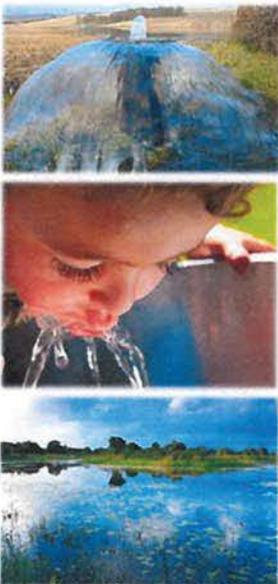


**MCMULLIN AREA GROUNDWATER  
SUSTAINABILITY AGENCY**

**GROUNDWATER CREDIT AND SURFACE WATER  
MARKETING STRATEGY**

**FRESNO COUNTY, CA**



**Application Submitted to the United States Bureau of Reclamation for a  
WaterSMART: Water Marketing Strategy Grant  
Funding Opportunity No. BOR-DO-18-F010**

**Project Manager: Don Cameron  
President of the Board of Directors  
McMullin Area Groundwater Sustainability Agency  
Email: [dcameron@terranovaranchinc.com](mailto:dcameron@terranovaranchinc.com)  
Phone: 559-449-2700**

**JULY 2018**

**JUL 17 '18 AM10:49**

**TABLE OF CONTENTS**

**1 . EXECUTIVE SUMMARY ..... 1**  
(A) GENERAL PROJECT INFORMATION .....1  
(B) PROJECT SUMMARY .....1  
(C) PROJECT DURATION AND ESTIMATED COMPLETION DATE.....1  
(D) RECLAMATION NEXUS .....2  
**2 . BACKGROUND DATA..... 2**  
(A) GEOGRAPHIC LOCATION.....2  
(B) WATER SUPPLY .....2  
(C) WATER DELIVERY SYSTEM .....3  
(D) WATER DEMANDS.....4  
(E) PAST WORKING RELATIONSHIPS WITH RECLAMATION .....4  
**3 . PROJECT DESCRIPTION ..... 4**  
(A) PROJECT WORKPLAN.....4  
(B) PROJECT SCHEDULE.....7  
**4 . EVALUATION CRITERIA ..... 7**  
(A) EVALUATION CRITERION A: WATER MARKETING BENEFITS (40 POINTS).....7  
(B) EVAL. CRITERION B: LEVEL OF STAKEHOLDER SUPPORT AND INVOLVEMENT (30 POINTS).....14  
(C) EVALUATION CRITERION C: ABILITY TO MEET PROGRAM REQUIREMENTS (20 POINTS).....17  
(D) EVALUATION CRITERION D: DEPARTMENT OF INTERIOR PRIORITIES (10 POINTS).....18  
**5 . REQUIRED PERMITS OR APPROVALS ..... 19**  
**6 . PROJECT BUDGET ..... 19**  
**7 . ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE ..... 21**  
**8 . EXISTING ANALYSIS CONTRIBUTING TO WATER MARKETING STRATEGY ..... 21**  
**9 . LETTERS OF SUPPORT ..... 21**  
**10 . OFFICIAL RESOLUTION ..... 22**

**APPENDICES**

- A - PROJECT SCHEDULE
- B - COST ESTIMATE
- C - ANNUAL AGENCY BUDGET
- D - AGENCY RESOLUTION
- E - REFERENCES AND RELATED DOCUMENTS
- E - LETTERS OF SUPPORT

**LIST OF FIGURES**

Figure 1 - Participating Agencies ..... 3  
Figure 2 - Areas with Long-Term Surface Water Supply ..... 8  
Figure 3 - Spring Groundwater Hydrograph..... 9  
Figure 4 – Groundwater Flow Conditions in MAGSA..... 12

**LIST OF TABLES**

Table 1 - 2018 Funding Request Summary ..... 1  
Table 2 - Project Work Plan..... 4  
Table 3 - Major Stakeholder Groups..... 10  
Table 4 - Funding Sources ..... 20  
Table 5 - Budget Proposal..... 20

## TECHNICAL PROPOSAL

### 1 . Executive Summary

#### (A) General Project Information

**Proposal Name:** Groundwater Credit and Surface Water Marketing Strategy

**Date:** July 16, 2018

**Applicant Name:** McMullin Area Groundwater Sustainability Agency

**County and State:** Fresno County, California

#### (B) Project Summary

The McMullin Groundwater Sustainability Agency (MAGSA) is in central California and covers 120,635 acres. MAGSA was formed in response to the Sustainable Groundwater Management Act passed into law in California in 2014, which will ultimately limit groundwater withdrawals in the area. MAGSA has significant water supply issues including groundwater overdraft (33,000 acre-feet/year), declining groundwater levels, declining water quality, no permanent surface water supply, and land subsidence. These conditions have mobilized the MAGSA to explore a water marketing strategy. The proposed project includes two main components: 1) Development of a Groundwater Credit Program, and 2) Coordination with other agencies that could potentially market water to MAGSA. The Groundwater Credit Program would allow landowners, who do not use all their groundwater allocation, to sell or trade the groundwater to other water users in MAGSA. The water marketing component will include outreach, coordination and studies with several water agencies to facilitate potential water transfers into MAGSA. Both components will include significant outreach with landowners, residents, and local water agencies. The project will benefit a multi-jurisdictional area with 12 major stakeholders representing agricultural, municipal, domestic, industrial and environmental water users. The project is located in Reclamation's Central Valley Project Service Area, and could potentially involve water transfers from the Friant Division (San Joaquin River) of the Central Valley Project. The expected project benefits include an increase water supplies, improved water reliability, reduction in land subsidence, incentives to conserve groundwater, improved coordination with other agencies, and creation of a sustainable water supply. The project will require 19 months to complete. The total funding requested is \$193,000 with a cost share of \$193,000 and total cost of \$386,000. Funding is requested from Funding Group I.

**Table 1 - 2018 Funding Request Summary**

Funding Source	Funding Amount
Non-Federal Entities	\$0
McMullin Groundwater Sustainability Agency	\$193,000
Subtotal:	\$193,000
Reclamation Funding:	\$193,000
<b>TOTAL PROJECT FUNDING</b>	<b>\$386,000</b>

#### (C) Project Duration and Estimated Completion Date

Work on the project is expected to begin in December 2018. It is estimated that all work will be completed by the end of June 2020, three months prior to the contractual deadline of September 2020. This will provide a 3-month buffer to account for unforeseen circumstances.

