dramatic reduction in runoff as a result of adopting drip as opposed to flood irrigation. With regards to phosphorus, however, the application of fertilizer is tailored to periodic soil health testing by the farmer, in terms of timing and quantity (Stakeholder Interview, 2022). While better for the environment, this introduces more variability in the modeling of total phosphorus retention and its associated cost. It is assumed for simplicity that a one-time application is made and then retained as a result of the high soil retention capacity of alfalfa and the reduced runoff created by adopting drip irrigation systems. This one-time application is expected to benefit the field for the typical 7-year crop cycle for alfalfa. Additional phosphorus would be added after year one if testing reveals it is necessary. For the sake of calculation, the value created is annualized over seven years, and one year's worth is included for the 2021 proejct year.

Wildfire and Flooding Risk Reduction: The county in which these alfalfa crops reside have historically lower risk to wildfires and flooding as compared to other regions in California. Thus, the proxies here may be considered more an impact of climate change resilience, as opposed to climate change mitigation.

Groundwater Recharge: Claiming direct impact on groundwater recharge as a result of adopting an irrigation system is difficult to do, given the complexities of aquifer level withdrawal and recharge rate monitoring. While flood irrigation offers a higher chance of net recharge-withdrawal rates by allowing the higher volumes of water extracted to returned in some form to the land for infiltration, there are heavy issues of pollution, ecosystem and land impacts associated with this method of irrigation. By adopting a drip irrigation system, a farmer may contribute to groundwater recharge by the following:

a. Healthier soils result in better drainage and soil moisture capacity, allowing for more potential recharge
b. Conservation-based water use allows for direct conservation of groundwater volume left in the aquifer
c. Adoption of a hybrid flood and drip irrigation management strategy allows for the highest rates of recharge by conserving water through drip irrigation in non-winter months, while allowing for controlled flooding in winter months with surface water

Table 8: Assumption Inputs Used

Input Assumptions Description	Value	Value Unit	Year Start	Year End
Site acreage (total acres)	87.3	Acres		
Project land	87.3	Acres		
Equipment and Materials	254.00	$/acre		
Installation cost	88.00	$/acre		
Operating Cost	825.00	$/acre/year	1	1
Establishment Costs amortized for 7 years	114.00	$/Year/acre	1	1
Annual Management Support	150.00	$/Year/acre	1	1
Crop Value	185.60	$/ton	1	1
Number of working hours per year	320	hours/year	1	1
Jobs Created Agriculture	6	# of jobs	1	1
Population of Kings County	152486	#		
Population of Hanford	57990	#		
Wages Agriculture	17.51	$/hour	1	1
Number of Households in the immediate communities	18777	#	1	1
Selling price Conservation Contract	0.00209	$/gallon	1	1
People in a square mile	500	#	1	1
Original Water Use	5	ac ft/acre	1	1
Drip Irrigation Water Use	2.51	ac ft/acre	1	1
Original Crop Yield	6.8	ton/acre/year	1	1
Drip Crop Yield	9.54	ton/acre/year	1	1
Harvest Cost	579.00	$/acre/year	1	1
Operating Cost Savings	68.00	$/ton	1	1
Value of the Marginal Nitrogen	11.46	$/lbs	1	1
Value of Nitrogen Market Price	14.14	$/lbs	1	1
Nitrogen Retained	51	lbs/ton	1	1
Phosphorus Market Price	14.14	$/lbs	1	1
Phosphorus Retention Social Value	153.75	$/lbs	1	1
Phosphorus Retained	12	lbs/ton	1	1
Soil Stabilization Value	1.94	$/ton	1	1

Max. Estimate of Sediment Stabilized	1.8	ton/acre/year	1	1
Year Reaches Full Potential	1	Years		
Hectare/Acres Conversion Rate	2.47	Acres		
Discount Rate	0.00	%		
Storm protection	14.00	$/acre	1	1
Support of Pollinator Populations	14.00	$/hectare/year	1	1
Biological Control	13.35	$/ acre	1	1
Air Quality	0.11	$/acre/year	1	1
Soil Formation	1.93	$/acre/year	1	1
Source Water Protection- quality	51.60	$/acre/year	1	1
Preservation of heritage farmlands	28.00	$/household	1	1
Value of enhanced reputation	0.26	0.26 * project investment		
Property Value-Cropland preservation	13300.00	$/ acre	1	1
Increased marketing opportunities	15000.00	$/year	1	1
Enhanced ecological sustainability of regional agriculture	25000.00	$/grant	1	1
Refuge habitat	1.32	$/acre/year	1	1
Compaction restoration avoided	5.30	$/acre	1	1
Valuing the water resource	64.14	$/household/year	1	1
Social Cost of Carbon	51.00	$/MTCO2e	1	1
Property Value Enhancement surrounding properties	21.00	$/acre/year	1	1
Gallons per Acre Foot	325851	gallons per ac ft		
Average Cost of Water in CA	0.003	$/gallon		
Oxygen Produced	6.19	ton/acre/year	1	1
Oxygen Value	0.00108	$/ton	1	1
Subsidence cost avoidance	1.80	$/acre/year	1	1
Local Tax Income from farm	17,300.00	$	1	1
Tax on revenue paid to state	143463.00	$	1	1
Local food production	21.85	$/acre/year	1	1
Particulates Cost	11.20	$/person	1	1
Value of sustainable farm practices	30.00	$/household	1	1
Wildfire Risk Reduction	187.50	$/ acre	1	1
Percent of contract sales to farmer	0.25	#	1	1

Tons of carbon saved per acre in equipment use	0.6	ton/acre/year	1	1
Crop tons per cycle	1.42	tons/acre	1	1
Water quality enhancement from runoff	51.60	$/acre/year	1	1
Water quantity flow regulation	7.00	$/acre/year	1	1
Impacted cows per herd	25	#	1	1
Value per cow	588.00	$	1	1
Nutrient cycling for alfalfa	7.54	$/acre/year	1	1
Number of households in immediate sq mi	125	#	1	1

