Geosyntec consultants

engineers | scientists | innovators

TRI-COUNTY WATER AUTHORITY

MULTI-BENEFIT LAND REPURPOSING PLAN

For the Tri-County Water Authority in the Tule Subbasin

Prepared for

Tri-County Water Authority
944 Whitley Ave. Suite E
Corcoran, CA 93212

Prepared by

Geosyntec Consultants, Inc.
1111 E Herdon Ave, Suite 214
Fresno, CA 93720

Project SF0212

March 2025

EXECUTIVE SUMMARY

This report serves as the *Local Plan* for the Tri-County Water Authority GSA within the Tule Subbasin and has been developed under the Tule Subbasin Multibenefit Land Repurposing Program funded by the California Department of Conservation. This *Local Plan* is intended to support the Core Plan for Multibenefit Land Repurposing for the entire Tule Subbasin by identifying existing conditions, needs, priorities, opportunities, and resources for the repurposing of irrigated agricultural land within the TCWA portion of the subbasin. This report has been prepared on behalf of TCWA by Geosyntec Consultants and is not intended to serve as a representation of or endorsement of specific land repurposing activities or approaches by the GSA. The report is provided in 'Draft Final' format as the Core Plan for the subbasin is still under development and updates or revisions to incorporate additional Core Plan elements or provide additional resources are expected upon completion of the Core Plan which is anticipated later in the year.

The Tule Subbasin groundwater aquifer has been designated as critically overdrafted by the State of California Department of Water Resources and Groundwater Sustainability Agencies (GSAs) within the Subbasin are tasked with managing a transfer to sustainable groundwater use by 2040. This will require a significant reduction in the amount of groundwater pumped for agricultural uses within the basin.

TCWA is one of six GSAs within the subbasin and covers approximately 69,000 acres. Nearly half of the land within TCWA is still actively irrigated and farmed although a significant reduction in area under production has already occurred due to decreases in surface water deliveries, past groundwater management efforts, and changing market conditions. Additional and significant changes to the way land is managed within TCWA will be required to meet the State mandated groundwater sustainability targets under the Sustainable Groundwater Management Act (SGMA).

Economic impacts from further reductions in agricultural production are expected to significantly impact both farm scale decisions and the regional agriculture-based economic engine which is estimated to directly account for $32 billion in annual revenue and employes more than 260,000 people in the San Joaquin Valley. Within TCWA service area alone, annual crop values exceed $165 million per year. Tulare County is also home to the largest dairy industry in the state. Together dairy operations and crop production also provide significant indirect economic impact through the support of the food and beverage industry and local processing and product facilities.

In addition to the economic impacts, large-scale land fallowing has the potential to considerably degrade surrounding natural resources and further burden communities already challenged by water and air quality issues. Areas within TCWA, particularly the Southeast Management Area, are particularly at risk because for land fallowing because growers are entirely dependent upon groundwater pumping in all but the wettest of years. Analysis conducted for this plan estimates that up to half of the remaining agricultural land in TCWA may be subject to land repurposing.

Fallowed lands are vulnerable to erosion, soil loss, flooding, and weeds, and generate dust which degrades local and regional air quality and can be a health hazard. Transitioning to new land uses

that stabilize soils and provide economic and/or environmental benefits is a critical step in preserving value, limiting liability, and protecting local economies and communities. In order to avoid the worst impacts of large-scale land fallowing, lands that are taken out of production can be transitioned to new multi-benefit land uses that retain economic value and protect the local communities and environment. This is also an opportunity to enact significant landscape scale projects that can restore once vibrant and thriving habitats and to bring project partners and diverse funding sources together.

Land repurposing strategies vary and a site-specific approach that considers the existing uses, site conditions, opportunities and constraints and balances the needs and priorities of both the landowner and impacted communities is most likely to result in positive and lasting outcomes. This report summarizes common land repurposing strategies, key concepts, considerations, and stakeholder priorities within TCWA with the intent that it can be a useful tool and reference for both individual and collaborative land repurposing efforts.

The land repurposing strategies detailed in this report include Temporary Fallowing and Cover Cropping, Dryland and Low Water Use Farming, Conservation Easements, Solar Farms, Grazing, Habitat and Open Space, Floodplain Restoration, Groundwater Recharge, and other practices which reduce groundwater use and stabilize soils. Spatial analysis and an initial screening has been performed to provide opportunity zones for these repurposing strategies within TCWA.

Given the scale of potential repurposing that may occur within TCWA, the need for project funding of all types is significant. Total funding needs for repurposing within TCWA likely reach into the $100s of millions. Much of this cost will be borne by private landowners or result in unmitigated fallowing and associated negative environmental, community, and economic impacts if not provided through other means. Ongoing efforts to identify and secure funding via grants and both private and public partners for repurposing projects is a key need and focus within the GSA.

Despite the challenges ahead and the significant need documented within this plan, there are already inspiring examples of successful, collaborative, and mutually beneficial repurposing projects on the ground within TCWA. Ongoing restoration of the Capinero Creek project site proves the potential for multibenefit land repurposing. Opportunities for further collaboration and expansion of existing protected areas, solar energy sites, low-water and innovative agricultural practices, groundwater recharge, and other approaches offer a way forward to SGMA compliance that can work for the growers, communities, the environment, and tribes and the promise of a vibrant, thriving Tule Subbasin if the appropriate resources and effort can be brought to bear.

TABLE OF CONTENTS

1. ACKNOWLEDGEMENTS AND OBJECTIVES 1

2. INTRODUCTION 2

3. HOW TO USE THIS PLAN 2

4. BACKGROUND 3
   - 4.1 Land Repurposing – Key Concepts 3
   - 4.2 TCWA Management Area – Tule Subbasin 5
   - 4.3 TCWA Tule Subbasin Groundwater Sustainability Plan (GSP) 6
   - 4.4 Project Permitting and Other Considerations 7
     - 4.4.1 California Environmental Quality Act (CEQA) 7
     - 4.4.2 Williamson Act 8

5. LAND REPURPOSING STRATEGIES 9
   - 5.1 Strategy Summaries 9
     - 5.1.1 Temporary Fallowing and Cover Cropping 10
     - 5.1.2 Dryland and Low Water Farming 11
     - 5.1.3 Conservation Easements 12
     - 5.1.4 Solar Farms 13
     - 5.1.5 Grazing 14
     - 5.1.6 Habitat and Open Space 15
     - 5.1.7 Floodplain Restoration 16
     - 5.1.8 Groundwater Recharge 17
   - 5.2 Choosing a Strategy 18

6. LAND REPURPOSING NEED WITHIN TCWA 21

7. PROJECT OPPORTUNITIES AND PRIORITIES 22
   - 7.1 Multi-Benefit Land Repurposing Priorities 22
   - 7.2 Multi-Benefit Land Repurposing Opportunities 23
     - 7.2.1 Core Plan Opportunity Resources 23
     - 7.2.2 TCWA Local Plan Opportunity Screening and Identification 23

8. EXISTING AND PLANNED PROJECTS 31
   - 8.1 Existing Projects 31
     - 8.1.1 Capinero Creek Restoration Project 31
     - 8.1.2 Tule Trust Land Fallowing and Cover Cropping 31
     - 8.1.3 Atwell Island Restoration Project (Ton Tachi Wetlands) Preserve 32
     - 8.1.4 Lower Deer Creek Watershed Plan 32
     - 8.1.5 Private Solar Developments 32

8.2 Planned Projects 33
8.2.1 Allensworth Habitat and Water Security Project 33
8.2.2 Additional Project Opportunities....33

9. PROJECT ECONOMICS AND FUNDING 33
9.1 Project Economics....33
9.1.1 Potential Lost Crop Value 34
9.1.2 Example Project Costs & Benefits 34
9.2 Funding Sources and Funding Needs....34

10. LAND REPURPOSING POLICIES 35
10.1 Existing Policies....35
10.2 Policy and Planning Needs....36

11. RESOURCES & LINKS 37
11.1 Additional Resources and Helpful Links 37

12. REFERENCES 38

LIST OF TABLES

Table 1. Land Repurposing Opportunity Summary.... 23
Table 2. Tule Trust Land Fallowing Costs and Benefits 34

LIST OF FIGURES

Figure 1. TCWA in Tule Subbasin 6
Figure 2. Existing Resource Summary in TCWA Tule Subbasin 24
Figure 3. Existing Crop Summary TCWA Tule Service Area 25
Figure 4. Existing Water Use in TCWA Tule Service Area.... 25
Figure 5. Williamson Act Areas 26
Figure 6. Conservation Easement and Habitat/Open Space Opportunities 27
Figure 7. Dryland and Low Water Use Opportunities.... 27
Figure 8. Solar Opportunities.... 28
Figure 9. Floodplain Restoration Opportunities 28
Figure 10. Groundwater Recharge Opportunities.... 29
Figure 11. Field Level Count of Opportunities.... 29
Figure 12. Potential Repurposing Prioritization 30

LIST OF APPENDICES

Appendix 1: Tule Subbasin MLRP Core Plan Fact Sheets

Appendix 2: TCWA Tule Subbasin Conditions and Opportunities

1. ACKNOWLEDGEMENTS AND OBJECTIVES

This plan has been developed with funding provided by the California Department of Conservation (DOC) through the Tule Subbasin Multi-Benefit Land Repurposing Plan (MLRP) Block Grant. Specifically, funding for this project was provided to the Tri-County Water Authority (TCWA or GSA) via a sub-award for the development of a "Local Plan" to identify land repurposing activities, opportunities, challenges, and needs within the TCWA jurisdiction of the Tule Subbasin.

The TCWA Local Plan is one of three "Local Plans" that together will support overall land repurposing strategies within the Tule Subbasin and is provided both as a stand-alone plan and as an attachment to the overall strategic land repurposing plan, or "Core Plan" for the Tule Subbasin.

The objective of this TCWA Local Plan is to provide landowners, growers, residents, project proponents, and other interested parties within the TCWA service area the tools needed to:

- Develop land repurposing project concepts,
- Understand potential tradeoffs between repurposing strategies,
- Document existing land repurposing projects,
- Identify potential project opportunities and constraints,
- Identify potential partners and funding sources for projects, and
- Provide resources to facilitate project implementation.

This TCWA Local Plan also documents the relevant policies and procedures that support land repurposing within the TCWA Tule Subbasin service area and supports the GSA's efforts to transition to sustainable groundwater management as mandated by the Sustainable Groundwater Management Act (SGMA) and outlined in the TCWA Groundwater Sustainability Plan (GSP).

2. INTRODUCTION

The Tule Subbasin groundwater aquifer has been designated as critically overdrafted by the State of California Department of Water Resources and Groundwater Sustainability Agencies (GSAs) within the Subbasin are tasked with managing a transfer to sustainable groundwater use by 2040. This will require a significant reduction in the amount of groundwater pumped for agricultural uses within the basin.

Of TCWA's 69,000 acre service area within the Tule Subbasin, nearly half of the land is still actively irrigated and farmed. These numbers already represent a significant reduction in area under production due to decreases in surface water deliveries, past groundwater management efforts, and changing market conditions which have already resulting in approximately 24,000 acres being retired or idled from a height of nearly 52,000 acres[1].

As the Tule Subbasin, and the entire San Joaquin Valley, transition to a future of sustainable groundwater management, significant changes to the way land is managed will be required impacting both farm scale economics and the regional economic engine. The Public Policy Institute of California (PPIC) estimates that agriculture in the San Joaquin Valley directly accounts for $32 billion in annual revenue and employes more than 260,000 people[2]. In TCWA service area alone annual crop values exceed $165 million per year[3]. Tulare County is also home to the largest dairy industry in the state. Together dairy operations and crop production also provide significant indirect economic impact through the support of the food and beverage industry and local processing and product facilities.

While the impact of SGMA on the amount of land in production and the value of the local agricultural economy is hard to determine, it will be significant. TCWA's Tule Subbasin service area, particularly the Southeast Management Area, is particularly at risk because, unlike other GSAs, growers in the Southeast Management Area are entirely dependent upon groundwater pumping in all but the wettest of years. Analysis conducted for this plan estimates that up to half of the remaining agricultural land in TCWA may be subject to land repurposing.

In order to avoid the worst impacts of large-scale land fallowing, both economic and environmental, lands that are taken out of production can be transitioned to new multi-benefit land uses that retain economic value and protect the local communities and environment. This is also an opportunity to enact significant landscape scale projects that can restore once vibrant and thriving habitats and to bring project partners and diverse funding sources together.

3. HOW TO USE THIS PLAN

This plan provides background information, land repurposing strategies and approaches, information on planned and existing projects, and tools and resources specific to multi-benefit land repurposing projects within the TCWA service area of the Tule Subbasin. This plan is focused on the specific needs and characteristics of the subbasin within TCWA's service area.

---

[1] Derived from 2022 LandIQ Cropp mapping data for Tulare County from the State of California.
[2] PPIC The Future of Agg in the San Joaquin Valley
[3] Derived from 2022 LandIQ Cropp mapping data and Tulare County Farm Report Crop Values

For additional information on general land repurposing and efforts throughout the Tule Subbasin, refer to the Core Plan[4].