## **(D) Reclamation Nexus**

The McMullin Area Groundwater Sustainability Agency (MAGSA) is a Joint Powers Authority comprised of the County of Fresno (County), Mid-Valley Water District (MVWD), and Raisin City Water District (RCWD). Reclamation nexus with MAGSA members, and several potential water trading partners include:

- On several occasions, MVWD has obtained temporary contracts from USBR to divert Section 215 floodwater from the CVP Friant Division
- The County of Fresno Water Works District 18 has a contract for Class 1 surface water from the CVP Friant Division
- Fresno Irrigation District, located immediately east of MAGSA, has a contract with Reclamation for 75,000 acre-feet (AF) of Class 2 water from the CVP Friant Division
- James Irrigation District, located immediately west of MAGSA, has a contract for 9,700 AF of Schedule 2 CVP water, and another South of Delta CVP contract for 35,300 AF

## **2 . Background Data**

MAGSA was formed in response to the Sustainable Groundwater Management Act (SGMA) passed into law in California in 2014, which will ultimately limit groundwater withdrawals in the area. MAGSA is a Joint Powers Authority comprised of three member-agencies: MVWD, RCWD, and the County of Fresno.

### **(A) Geographic Location**

MAGSA is in north central Fresno County. The agency is bounded to the north by the San Joaquin River. The remaining boundaries of the MAGSA are defined by political boundaries of water districts and other Groundwater Sustainability Agencies (GSAs). MAGSA encompasses approximately 120,635 acres (188 square miles). In addition to its three member-agencies, the MAGSA area also includes two Ecological Reserves managed by the California Department of Fish and Wildlife: the Kerman Ecological Reserve and the Alkali Sink Ecological Reserve. There are no tribal or federal lands in MAGSA. Refer to **Figure 1** for a map of MAGSA and other stakeholders.

### **(B) Water Supply**

The Kings Groundwater Sub-basin of the San Joaquin Groundwater Basin is the main source of water for MAGSA. The aquifer below MAGSA is used for irrigation, municipal, and minor industrial purposes. Groundwater pumping for municipal use occurs in the community of Raisin City. Other private domestic and industrial wells are scattered throughout MAGSA. Agriculture accounts for the largest groundwater demand.

Over 2 million AF of groundwater has been extracted and not replenished in the aquifer below MAGSA, with an average annual groundwater overdraft of approximately 33,000 AF. The aquifer is subject to falling groundwater levels due to a semi-arid climate, limited recharge, and overdraft pumping. Annual rainfall varies considerably from year to year and averages about 10 inches, of which approximately 80% occurs from November through April. This results in a prolonged dry season with heavy reliance on irrigation with groundwater pumping to meet water demands.

MAGSA does not act as a water distributor but has the authority to do so. MVWD, a member agency of MAGSA, has occasionally received small quantities of floodwater from the Kings River and San Joaquin River. Between 1986 and 2017, surface water was delivered 6 out of 32 years and averaged about 5,000 AF/year during each diversion period. More frequent and larger water imports are needed for sustainable farming and groundwater management, which are the impetus for this grant application.

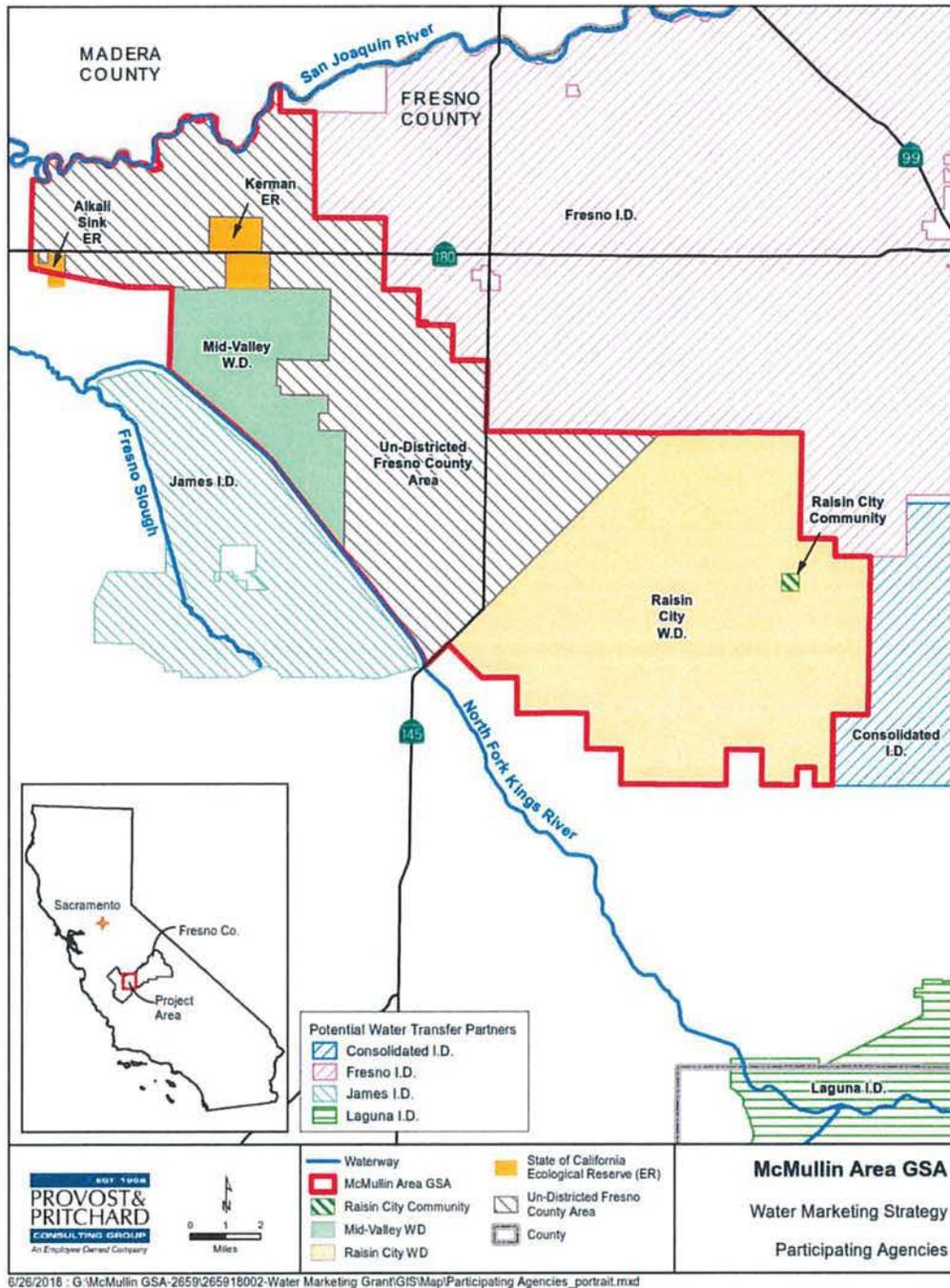


Figure 1 - Participating Agencies

**(C) Water Delivery System**

Water is primarily obtained through private wells and then delivered through private delivery systems. Production well depths range in depth from 75 feet to 800 feet. There are an estimated 1,202 active wells in MAGSA. MAGSA has limited facilities to deliver surface water, since they do not have a permanent surface water supply.

Some limited turnout and conveyance facilities, largely private owned, can be found in various parts of the GSA. These have been used to deliver floodwater from the Kings River and San Joaquin River. MAGSA members are in various stages of planning and design of new recharge ponds, turnouts, and delivery canals.