Table 9: SROI Mapping Stage 3 – Valuing the Outcomes

Outcome	Indicator	Source	Duration in Years	Outcomes Start Year	Financial Proxy	Value of Outcome in $	Mater iality	Source Relative to Materiality
Water Quantity Improvement as Cost Benefit to Consumers	gallon of water	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$212,497.54	Yes	Stakeholder interviews and surveys
Increased Crop Revenue	ton of crop	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$44,395.89	Yes	Stakeholder interviews and surveys
Air Quality - Oxygen Production	tons of O2	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$1,480.66	Yes	Stakeholder interviews and surveys
Soil Compaction Reduction	cost per acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$462.69	Yes	Stakeholder interviews and surveys
Enhanced Community and Municipal Resources	dollars	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$17,300	Yes	Stakeholder interviews and surveys
Strengthening of California Ag Economy	dollars	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$143,463	Yes	Stakeholder interviews and surveys
Food Security - Localizing Food Production	cost per acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$1,907.51	Yes	Stakeholder interviews and surveys

Air Quality - Dust Particulates Reduction	cost per person	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$2,800	Yes	Stakeholder interviews and surveys
Env Impact of Sustainable Farm Practices	cost per household	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$563,310	Yes	Stakeholder interviews and surveys
Operating Cost Savings	dollars	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$56,633.26	Yes	Stakeholder interviews and surveys
Air Quality - Other Greenhouse Gases Reduction	tons of GHG	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$10.00	Yes	Stakeholder interviews and surveys
Wildfire Risk Reduction	probability risk cost per acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$16,368.75	Yes	Stakeholder interviews and surveys
Share of Contracts Sales	dollars per gallon	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$37,009.99	Yes	Stakeholder interviews and surveys
Air Quality - Carbon Emission Reduction from Operations	tons of GHG	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$2,671.38	Yes	Stakeholder interviews and surveys
Drought Resilience	additional harvest cycles per year of possible 9	Citation from Assumptions and Financial Proxy Data	1	1	See financial proxy view	$17,175.05	Yes	Stakeholder interviews and surveys

		View						
Nutrition Density Improvement	cost per cow	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$14,700	Yes	Stakeholder interviews and surveys
Regulating Water Quantity Runoff	cost per acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$611.10	Yes	Stakeholder interviews and surveys
Nutrient Cycling	cost per acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$658.24	Yes	Stakeholder interviews and surveys
Carbon Sequestered as Social Cost of Carbon	Tons of carbon sequestered per acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$15,137.82	Yes	Stakeholder interviews and surveys
Soil Formation	improved soil/acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$168.49	Yes	Stakeholder interviews and surveys
Soil Erosion Control	tons of soil/acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$304.85	Yes	Stakeholder interviews and surveys
Air Quality - Other GHG	air quality improvement per acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$0.00	Yes	Stakeholder interviews and surveys
Phosphorus Retention as Reduced Impact to Infrastructure	pounds phosphorus retained per ton	Citation from Assumptions and Financial	1	1	See financial proxy view	$219,732.87	Yes	Stakeholder interviews and surveys

	of crop	Proxy Data View						
Nitrogen Retention as Reduced Impact to Infrastructure	pounds nitrogen retained per acre per ton of crop	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$69,607.09	Yes	Stakeholder interviews and surveys
Pollinator Populations Support	value of pollinator habitat created per acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$3,018.83	Yes	Stakeholder interviews and surveys
Biological Control-Herbicide Use Reduction	Trophic-dynamic regulation of plant and wildlife populations by acres.	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$1,165.00	Yes	Stakeholder interviews and surveys
Water Quality Enhancement	retention of pollutants per acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$4,505.00	Yes	Stakeholder interviews and surveys
Property Value of Cropland Preservation	as property value increase in $/acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$1,152,360.00	Yes	Stakeholder interviews and surveys
Enhanced Marketing Opportunities	Estimated advertising value of positive press coverage	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$15,000.00	Yes	Stakeholder interviews and surveys
Reduced Water Risk for Entire Value Chain, Improved License to Operate from Enhanced Reputation	Dollar value of enhanced reputation	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$54,363.97	Yes	Stakeholder interviews and surveys
Market Value of Carbon Credits	Carbon Price Forecast ($/t	Citation from Assumptions	1	1	See financial proxy view	$5,936.40	Yes	Stakeholder interviews and

	CO2-e) Average Sequestered (t CO2-e/acre/year)	and Financial Proxy Data View						surveys
Market Value of Nitrogen Credits	Value of the nitrogen offset portion of a water quality credit that includes both N and P offsets.	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$600,595.68	Yes	Stakeholder interviews and surveys
Market Value of Phosphorus Credits	Value of the phosphorus offset portion of a water quality credit that includes both N and P offsets.	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$141,316.63	Yes	Stakeholder interviews and surveys
Opportunities for Sustainable Agriculture Grant Funding	USDA grants value in $	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$25,000	Yes	Stakeholder interviews and surveys
Local Jobs Created	Jobs created; number of working hours per year; wages	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$33,619.20	Yes	Stakeholder interviews and surveys
Valuing the Water Resource	water quality enhancement per acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$1,204,356.78	Yes	Stakeholder interviews and surveys
Preservation of Heritage Farmlands	Value of the cultural and historical perspective	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$525,756	Yes	Stakeholder interviews and surveys
Habitat Creation/Preservation	cost per acre	Citation from Assumptions and Financial Proxy Data	1	1	See financial proxy view	$115.24	Yes	Stakeholder interviews and surveys

		View						
Cultural and Scenic Value	value as $/acre	Citation from Assumptions and Financial Proxy Data View	1	1	See financial proxy view	$1,833.30	Yes	Stakeholder interviews and surveys

Key- Description of column headers:

Description: How would the stakeholder describe the changes? Note this is a forecast model.
Indicator: How would you measure it?
Source: Where did you get the information from? See citations.
Duration: How long does it last after end of activity? Numbers are in years.
Outcomes Start Year: Does it start in period of activity (1) or in period after (2). How are these periods defined?
Financial Proxy: What proxy would you use to value the change? Note that Actual financial proxy is a value that changes per year due to discounting and changing conditions, see Table 10.
Value in currency: What is the value of the change? (Not corrected for discount factors.)
Materiality (Mat.): Is this a material outcome, in terms of quantity, duration, value, and causality?
Source relative to materiality: Where did you get the information from?