For Landowners and Growers this plan can be used to support project implementation by providing information about the types of MLRP projects best suited to the TCWA service area. This plan also provides resources to support project planning and implementation such as land repurposing opportunity maps, fact sheets, and additional technical resources. The plan also summarizes existing projects and policies within the TCWA service area. Landowners and growers will find this information in Sections 5, 6, 8, 9, and 11.

For Communities this plan can be used to understand the types of projects that may be considered and what their impacts and potential benefits could be. This information is important so that communities can be informed and provide feedback on projects that could influence water availability and quality, the local environment, and the local economy. The technical tools and resources can also be used to support potential projects, collaborations with project implementers, or project applications through various funding mechanisms. Community members can find this information in Sections 4, 5, 6, 7, 8, 9, and 11.

For Regulators and Interested Parties this plan can be used to understand the scope of potential land repurposing within the TCWA service area of the Tule Subbasin. The plan documents existing projects, priorities within the GSA's service area, GSA specific policies, existing conditions, and economic considerations. This plan is also intended to support the GSP[5] for the TCWA in the Tule Subbasin and document land repurposing needs and opportunity zones to support the GSA's transition to sustainable management. Multi-benefit land repurposing supports the GSA's measurable objectives for water levels, subsidence, and water quality by providing and incentivizing alternative land uses to reduce groundwater pumping.

4. BACKGROUND

This section provides summary information and context for multi-benefit land repurposing within the TCWA management areas of the Tule Subbasin.

4.1 Land Repurposing – Key Concepts

Land repurposing involves taking current irrigated agricultural land out of production and transitioning that land to a new productive land use that avoids the negative consequences of fallowed unmanaged land. Land repurposing strategies vary and a site-specific approach that considers the existing uses, site conditions, opportunities and constraints and balances the needs and priorities of both the landowner and impacted communities is most likely to result in positive and lasting outcomes. This section summarizes common land repurposing strategies and key concepts. Section 5 of this Plan provides more detailed information on specific land repurposing strategies.

[4] Core Plan for the Tule Subbasin (in development).
[5] TCWA Tule 2024 Updated GSP – Section 6.2.5. Project 5 Land Repurposing Program

Need for Repurposing: Ongoing overdraft of groundwater aquifers, largely due to irrigated agricultural demand, will gradually be reduced until groundwater pumping is **at** sustainable levels. Sustainable groundwater management will require a significant reduction in current groundwater use and irrigated area.

Case for Multi-Benefits: Removing large quantities of land from production (fallowing, idling, or retiring) without transitioning that land to new beneficial uses will have severe economic and environmental impacts on nearby communities, resources, and remaining production lands. Fallowed lands are vulnerable to erosion, soil loss, flooding, and weeds, and generate dust which degrades local and regional air quality and can be a health hazard. Transitioning to new land uses that stabilize soils and provide economic and/or environmental benefits is a critical step in preserving value, limiting liability, and protecting local economies and communities.

Common Strategies: Multi-benefit land repurposing strategies include Temporary Fallowing and Cover Cropping, Dryland and Low Water Use Farming, Conservation Easements, Solar Farms, Grazing, Habitat and Open Space, Floodplain Restoration, Groundwater Recharge, and other practices which reduce groundwater use and stabilize soils. Each strategy is summarized below, and Section 5 presents additional information.

- **Temporary Fallowing and Cover Cropping:** Involves fallowing fields and planting a stabilizing cover crop. This strategy can be used in conjunction with others as a transition phase, or as a stand-alone strategy that allows banking or transfer of unused allocations. Cover crops can provide soil stabilization, restore soil health, provide seasonal habitat, or forage, and provide flexibility to landowners while retaining full control and ownership of these lands.

- **Dryland and Low Water Use Farming:** Involves transitioning from higher water use to lower water use crops and/or more efficient irrigation methods. This strategy can have a higher initial cost but keeps lands in production and maintains ownership.

- **Conservation Easements:** Are commonly used in conjunction with other practices to compensate landowners who maintain ownership but forfeit the ability to develop lands under easement. Easements are site specific and negotiable with the activities considered and protected under the easement varying based on the current uses of the land and potential environmental value. Conservation easements are typically funded by private organizations or non-profit groups including land trusts and environmental organizations.

- **Solar Farms:** Generate electricity for on-farm use or sale to the electric grid by installing photovoltaic (PV) panels on formerly irrigated land. Solar farms range from small scale installations of less than an acre to utility-scale installations of 100 acres or more. Utility-scale installations require significant investment from a solar developer and may have years long project development and interconnection timelines based on site specific project permitting and availability of local transmission lines and capacity.

- **Grazing:** Livestock grazing is typically used in conjunction with other practices, such as temporary fallowing and cover cropping, dryland farming, or conservation easements,

and involves transitioning to grasslands or lower water crops that provide additional economic value by supporting foraging animals including cattle, goats, sheep, and others.

- **Habitat and Open Space:** This practice typically involves selling land to an entity that then restores it to provide habitat for sensitive species or provide open space. Land is more suitable or valuable for potential buyers if it has higher restoration potential and is directly adjacent to or closely located to existing preserves, open spaces, or protected habitats.

- **Floodplain Restoration:** Specifically for areas located within or adjacent to a floodplain, this practice is typically combined with conservation easements or habitat and open space restoration to reconnect floodplains and improve stream function and habitat.

- **Groundwater Recharge Basins:** Where landowners have access to surface water and a water right to divert and store that water, groundwater recharge basins can be used to create groundwater banks, landowner developed groundwater credits or improve local groundwater levels and/or quality. Recharge basins are typically excavated or constructed with a series of levees to hold diverted surface waters as they percolate into the underground aquifer. Recharge basins can also provide temporary habitat for certain species.

4.2 TCWA Management Area – Tule Subbasin

The TCWA area within the Tule Subbasin comprises approximately 69,000 acres including 29,000 acres of irrigated agricultural land. It consists of two non-contiguous zones: The North Management Area is approximately 12,000 acres and the Southeast Management Area is approximately 57,000 acres. The North Management Area includes parts of Angiola Water District, Deer Creek Storm Water District, and W.H. Wilbur Reclamation District. The Southeast Management Area includes parts of Atwell Island Water District, Allensworth Community Service District, unincorporated "white lands," Bureau of Land Management, Deer Creek Storm Water District, and State of California Lands. In the North Management Area, the Angiola Water District provides access to surface water from a number of sources and operates two well fields to deliver agricultural water across the subbasin and also exports approximately 75% of what it pumps from its wellfields to customers outside the subbasin. In the Southeast Management Area, communities and agricultural users are almost entirely dependent upon groundwater pumping with very limited access to surface water. Figure 1[6] shows the TCWA area within the Tule Subbasin.

[6] From Figure ES 2-1, TCWA GSP showing TCWA Management Areas and Subbasin.

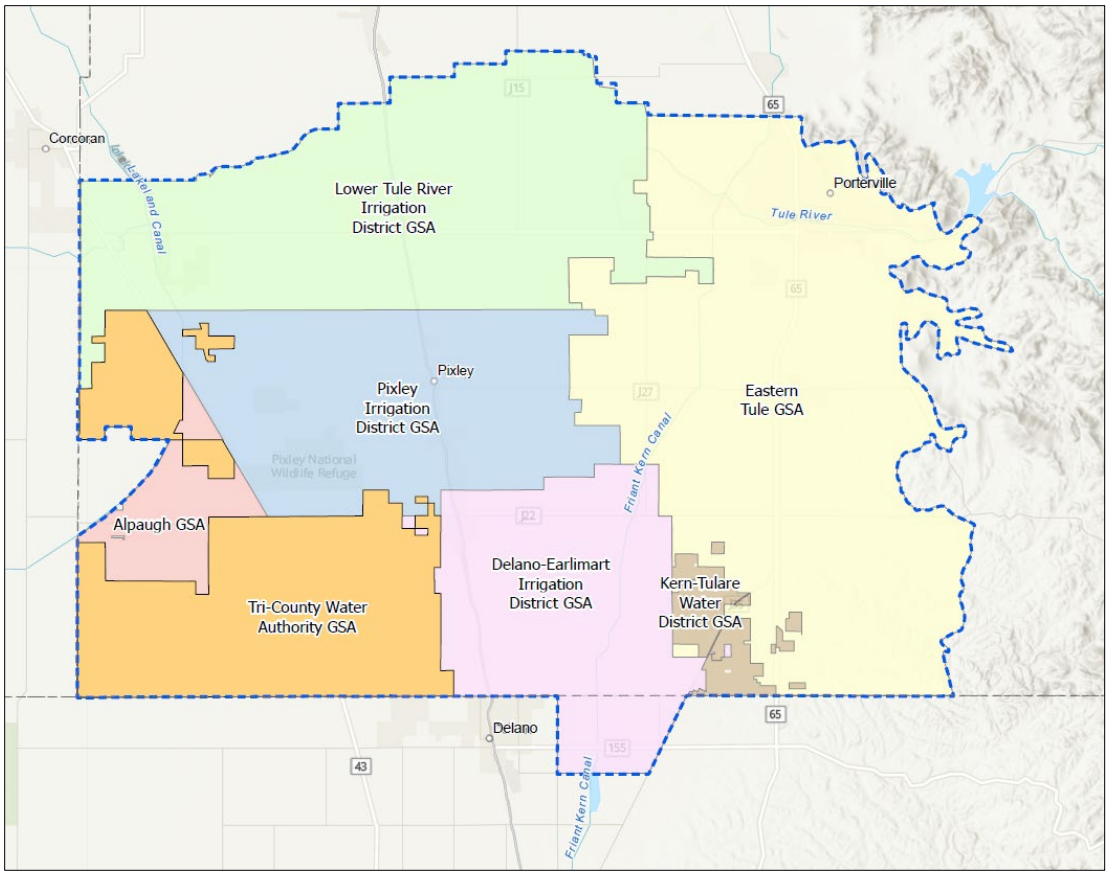


Figure 1. TCWA in Tule Subbasin

Irrigated agriculture within the TCWA area is dominated by nut trees. There is also significant dairy production within the area supported by irrigation of forage crops such as hay and alfalfa. Figure 3 in Section 7 shows the distribution and type of irrigated agriculture within the basin based on 2022 annual crop statistics.

The TCWA Southeast Management Area includes the community of Allensworth, home to approximately 500 residents, who are served by wells operated by the Allensworth Community Services District. Allensworth is identified as a Disadvantaged Community by the State of California and has a long history of both water quality and water supply issues.

4.3 TCWA Tule Subbasin Groundwater Sustainability Plan (GSP)

TCWA collectively manages the Tule Subbasin with seven other GSAs and is working to ensure a reliable water supply by 2040 by eliminating groundwater overdraft and balancing pumping and recharge without causing significant negative impacts. The TCWA Draft Updated Groundwater Sustainability Plan (Geosyntec, 2024) includes sustainable management criteria, monitoring efforts, management actions, and an implementation plan for achieving groundwater sustainability. The GSP identifies a target reduction in annual pumping of approximately 38,000

ac-ft (56,000 ac-ft to 18,000 ac-ft) which includes an anticipated 20,000 ac-ft annually in reductions through land repurposing[7].

This Local Plan is intended to support the GSP and identifies existing and planned projects within TCWA management areas to achieve the target annual pumping reductions through land repurposing.

As of September 2024, the State Water Resources Control Board voted to place the Tule Subbasin including the TCWA in Probation. Basins in Probation are subject to additional fees, monitoring, and reporting requirements from the State for a period of up to one year at which point the Basin's status is re-evaluated. The decision to place the Basin in Probation highlights the need for and importance of significant changes in groundwater management within the Basin.

4.4 Project Permitting and Other Considerations

Repurposing projects may be subject to federal, state, and local regulations and policy that can significantly impact the cost and desirability of implementing a certain project. This Local Plan is not intended to be a comprehensive resource for project permitting and compliance, but basic information and links to additional resources are provided for key regulations including the California Environmental Quality Act (CEQA) and the California Land Conservation Act of 1965 (Williamson Act), additional information regarding project permitting considerations is included in the Core Plan.

4.4.1 California Environmental Quality Act (CEQA)

The California environmental Quality Act is intended to prevent or minimize significant, avoidable damage to the environment, disclose potential impacts, ensure transparency, and encourage public participation in the environmental review and decision-making process. CEQA is applicable to all projects requiring discretionary approval and may apply to certain types of land repurposing projects.

For projects where CEQA applies, the compliance process involves a number of environmental studies and consultations e.g., California Endangered Species Act and/or cultural resources with tribes and the State Historic Preservation Officer. These determinations can add a year or more, and significant cost, to a project depending on the site and project activities. A categorical exemption (CE) under CEQA is a project class that is exempt from the environmental review process because it is not expected to have significant environmental impact. A list of CE classes is found in the CEQA Guidelines.

CEQA Appendix G11 directs lead agencies to refer to the California Agricultural Land Evaluation and Site Assessment model to determine whether project impacts are a significant environmental effect to agricultural resources and would be pertinent to repurposes and/or changes in land use on agricultural lands.

[7] From GSP Section 6.2.5

Additional information regarding CEQA and land repurposing projects is available: https://www.conservation.ca.gov/dlrp/Pages/CA-Environmental-Quality-Act-(CEQA)-.aspx.