**(D) Water Demands**

MAGSA is overwhelmingly categorized as agricultural land. Water demands are generally proportional to the land use. Permanent crops represent around 61% of the land, followed by grains, pastures and field crops that occupy around 23%. Residential areas are dominated by rural, single-family homes that occupy 1.5% of the total area. Total water demands are estimated at 282,000 AF/year. MAGSA is preparing a detailed water budget that will provide a more accurate breakdown of water demands.

**(E) Past Working Relationships with Reclamation**

MAGSA is a Joint Powers Authority comprised of MVWD, RCWD, and Fresno County. On several occasions, MVWD has obtained temporary contracts from the USBR for Section 215 flood water from the Friant System of the Central Valley Project (San Joaquin River). MVWD and RCWD were originally formed to execute a contract for surface water from the USBR's then proposed Mid-Valley Canal Unit of the Central Valley Project. In the 1970's, MVWD and RCWD worked closely with USBR on studies for the Mid-Valley Canal. The Mid-Valley Canal was never constructed since most remaining CVP water supplies were dedicated to environmental flows.

**3 . Project Description**

The proposed project includes two main components: 1) Development of a Groundwater Credit Program, and 2) Coordination with other agencies that could potentially market water to MAGSA. The Groundwater Credit Program would allow landowners, who do not use all their groundwater allocation, to sell or trade the groundwater to other water users in MAGSA. The water marketing component will include outreach, coordination and studies with several water agencies to facilitate potential water transfers into MAGSA. Both components will include extensive public outreach to educate local water users on the proposed programs and solicit input and ideas. Funding is requested from Funding Group I.

**(A) Project Workplan**

**Table 2 - Project Work Plan**

Project Management & Grant Administration	Task 1 - Project Management and Administration	
	1.1 - Project Work Plan	- Work with USBR to develop and refine the project work plan, define roles, tasks, deliverables, schedule and budget
	1.2 – Coordination	- Coordinate with USBR monthly
	1.3 - Invoicing	- Review and prepare invoices for submittal to USBR
	1.4 - Monitoring and Reporting	- Monitor Project progress and prepare Interim Performance Reports that track whether milestones, schedules, and costs are on track
	1.5 - Technical Rpts	- Prepare Final Performance Report explaining the process and outcomes

<b>Task 2 - Outreach and Partnership Building</b>		
<b>Element 1 - Outreach</b>	2.1 - Communication and Outreach Plan	- Develop a Communication and Outreach Plan to engage the public, residents/landowners, and other interested parties in project development
	2.2 - Identification and engagement of potential transfer partners	- Identify potential water transfer partners which may include CVP, SWP and Kings River water contractors
		- Contact potential water transfer partners to explore transfer interest, availability, pricing, etc.
	2.3 - Identification and engagement of GSA stakeholders	- Identify stakeholders and affected parties within and adjacent to MAGSA including but not limited to water districts, irrigation districts, municipal water agencies, other public agencies, environmental interests, etc.
	2.4 - Public Outreach	- Conduct targeted outreach to engage the public and interested parties
2.5 - Technical Workshops	- Organize two informational public workshops to explain the water market and groundwater credit program, explain the strategy development process, and solicit feedback and present study results and draft strategy for review.	
<b>Task 3 - Scoping and Planning Activities</b>		
<b>Element 2 - Scoping &amp; Planning</b>	3.1 - Surface Water Market Evaluation	- Review market types such as one-time trading "spot markets," temporary contracts, and permanent contracts; list advantages and constraints of each - Identify potential partners for surface water transfers and sales (Task 2.2) and mechanisms for water exchanges - Quantify the interest and need of stakeholders including M&I, agriculture, and environmental refuges
	3.2 - Groundwater Credit and Trading program Evaluation	- Review existing groundwater credit programs such as Pajaro Valley, North Platte Project, etc. - Identify interested groundwater buyers and sellers
	3.3 - Evaluate Infrastructure Requirements	- Evaluate existing infrastructure capacity and required infrastructure for delivery of surface water, banking, and groundwater transfers
	3.4 - Legal/Water Rights Analysis	- Evaluate any potential legal or institutional issues with water transfers and water rights such as type and place of use - Analyze legal issues with water use such as underground storage, in-lieu recharge, and non-contracted high flow water - Identify agency policies and potential policy issues - Identify compliance needs and permit requirements
	3.5 - Analyze Quantity of Available Supplies	- Analyze water availability for water year types and contractual scenarios - Analyze indirect limitations such as irrigated acreage, crop water uses, and potential localized impacts - Determine current and future demands, sustainable yield, maximum allowable pumping, groundwater recharge capacity and rates (to be done concurrently with Groundwater Sustainability Plan development)
	3.6 - Evaluate Socioeconomic and	- Identify environmental compliance requirements and affected resources with regard to proposed water market and necessary infrastructure upgrades

	<p>Environmental Impacts</p>	<ul style="list-style-type: none"> <li>- Evaluate impacts to agricultural economy from land fallowing versus importing surface water</li> <li>- Perform hydrogeological analysis of the existing aquifer and current and historical evaluation of groundwater conditions and uses (in draft for the 2020 McMullin GSP)</li> <li>- List potential impacts to the aquifer due to groundwater trading and movement including but not limited to: groundwater level declines, subsidence, reduction in groundwater storage, degradation of water quality, changes to groundwater/surface water interactions.</li> </ul>
	<p>3.7 - Economic Analysis</p>	<ul style="list-style-type: none"> <li>- Determine the capital needed to proceed with infrastructure upgrades and annual maintenance costs</li> <li>- Identify operational, overhead, and administrative costs of two programs</li> <li>- Evaluate the cost of surface water exchanges and wheeling charges, and the economic impact of using surface water to supplement groundwater</li> <li>- Evaluate groundwater trading, purchasing, and banking practices for existing groundwater credit markets and the economic effects</li> </ul>
<p>Task 4 - Development of Water Marketing Strategy</p>		
<p>Element 3 - Development of a Water Marketing Strategy</p>	<p>4.1 – Implementation Plan</p>	<ul style="list-style-type: none"> <li>- Identify water market and credit system goals</li> <li>- Defined limiting factors such as extraction rates and volumes, individual allocations, groundwater banking carryover limits, consumptive use limitations, trading zones and ratios</li> <li>- Identify participants (buyers, sellers, investors) in water marketing program, infrastructure to be used (wells, points of diversion, conveyance channels and pipes, and recharge basins)</li> <li>- Address assessments and fees for maintaining and administering the water marketing and groundwater credit program, potential fees and rebates for transfers and conservation</li> <li>- Define roles, responsibilities and administrative structure for implementing marketing and credit program</li> <li>- Summarize rationale for pursuit of preferred surface water transfers, sales and alternatives considered and not selected, and issues to be resolved prior to implementation</li> </ul>
	<p>4.2 – Legal Framework</p>	<ul style="list-style-type: none"> <li>- Establish oversight and enforcement mechanisms</li> <li>- Discuss water rights laws that pertain to proposed programs</li> <li>- List internal rules and regulations that would govern water marketing and groundwater credit programs</li> <li>- Establish trading and transfer approval procedures</li> </ul>
	<p>4.3 - Monitoring Plan</p>	<ul style="list-style-type: none"> <li>- Select programs and tools for tracking water transfers and payments, and impacts to groundwater conditions</li> </ul>
	<p>4.4 - Decision Support Tools</p>	<ul style="list-style-type: none"> <li>- Research commercial programs such as WaterFind (<a href="https://www.waterfind.com.au/">https://www.waterfind.com.au/</a>) and Mammoth Trading (<a href="http://www.mammothtrading.com">www.mammothtrading.com</a>) for water trading</li> </ul>