Table 10: SROI Mapping Stage 3 – Valuing the Outcomes – Detail on Proxy Determination

Stakeholder	Outcome	Financial Proxy*	Source	Further Detail on How Proxy Determined and Used
Environment	Soil Formation	$1.93/acre/year	1, 2, 3	Refers to weathering of rock and accumulation of organic material. Conventional farming methods can result in soil erosion rates exceeding soil formation rates. The healthier soils, reduced field disturbance, non-flooding practices and soil macroaggregate formation as a result of the alfalfa plant and the farming methods deployed here allow for a healthier rate of soil formation. The equation multiples the proxy by the acreage of the site and over time.
	Soil Erosion Control	$1.94/ton	1, 2, 4	Vegetation helps stabilize soils and prevent erosion. The deep root systems of the alfalfa crop and increased macroaggregates in soils contribute to resistance to erosion. A California study found over 4x as many macroaggregates in soil from fields using alfalfa as a rotation crop as compared to those using corn. The transition from flood irrigation also reduces erosion rates. The costs associated with erosion include reduced soil productivity, damaged roads and structures, filled ditches and reservoirs, reduced water quality and harm to fish populations. This value is based on erosion rates of 1.8 tons/acre/year
	Water Quality Enhancement	$51.60/acre/year	1, 5	Refers to an ecosystem's recovery of mobile nutrients and removal or breakdown of excess nutrients and compounds/detoxification. The equation multiples the proxy by the acreage of the site and over time. As a result of its perennial ground cover and soil stabilizing root systems, alfalfa regulates the quality of surface water by reducing the amount of sediment and nutrients that wash into lakes and streams, as well as the low application of N-fertilizers. This has profound impact on the surrounding ecosystems and their effectiveness in natural water treatment.
	Regulating Water Quantity Runoff	$7/acre/year	6	Role of land cover in regulating runoff and river discharge, drainage, natural irrigation, etc. Along with the adoption of drip irrigation, the improved water infiltration in alfalfa fields reduces the amount of surface runoff to waterways during heavy rain, which results in the important services of flood prevention and groundwater recharge.
	Nutrient Cycling	$7.54/acre/year	3, 7, 8	Role of biota in storage and re-cycling of nutrients (e.g., nitrogen). The high rates of nitrogen fixation unique to the alfalfa plant enhances the maintenance of healthy soils and productive ecosystems
	Habitat Creation/Preservation	$1.32/acre/year	1, 5, 9	Providing habitat for plants and animals and their full diversity. This value is based on the surrounding ecosystems that are sensitive to agricultural practices and based on a conservative estimate for land cover type. Relative to other crop rotation combinations, alfalfa fields naturally promote higher levels of biodiversity including birds, soil microorganisms and other native plants and flowers. The equation multiples the proxy by the acreage of the site and over time.

	Biological Control-Herbicide Use Reduction	$13.35/acre/year	10	The reduction of herbicide use has profound impact on the health of surrounding ecosystems. The reduction of herbicide use in this proposed systems is 80% compared to existing flooding irrigation practices.
Agriculture Value Chain	Pollinator Populations Support	$5.67/acre/year	1, 11	Provisioning of pollinators for the reproduction of plant populations, based on the pollination value of cropland dominant regions. Bee-forage crops such as alfalfa are essential for the productivity of California fruit and nut orchards. The equation multiples the proxy by the acreage of the site and over time.
	Enhanced Marketing Opportunities	$15,000/year	12	Based on NPR advertising value and audience reach. Assumption is that news stories and positive press coverage will function as free advertising
Alfalfa Farmers	Soil Compaction Reduction	$5.30/acre	13	Increased soil microaggregates and general soil health of the alfalfa fields reduce soil compaction. This value is an estimate of the cost of soil compaction treatment avoided as a result of healthier soils and low disturbance farming practices
	Increased Crop Revenue	$195/ton	14, 15	Additional revenue to the farmer is determined by the market price of alfalfa multiplied by the additional tonnage generated utilizing SDI/ Precision Alfalfa Management (PAM). Based on actual yield increases achieved on existing fields with audited PAM Program results of 12.8 tons/acre/year
	Operating Costs Savings	$64.88/ton	15	By adopting the new drip irrigation system, the alfalfa farmer can expect to save in operating costs including water use, energy, harvesting and herbicide application
	Share of Contracts Sales	25%	15	Percentage of contract sales of water certificates, according to project contracts, based on the cost of water at $0.00209 per gallon saved
	Opportunities for Sustainable Agriculture Grant Funding	$25,000	16	By adopting sustainable agricultural practices including water conservation, low disturbance methods and low fertilizer application, the farmer is eligible for a variety of State and Federal grant programs
	Drought Resilience	1.4 tons/year	15	As a result of the water saved by higher efficiency irrigation methods (halving their conventional water demand) and the enhanced soil health, a farmer is insuring an additional harvest cycle worth of water during dry periods with their enhanced water reserves.
	Property Value of Cropland Preservation	$13,300/acre	17	Difference in property value maintained from the preservation of irrigated cropland and land that is left to fallow or pasture. Unsustainable water use puts many acres of farmland at risk of fallowing which would come with a loss of property value as well.

Dairy Farmers	Nutrition Density Improvement	$14,700/year	18, 19	Third party studies have shown the high quality of alfalfa produced with the drip irrigation system, in regard to both protein and total digestible nutrient percentage. By providing higher quality cow feed to dairy farmers, those farmers can avoid the cost of rehabilitating a malnourished cow. This estimate uses 1% of a typical cow herd.
Community	Enhanced Community and Municipal Resources	$17300/farm/year	20	This represents the average annual property tax payments in CA per farm that would be lost to rural communities and consequently impact community and municipal resources such as schools and medical centers. Considering the water stressed conditions of the SJ valley, one third of farms could be at risk to be fallowed as a result of water overuse issues.
	Food Security - Localizing Food Production	$21.85/acre/year	11	By preserving the California agricultural industry, issues of food security are addressed by allowing community members access to locally grown production along the dairy supply chain.
	Strengthening of California Ag Economy	$14,3462.8/year	15, 21	By ensuring sustainable farm production, the State of California is securing tax revenues (20% tax rate) to further enhance the local economy and resident well-being
	Local Jobs Created	$112/acre/year	22	For farms deploying this irrigation system, additional employment opportunities are created as a result of the high field productivity. Based on the estimated seasonal work demands of the field in question, an average of 6 hires working 8 weeks at 40 hours/week at an average CA hourly rate for agricultural workers is calculated for the acreage of the job hired for.
	Preservation of Heritage Farmlands	$28/household/year	23	With high levels of regional farm exodus due to climate change, economic and environmental factors, the preservation of heritage farmlands holds great value to the surrounding communities. This value is reflected in the average amount a local household is willing to pay per year to preserve farmland and avoid conversion of that land to other land use type.
	Cultural and Scenic Value	$21/acre/year	6	Refers to aesthetic, artistic, educational, spiritual, and/or scientific values that an agricultural ecosystem provides to the community by inherently being a cropland.
	Valuing the Water Resource	$64.14/household/year	4	Valuing the water resource in particular to its quality to residents in the watershed region includes various factors. The protection of the resource is motivated by the need to have higher quality drinking water, lower treatment costs, as well as the passive and recreational benefits that a cleaner water system provides. The equation multiplies the proxy by the number of local households and over time.
	Env Impact of Sustainable Farm Practices	$30/household/year	29	This value represents the willingness to pay of surrounding community members for farmers to adopt better farming strategies and practices in order to enhance local water quality and promote climate change mitigation. The equation multiplies the proxy by the number of local households and over time.