4.4.2 Williamson Act

The Williamson Act (California Land Conservation Act of 1965) allows Counties to contract with private landowners to restrict specific land parcels to agricultural or related open spaces uses. In turn, landowners receive property tax assessments based on the value of goods produced on their lands rather than assessed land values. Williamson Act contracts run with the land and continue even if/when land ownership changes. The Williamson Act is locally implemented with specific rules and procedures developed by the implementing County.

TCWA service area in the Tule Subbasin is located entirely within Tulare County. Tulare County issues Williamson Act contracts for a minimum of 10 years up to a maximum of 20 years. Contracts can be removed either through a non-renewal process that takes place over multiple years (with property taxes increasing gradually) or through a cancellation process including a comprehensive review and approval process and the payment of fees by the landowner equal to 12.5 percent of the full market value of the property[8]. Williamson Act areas are shown in the figures included in Section 7 of this plan based on information available from the State's *Williamson Act Enrollment Finder* web mapping tool.

For landowners with Williamson Act contracts, carefully consider how your existing contract could impact available land repurposing strategies to avoid triggering the unintended cancellation of your WA contract. The key is to avoid a "no compatibility finding" which would result in cancellation of your contract and require payment of a cancellation fee.

The following types of projects are more likely to result in a no compatibility finding and result in WA cancellations: conservation easements, dryland farming, cover cropping, lower water use agriculture, agritourism, and development of small scale solar projects (for on-farm energy use).

Each scenario is different and WA contract holders are advised to take advantage of DOC's open technical assistance (hosted the second Thursday of each month) to evaluate potential WA considerations when considering land repurposing.

Williamson Act information and resources are available from the DOC at: https://www.conservation.ca.gov/dlrp/wa.

Williamson Act enrollment mapping is available from the DOC at: https://maps.conservation.ca.gov/dlrp/WilliamsonAct/App/index.html

[8]Tulare County General Plan. Section 3 – Agriculture, August 2012

5. LAND REPURPOSING STRATEGIES

The previous section introduced a number of multi-benefit land repurposing strategies and considerations which are further detailed here. A one-page fact sheet for each repurposing strategy is provided which describes:

1) What the repurposing strategy is,
2) What groundwater benefits it provides,
3) Particular benefits to the grower/landowner implementing the strategy,
4) Benefits to nearby communities and the environment,
5) Cost-benefit considerations, and
6) Resources for additional information.

Much of this information is summarized from the Strategy Summaries prepared by the Tule MLRP Program team as part of the outreach and engagement process for the basin wide MLRP effort. The full summaries are provided in Appendix 1.

5.1 Strategy Summaries

Fact sheet summaries are provided for the following multi-benefit land repurposing strategies.

- Fallowing and Cover Cropping
- Dryland and Low Water Use Farming
- Conservation Easements
- Solar Farms
- Grazing
- Habitat and Open Space
- Floodplain Restoration
- Groundwater Recharge

5.1.1 Temporary Fallowing and Cover Cropping

What is Land Fallowing? Land fallowing is the practice of intentionally leaving fields unplanted and/or taking fields out of production by terminating existing crops. Fallowing is a temporary measure that can be implemented for a portion of the growing season or across multiple growing cycles and years. Land fallowing should be accompanied with the establishment of low water use cover crops to protect and restore soil health.

Groundwater Benefits: Fallowing provides groundwater demand reduction as demand from previously irrigated areas is removed for either one or more growing cycles. The quantity of groundwater savings varies by the type of crop that is taken out of production and how the conserved groundwater is later used. In TCWA service area, fallowing and cover cropping will result in reduction of debits charged to growers BasinSafe accounts resulting in credits that are accumulated over time.

Landowner/Grower Benefits:

Accumulation of Groundwater Credits: Unused groundwater allocations will accrue to grower accounts and can be used at a later time.

Soil Restoration & Health: Cover crops help restore soil health, by providing root mass, fixing nutrients, maintaining biological activity, retaining moisture, increasing infiltration, and increasing organic content.

Operational Benefits: This practice provides growers flexibility to manage operations during dry or wet years, develop groundwater 'banks' within their BasinSafe accounts, and can reduce the quantity of inputs needed when growing is resumed. Benefits will vary by type of cover crop applied, termination practices, and length of time a field is fallowed.

Community & Environmental Benefits:

Reduced Groundwater Overdraft: Reduced pumping allows groundwater levels to stabilize and helps make progress towards groundwater sustainability.

Water Quality: Cover crops can take up unused fertilizers leftover from the previous growing season and stabilize soils. This can reduce the amount of stormwater that runs off a site and the amount of pollutants that are carried with it or infiltrated into the groundwater.

Air Quality: Cover crops protect fallow fields against wind erosion and limit the generation of dust which can carry pollutants and the fungus that causes Valley fever.

Cost-Benefit Considerations: The cost of this approach is relatively inexpensive compared to others, with a median cost of about $50/acre including seed, seeding, and termination from a recent survey. Benefits in the form of reduced inputs during future plantings increase over time as do accrued groundwater credits. Incentive payments may be available via the Tule Trust program which has provided up to $1000 per acre in recent years.

Is Fallowing Right For Me: Fallowing may be appropriate for growers transitioning to new uses or for those with the flexibility to reduce acreage in production for a year or more.

More Information: This Fact Sheet is adapted from the *Land Repurposing Summary for Land Fallowing* developed for the Tule Subbasin Multi-Benefit Land Repurposing Program by Susan Long, Executive Director, of the Tule Basin Land and Water Conservation Trust. The full summary is available in Appendix 1.

5.1.2 Dryland and Low Water Farming

What is Dryland and Low Water Farming? Dryland farming is a practice that relies entirely on natural rainfall for irrigation of low water use crops. Appropriate crop types and yields are limited based on the amount of rainfall and when it falls (typically in the winter in the Tule Subbasin). Because of the lower costs associated with dryland farming it can be profitable, especially when combined with other practices. In some cases, dryland farming is supported with supplemental irrigation to increase yields. Low Water farming is the practice of growing very low water using crops. Sometimes significant water savings can be made by switching to lower water using crops than those currently cultivated, particularly if current crops are high water users, or by changing irrigation or cropping practices (using more efficient systems or reducing the number of cuttings each year). Dryland and low water crops that may be suited to the Tule subbasin include winter wheat, rosemary, sage, and agave.

Groundwater Benefits: Dryland farming and low water use farming reduce or eliminate water demand on irrigated areas. The quantity of groundwater savings varies by the type of crop that is taken out of production and how the conserved groundwater is later used.

Landowner/Grower Benefits:

Continuity – Dryland and low water farming keeps land in production rather than transitioning it to non-agricultural uses. This requires lower up-front costs, does not require environmental permitting, and maintains land ownership and control.

Accumulation of Groundwater Credits: Unused groundwater allocations will accrue to grower accounts and can be used at a later time.

Lower Costs: This practice can have lower up-front and annual costs, particularly compared to high water use crops and other repurposing strategies. Funding support may also be available where multiple benefits are provided.

Community & Environmental Benefits:

Reduced Groundwater Overdraft: Reduced pumping allows groundwater levels to stabilize and helps make progress towards groundwater sustainability.

Water Quality: Dryland and low water use crops require fewer inputs and stabilize soils. This can reduce the amount of stormwater that runs off a site and the amount of pollutants that are carried with it or infiltrated into the groundwater.

Air Quality: Keeping lands in production helps prevent wind erosion and limit the generation of dust which can carry pollutants and the fungus that causes Valley fever.

Pollinators and Habitat: Some dryland farming practices can create seasonal or longer term habitat and forage for pollinators, birds, and other sensitive species. Dryland practices often include lower impact farming methods that help preserve soil moisture and are less impactful to surrounding areas.

Cost-Benefit Considerations: The cost and returns of this approach can vary significantly depending on the practice implemented. Generally, dryland or low water use farming provides lower gross returns but also has lower costs. It can be combined with practices like grazing for additional income generation.

Is Dryland Right For Me: Dryland and low water use cropping may be appropriate for landowners transitioning to new uses and who want to maintain long term agricultural uses and ownership.

More Information: This Fact Sheet is adapted from the *Land Repurposing Summary for Dryland & Low Water Farming* developed for the Tule Subbasin Multi-Benefit Land Repurposing Program by Susan Long, Executive Director, of the Tule Basin Land and Water Conservation Trust. The full summary is available in Appendix 1.

5.1.3 Conservation Easements

What are Conservation Easements? A conservation easement is an agreement between a landowner and qualified entity (usually a non-profit land trust or government agency) that restricts the future use of a property. Conservation easements are site specific and designed between the parties to protect certain uses (like wildlife friendly aggriculture) while prohibiting others (like non-agricultural development). Each conservation easement is unique based on the characteristics of the property and needs of the landowner as well as the benefits saught by the easement purchaser. As a result, no two conservatin easements are alike.

Groundwater Benefits: Conservation easements can explicitly or implicitly help reduce the amount of groundwater pumped from subject properties. Easement provisions may require limiting pumping to native yield or require conversion to native habitat or other low water uses. The quantity of groundwater savings will vary based on the provisions and current uses of land for each easement.

Landowner/Grower Benefits:

Ownership and Groundwater Allocations: Conservation easements allow landowners to maintain ownership while generating additional value/income based on the specific easement. This can include retention of groundwater allocations and surface water rights which may be used on other properties.

Easement Value: The cost/value of an easement is based on the value of the rights which are being restricted by the terms of the agreement. This can sometimes be a significant portion of the land value and provide capital for operations or other land transitions.

Community & Environmental Benefits:

Reduced Groundwater Overdraft: Reduced pumping allows groundwater levels to stabilize and helps make progress towards groundwater sustainability.

Long-Term Conservation: Conservation easements typically are perpetual and run with the land meaning that the protections established under them will be enduring and long lasting.

Flexibility and Access: Conservation easements can provide both landowners and conservation groups options in how they manage, maintain, or transition agricultural land. In some cases, conservation easements can be designed to allow for public access (like a trail system) or support important tribal practices (like collection or cultivation of culturally important plants).

Cost-Benefit Considerations: The value of an easement is established by a qualified appraiser and is specific to each property and agreement.

Is a Conservation Easement Right for Me: Conservation easements may be appropriate for landowners looking to maintain ownership, retain groundwater allocations, and/or retain surface water rights but open to restructure some potential future uses of their land.

More Information: This Fact Sheet is adapted from the *Land Repurposing Summary for Conservation Easements* developed for the Tule Subbasin Multi-Benefit Land Repurposing Program. The full summary is available in Appendix 1. Additional information is available from the Land Trust Alliance and the California Council of Land Trusts at: https://landtrustalliance.org/take-action/conserve-your-land/how-to-conserve-your-land and https://calandtrusts.org/conservation-basics/conservation-tools/conservation-easement/

5.1.4 Solar Farms

What are Solar Farms? Solar farms use photovoltaic (PV) panels to generate electricity for use on-farm, at the community level, or for sale on the electric grid. Solar farms can range from small-scale panel installations incorporated with continued agricultural production (sometimes referred to as agrivoltaics) to utility-scale projects that generate from 25 to 200+ Megawatts (MW) of power across panel fields from 40 to 200, or even 1,000s of acres. In TCWA service area there are already a number of existing solar projects with additional projects planned within the Subbasin.

Groundwater Benefits: Solar panels fields take up space that was previously irrigated, reducing the amount of groundwater pumped to satisfy crop water demands. In cases where panels are used in conjunction with continued production, panels provide partial shading and decrease soil temperatures and moisture loss resulting in lower crop water demands. The quantity of groundwater savings varies by the type and size of the specific solar project.

Landowner/Grower Benefits:

Reliable Revenue: Utility-scale solar projects typically lease land for installation and production on a 15 to 20-year timescale. Plants are managed and maintained by a solar developer or energy company.

Reduced Energy Costs: For on-farm or community-scale solar projects, energy demand can be reduced or eliminated entirely with excess solar generation sold back to the grid.

Retained Ownership: For solar lease projects, land ownership is retained along with groundwater allocations and surface water rights.

Community & Environmental Benefits:

Clean Energy & Air Quality: Solar projects produce clean energy that can help reduce local air pollution and contribute to larger scale reductions in carbon emissions.

Reduced Groundwater Overdraft: Reduced pumping allows groundwater levels to stabilize and helps make progress towards groundwater sustainability.

Multiple-Benefits: Solar projects can be designed and constructed to provide multiple benefits like providing pollinator habitat, native grasses, and sustaining livestock grazing herds.

Cost-Benefit Considerations: Lease payments and energy offsets can vary significantly based on project specifics, but lease payments can range from $250 to $2,000 per acre per year with utility-scale projects financed entirely by the solar developer.

Is Solar Right For Me: Large scale solar projects typically have longer lead times for permitting, construction, and interconnection but provide dependable and regular revenue. Smaller scale projects can have very short lead times are highly customizable to site, owner, and community needs.

More Information: This Fact Sheet is adapted from the *Land Repurposing Summary for Solar Farms* developed for the Tule Subbasin Multi-Benefit Land Repurposing Program. The full summary is available in Appendix 1.

5.1.5 Grazing

What is Livestock Grazing? Grazing livestock including sheep, cattle, or goats on previously irrigated agricultural land can be its own land repurposing strategy or used in combination with others (like cover cropping, solar farms, conservation easements, or habitat restoration). Lands can be leased for grazing or owners can raise and sustain their own herds of grazing animals.