	- Develop decision matrix for restricting groundwater transfers and purchasing water based on economic and environmental considerations
4.5 - Identify Future Pilot Programs	- Document details for potential future pilot programs

**(B) Project Schedule**

Work is expected to begin in December 2018. It is estimated that all work will be completed by the end of June 2020, three months prior to the anticipated contract deadline of September 2020. This will provide a 3-month buffer in case of unforeseen circumstances that could delay the project. **Appendix A** includes a Gantt chart showing a detailed schedule. The tasks in the schedule match those in the workplan and project budget. Agency staff and board members have already reserved time to work on the project and identified potential consultants to lead the work.

**4 . Evaluation Criteria**

**(A) Evaluation Criterion A: Water Marketing Benefits (40 points)**

- o *Will the water marketing strategy address a specific water supply shortfall?*

Historically, there have been no restrictions on groundwater pumping in most areas of California. This has led to significant groundwater overdraft, especially in areas like MAGSA that have no permanent surface-water supply. MAGSA is almost fully developed for irrigated agriculture, and their sustainable groundwater supply is insufficient to meet water demands. MAGSA is in the Kings Groundwater Sub-basin, which is considered a 'high priority' and 'critically overdrafted' basin, according to the California Department of Water Resources.

In 2014, the State of California passed three bills that are collectively known as the Sustainable Groundwater Management Act (SGMA). Under SGMA, MAGSA is required to develop a Groundwater Sustainability Plan, and gradually achieve groundwater sustainability between 2020 and 2040. Once the GSP is implemented, groundwater pumping will need to be regulated. To meet all future water demands, MAGSA will need to reduce groundwater pumping, import more surface water, or both. While SGMA is mandated by the State of California, MAGSA also sees it in their best interest to stabilize groundwater levels and develop a more robust surface water program.

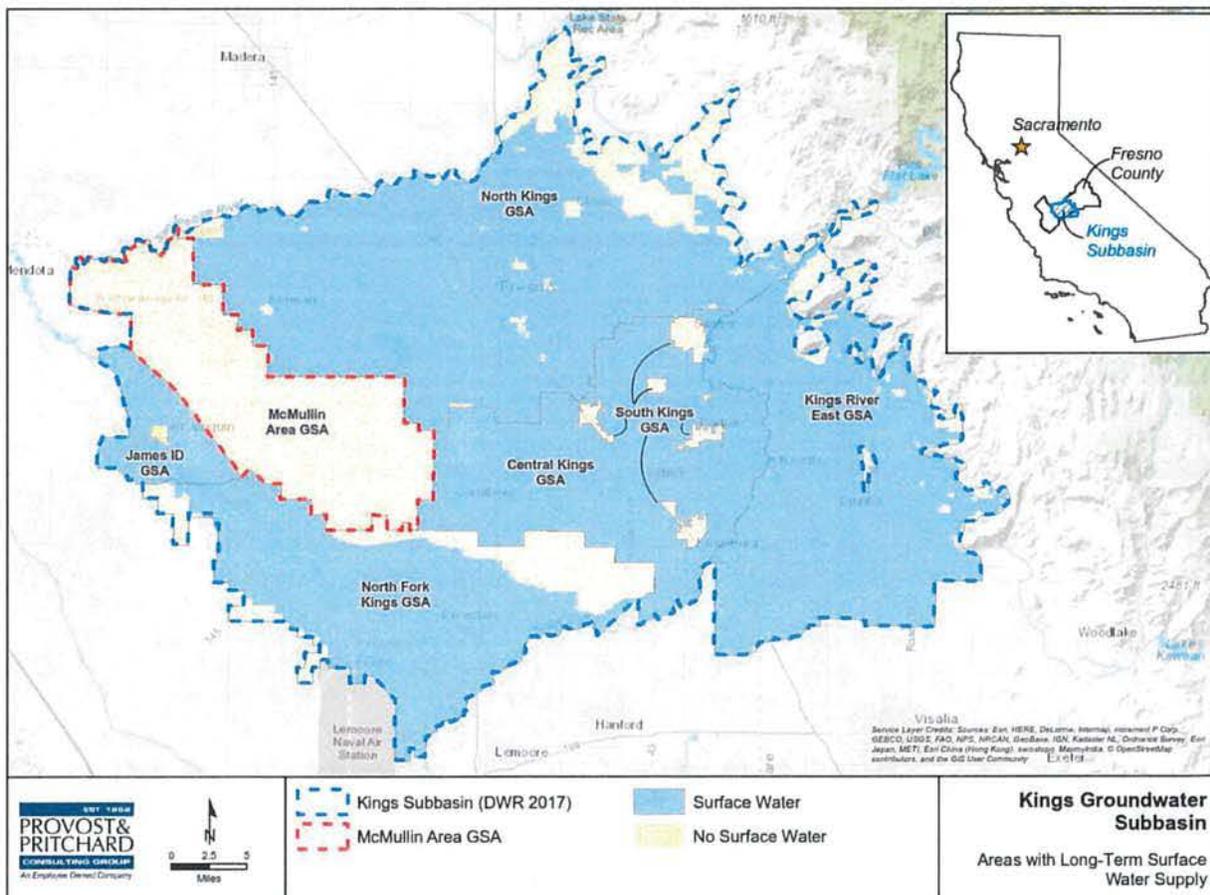
Groundwater contour maps show that MAGSA has an estimated overdraft (i.e. supply gap) of 33,000 AF/year in 2018. This shortfall will need to be addressed through land fallowing (considered a last resort), water conservation (which is encouraged through the proposed Groundwater Credit Program) and surface water imports (a focus of this grant application). The overdraft MAGSA must correct will likely be larger, since MAGSA has created cones of depression and significantly modified groundwater flow patterns. (Groundwater flow maps are shown later under this Evaluation Criteria). This has increased the rate of groundwater flow into MAGSA from neighboring areas, thus masking the true overdraft condition.

The Water Marketing will address this shortfall by creating a plan to import surface water, reduce demands on groundwater, and eliminate the shortfall (i.e. eliminate groundwater overdraft).