	Wildfire Risk Reduction	$187.5/acre	24, 25, 26	The average estimated cost of a wildfire is about $750/acre. Federal spending for the aftermath of a wildfire includes property damage, debris removal and land rehabilitation. With high risk of wildfires in CA enhanced by drought conditions, preserving a cropland over the alternative of fallowing as a result of water overuse can lead to reduced risk based on fire "proneness" by land cover type. This value reflects the wildfire costs that can be avoided as a result of reducing the risk by preserving land type
	Carbon Sequestered as Social Cost of Carbon	$51/ton	30	This metric multiplies the total additional carbon sequestered as a result of using the PAM irrigation system, over conventional irrigation methods, by the social cost of carbon and the acreage of the site. The social cost of carbon is inclusive of various economic damages by carbon emissions, such as impacts on the environment, agriculture, and human health.
	Phosphorus Retention as Reduced Impact to Infrastructure	$153/lb	31, 32	The social value of marginal Phosphorus is derived from the modeling of potential water nutrient interaction between agricultural nonpoint sources and wastewater treatment plants mandated to reduce emissions. This value is based on the retention value of phosphorus in alfalfa crops and assumes reduced runoff as a result of transitioning from flood irrigation and low- or no-fertilizer inputs
	Nitrogen Retention as Reduced Impact to Infrastructure	$11.46/lb	31, 33	The social value of marginal Nitrogen is derived from the modeling of potential water nutrient credit trading based on the interaction between agricultural nonpoint sources and wastewater treatment plants mandated to reduce emissions. This value is based on the retention value of nitrogen in alfalfa crops and assumes reduced runoff as a result of transitioning from flood irrigation and low- or no-fertilizer inputs
	Water Quantity Improvement as Cost Benefit to Consumers	$0.003/gallon	34	By reducing water demands of agriculture, this value represents the water conserved that is now available to the community at a utility rate, as opposed to sourcing more expensive water from other sources, making local drinking water more accessible.
	Air Quality - Dust Particulates Reduction	$11.20/person/year	35, 36, 37	Agricultural operations and field disturbance can generate and contribute to an average of 16% of total particulate matter air pollution, and generate a social cost that includes welfare, morbidity and economic losses. This value is multiplied by the local population chronically exposed to this pollution (those in the closest square mile with a population density that follows the USDA classification for rural areas) and reduced by half to reflect the dramatic reduction of field disturbance as a result of this conservation-based farming practice.
	Air Quality - Oxygen Production	$0.00108/ton/year	38	The social value of oxygen produced by trees is reduced to a value per ton and per year, and then applied to the additional oxygen produced and monitored by the PAM irrigated alfalfa fields, as compared to conventional state average alfalfa oxygen production rates
	Air Quality - Other Greenhouse Gases Reduction	$0.11/acre/year	39	Green space improves air quality by the removal of other GHG air pollutants such as nitrogen dioxide, sulfur dioxide and ozone. The social value to nearby residents includes human health and the costs of pollution removal. This value is based on human impact of low population density areas. The equation multiples the proxy by the acreage of the site and over time.

	Air Quality- Carbon Emission Reduction from Operations	0.6 tons/acre/year	40	The use of diesel fuel for farming equipment during alfalfa field operations can be a hefty contributor of GHG pollution. Due to the environmentally minded reduced disturbance methods deployed here, we reduce the emissions for typical alfalfa farming practices and multiply by the social cost of carbon.
Conservation Contract Buyer	Reduced Water Risk for Entire Value Chain, Improved License to Operate from Enhanced Reputation	26%	42	26% of the money invested in the project is returned to the organization as a result of increased reputation.
	Market Value of Carbon Credits	$24.50/t CO2 -e	43	This metric multiplies the Market Value of Carbon Sequestered by multiplying Total Carbon Sequestered by the Carbon Price Forecast, using the total carbon sequestered and mitigated by the field and by operations.
	Market value of Nitrogen Credits	$14.14/lb	44	This captures the value of Nitrogen reductions as part of a water quality trading program. Average trading price reflects California nutrient offset programs.
	Market Value of Phosphorus Credits	$14.14/lb	44	This captures the value of Phosphorus reductions as part of a water quality trading program. Average trading price reflects California nutrient offset programs.

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7.5 Correcting for Discount Factors

In order to ensure consistency with the SROI process, it is necessary to correct the initial values of the outcomes to be more reflective of the changes that are actually due to the project or activity. In other words, we are determining the "net value impact." This is done via a number of corrections as defined in 7.5.1 through 7.5.8 and illustrated in Figure 10 and Tables 11 and 12. The project is unique in that the site is an existing alfalfa farm, and will remain as such, except with the drip irrigation system instead of flood irrigation. In addition, they are now implementing new more sustainable farming practices. Another important factor to consider is that it is predicted that as much as one third of such farms in the Central Valley would be fallowed due to the inability to maintain profitable operations unless they were to implement more efficient and less costly methods. As such, some benefits are viewed as value added over current practices, however others are viewed as fully value added because the alternative is unproductive, fallowed land.