Examples of grazing practices and applications include:

- Improving or maintaining wildlife habitat by helping to control unwanted or overgrowing vegetation,
- Vegetation management in solar farms and transmission corridors, and
- Grazing cover crops or dryland pasture on previously irrigated lands.

Groundwater Benefits: Conversion of previously irrigated agricultural land to grazing land reduces groundwater pumping demand. The quantity of groundwater savings varies by the type of crop that is taken out of production and how the conserved groundwater is later used.

Landowner/Grower Benefits:

Revenue: Gracing leases can generate income on the order of $10 or more per acre. Returns can be increased by growing or sustaining your own herds and even contracting these herds out to manage vegetation at solar sites, utility rights-of-way, or for wildland fire vegetation control.

Retained Ownership: For grazing projects, land ownership is retained along with groundwater allocations and surface water rights.

Community & Environmental Benefits:

Reduced Groundwater Overdraft: Reduced pumping allows groundwater levels to stabilize and helps make progress towards groundwater sustainability.

Local Food Supply: Grazing herds can become or support local sources of protein.

Sustainable Vegetation Management: Grazing herds can help to manage vegetation in both conservation, restoration, and mitigation settings. Herds are less impactful to the environment than mechanical or chemical based management options.

Cost-Benefit Considerations: Grazing values vary significantly based on the use case and market prices for animal proteins fluctuate but they can be a stand-alone revenue stream or an additional revenue source when combined with other practices.

Is Grazing Right For Me: Grazing can be a flexible and layered solution to land repurposing and is commonly used to supplement other practices or where herds or grazing is already practiced.

More Information: This Fact Sheet is adapted from the *Land Repurposing Summary for Livestock Grazing* developed for the Tule Subbasin Multi-Benefit Land Repurposing Program. The full summary is available in Appendix 1.

5.1.6 Habitat and Open Space

What are Habitat and Open Spaces? Habitat and open space areas provide refuge for plant and animal species as well as a range of recreational and other benefits for people. Previously irrigated agricultural land can be converted to both temporary and permanent habitat and/or open space lands by replacing cultivated crops with native vegetation or allowing and facilitating a slower natural conversion to non-irrigated spaces. This can help expand existing habitat and open space areas, provide connectivity between previously disconnected areas, and create buffers around resources and communities. Habitat can be provided as larger field-scale plots or in edge-of-field or in-field applications.

Groundwater Benefits: Natural habitats and open spaces typically require no irrigation or significantly less irrigation than agriculture which allows for significant reductions in groundwater pumping. The quantity of groundwater savings varies by the type of crop that is taken out of production and how the conserved groundwater is later used.

Landowner/Grower Benefits (Edge-of-Field Practices):

Reduced Water Demand, Soil Restoration & Health: Development of hedgerows, pollinator strips, and other in or edge-of-field practices can reduce irrigated water demand, improve soil health and moisture retention, and decrease erosion.

Operational Benefits: In turn, the benefits above help reduce the demand for inputs and can also attract beneficial insects and predators.

Landowner/Grower Benefits (Field-Scale Practices):

Reduced Water Demand and/or Ownership Transition: Restoring previously irrigated fields to natural habitats or open spaces can reduce water demand, allowing allocation credits to be used elsewhere, and can also be an attractive opportunity for ownership transitions. Conservation and restoration groups and other NGOs or non-profit entities may be able to make attractive offers for high conservation value land.

Community & Environmental Benefits:

Reduced Groundwater Overdraft: Reduced pumping allows groundwater levels to stabilize and helps make progress towards groundwater sustainability.

Water Quality & Air Quality: Converting agricultural land to natural open spaces helps improve water and air quality by removing inputs of fertilizer, pesticides, and other inputs.

Recreation, Aesthetic, and Tribal Cultural Resources: Natural spaces and open spaces can provide new or enhanced outdoor recreation, aesthetic, and tribal cultural opportunities.

Cost-Benefit Considerations: The cost/value of this approach varies significantly based on the size, current conditions, and intended uses of the habitat area and/or open space. Costs for in-field or edge-of-field practices can be very low, while the cost of restoring or converting fields to natural areas can be high (but is typically carried by a restoration group).

Are Habitat and Open Spaces Right for Me? Habitat and open space can support both continued agricultural production and permanent repurposing and may be suitable at some scale for most .

More Information: This Fact Sheet is adapted from the *Land Repurposing Summary for Habitat and Open Space* developed for the Tule Subbasin Multi-Benefit Land Repurposing Program. The full summary is available in Appendix 1.

5.1.7 Floodplain Restoration

Photo Credit: Gregory Liebau

What is Floodplain Restoration? Floodplain restoration is similar to Habitat and Open Space restoration but is for project areas within designated floodplain, riparian, or other flood prone areas. These project areas are more likely to experience seasonal inundation or flooding and may require additional maintenance or management following large flow events. The potential habitat and restoration value for floodplain areas is also typically higher than non-floodplain areas.

Groundwater Benefits: Floodplain restoration areas typically require no irrigation or significantly less irrigation than agriculture which allows for significant reductions in groundwater pumping. The quantity of groundwater savings varies by the type of crop that is taken out of production and how the conserved groundwater is later used.

Landowner/Grower Benefits:

Reduced Water Demand and/or Ownership Transition: Restoring previously irrigated fields to natural habitats or open spaces can reduce water demand, allowing allocation credits to be used elsewhere, and can also be an attractive opportunity for ownership transitions. Conservation and restoration groups and other NGOs or non-profit entities may be able to make attractive offers for high conservation value land.

Removal of Marginal Lands and Reduced Flood Risk: Floodplain areas are typically less productive than other agricultural areas doe to difficulties in managing the excess water and soil moisture that can accumulate there, particularly for certain types of crops. These areas are also at risk of flooding and crop losses during extreme events.

Community & Environmental Benefits:

Reduced Flood Risk: Restored floodplains can accommodate higher flows and act to store and slow down flood waters, this can provide both localized and downstream flood risk reduction.

Reduced Groundwater Overdraft: Reduced pumping allows groundwater levels to stabilize and helps make progress towards groundwater sustainability.

Water Quality & Air Quality: Converting agricultural land to natural open spaces helps improve water and air quality by removing inputs of fertilizer, pesticides, and other inputs.

Recreation, Aesthetic, and Tribal Cultural Resources: Restored floodplains create natural spaces and open spaces can provide new or enhanced outdoor recreation, aesthetic, and tribal cultural opportunities.

Cost-Benefit Considerations: Floodplains are typically high-value restoration and conservation areas due to their potential to support complex ecosystems and multiple sensitive species. These projects typically qualify for multiple grant programs and generate high levels of interest from project partners.

Is Floodplain Restoration Right for Me: Floodplain restoration projects are limited to those lands that have a connection to existing floodplains or riparian areas, this can limit the applicability of this approach.

More Information: This Fact Sheet is adapted from the *Land Repurposing Summary for Habitat and Open Space* developed for the Tule Subbasin Multi-Benefit Land Repurposing Program. The full summary is available in Appendix 1.

5.1.8 Groundwater Recharge

Photo Credit: LTID, Tule Subbasin Wildlife-Friendly Recharge Basin at Deer Creek.

What is Groundwater Recharge?

Groundwater recharge involves diverting or capturing surface waters or stormwater runoff and spreading it across a basin or field that allows the water to seep into the ground and the underlying groundwater aquifer. Groundwater recharge can be achieved using a number of different methods including through a dedicated recharge basin or pond or by flooding active fields. For groundwater recharge to be viable option, water rights and sometimes permits must first be held or acquired.

Groundwater Benefits: Groundwater recharge directly benefits groundwater levels by adding to the amount of water that replenishes groundwater aquifers, however unless recharge is achieved using surface water or other water that wouldn't otherwise reach the aquifer, there is little if any benefit.

Landowner/Grower Benefits:

Accumulation of Groundwater Credits: Recharged groundwater can be added to balances within a landowner's BasinSafe accounts. In some cases, a percentage of the recharged water may be held back as 'leave behind' for net environmental benefit and to account of uncertainty in quantification of infiltrated volumes.

Community & Environmental Benefits:

Reduced Groundwater Overdraft: Recharge can help mitigate historical over pumping and help groundwater levels to stabilize and recover.

Reduced Flood Risk: When flood flows are captured and diverted for recharge, downstream flooding can be reduced.

Water Supply Protection: Recharge can help stabilize or increase local groundwater levels reducing the risk of domestic wells going dry and diluting potential existing contaminants.

Ecosystems: Groundwater recharge can benefit local ecosystems by stabilizing groundwater levels and reconnecting root zones to soil moisture.

Cost-Benefit Considerations: The cost of implementing recharge projects varies considerably based on project-specific needs, permitting, and opportunities. There are a number of technical studies and evaluations that are typically required to determine if a recharge approach is suitable and feasible for a given project.

Is Recharge Right For Me: Recharge can be very beneficial where flood flows, or surface water rights can be used to supply new groundwater recharge sources. These projects can be complex and require careful consideration of existing water rights, downstream impacts, and water quality and groundwater quality protection.

More Information: This Fact Sheet is adapted from the *Land Repurposing Summary for Groundwater Recharge* developed for the Tule Subbasin Multi-Benefit Land Repurposing Program. The full summary is available in Appendix 1.

5.2 Choosing a Strategy

Each strategy presented above may not be right for your piece of land, community, or situation and every land repurposing project will be specific to the site's specific opportunities and needs. The following considerations can help evaluate which strategy may be most applicable.

Additional information is provided in the Land Repurposing Summaries in Appendix 1 and through the resources provided in Section 11.

When choosing a strategy, the following may be helpful to consider:

- **Maintaining Land Ownership** – These strategies allow the existing landowner to maintain ownership under the new multi-benefit land use.
- **Retaining Groundwater Allocation** – Where owners have current groundwater allocations, this strategy allows them to retain those allocations under the new land use.
- **Providing Economic Value –** These strategies provide an economic return to the grower, owner, and local economy.
- **Providing Groundwater Benefit** – These strategies provide either a direct benefit by augmenting existing supplies (recharge) or by forgoing pumping that would otherwise contribute to continued overdraft.
- **Providing Habitat or Environmental Benefit** - These strategies include projects that protect, restore, or enhance physical habitat for sensitive species or provide other environmental benefits.
- **Providing Community Benefits** – Community benefits provided by these projects can be direct, like creating open space, public park access, or a buffer zone of stabilized land around a community, or indirect like protecting otherwise fallow land with cover crops or stabilization that helps prevent dust generation and the creation of airborne pollutants.
- **Potential Impact to Local Jobs** – Certain alternatives may protect existing jobs - like switching to lower water use crops, others create new jobs – like a utility scale solar PV plant. Other alternatives may only replace a few of the jobs potentially lost by switching from one land use to another. For more information on the potential economic and jobs impacts, refer to Section 9.
- **Temporary/Intermediate Approaches –** Some alternatives are easy to implement but may only be a temporary measure (like fallowing and cover cropping). Other transitions take more time and are hard to undo once implemented (e.g., creation and restoration of open space or large scale solar development).
- **Permitting, Planning, & Design Effort** – Certain alternatives are easily implemented with little or no need for detailed planning, permitting, or design. Others involve multiple steps and potentially years long efforts to secure the required state/local/federal permits and approvals.
- **Cost of Implementation** – The cost of implementing each alterative will vary based on project specific conditions and the size of the project. The matrix provides a relative

ranking of the cost expected for each alternative. Additional cost information is provided in the fact sheets in the previous section and in Section 9.

The Land Repurposing Considerations and Benefits Matrix below summarizes some of the key considerations and benefits of each land repurposing strategy considered in this plan. The matrix can be used to help evaluate which strategies may be appropriate for different scenarios and combination of grower/landowner, community, and environmental priorities. The matrix is intended to provide qualitative values (high/medium/low, yes/no, etc.) to assist in relative comparison between potential strategies. Assignments are generally made as follows:

- **High, Yes:** Strategy clearly and consistently satisfies criteria or provides clear benefit that is larger than alternatives.
- **Medium, Yes/No:** Strategy may satisfy criteria depending on project specific conditions and provides more than a baseline level of benefit compared to "Low" or "No" alternative.
- **Low, No:** Strategy does not satisfy criteria or provides only baseline level of benefit.

In some cases where outcomes are not easily defined or there is the potential for multiple results a dual rating (e.g., Y/N, or L/M) is assigned.

In addition to the matrix on the next page, and as part of the Core Plan effort, a scenario planning tool has been developed and will be made available at: https://tule-mlrp.org/. This tool, while course in scale (does not provide information for specific geographic areas smaller than one square mile) can be used to further evaluate the potential benefits and impacts of a given repurposing strategy.