- o *What is the nature and severity of the shortfall?*

**Regional Impacts.** The San Joaquin Valley of California was disproportionately affected by water restrictions during the most recent 5-year drought (2012-2016). San Joaquin Valley communities, agriculture, and even specialized habitats suffered due to surface water restrictions and declining groundwater levels. Severe drought conditions prompted statewide curtailments, which in turn increased demand on groundwater aquifers. In 2015, some surface water users received zero allocation.

**Lack of Surface Water.** MAGSA relies primarily on groundwater to meet water demands. The total estimated water demand in MAGSA is 283,000 AF/year. However, annual surface water imports have only averaged 1,700 AF/year. The total demand greatly exceeds the groundwater safe yield and is causing groundwater overdraft. **Figure 2** is a map showing areas with and without a long-term surface water supply in the Kings Groundwater Sub-basin. This figure clearly shows that MAGSA is the largest area without a surface water supply. The proposed Water Supply Strategy will be the first step in correcting this situation.

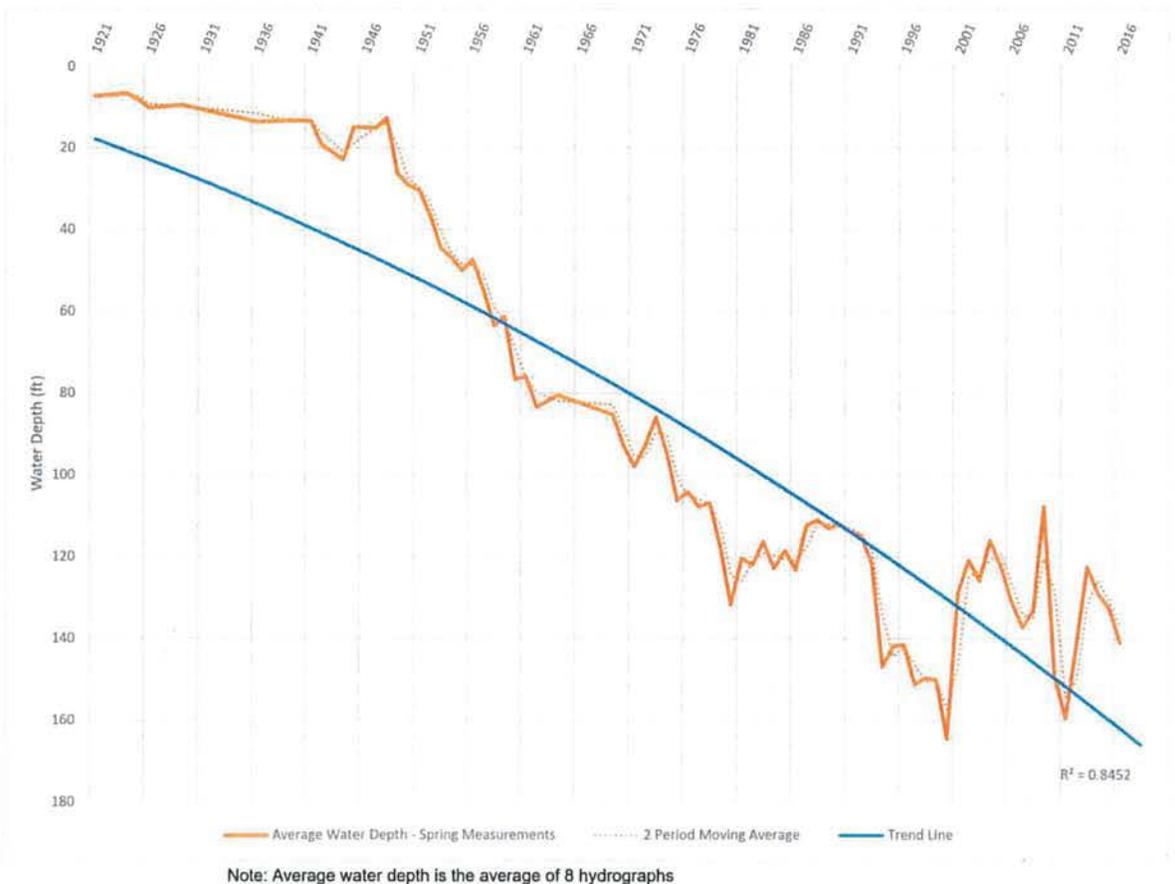


**Figure 2 - Areas with Long-Term Surface Water Supply**

**Groundwater Levels.** Groundwater levels in the MAGSA have historically fluctuated seasonally and in response to wet or dry periods, however, the long-term trend is decreasing water levels. **Figure 3** show a hydrograph based on average of eight different hydrographs in MAGSA. Groundwater levels have declined about 150 feet since the 1920's, with a long-term average decline of 1.5 feet/year. During the drought from 2012 to 2015, groundwater levels dropped as much as 40 feet in some areas.

**Land Subsidence.** Groundwater overdraft has also lead to land subsidence. The Draft MAGSA Groundwater Sustainability Plan (Provost & Pritchard, 2018) states that from May 2015 to May 2016, the 'western edge of the MAGSA area has up to 7 inches of subsidence, caused principally by groundwater pumping'.

All the water sectors (agricultural, municipal, residential, industrial and environmental) are impacted by these conditions. The declining groundwater levels result in lower well yields, greater pumping costs, lower water quality, and a reduction in groundwater reserves in droughts.



**Figure 3 - Spring Groundwater Hydrograph**

- *How and to what extent will the water market/water marketing activities, once implemented, address the shortfall? Please describe the expected benefits.*

The two components of the project are intertwined and synergistic. Surface water imports will allow landowners to reduce groundwater pumping or obtain a groundwater surplus through groundwater recharge. Landowners will be able to improve water reliability by selling/trading groundwater surpluses to other water users.

After 5 years of extreme drought, the California Central Valley experienced one of the wettest water years on record in 2017. The San Joaquin River received 240% of its average full natural flow. Flooding along the Kings

and San Joaquin Rivers caused serious threats to life and property as dams and levees overtopped or eroded. Contractors for USBR Central Valley Project water contracts were unable to utilize their full contract amounts, selling and exchanging surface water with districts that possessed infrastructure to divert. These are the types of opportunities that the MAGSA is seeking.

Surface water could potentially be transferred into the MAGSA area from the San Joaquin River, Kings River, and various smaller local streams. Surface water purchases are believed to be feasible in Wet Years, when floodwater would be available. Also, in Above Average Years, other agencies may have surplus waters, or waters they cannot use during brief periods they are available.

The project is anticipated to provide the following benefits: 1) Increase water supplies; 2) Improve water reliability; 3) Stabilize groundwater levels; 4) Improve water quality; 5) Reduce the need to deepen or replace wells; 6) Reduce groundwater pumping costs; 7) Reduce pumping induced land subsidence; 8) Incentive to conserve water (Groundwater Credit Program); 9) Prevent or reduce land fallowing; 10) Reduced economic impact from land fallowing (by selling groundwater supplies); and 11) Create a sustainable water supply.