7.5.1 Counterfactual (Deadweight)

Research conducted by EcoMetrics LLC revealed that without this project either the land would be fallowed if this happened to be one of the 33% of sites that do not survive, or at best, it would continue at current water use and production rates. Some outcomes are by definition, value added in that the impact is new. Those input assumptions are already corrected by subtracting the baseline. For example, value of water saved is based on a metric that is original water use minus new water use. Another example is value of increased crop yield which uses an input assumption of new crop yield minus original crop yield. In other words, any deadweight has been corrected in the input assumption, and a correction at this stage is not necessary as it would be duplicative. Thus, **the deadweight rate for all stakeholder group outcomes is 0%.**

7.5.2 Attribution

The site remains in the same use but with better, more efficient operations. No one outside of the project contributed to the outcomes. Thus, **the attribution rate for all stakeholder group outcomes is 0%.**

7.5.3 Displacement

The project is simply improving the way the current activities are done and thus, **the displacement rate for all stakeholder group outcomes is 0%.**

7.5.4 Drop-Off

The project life cycle used for this analysis is the 2021 alfalfa crop rotation. Thus, **the drop-off rate for all stakeholder group outcomes is 0%.**

7.5.5 Testing Outcomes for Materiality

In accordance with SVI's Principle 4 Guidance- Only Include what is Material, we used the following test:

Outcomes are included if activities contribute to the outcome and:

- stakeholders perceive an outcome as important to them;
- peers are already managing the outcome and have demonstrated its value;

- the organization has a policy to include the outcome;
- there are existing social norms that demand it; or
- there are financial consequences to the organization for not including this outcome in the analysis.

As this is an initial, limited analysis for proof of concept, additional stakeholder engagement will be necessary to assess materiality more accurately. In general, outcomes of the project are determined by first analyzing collected information from the qualitative phase of research (see description in section 3 "Research Methodologies"). Collected stakeholder input information is then quantitatively analyzed to determine frequencies, differences, and similarities of outcomes identified by participants across stakeholder categories. Only outcomes identified by stakeholder groups during the qualitative research phase are included. Once outcomes are identified by stakeholder group, third-party (secondary source) literatures are consulted to validate research findings within broader third-party literature and other relevant studies. Input from the limited stakeholder engagement done informed the first assessment of materiality.

Causality between the outcomes and the project was determined based on stakeholder engagement and relevant third-party literature. For example, if the regional aquifer were to become stressed in severe drought conditions, it is possible there may not be sufficient water, regardless of the drip irrigation efficiency. Also, the value of the crop used to assess value created by better productivity is influenced by market forces outside of what occurs on the site. Outcomes noted by stakeholders, indirectly implied by stakeholders, or naturally extrapolated based on predictions consistent with stakeholder input and third-party literature review and verified by review of other information are noted as material. But in any case, the outcome is material as it will result in improvement over baseline conditions, even if the actual value changes due to external circumstances.

Relevance was determined by the materiality of the outcome, that is, if it was a material outcome articulated by a member of a stakeholder group during the qualitative phase of the research. For the Environment stakeholder, the only group that cannot speak for itself, relevance was determined by third-party literature as well as suggestions by EcoMetrics LLC and applicable stakeholders.

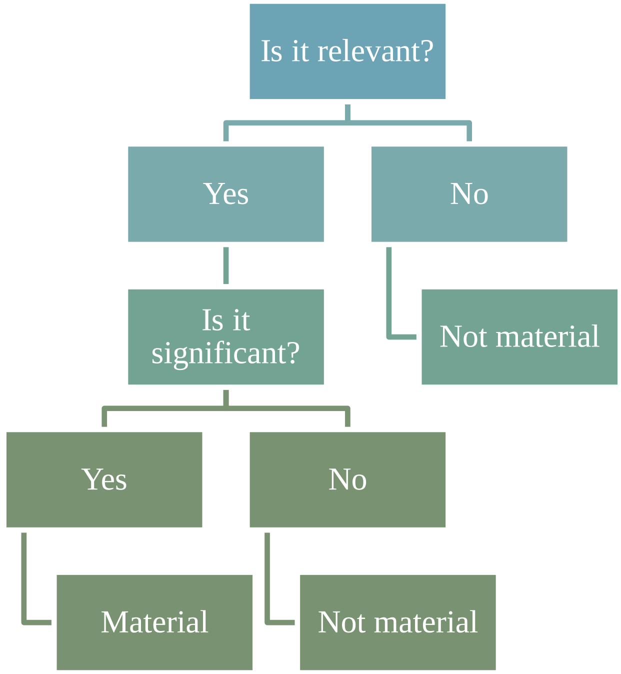

Figure 5: Determining Materiality Through Relevance and Significance

7.5.6 Unintended or Negative Outcomes

EcoMetrics methodologies were designed to capture unintended consequences or negative outcomes stemming from the project and what would happen without the project. The stakeholder engagement process explored the following questions to account for unintended or negative outcomes:

- Do outcomes change over time? As the site comes online and matures, does it impact who uses it differently?
- What possibilities are there for reduced or increased viability of the farm, over time and for whom?
- What kinds of uses might change over time?
- Do certain outcomes impact groups differently?
- Do you think development of the site might have any unintended negative impacts or outcomes over time?

For the project, the main negative consequences if the project were not to occur would be at best not operating at potential efficiencies, and at worst, needing to cease operations and fallow the land. Hence, no unintended or negative outcomes are anticipated.

Table 11 SROI Mapping Stage 2 cont.- Materiality and Relevance of Outcomes by Stakeholder

Stakeholders	Outcome	Was the Outcome Identified by Stakeholders During Qualitative Phase of Research?	Was the Outcome Confirmed by Third Party Research?	Is the Outcome Relevant?
Environment	Soil Formation	Yes	Yes	Yes
	Soil Erosion Control	Yes	Yes	Yes
	Water Quality Enhancement	Yes	Yes	Yes
	Regulating Water Quantity Runoff	Yes	Yes	Yes
	Nutrient Cycling	Yes	Yes	Yes
	Habitat Creation/Preservation	Yes	Yes	Yes
	Biological Control- Herbicide Use Reduction	Yes	Yes	Yes
Agriculture Value Chain	Pollinator Populations Support	Yes	Yes	Yes
	Enhanced Marketing Opportunities	Yes	Yes	Yes
Alfalfa Farmers	Soil Compaction Reduction	Yes	Yes	Yes
	Increased Crop Revenue	Yes	Yes	Yes
	Operating Costs Savings	Yes	Yes	Yes
	Share of Contracts Sales	Yes	Yes	Yes
	Opportunities for Sustainable Agriculture Grant Funding	Yes	Yes	Yes
	Drought Resilience	Yes	Yes	Yes
	Property Value of Cropland Preservation	Yes	Yes	Yes
Dairy Farmers	Nutrition Density Improvement	Yes	Yes	Yes
Community	Enhanced Community and Municipal Resources	Yes	Yes	Yes
	Food Security - Localizing Food Production	Yes	Yes	Yes
	Strengthening of California Ag Economy	Yes	Yes	Yes
	Local Jobs Created	Yes	Yes	Yes
	Preservation of Heritage Farmlands	Yes	Yes	Yes
	Cultural and Scenic Value	Yes	Yes	Yes
	Valuing the Water Resource	Yes	Yes	Yes
	Env Impact of Sustainable Farm Practices	Yes	Yes	Yes
	Wildfire Risk Reduction	Yes	Yes	Yes