Land Repurposing Considerations and Benefits Matrix

	Maintains Land Ownership	Retains Groundwater Allocation	Provides Economic Value	Provides Groundwater Benefit	Provides Habitat or Environmental Benefit	Provides Community Benefits	Potential Impact to Local Jobs	Temporary or Intermediate Approach	Permitting, Planning, Design, Effort	Cost of Implementation
Fallowing and Cover Cropping	Y	Y	L	L	L	M	L	Y	L	L
Dryland and Low Water Use Farming	Y	Y	L/M	L	L	M	L	Y/N	L	M/H
Grazing	Y	Y	L	L	L	M	M	Y/N	L	L
Conservation Easements	Y	Y/N	M	L	M	M/H	L/M	Y/N	L	L
Habitat and Open Space	N	N	M	M	H	H	M	N	M/H	M/H
Floodplain Restoration	Y/N	Y/N	L/M	M	M/H	H	L/M	Y/N	M/H	M/H
Solar Farms	Y/N	Y/N	H	L	L	L	L	N	H	H
Groundwater Recharge	Y	Y	H	H	L	M	L	Y/N	H	M/H

Matrix Key: Y=Yes, N=No, H=High, M=Medium, L=Low, Y/N = Sometimes

6. LAND REPURPOSING NEED WITHIN TCWA

The total need for land repurposing within the TCWA service area in the Tule Subbasin cannot be precisely calculated as the key parameters (area irrigated, irrigation demand, etc.) will vary from year to year and even field to field based on timing and volume of rainfall, temperature, types of crops grown, and individual farming practices but it is possible to estimate, or at least bracket, the land area that may need to be repurposed using both a top-down and bottom-up approach. This section estimates the area that may need to be repurposed using the GSP land repurposing targets (top-down) and sustainable yield based estimates (bottom-up).

GSP Land Repurposing Targets:

The revised 2024 TCWA GSP for the Tule Subbasin includes a target annual groundwater saving of 20,000 ac-ft per year to be achieved through multi-benefit land repurposing. This is a significant portion of the overall groundwater savings needed for the TCWA service area to reduce groundwater pumping to a sustainable level but is not the only practice accounted for in the GSP. Based on average groundwater pumping rates in Water Year 2023 of 2 acre-feet per acre[9], this would equate to approximately 10,000 acres removed from production or transitioned to land uses that do not require groundwater pumping.

Sustainable Yield Based Estimates:

Groundwater modeling performed for the GSP has been used to establish a sustainable yield estimate of 0.22 acre-feet per acre. Sustainable yield can be applied through groundwater allocations to all parcels that were actively irrigated during the 2018 water year, this is approximately 51,000 acres equaling a total sustainable yield for agricultural pumping of approximately 11,220acre-feet per year. At the current water use rates of 2 acre-feet per acre per year, this volume of groundwater can only support approximately 5,600 acres of irrigated agriculture representing a need for more than 23,000 acres of land repurposing.

Regardless of the method used to calculate the overall need for land repurposing and the imprecise nature of the calculations themselves, it is clear that a significant portion of the remaining irrigated land within TCWA service area will need to transition to new land uses to meet the sustainability measures required by SGMA.

It is also acknowledged that while the scale of the land repurposing needed in TCWA is significant, there are a number of management practices and policies that can be implemented at both the local landowner/grower level and at the GSP level that can meaningfully reduce the amount of land that needs to be taken out of production. Policies like TCWA's groundwater banking and recharge policy and individual projects that recharge the aquifers can have a meaningful impact. Some of the projects are already in the ground while others are actively in

[9] WY2023 average irrigation is derived from the total agricultural groundwater pumping (approximately 58,000 ac-feet) and the area actively irrigated (29,000 acres) as reported in BasinSafe for the 2023 water year for the North and South Management Areas combined.

development. Refer to Section 8 for more information on existing and planned projects and Section 10 for Policies that impact the need for land repurposing.

7. PROJECT OPPORTUNITIES AND PRIORITIES

This section is intended to provide a summary of some of the key priorities and opportunities for land repurposing that have been identified throughout the development of this Local Plan and the associated Core Plan for the Tule Subbasin.

7.1 Multi-Benefit Land Repurposing Priorities

Based on the various outreach and engagement and advisory efforts associated with this Local Plan and the Core Plan effort for the Tule Subbasin the following key priorities have been identified for the various stakeholder groups.

Grower Priorities: Growers have expressed a strong desire to protect their multi-generational history of agricultural production within TCWA along with the lifestyle and importantly local communities that it supports.

Community Priorities: The community of Allensworth has long been underserved and has multiple priorities but continues to prioritize the need for clean drinking water and protection of recent and ongoing investments in their domestic well infrastructure. Other community needs include access to green/open space and community recreation opportunities, flood protection, and expansion of the local economy.

Environmental Priorities: The TCWA service area is home to, or closely adjacent to, a number of important ecological preserves and protected open spaces including the Pixley and Kern National Wildlife Refuges, the Allensworth Ecological Preserve, and the Atwell Islands (Ton Tache Wetlands). Environmental priorities include expanding and connecting these areas through protection of adjacent lands as well as maintaining and protecting existing resources.

Tribal Nation Priorities: The Tachi Yokut Tribe and their people whose Santa Rosa Rancheria is located north of the TCWA service area once called the entire central valley home and have sacred connections to the ancient Tulare Lake. Through outreach and engagement with the Tribe as part of the Core Plan, the Tachi have expressed a strong desire to protect and restore water and groundwater resources for all generations to come. The tribe also finds it critical to be consulted with during projects that disturb the land so they can help protect cultural resources and sacred burial sites that may not be identified in resource databases. The Tachi have a sacred connection to Tulare Lake and also support activities that would restore or enhance this important site.

GSA Priorities: TCWA is focused on demonstrating compliance with the requirements of the SGMA and supporting the growers, landowners, communities, tribes, and state, local, and federal partners with resources within its service area. The GSA supports an “all of the above” strategy that achieves groundwater pumping reductions while minimizing the impact and potential negative consequences to the local economy and communities, and where possible helps to expand protections and restore habitat and natural resources with the basin.

7.2 Multi-Benefit Land Repurposing Opportunities

It is important to understand that successful land repurposing opportunities are highly specific to the physical conditions of existing and adjacent lands, the current and past land use practices, and the individual priorities of landowners/managers and communities. As such, this Local Plan does not attempt to identify specific projects (land repurposing for an individual field or parcel) but instead has compiled available data and resources to help identify which approaches may be best suited for certain areas. Actual repurposing should always be a site-specific decision taking into account information that is not available at the Subbasin or even TCWA service area scale.

7.2.1 Core Plan Opportunity Resources

As part of the Core Planning effort, geospatial mapping and analysis have been conducted to identify potential opportunity or priority areas for implementing certain land repurposing strategies. This mapping has been conducted at the subbasin scale at various spatial resolutions. These maps are available at tule-mlrp.org/land-repurposing-options within the Land Repurposing Fact Sheets and are included as Appendix 1 in this Local Plan.

7.2.2 TCWA Local Plan Opportunity Screening and Identification

In addition to the resources considered and provided by the Core Plan effort, this Local Plan has further evaluated land repurposing opportunities by analyzing opportunities at the field scale and using additional field-specific data like crop mapping, relative water use, and history to provide additional information. These resources are included in Appendix 2 as opportunity and constraint maps. Each opportunity and constraint map includes additional information and data sources describing how the mapping and analysis were conducted. Table 1 below summarizes the total area within the TCWA portion of the Tule Subbasin that was identified by this analysis (note that opportunity areas may overlap with one or more other opportunity).

Table 1. Land Repurposing Opportunity Summary

Repurposing Strategy	Opportunity Area (acres)
Dryland or Low Irrigation Farming	20,200
Conservation, Habitat, and Open Space	5,399
Solar Farms	6,271
Recharge	15,987
Floodplain Restoration	14,439

Existing Condition Summary: It is important to understand existing conditions when evaluating the potential suite of available repurposing options, for example if current crop water use if already very low transitioning to a low water crop may not provide additional benefit. Additionally, if lands are under Williamson Act contracts, have already been idled, or are adjacent to existing protected areas, they may each have different project-specific considerations. The following figures illustrate some of these considerations based on crop mapping available through LandIQ using 2022 information. More detailed information on each map is available in Appendix 2.

Figure 2 shows the locations and planting date of active agricultural areas, idle agricultural areas, existing conservation and open space areas, solar farms, and dairies within the TCWA area of the Tule Subbasin. The figure illustrates that a significant portion of land has already been idled in TCWA and that there are considerable open space and protected areas within or adjacent to the TCWA area.

Figure 2. Existing Resource Summary in TCWA Tule Subbasin

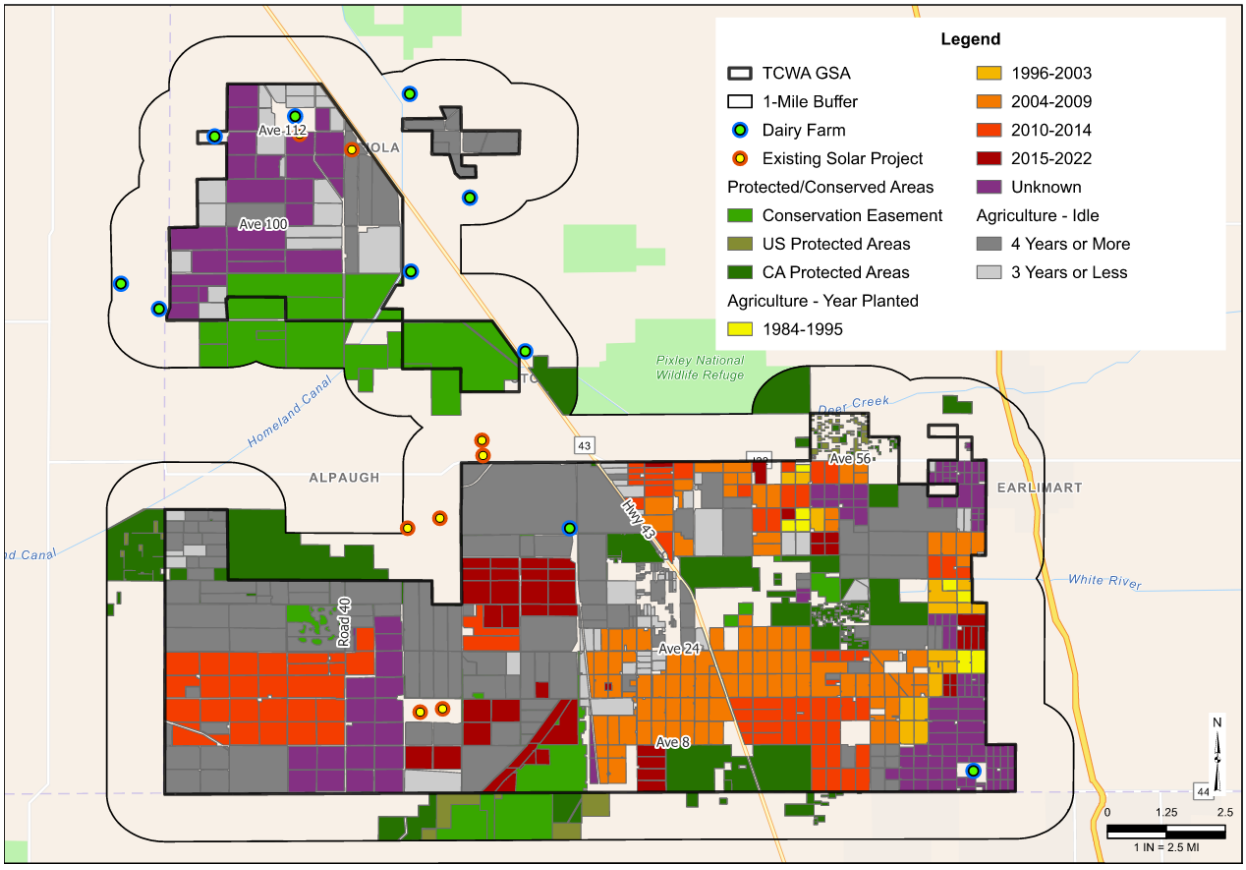


Figure 3 shows the distribution of the different crop types within the Tule Subbasin portion of TCWA. Crops are dominated by nut trees (almonds and pistachios) with significant areas also producing animal feed crops to support dairy operations. The eastern portion of TCWA has more crop diversity including potatoes, vines, and other crops.