- *Will the water market/water marketing activities benefit multiple sectors and/or types of water uses? If so, to what extent and which sectors and water uses will benefit?*

Multiple stakeholders and stakeholder groups will benefit from the project as shown below:

**Table 3 - Major Stakeholder Groups**

No.	Stakeholder	Description
1	McMullin Area Groundwater Sustainability Agency (MAGSA)	Applicant
2	Mid-Valley Water District	Members of MAGSA
3	Raisin City Water District	
4	County of Fresno	
5	Raisin City	Residential community in MAGSA
6	Rural residential pumpers	Domestic well owners in unincorporated areas of MAGSA
7	California Department of Fish and Wildlife	Manger of Kerman Ecological Reserve and Alkali Sink Ecological Reserve in MAGSA
8	Kings River Conservation District	Regional water agency that covers the Kings River region, including all of MAGSA
9	Fresno Irrigation District	Potential water transfer partners
10	Consolidated Irrigation District	
11	Laguna Irrigation District	
12	James Irrigation District	

**Agricultural:** The two agricultural water districts in MAGSA (RCWD and MVWD) will benefit from improved water reliability, reduced groundwater overdraft, improved water quality, an incentive to conserve groundwater, and a lower risk of land fallowing. If land fallowing or land conversion do occur, the economic impact could be lessened with the ability to market groundwater allocations. Four neighboring agricultural water agencies have

the potential to transfer water to MAGSA. These agencies can benefit from additional revenue, while helping to reduce the cone of depression in MAGSA that adversely modifies groundwater flows and groundwater levels in their service areas.

**Municipal, Residential, and Industrial:** Municipal, residential, and industrial water users will benefit from more reliable water supplies, improved water quality, less groundwater overdraft, and a long-term reduction in the need to deepen or replace wells.

**Environmental:** The two Ecological Reserves in MAGSA could utilize surface water imports to develop pond, wetland and vernal pool habitat. They could also sell their groundwater allocation through the Groundwater Credit Program and use the revenue for habitat improvements.

- *Explain how and to what extent the proposed water market or water marketing activities will improve water supply reliability in general in the area upon implementation of the strategy:*
  - o *Reducing the likelihood of conflicts over water*

There are two existing conflicts in the region that the project will help address:

#### Modification of Groundwater Flows

Tensions exist between two different groups in the region: 1) Those with a surface water supply; and 2) Those that rely exclusively on groundwater. **Figure 2** showed that MAGSA was the largest area in the Kings Groundwater Sub-basin without a long-term surface water supply. Areas that rely exclusively on groundwater are responsible for much of the groundwater overdraft, have modified groundwater flows due to the creation of cones of depression, and have impacted groundwater levels in adjacent areas. The MAGSA Groundwater Sustainability Plan (2018) states:

*“Groundwater flow patterns in the upper (unconfined) and in lower confined aquifers (i.e., below the Corcoran Clay) under natural flow conditions in the MAGSA differed greatly before agricultural development of the area.”*

**Figure 4** shows regional groundwater flows in 2015. Water flows into MAGSA from several areas, at gradients and flow volumes that exceed historical values. This has created conflicts with several neighboring areas. The proposed project can help to reverse this problem by allowing MAGSA to import surface water, raise groundwater levels, and help the gradients of groundwater flows entering MAGSA.

#### Groundwater Exportation

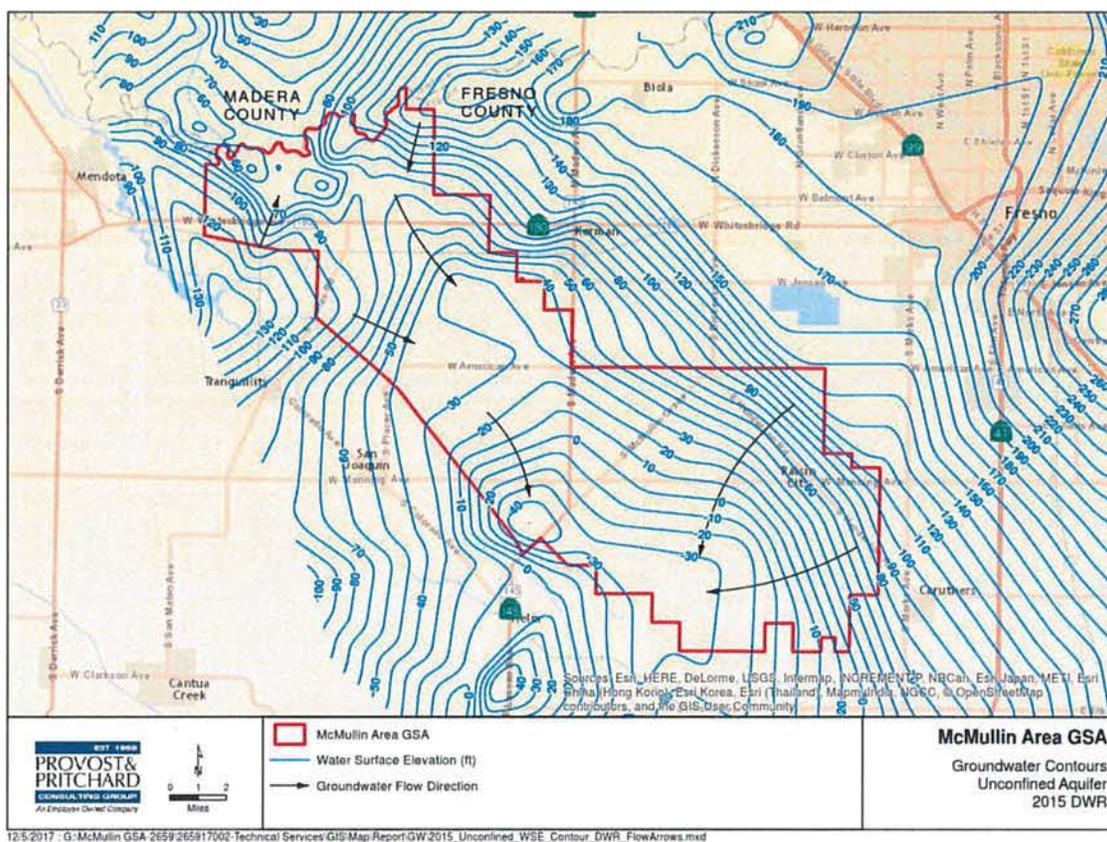
James Irrigation District (JID), located just west of MAGSA, pumps and exports groundwater from 35 wells located within MAGSA. JID has a Groundwater Deed that has allowed these groundwater exports for many years. While a legal deed permits this pumping, it has caused tension between MAGSA and JID due to the significant effect on groundwater levels. The two parties are trying to address how the groundwater exportation will be addressed through new groundwater laws in California. However, the Water Marketing Study will identify ways to import surface water and help mitigate the current groundwater overdraft. Furthermore, James Irrigation District could potentially transfer water to MAGSA, while generating additional revenue for itself.