	Carbon Sequestered as Social Cost of Carbon	Yes	Yes	Yes
	Phosphorus Retention as Reduced Impact to Infrastructure	Yes	Yes	Yes
	Nitrogen Retention as Reduced Impact to Infrastructure	Yes	Yes	Yes
	Water Quantity Improvement as Cost Benefit to Consumers	Yes	Yes	Yes
	Air Quality - Dust Particulates Reduction	Yes	Yes	Yes
	Air Quality - Oxygen Production	Yes	Yes	Yes
	Air Quality - Other Greenhouse Gases Reduction	Yes	Yes	Yes
	Air Quality - Carbon Emission Reduction from Operations	Yes	Yes	Yes
Conservation Contract Buyer	Reduced Water Risk for Entire Value Chain, Improved License to Operate from Enhanced Reputation	Yes	Yes	Yes
	Market Value of Carbon Credits	Yes	Yes	Yes
	Market Value of Nitrogen Credits	Yes	Yes	Yes
	Market Value of Phosphorus Credits	Yes	Yes	Yes

7.5.7 Sensitivity Analysis

As the analysis is Evaluative and only covers the 2021 year, it is difficult to fully understand all the parameters that would need to be analyzed for sensitivity. For example, possible sensitivity parameters could be the credit trading value of carbon, nitrogen, and phosphorus. For other parameters that are more significant, for example some of the financial proxies for social value, there is not enough indication at this early stage to raise a concern. However, the basis for the project hinges on two outcomes- water saved and crop productivity increase. Indirectly, the ability to remain in business is key. The values used to establish these outcomes are well known and informed by real data, and therefore although relatively sensitive, are well established. To account for the uncertainty in doing sensitivity analysis at this stage, the study used relatively conservative estimates.

7.5.8 Statement of Risks of Overclaiming

All outcomes assessed in this analysis are directly associated with the project, including social, economic, and environmental outcomes for several different stakeholder groups. Outcomes valued and claimed are directly related to the introduction of the drip irrigation system and related best practices.

7.6 Net Valuation of Outcomes – SROI Map Stage 4

We can now take the uncorrected values of the outcomes from Table 9, and information from Table 11 to determine the corrected, or net value, created for each outcome (Table 12). These corrected net outcome values are presented in Sections 8 and 9 sorted by stakeholder, and by market and non-market category.

As noted above, the corrected net value is the same as the calculated value for all outcomes due to the reasons explained in sections 7.5.1 to 7.5.4.

Table 12: SROI Mapping Stage 4 – Corrections to Values

Outcome	Deadweight %	Displacement %	Attribution %	Drop off %	Corrected Net Value
Water Quantity Improvement as Cost Benefit to Consumers	0.00%	0.00%	0.00%	0.00%	$212,497.54
Increased Crop Revenue	0.00%	0.00%	0.00%	0.00%	$44,395.89
Air Quality - Oxygen Production	0.00%	0.00%	0.00%	0.00%	$1,480.66
Soil Compaction Reduction	0.00%	0.00%	0.00%	0.00%	$462.69
Enhanced Community and Municipal Resources	0.00%	0.00%	0.00%	0.00%	$17,300
Strengthening of California Ag Economy	0.00%	0.00%	0.00%	0.00%	$143,463
Food Security - Localizing Food Production	0.00%	0.00%	0.00%	0.00%	$1,907.51
Air Quality - Dust Particulates Reduction	0.00%	0.00%	0.00%	0.00%	$2,800
Env Impact of Sustainable Farm Practices	0.00%	0.00%	0.00%	0.00%	$563,310
Operating Cost Savings	0.00%	0.00%	0.00%	0.00%	$56,633.26
Air Quality - Other Greenhouse Gases Reduction	0.00%	0.00%	0.00%	0.00%	$10.00
Wildfire Risk Reduction	0.00%	0.00%	0.00%	0.00%	$16,368.75
Share of Contracts Sales	0.00%	0.00%	0.00%	0.00%	$37,009.99
Air Quality - Carbon Emission Reduction from Operations	0.00%	0.00%	0.00%	0.00%	$2,671.38
Drought Resilience	0.00%	0.00%	0.00%	0.00%	$17,175.05
Nutrition Density Improvement	0.00%	0.00%	0.00%	0.00%	$14,700
Regulating Water Quantity Runoff	0.00%	0.00%	0.00%	0.00%	$611.10
Nutrient Cycling	0.00%	0.00%	0.00%	0.00%	$658.24
Carbon Sequestered as Social Cost of Carbon	0.00%	0.00%	0.00%	0.00%	$15,137.82
Soil Formation	0.00%	0.00%	0.00%	0.00%	$168.49
Soil Erosion Control	0.00%	0.00%	0.00%	0.00%	$304.85
Air Quality - Other GHG	0.00%	0.00%	0.00%	0.00%	$0.00
Phosphorus Retention as Reduced Impact to Infrastructure	0.00%	0.00%	0.00%	0.00%	$219,732.87
Nitrogen Retention as Reduced Impact to	0.00%	0.00%	0.00%	0.00%	$69,607.09