Figure 3. Existing Crop Summary TCWA Tule Service Area

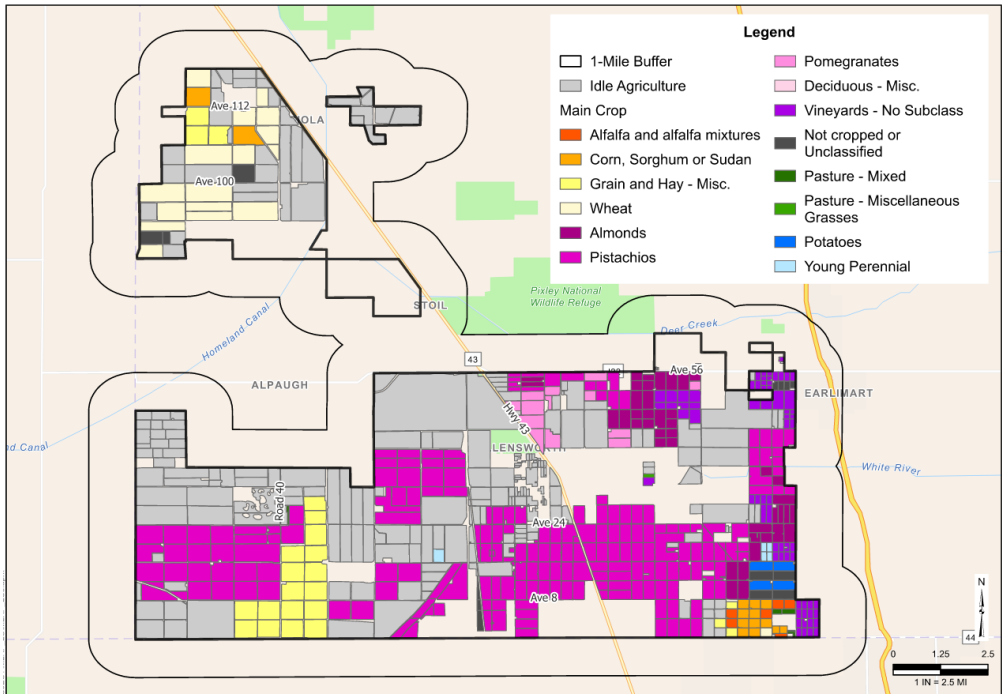
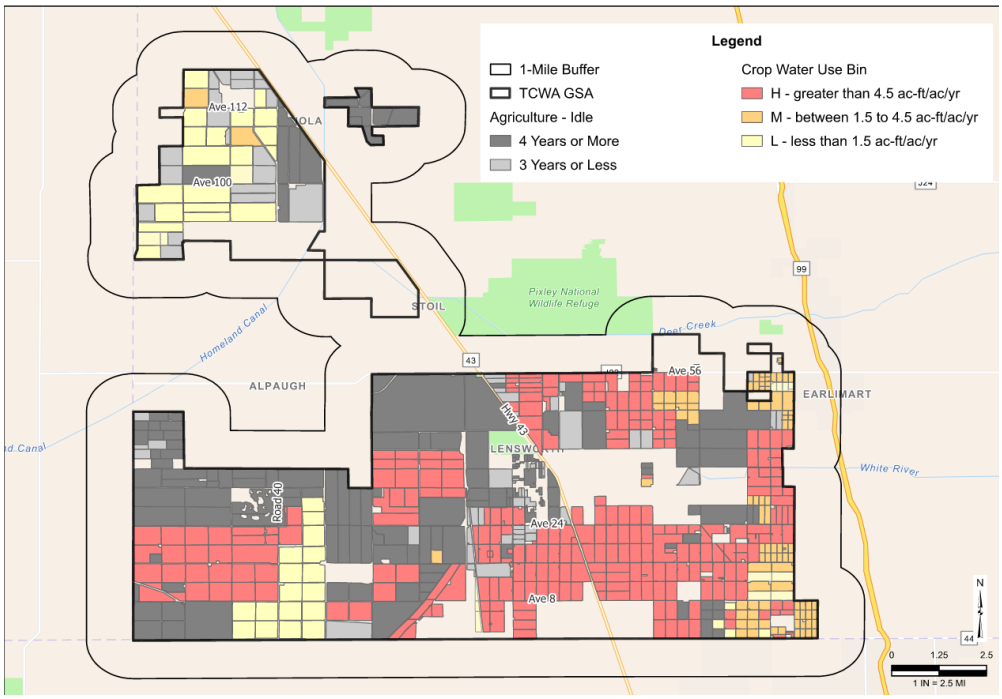


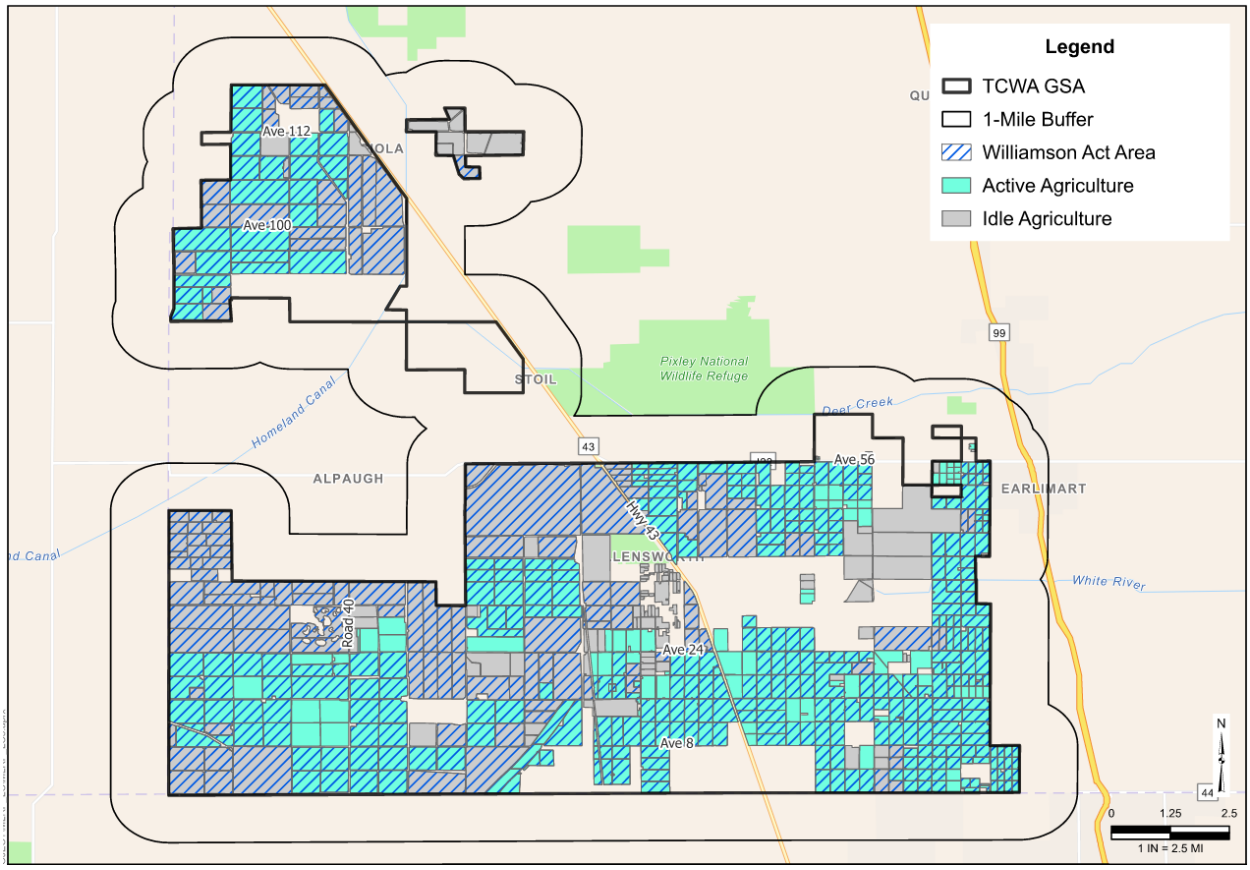
Figure 4 shows crop water use categorized into high (greater than 4.5 acre-feet per acre per year), medium (between 1.5 to 4.5 acre-feet per acre per year), and low (less than 1.5 acre-feet per acre per year) categories.

Figure 4. Existing Water Use in TCWA Tule Service Area



Finally, Figure 5 shows areas that are enrolled in the Williamson Act. These areas will have to terminate their Williamson Act contracts or restrict the repurposing activities to Williamson Act compatible uses (refer to Section 4.4.2 for more information on the Williamson Act).

Figure 5. Williamson Act Areas



Multi-Benefit Repurposing Opportunities:

Multi-benefit land repurposing opportunities have been identified for irrigated areas within the TCWA Tule service area using available geospatial information on existing conservation areas, resources, and other background layers from the Core Plan, combining this with field based crop type mapping and information available via the LandIQ and others, and applying tabulated agricultural values like annual value, annual water need, and typical rotation cycle/crop age. The result is a set of opportunity maps which identify potentially applicable strategies for different areas. The following figures demonstrate some of these results with a full set of opportunity exhibits provided in Appendix 2 along with additional supporting information and references.

Again, it should be noted that this analysis has been conducted using regional scale data that was readily available. It is understood that site specific conditions may be different than those identified in the underlying dataset and that conditions may change over time. The exhibits are provided as a starting point and are not a substitute for proper project planning nor an endorsement of a specific approach at a given location.

Figure 6 shows the areas with the most potential conservation value based on proximity to existing open space and protected areas. For this analysis a buffer of 100 feet was used to identify areas adjacent to protected areas resulting in a total area of 5,400 acres.

Figure 6. Conservation Easement and Habitat/Open Space Opportunities

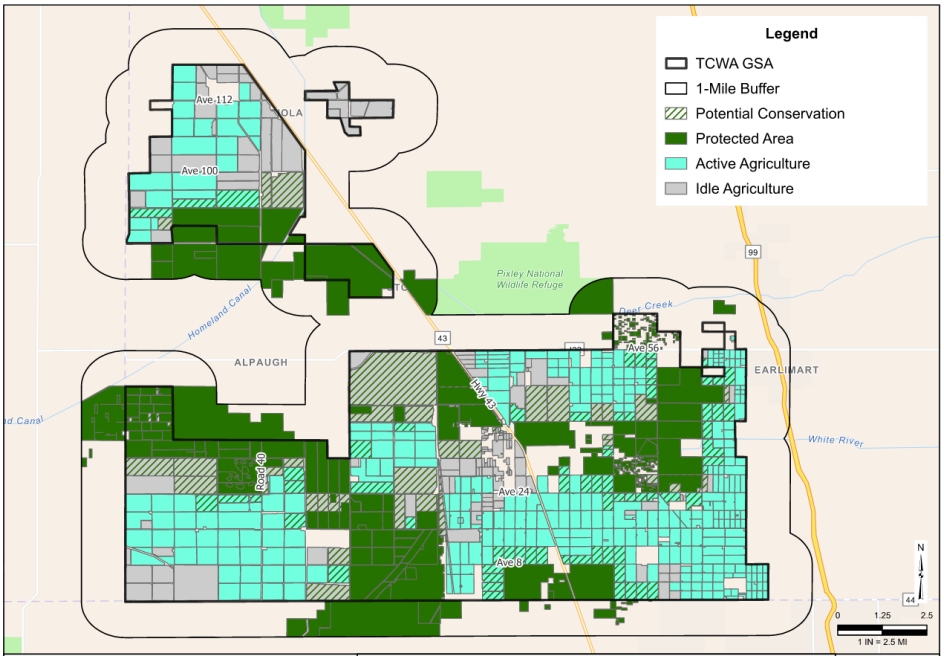


Figure 7 shows those areas that may be most suited to dryland or low water use farming based on analysis performed by the Public Policy Institute of California which identified areas that could sustain winter wheat with 4 to 8 inches of supplemental irrigation. This includes 20,000 acres within TCWA.

Figure 7. Dryland and Low Water Use Opportunities

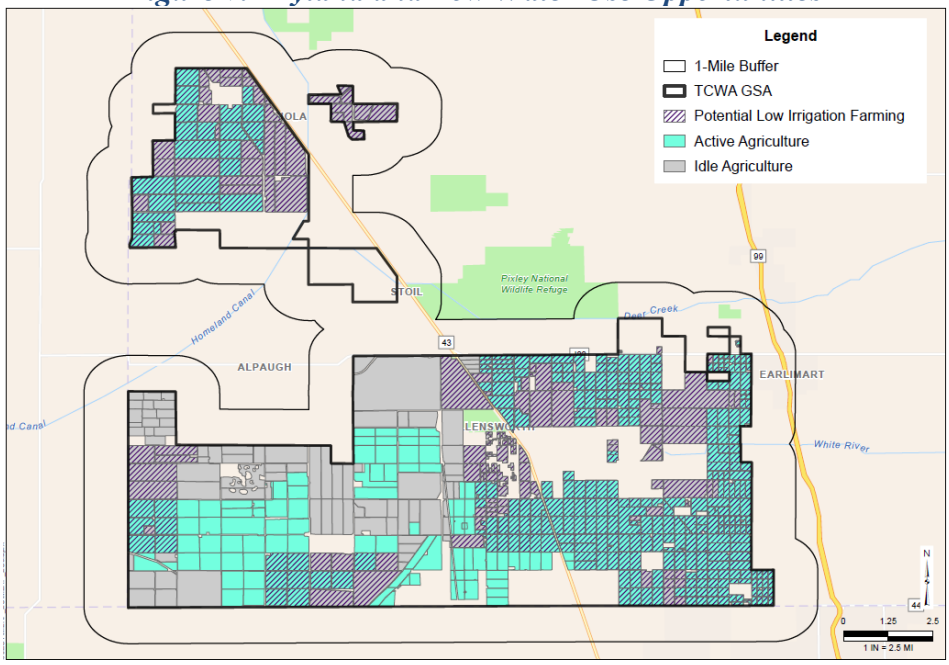
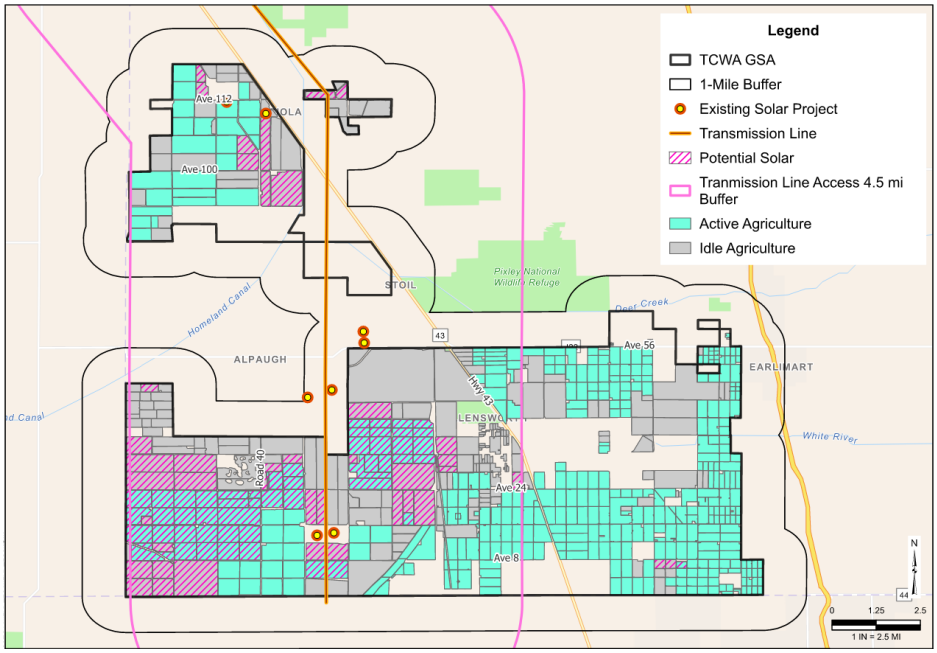