- o *Increasing resiliency to drought*

Creating a water market to import surface water will be the first step toward developing a conjunctive use system that, at a minimum, allows for groundwater recharge and potentially supplements groundwater directly. Having access to multiple sources of water will increase drought resiliency by conserving groundwater during wet years, which will decrease vulnerability to drought. The Groundwater Credit Program will also increase resiliency by giving value to groundwater and treating it as a commodity. This will create additional incentive to use water more efficiently.

*o Sustaining agricultural communities*

As groundwater pumping is gradually limited to the sustainable yield, groundwater supplies will be insufficient to meet crop demands, possibly leading to the fallowing of large areas. Implementing the water market and groundwater credit program will import additional water supplies, increase flexibility in groundwater use, and help reduce the need for land fallowing.



**Figure 4 – Groundwater Flow Conditions in MAGSA**

*o Demonstrating a water marketing approach that is innovative and which may be applied by others*

Implementation of a Groundwater Credit Program would pioneer the way for other agencies in the Kings Groundwater Sub-basin, and surrounding areas, to develop similar programs. The Implementation Plan, new policies developed, and other related studies can be shared with other agencies. No similar programmatic studies on surface water transfers have been performed in the Kings Groundwater Sub-basin. The methodology,

general conclusions and lessons learned can be shared with the rest of the region and help to benefit a wider area.

- o Providing instream flows for species, recreation or water quality objectives.*

During a May 2018 meeting of the Technical Committee for the MAGSA Groundwater Sustainability Plan, several local growers stated the following:

1. As groundwater levels have declined, so has groundwater quality. In particular, groundwater has become more bicarbonate, requiring the use of more amendments for irrigation systems, which also increases operational costs.
2. In limited areas where surface water has been used, higher crop yields were realized due to better quality water and leaching of salts from the soils.

This suggests that chemicals are concentrating as groundwater levels decline. Hence, groundwater quality should improve from a reduction in groundwater pumpage and increase in surface water use.

- *Explain the extent to which the water market/activity will be ready to proceed upon completion of the strategy, addressing each of the following:*
  - o Describe your plans and timeline for implementing the strategy upon its completion.*

The Water Marketing Strategy is intended to be a detailed guidebook with sufficient information to immediately implement surface water imports and the Groundwater Credit Program. Upon completion of the Water Marketing Strategy, MAGSA will implement the following steps:

1. Enact the authority to limit groundwater pumping, require monitoring, and enforce penalties for non-compliance. This will be done as part of California's Sustainable Groundwater Management Act. This authority will begin in 2020 with a gradual increase in regulations and enforcement.
  2. Purchase and develop database software for tracking and managing the Groundwater Credit program
  3. Draft and execute surface water contracts
  4. Upgrade or install infrastructure to divert, convey and recharge surface water imports
- o Are there complex issues, including issues of law or policy, that would need to be resolved before the strategy could be implemented?*

Three water sources are potentially available for transfer into MAGSA: San Joaquin River, Kings River, and various local streams. Each source has unique laws and policies regarding place of use, environmental flows requirements, diversion limitations, etc. These laws and policies will be reviewed to identify the best options for MAGSA. MVWD in MAGSA has successfully imported limited surface water since the 1980's, illustrating that some level of water transfers is feasible.

No groundwater laws or policies are expected to impact the Groundwater Credit Program. However, the proposed policy will still be reviewed for compliance with local and statewide groundwater laws.

- o Explain whether previous planning, outreach and/or water marketing activities have been completed, including work on any of the required Project elements (1), (2), and (3).*

**Appendix E** summarizes complementary planning efforts that will assist in the development and eventual implementation of the Water Marketing Strategy. It includes local and statewide planning documents, selected projects from local planning documents, databases, and other water markets/case studies that will be reviewed. **Appendix E** also describes the specific relevancy of each study, and their relation to the three grant application elements.

Valuable information in these documents includes the following: 1) Characterization of hydrogeology; 2) Documentation of the water supply shortfall; 3) Frequency and availability of local floodwaters; 4) Preliminary studies for groundwater recharge and conveyance projects; 5) Preliminary studies on conveyance projects with neighboring agencies Fresno Irrigation District and Laguna Irrigation District, who could be water trading partners; 6) Public outreach efforts and input from the public; and 7) Criteria for managing the aquifer sustainably

### **(B) Eval. Criterion B: Level of Stakeholder Support and Involvement (30 points)**

- *Identify stakeholders in the planning area who have committed to be involved in the planning process.*

As part of the grant application, significant outreach was performed to educate stakeholders, solicit comments, and secure support for the proposed work. The outreach efforts included the following:

- **Website News Article.** A news article was published in the MAGSA website on June 22, 2018 (<http://mcmullinarea.org/mcmullin-area-gsa-pursues-grant-for-water-marketing-study-and-groundwater-credit-system/>) describing the grant application, and requesting comments and input.
- **Technical Subcommittee Meeting.** On May 2, 2018, a presentation on overdraft mitigation measures was given to the Technical Committee for the MAGSA Groundwater Sustainability Plan. Several measures were discussed, including surface water imports and groundwater credits. Local landowners showed particular interest in a groundwater credit program, which was a primary motive for this grant application. A news article discussing the meeting is on the MAGSA website (<http://mcmullinarea.org/consultants-propose-gsp-project-concepts-for-mcmullin-area/>).
- **MAGSA Board Meetings.** The grant application was discussed at two public MAGSA Board meetings on June 6 and July 11, 2018. Members of the public asked several questions and showed overall support for the application. The Board of Directors adopted a resolution to support the application on July 11, 2018 (see **Appendix D**).
- **Kings Coordinated Committee Meeting.** On June 16, 2018, a MAGSA representative presented the proposed Water Marketing Study to the Kings Coordinated Group, a group of seven GSAs in the Kings Groundwater Sub-basin. The reaction was positive, and no opposition was noted. Among those present were four potential water trading partners.
- **Letters of Support.** Letters of Support were received from numerous stakeholders (see letters in **Appendix F**, and a list of authors in Section 9 – Letters of Support).

All the major stakeholders have committed to being involved in the project, including landowners, growers, local water agencies, and neighboring water agencies.

- *Describe their commitment, e.g., will they contribute funding or in-kind services or otherwise engage in the planning process?*

The primary stakeholders include local landowners, MAGSA member agencies, MAGSA Board members and staff, and neighboring agencies. All of these stakeholders will contribute at meeting and workshops and assist in the review of deliverables. MAGSA staff and member agencies will assist with administrative tasks and organizing and running outreach events. Neighboring agencies will contribute through meetings and discussions with MAGSA on potential water transfers. There are no plans for MAGSA staff to claim costs for their in-kind services.

- *Please explain whether the project is supported by a diverse set of stakeholders.*

**Agricultural:** The project is supported by local growers and agricultural water agencies, as evidenced by letters of support, and their verbal support at various meetings.