Infrastructure					
Pollinator Populations Support	0.00%	0.00%	0.00%	0.00%	$3,018.83
Biological Control- Herbicide Use Reduction	0.00%	0.00%	0.00%	0.00%	$1,165.00
Water Quality Enhancement	0.00%	0.00%	0.00%	0.00%	$4,504.68
Property Value of Cropland Preservation	0.00%	0.00%	0.00%	0.00%	$1,152,360.00
Enhanced Marketing Opportunities	0.00%	0.00%	0.00%	0.00%	$15,000.00
Reduced Water Risk for Entire Value Chain, Improved License to Operate from Enhanced Reputation	0.00%	0.00%	0.00%	0.00%	$54,363.97
Market Value of Carbon Credits	0.00%	0.00%	0.00%	0.00%	$5,936.40
Market Value of Nitrogen Credits	0.00%	0.00%	0.00%	0.00%	$600,595.68
Market Value of Phosphorus Credits	0.00%	0.00%	0.00%	0.00%	$141,316.63
Opportunities for Sustainable Agriculture Grant Funding	0.00%	0.00%	0.00%	0.00%	$25,000.00
Local Jobs Created	0.00%	0.00%	0.00%	0.00%	$33,619.20
Valuing the Water Resource	0.00%	0.00%	0.00%	0.00%	$1,204,356.78
Preservation of Heritage Farmlands	0.00%	0.00%	0.00%	0.00%	$525,756.00
Habitat Creation/Preservation	0.00%	0.00%	0.00%	0.00%	$115.24
Cultural and Scenic Value	0.00%	0.00%	0.00%	0.00%	$1,833.30

Key- Description of Headers:
Deadweight: What would have happened without the activity?
Displacement: What activity did you displace?
Attribution: Who else contributed to the change?
Drop Off: Does the outcome drop off in future years?
Corrected Net Value: Quantity times financial proxy, less deadweight, displacement, attribution, and drop-off.

8.0 Summary of Social Value Created

To calculate the value created by the project, the costs and benefits incurred or generated in 2021 are summed.

8.1 Stakeholder Social Value- Non-market

The SROI analysis of the anticipated outcomes for each stakeholder group shows a positive social return associated with the project. An investment of $148,040 created approximately $4,405,136 of net social impact in 2021, resulting in an indicative SROI ratio of 29.76:1 (Table 1). In other words, the SROI analysis presents evidence that substantiates that for every dollar invested in buying the conservation contracts, $29.76 is returned to community stakeholders in social value.

Of the social value created, the greatest amounts are associated with water-related and farm practices-related outcomes, and the implications of improved productivity and efficiency. For example, increased crop revenue, operating cost savings, revenue for farmers from contract sales all scored relatively high value. We also see very high values for water-related outcomes in terms of how they impact the community and its infrastructure. This is particularly true of water quality related implications, where the onsite retention of nutrients (Nitrogen and Phosphorus) makes a significant difference to how the community would have had to address poorer surface water quality.

In regard to the local economic stability and sustainability of farming in the region, we see that much value is created by preserving the land as active alfalfa farming. Agriculture is very important to this region both in terms of cultural legacy, as well as direct economic development. This project increases the viability of the farm and dairy, thereby further ensuring its continued operation.

Table 13: Social Return on Investment by Stakeholder Group.

Stakeholders	Outcome	Social Value Creation	Social Value Creation per Stakeholder Group
Environment	Soil Formation	$168.00	**$7,527.00**
	Soil Erosion Control	$305.00	
	Water Quality Enhancement	$4,505.00	
	Regulating Water Quantity Runoff	$611.00	
	Nutrient Cycling	$658.00	
	Habitat Creation/Preservation	$115.00	
	Biological Control- Herbicide Use Reduction	$1,165.00	
Agriculture Value Chain	Pollinator Populations Support	$3,019.00	**$18,019.00**
	Enhanced Marketing Opportunities	$15,000.00	
Alfalfa Farmers	Soil Compaction Reduction	$463.00	**$1,333,037.00**
	Increased Crop Revenue	$44,396.00	
	Operating Costs Savings	$56,633.00	
	Share of Contracts Sales	$37,010.00	
	Opportunities for Sustainable Agriculture Grant Funding	$25,000.00	
	Drought Resilience	$17,175.00	
	Property Value of Cropland Preservation	$1,152,360.00	
Dairy Farmers	Nutrition Density Improvement	$14,700.00	**$14,700.00**
Community	Enhanced Community and Municipal Resources	$17,300.00	**$3,031,853.00**
	Food Security - Localizing Food Production	$1,908.00	
	Strengthening of California Ag Economy	$143,463.00	

	Local Jobs Created	$33,619.00	
	Preservation of Heritage Farmlands	$525,756.00	
	Cultural and Scenic Value	$1,833.00	
	Valuing the Water Resource	$1,204,357.00	
	Env Impact of Sustainable Farm Practices	$563,310.00	
	Wildfire Risk Reduction	$16,369.00	
	Carbon Sequestered as Social Cost of Carbon	$15,138.00	
	Phosphorus Retention as Reduced Impact to Infrastructure	$219,733.00	
	Nitrogen Retention as Reduced Impact to Infrastructure	$69,607.00	
	Water Quantity Improvement as Cost Benefit to Consumers	$212,498.00	
	Air Quality - Dust Particulates Reduction	$2,800.00	
	Air Quality - Oxygen Production	$1,481.00	
	Air Quality - Other Greenhouse Gases Reduction	$10.00	
	Air Quality - Carbon Emission Reduction from Operations	$2,671.00	
		Total Present Value	**$4,405,136.00**
		Total Investment	**$148,040.00**
		Social Return on Investment (dollar returned per dollar invested)	**$29.76**

8.2 Market Value Creation

Additionally, $802,212 in direct market value is returned to contract buyers largely from the value of enhanced reputation and license to operate, and a direct market return of $5.42 for every dollar invested.

The market value, or direct value created for the contract buyers is composed of several components. The marketability of carbon sequestration on a per ton basis is based on prevailing cost for a ton of carbon and will likely significantly increase as the demand for sequestration offset credits increases.

Also accounted for as market return is the “license to operate” value. This is based on the implications to the buyer’s brand and positive perception by its own stakeholders. This is a manifestation of the value expected by having sustainability goals and reporting on them publicly. In other words, verified and demonstrated ESG performance translates into brand value. The purchase of the conservation contract documenting a specific amount of water saved via the investment is how the buyer demonstrates their impact.

The greatest potential values are related to the nutrient retention potential of the alfalfa crop. In some states and regions, it is possible to trade these nonpoint source reductions to others who have permit limits on water discharge chemistry but cannot meet them with onsite treatment effectively or affordably. The option for an entity to pay another for voluntary reduction of nutrient runoff is available anywhere as long as there are willing parties, but currently the greatest demand for these is in places where they can be used for a compliance offset instead of or in addition to a water quality improvement sustainability goal. Note that California does not yet have a regulatory agency-supported water quality credit trading market. As such, any purchases of water quality credits would not be eligible for compliance offset and would be voluntary with prices set by the specific transaction.