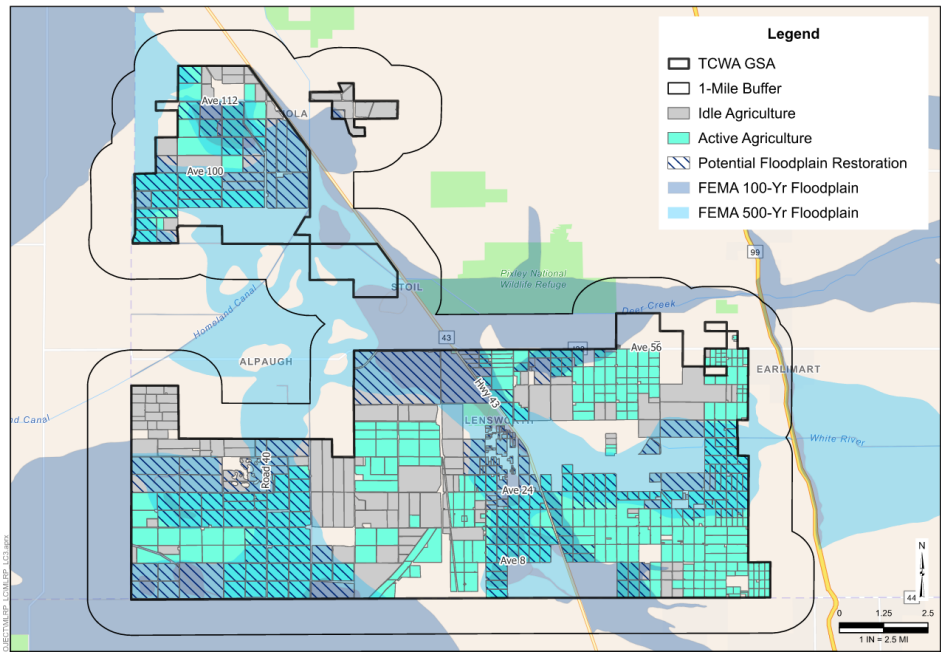
Figure 8 identifies sites potentially suitable to conversion to solar farms based on least conflict areas identified by the Power of Place study and within a 4.5 mile distance of existing transmission lines. Solar siting is complex and transmission capacity and extensions are occuring throughout the Central Valley but there is significant potential for additional solar projects within TCWA area, more than 6,000 acres are within the 4.5 mile distance of existing transmission.

Figure 8. Solar Opportunities



Floodplain restoration opportunities are significant given the extents of floodplains within TCWA. Figure 9 shows 14,000 acres have been identified where more than 50% of the field block intersects the FEMA 500-year floodplain.

Figure 9. Floodplain Restoration Opportunities



Groundwater recharge is very site specific, and potential may not be captured well in regional level mapping. In general, though, the presence of Corcoran Clay in the western parts of TCWA reduces the potential for recharge compared to the eastern portions as shown in Figure 10.

Figure 10. Groundwater Recharge Opportunities

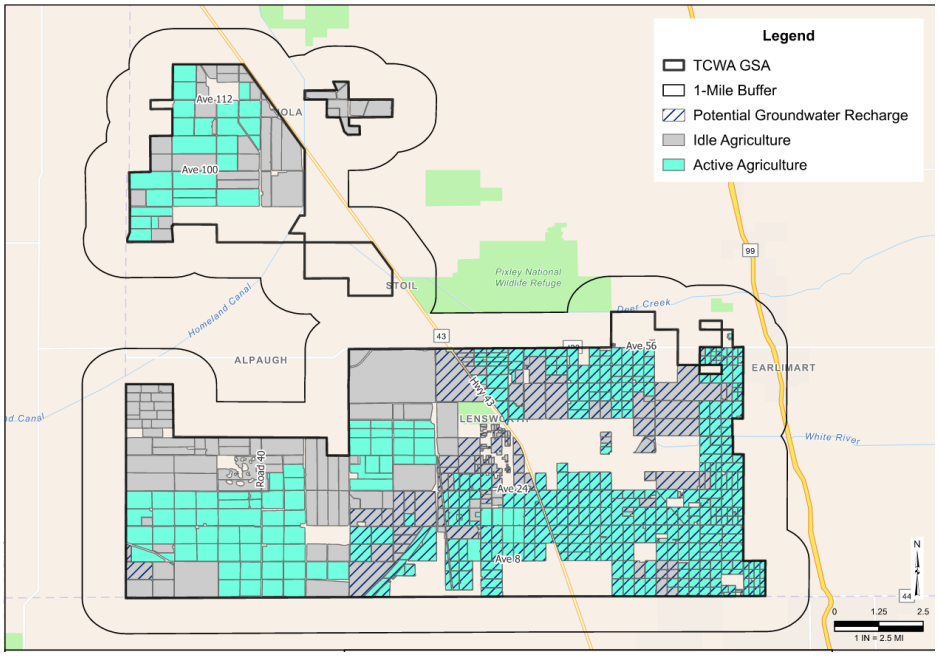
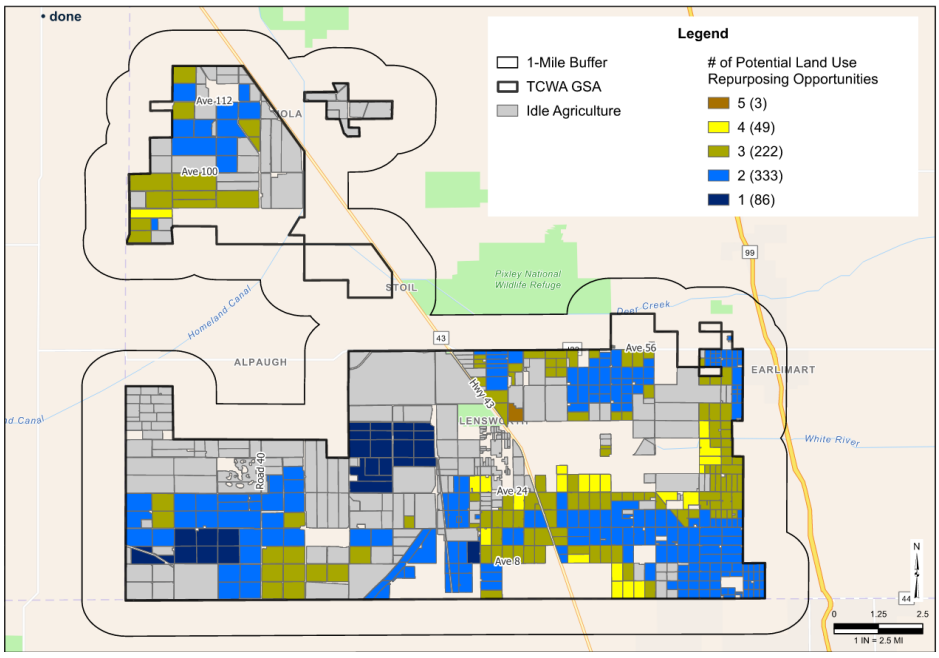


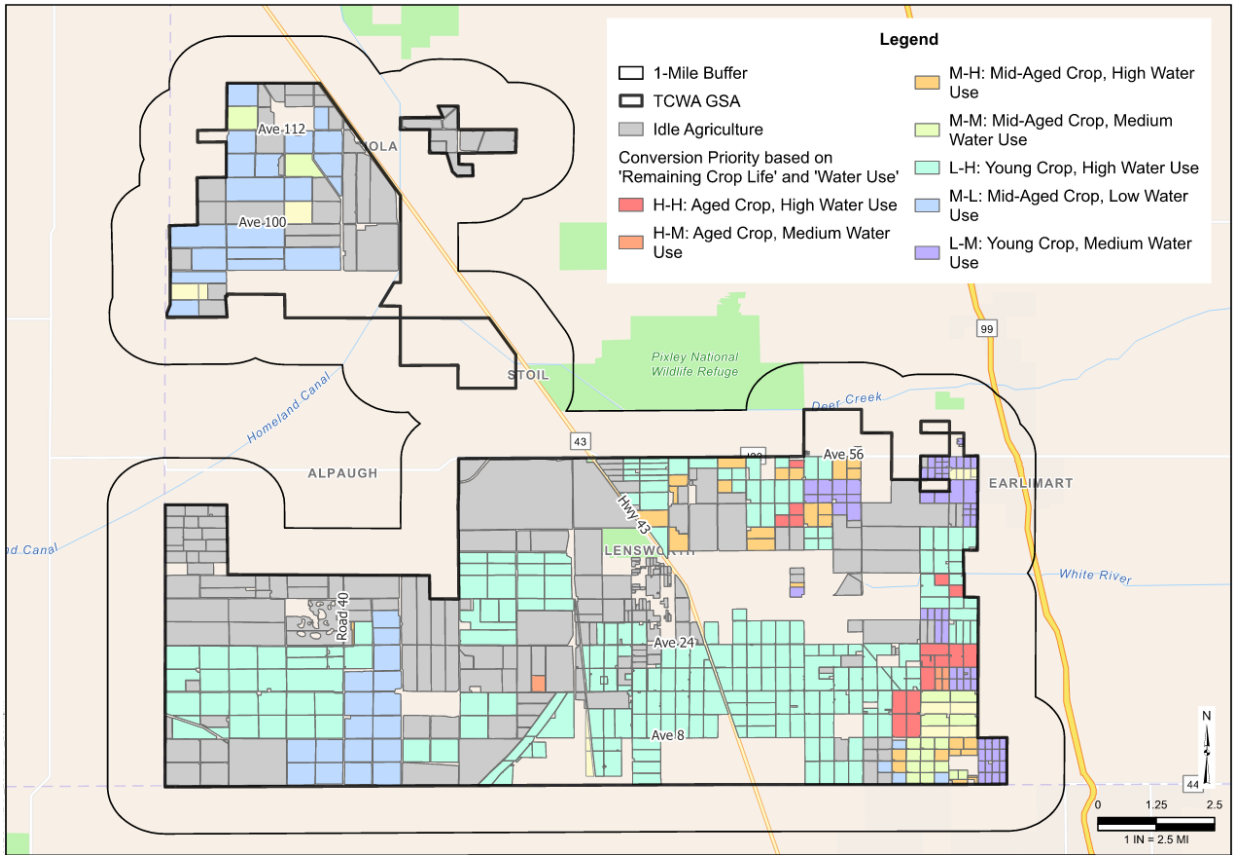
Figure 11 summarizes the total count of different opportunities that may be suitable for a given field. Most fields have multiple potential repurposing strategies that are likely suitable indicating the potential for truly multi-benefit type approaches and solutions. Again, these results are intended to support consideration of alternatives, not restrict any given repurposing strategy for a particular field.

Figure 11. Field Level Count of Opportunities



Finally, Figure 12 illustrates a potential prioritization approach where repurposing of areas with higher current water use and older crops are prioritized for initial repurposing efforts. Such an approach could accelerate progress towards groundwater sustainability and take advantage of areas where crops may be ready or nearly ready either rotate or turn over.

Figure 12. Potential Repurposing Prioritization



8. EXISTING AND PLANNED PROJECTS

A number of existing multi-benefit land repurposing projects are currently in the ground within the TCWA Tule service area. Some of these projects were funded and constructed prior to the establishment of the Tule Subbasin MLRP Program but are important examples and building blocks for additional land repurposing projects within the TCWA area and the subbasin as a whole. In addition to these existing projects, the Tule Subbasin MLRP Block Grant has funded several additional projects that are at various stages of the design and implementation phase. Both the existing and planned projects within the TCWA service area are described in this section with links and resources provided for more detailed information.

8.1 Existing Projects

The following projects were implemented prior to the establishment of the Tule MLRP Program but provide important multiple-benefits and reduce groundwater pumping.

8.1.1 Capinero Creek Restoration Project

The Capinero Creek Restoration Project is a 467-acre project that is restoring San Joaquin Desert upland and alkali scrub habitat on land formerly irrigated with groundwater to produce dairy feed crops. The project was initiated with negotiations for purchase of the land in May 2021 with the sale closed in December 2021, a habitat restoration plan developed starting January 2022, and initial habitat restoration beginning in October 2023. Restoration activities are estimated to be completed by December 2026 and save up to 9,200 acre feet of water over the life of the project.

The project was funded by the Bureau of Reclamation, Department of Conservation, and Southern Pacific Railroad. Led by the Tule Basin Land and Water Conservation Trust, the project was also supported by The Bureau of Reclamation, The Nature Conservancy, Pixley Irrigation District, and Six-33 Solutions.

More information on the Capinero Creek Restoration Project is available at: Capinero Creek Restoration — Tule Basin Land & Water Conservation Trust or by contacting admin@tuletrust.org.

8.1.2 Tule Trust Land Fallowing and Cover Cropping

Since 2022, the Tule Trust has supported growers within the TCWA service area and Tule Subbasin by providing funding (reverse auction payments) for temporarily taking land out of production and planting a cover crop that helps improve soil health and provides forage and temporary habitat for birds like the tricolor blackbird. Funding for the program has been provided through generous private donations, matching funds from the Tule GSAs including TCWA, and the Tule Subbasin MLRP Block Grant.

Participating growers agree to fallow their land ahead of the planting season and establish a pre-approved cover crop seed mix before December 31st. That cover crop cannot be terminated before July of the following year. Growers receive an incentive payment per acre (which has historically ranged from about $500 to $1000 dollars per acre) and in return abide by the program rules which include forgoing the use of any transitional water allocation (overdraft) during the enrollment period. Since its inception in 2022, the program has provided an estimated 6,600 acre-feet in groundwater savings across a total of 2,750 acres (average of 1,375 acres per year).

As part of its collaboration with the Trust and commitment to sustainable groundwater management, the TCWA GSA has committed up to $200,000 per year to the fallowing program over the next five years (total $1M).

More information on the Tule Trust land fallowing and cover cropping program is available at: https://www.tuletrust.org/land-fallowing-program or by contacting admin@tuletrust.org.

8.1.3 Atwell Island Restoration Project (Ton Tachi Wetlands) Preserve

The Atwell Island Restoration Project (AIP) is located at the southern edge of the historic Tulare Lake within the Ton Tachi Wetland basin. The project consists of 8,000 acres of restored native valley grassland, wetland, and alkali sink habitats on areas that had been previously farmed. The project provides an important wintering area for migratory birds within the San Joaquin Valley and provides recreational and bird watching activities. The project also provides important opportunities for local Tribes to collect culturally significant plants and resources.

More information on the Atwell Island Restoration Project is available at: https://www.blm.gov/visit/atwell-recreation-area.

8.1.4 Lower Deer Creek Watershed Plan

In collaboration with The Nature Conservancy, The National Audubon Society, and Pixley Irrigation District GSA, the Trust is in the process of developing a PL-566 Watershed Plan (566 Plan through the USDA NRCS Small Watershed Program. The plan is intended to evaluate and select sites for constructing wildlife friendly recharge basins and areas suitable for upland habitat restoration. As part of the funding requirements for the project, an Environmental Assessment is being conducted in accordance with NEPA and CEQA requirements.

More information on the Deer Creek Watershed Plan is available at: https://www.tuletrust.org/land-fallowing-program or by contacting admin@tuletrust.org.

8.1.5 Private Solar Developments

While not specifically envisioned as land repurposing projects, a number of solar energy projects have already been brought online within the TCWA service area since the 2010s with more capacity planned in the coming years including what would be one of the largest developments in California (the Rexford Solar project, located in the eastern portion of the subbasin but not in TCWAs service Area). Projects within the TCWA include:

- Atwell Island West a 20MW facility commissioned in 2015 sitting on 140 acres of previously irrigated agricultural land.
- Atwell Island East another 20MW facility adjacent to the West facility sitting on another 140 acres of previously irrigated agricultural land.
- Angiola a 3MW facility on 20 acres sitting on previously irrigated agricultural land.

Other projects worth noting include the 1.1 MW project at the Vanderham Dairy which sits on approximately 5 acres and provides power for dairy operations and helps offset greenhouse gas emissions from dairy operations.

Refer to Appendix 2 for mapping of these and other solar resources as well as local transmission lines.

8.2 Planned Projects

With funding provided through the Tule Subbasin MLRP and SGMA Round 1 Implementation Grants a number of projects are actively in development as part of the Tule MLRP Program.

8.2.1 Allensworth Habitat and Water Security Project

Through the Tule MLRP Block Grant funding projects to enhance local resources and improve the security and reliability of the community of Allensworth's water supply are in development. These include the restoration or creation of additional wetland and habitat area as well as funding for the design and permitting of a secondary potable water storage tank. These project elements are in the initial stages of design and permitting and are closely tied to other potential projects including the construction of a wastewater treatment system and conversion of existing septic system to a sewer collection system serving the community.

8.2.2 Additional Project Opportunities

Through the Core Planning effort and Block Grant for the Tule Subbasin, additional funding for community based projects is available at this time. Applicants with potential projects or project ideas are encouraged to develop a project concept and work with the Core Planning team to submit an application through the RFP process.

Additional information is available at: Tule-MLRP.org.

9. PROJECT ECONOMICS AND FUNDING

9.1 Project Economics

Based on the significant land repurposing need within TCWA area in the Tule subbasin, the potential for economic impacts is significant both at the farm, GSA, and subbasin scale. One goal of multi-benefit land repurposing is to offset these potential economic losses with corresponding benefits realized by the repurposing projects.

Subbasin scale economic analysis is being conducted in coordination with the University of California, Merced and will be available through the Core Plan and Tule-MLRP website. The Core Plan may also provide additional project-level economic considerations and tools that can help project proponents and planners evaluate alternatives, consider basin and GSA-scale tradeoffs and impacts, and support funding programs and grant applications.

For this TCWA Local plan a simplified economic analysis and examples of recent project funding from the Tule Basin Land and Water Conservation Trust's temporary fallowing and cover cropping program are summarized.

9.1.1 Potential Lost Crop Value

The 28,000 acres of irrigated agricultural land (approximate as determined by the 2022 LandIQ mapping) produced a gross crop value of $165 million and a net crop value of $78 million based on crop area. This represents a gross and net crop value of approximately $5,900 and $2,800 per acre respectively. If, as indicated is a possibility by the land repurposing need presented in Section 6, half of this productive area is replaced this represents an annual gross and net loss of crop value of approximately $82.5 million and $39 million annually. Land repurposing strategies should seek to recover or preserve as much of this potential lost value as possible.

9.1.2 Example Project Costs & Benefits

The Tule Basin Land and Water Conservation Trust has funded annual land fallowing and cover cropping projects within the Tule subbasin since 2022. The table below summarizes the total area of agricultural land enrolled in the program, the cost per acre paid to participating growers, and estimates of the volume and cost of groundwater saved on an annual basis.

Table 2. Tule Trust Land Fallowing Costs and Benefits

Year	Acres	Total Funding	Cost / Acre	Water Saved (acre-ft)[1]	Water Banked (acre-ft)[2]
2022	1,600	$800k	$500	3,840	704
2023	1,200	$1.2M	$1000	2,880	528

[1] Water saved assumes 2.4 ac-ft/ac avoided overdraft (transitional water).
[2] Banked water assumes 0.44 ac-ft/ac sustainable yield.

9.2 Funding Sources and Funding Needs

There are a number of State, Federal, and private project funding programs that are likely applicable to land repurposing projects covered in the Local Plan. Programs vary from one time project grants and awards to annual rebates or incentives, and long-term programmatic funding. The Core Plan team and the Department of Conservation MLRP team are in the process of

developing a list of potential resources for project funding. As these resources are developed, they will be made available as part of this Local Plan.

As part of this Local Plan effort a list of potential projects that could be advanced with additional project funding has been identified. The projects listed below are not inclusive of all possible projects and inclusion of a given project does not imply preference or priority:

- White River Hydraulics and Hydrology Study – This is an enabling study that will help advance multi-benefit flood control, recharge, and floodplain restoration projects along the White River within TCWA.

- Allensworth Multi-Benefit Flood Control and Recharge Basins – A multi-benefit flood control and recharge project has been explored adjacent to the disadvantaged community of Allensworth. An initial project planned for the site was put on hold due to conflicts between permit timelines and grant mandated construction timelines. A separate or similar project could help the community address existing flooding, water quality, and recreational needs.

- Tule Land Trust Temporary Fallowing and Cover Cropping Program – The existing temporary fallowing and cover cropping program could benefit from additional long-term funding beyond what the GSAs and private donors have committed to.

Given the scale of potential repurposing that may occur within TCWA, the need for project funding of all types is significant. Total funding needs for repurposing in TCWA reach into the $100s of millions[10]. Much of this cost will be borne by private landowners and/or result in unmitigated fallowing and associated negative environmental, community, and economic impacts if not provided through other means.

10. LAND REPURPOSING POLICIES

10.1 Existing Policies

TCWA has adopted a number of policies and plans that influence groundwater management and by extension multi-benefit land repurposing within the TCWA service area in the Tule Subbasin. These include Groundwater Extraction Allocations Policy and Procedures, Groundwater Recharge Policy, Well Registration Policy, and Water Meter Policy and Procedures. The portions of these policies and plans most relevant to land repurposing are summarized below. To access the full and most up-to-date policies and plans please visit tcwater.org.

- TCWA Groundwater Extraction Allocation Policy and Procedures

- TCWA Groundwater Recharge Policy

[10] Estimated from a range of repurposing from areas and costs: e.g., 20,000 acres at a cost per acre of up to $10,000 per acre represents a repurposing cost of $200 million.

- TCWA Well Registration Policy
- TCWA Water Meter Policy and Procedures
- TCWA Subsidence Management Policy

10.2 Policy and Planning Needs

Additional GSA policies may be developed as implementation of the GSP progresses and experience is gained from initial repurposing projects. As policy is updated it will be made available at tcwater.org. Potential policy or planning updates could include things like more robust water banking, inter-GSA, or out of basin transfer/storage policies that could support land repurposing.

11. RESOURCES & LINKS

11.1 Additional Resources and Helpful Links

This section contains links to additional MLRP and Land Repurposing or related information and resources that may be helpful.

The Tule Subbasin MLRP hosts a website with information, reports, meetings and events, announcements, and links at: https://tule-mlrp.org/

Included at the Tule Subbasin MLRP site are links to:

- The Tule Subbasin Core Plan (under development), and
- The Tule Subbasin Project Opportunity and Alternatives Screening Tool (under development)

The California Department of Conservation hosts an MLRP focused site at: Multibenefit Land Repurposing Program (MLRP) (ca.gov)

For more information on CEQA visit: https://www.conservation.ca.gov/dlrp/Pages/CA-Environmental-Quality-Act-(CEQA)-.aspx

For more information on the Williamson Act visit the following:

- https://www.conservation.ca.gov/dlrp/wa.
- https://maps.conservation.ca.gov/dlrp/WilliamsonAct/App/index.html

For information on Land Trusts visit the following:

- https://landtrustalliance.org/take-action/conserve-your-land/how-to-conserve-your-land
- https://calandtrusts.org/conservation-basics/conservation-tools/conservation-easement/

For examples of existing projects visit:

- Capinero Creek Restoration — Tule Basin Land & Water Conservation Trust
- https://www.tuletrust.org/land-fallowing-program

For information from the TCWA including the latest GSA Policies visit:tcwater.org

12. REFERENCES

California Protected Areas. California Conservation Easements. CPAD and CCED Databases retrieved from: calands.org

California Department of Water Resources, 2015. Land and Water Use Data. Crop Water Use 2011-2015.

California Natural Resources Agency, 2022. 2022 Statewide Crop Mapping. Developed by LandIQ. Retrieved from: https://data.cnra.ca.gov/dataset/statewide-crop-mapping/resource/a2ea1b53-44bb-4b56-b7ba-2ffc22c3048e

Escriva-Bou et al, 2023. The Future of Agriculture in the San Joaquin Valley, and Technical Appendices. The Public Policy Institute of California. February 2023.

Geosyntec, 2024. Tri-County Water Authority Tule Subbasin Updated Groundwater Sustainability Plan (GSP). Draft August 6.2024.

GlobalEnergyMonitor.org, 2024. Global Solar Power Tracker. Retrieved from: https://globalenergymonitor.org/projects/global-solar-power-tracker/

UCDavis, 2015. Soil and Groundwater Banking Index Rating (SAGBI) dataset.

Tulare County, 2012. General Plan and Agricultural Element. August 2012. Retrieved from: Microsoft Word - 09-CHP 3-Agriculture.doc

Tulare Agricultural Commission, 2024. Tulare County Crop and Livestock Report, 2023. September 2024.

Tule Subbasin MLRP, 2024. Various resources including Core Plan Fact Sheets. Retrieved from: https://tule-mlrp.org/

The Nature Conservancy, 2023. Power of Place: Clean Energy Solutions that Protect People and Nature. May 2023.

University of California Agricultural and Natural Resources Cooperative Extension, 2019. Sample Costs to Establish an Orchard and Produce Almonds. San Joaquin Valley South 2019.

APPENDIX 1
Tule Subbasin MLRP Core Plan Fact Sheets

APPENDIX 2
TCWA Tule Subbasin Conditions and Opportunities