Table 14: Market Return on Investment by Stakeholder Group.

Stakeholder	Outcome	Market Value Creation	Value Creation per Stakeholder Group
Conservation Contract Buyer	Reduced Water Risk for Entire Value Chain, Improved License to Operate from Enhanced Reputation	$54,363.00	**$802,212.00**
	Market value of Carbon Credits	$5,936.00	
	Market value of Nitrogen Credits	$600,596.00	
	Market Value of Phosphorus Credits	$141,317.00	
		Total Present Value	**$802,212.00**
		Total Investment	**$148,040.00**
		Market Return on Investment (dollar returned per dollar invested)	**$5.42**

In sum, with an initial investment of $148,040 in financial capital resulting from the contract buyer, the community and funding stakeholders see a combined market and non-market value return of $5,207,427 in 2021 for a total return on investment of 35.18:1.

9.0 Conclusions and Recommendations

This study evaluates the integrated market and social returns of the drip irrigation system and enhanced farm practices project at the Kings County Farm site in Kings County, California. Integrated return is defined as the comprehensive economic, social, and environmental benefits of a project and presents a holistic depiction of the interrelatedness of factors contributing to an organization’s capacity to create value over time. Integrated reporting focuses on the nature and quality of an organization’s relationship with its key stakeholders including how and to what extent the organization recognizes and responds to its key stakeholders’ needs and interests. In this analysis, integrated social value was quantified using the EcoMetrics model, which was built on the guiding principles of SVI’s SROI Methodology. Stakeholder relationships are of primary importance to this approach. The SVI approach concerns an in-depth, evidence-based understanding of change for a full range of community stakeholders with recognition of both positive and negative changes as well as intended and unintended outcomes. Value in this context refers to the relative importance placed by a stakeholder group on one potential outcome over another. Assigning these valuations using SVI principles requires the use of financial proxies, as many of the identified outcomes are difficult to quantify using conventional accounting practices.

It is important to note that this analysis is evaluative- in other words, it is assessing value of outcomes and their respective values created in a specific year that has already occurred. The conservation contracts concept project is only recently getting underway, and it will take time to have enough trend and performance data information to update, correct, and validate the predictions in this report. Secondly, we envision that some of the indicators, and outcomes themselves, can and will be further refined as we learn more. These outcomes are included herein but may need several years to materialize.

It was clear from the work to date, and particularly the stakeholder engagement albeit limited, that the project is a very important to the area, region, and the state of California a whole. Considering the role this region plays in national and global food supply, arguably the value created will have cross-cutting impact well beyond the site boundaries. The project is unique in that it involved innovative irrigation technology, which is then leveraged to introduce more sustainable farming practices.

10.1 Recommendations

In regard to the EcoMetrics SROI analysis, the following recommendations are proposed:

- *Continued stakeholder engagement.* This analysis was focused on the Kings County Farm site and to analyze results of the 2021 year. As the conservation contract initiative evolves, and additional sites are added, further stakeholder engagement will need to be completed as further stakeholders are identified. As additional buyers come forward, the specifics of future stakeholders will be clearer.
- *Communicate the impact.* The SROI analysis reveals several impacts that the development of the project can have on a variety of stakeholders. It is important for CGW and partners to communicate the ongoing results of the project to impacted stakeholders and potential contract buyers to demonstrate the outcomes achieved by the project. CGW already has a very informative website and can provide an excellent avenue to be able to communicate the increased detail and content provided by the EcoMetrics analysis.
- *Measure the outcomes of the project.* Use the methodology and lessons learned from this analysis to monitor the outcomes of the project, using the theory of change as the framework from which to identify expected and unexpected outcomes. CGW should continue to engage with stakeholders at regular intervals to understand the social value creation process over time and continue to build off the conservation contract program.
- *Develop the conservation contracts tracking system for ongoing sales building on the EcoMetrics analysis results.* EcoMetrics developed the inputs and algorithms necessary to calculate value of water saved and increased crop productivity. As a result, the customized EcoMetrics platform can be adapted on an ongoing basis to incorporate new sites, existing site expansions, and any changes in unit costs and prices.
- *Updating information*. As part of accomplishing these reviews, the outcomes, proxies, and specific quantification and valuation indicators should be updated as more sites are identified and more information becomes available.

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Appendix II – Kings County Farm Site, 2021 Data Collected

Cutting	Date cut	Tons	Ton/acre	Days old	DM	TTNDFD	Protein	TDN	RFV		Irrigated Water Hours	# of Sets	Water Hours Per Set	Drip System App Rate / Hr	Acre Inches Applied	cost per ton	90 acre field cost
1	3.1.21	94.51	1.05		39.51	62.59	28.33	68.55	222	Bagged						$127.45	$12,045.03
2	4.6.21	86.83	0.96	36	93.04	56.39	25.6	58.8	218	Baled	144	4	36	0.082	2.952	$203.71	$17,688.37
3	5.4.21	67.68	0.75	28	91.94	51.74	24.87	56.62	192	Baled	144	4	36	0.082	2.952	$95.79	$6,482.85
4	6.1.21	53.428	0.59	28	88.36	51.86	23.64	63.52	184	Baled	120	4	30	0.082	2.46	$93.43	$4,991.60
5	7.10.21	113.74	1.26	39	92.13		18.94	53.65	152	Baled	312	4	78	0.082	6.396	$115.62	$13,150.85
6	8.11.21	111.375	1.24	32	90.8	50.17	20.92	56.35	176	Baled	364	4	91	0.082	7.462	$109.23	$12,166.03
7	9.8.21	72.87	0.81	28	90.26	46.72	21.166	55.47	175	Baled	144	4	36	0.082	2.952	$92.00	$6,704.10
8	10.2.21	47.81	0.53	24	91.91	57.51	22.3	56.98	189	Baled	144	4	36	0.082	2.952	$165.30	$7,902.85
9	11.19.21	210.47	2.34	48	33.18	23.28	21.46	50.48	157	Bagged	96	4	24	0.082	1.968	$27.29	$5,743.61
																	$72,500.00*
	Total	858.713	9.54								1468	4	367	0.082	30.094	$185.60	$159,375.29
			$185.60	Per ton													
			9.54	Tons/acre													
			$1,770.84	Per acre													

*For drip system, seed, and land rent