**Municipal / Residential:** The project is supported by municipal and residential interests as evidenced by a Letter of Support from Fresno County, who operates the Raisin City water system and also represents rural residential areas. Domestic well owners also supported the project at various meetings and in letters of support.

**Environmental:** The California Department of Fish and Wildlife manages two ecological reserves in MAGSA. They have not been actively involved in MAGSA's efforts to date, and, as a result, MAGSA plans to directly reach out to them for input and cooperation on the Water Marketing Study.

There are no Federally recognized tribes in MAGSA. There is also no major water related recreation in MAGSA.

- *Describe stakeholders in the planning area who have expressed their support for the planning process, whether or not they have committed to participate.*

Letters of support for this grant application have been received from various stakeholder groups including landowners, growers, local water agencies, regional water agencies, non-profit organizations, and potential water trading partners. A list of the Letters of Support received is provided in Section 9 – Letters of Support. The letters of support are provided in **Appendix F**.

- *Is there opposition to the proposed strategy? If so, describe the opposition and explain how it will be addressed.*

There is no known opposition to the project. During the aforementioned public outreach efforts, no opposition was noted or observed. The proposed study has full support of the GSA Board of Directors, local landowners, local water agencies, and neighboring water agencies.

- *Do any separate planning efforts express support for the proposed water market/transaction? Explain how the proposed water marketing strategy will avoid duplication or complication of other ongoing planning efforts.*

**Appendix E** summarizes complementary planning efforts that will assist in the development and eventual implementation of the Water Marketing Strategy. It includes local and statewide planning documents, selected projects from local planning documents, databases, and other water markets/case studies that will be reviewed.

The Draft MAGSA Groundwater Sustainability Plan (Provost & Pritchard, 2018) justifies and supports the need for surface water imports, groundwater recharge and a Water Marketing Study in the following passage:

*"Since groundwater is currently the only source of water for the farmers and other users within MAGSA, there is a clear awareness of the importance of water conservation and a renewed focus on developing recharge and surface water deliveries projects. Four components are being considered. These are direct groundwater recharge, dormant flooding, in-lieu surface water deliveries, and groundwater banking. The intent of these options is to capture floodwater from the Kings and San Joaquin Rivers, when available, and to provide the facilities with which the Water Districts could participate in transfers or exchanges that would net water for the growers – either groundwater or surface water – and help move the plan area towards sustainability." (page 39)*

MAGSA will avoid duplication by performing a review of these studies during Sub-Tasks 3.1 and 3.2 in the Scope of Work, which are at the beginning of the Scoping and Planning Activities Task. This will help ensure that the information in the studies is utilized and efforts are not duplicated.

- *Describe what efforts that you will undertake to ensure participation by a diverse array of stakeholders in developing the water marketing strategy. If specific stakeholders have not yet been identified, or if some sectors are not yet represented, explain how you will accomplish this in the first few months after an award.*

An extensive public outreach effort is planned to educate, engage and solicit input from the public and various water agencies. Public outreach efforts in the scope of work will include:

- **MAGSA Email List:** MAGSA maintains an email list with over 120 stakeholders. Regular updates on the project will be conveyed to the email group.
- **MAGSA Website.** At least two articles on the Water Marketing Study will be posted on the MAGSA website to inform the public and invite them to participate.
- **Kings Coordinated Effort Meetings.** MAGSA regularly attend meetings that include representatives from all 7 GSAs in the Kings Groundwater Subbasin, including several potential water trading partners. MAGSA will give regular updates at these meetings.
- **Board of Director Meetings.** MAGSA Board meetings are open to the public, and typically draw members of the public. Regular updates and presentations on the project will be given at these meetings.
- **Meetings with Neighboring Water Agencies.** MAGSA will meet directly with at least four different water agencies that have potential to transfer water to MAGSA. They will be informed about the purpose of the study and asked to discuss future water transfers.
- **Public Workshops.** Two public workshops will be held to discuss the Water Marketing Strategy in detail and solicit input from stakeholders. These will be interactive sessions aimed at getting input, honest comments and new ideas from the public.
- **Report Posting.** Draft and Final Reports for the grant project will be placed on the MAGSA website for public review and information.

More effort will be made to engage the California Department of Fish and Wildlife (CDFW), who manages two Ecological Reserves in MAGSA. A letter was sent to CDFW informing them of MAGSA, and their plans to prepare a Groundwater Sustainability Plan. So far, they have not been actively engaged in MAGSA's efforts. MAGSA will directly contact CDFW to provide information and encourage their participation in the Water Marketing Study.

### (C) Evaluation Criterion C: Ability to Meet Program Requirements (20 points)

- Describe how the three elements of a water marketing strategy will be addressed within the required timeframe. Please include an estimated project schedule that shows the stages and duration of the proposed work including major tasks, milestones, and dates. If prior planning work will be relied on to meet any of the required elements, please explain.

See **Appendix A** for a detailed project schedule. The schedule includes tasks, sub-tasks, and major milestones. The schedule expects project completion 3 months prior to the contractual deadline, which provides a comfortable buffer. The budget is included in **Appendix B**. This schedule and cost estimate were both prepared by an engineering consulting firm that also assisted in developing the scope of work, is aware of existing conditions and needs of MAGSA, has extensive experience with water transfers in California, and is also assisting MAGSA with development of their Groundwater Sustainability Plan.

The tasks and subtasks are all consistent in the Scope of Work, Schedule and Budget. The project will consist of multiple tasks to satisfy the three Program Elements.

Elements 1, 2 and 3 in the grant solicitation will be addressed with Tasks 1, 2 and 3 in the Scope of Work. The administrative and reporting aspects of the grant will be covered in Task 1 – Project Reporting and Administration.

The only significant planning effort that the Water Marketing Study will rely on is the Draft MAGSA Groundwater Sustainability Plan, which will identify the sustainable yield and overdraft mitigation responsibility for MAGSA. This will be completed in early 2019 and will identify the volume of surface water MAGSA should strive to import.

- Describe the availability and quality of existing data and models applicable to the proposed water marketing strategy.

Much of the data applicable to the proposed Water Marketing Study is being collected as part of MAGSA's Groundwater Sustainability Plan. Significant work has already been performed on the plan, and a draft will be completed in January 2019.

The following data has already been collected for the Groundwater Sustainability Plan: historical groundwater levels, groundwater flow direction, land subsidence data, water quality data, and local demographics.

Future data to be collected or calculated in the plan include: a detailed water budget, groundwater sustainable yield, and a final overdraft correction value for MAGSA. These numbers will be very important in determining how much surface water MAGSA should import.

Flow data, contract allocations, and surface water diversion data for the San Joaquin River is readily available from USBR. Similar data for the Kings River is available from the Kings River Water Association.

- Identify staff with appropriate technical expertise and describe their qualifications. Describe any plans to request additional technical assistance from Reclamation, or by contract.

The applicant has no plans to request technical assistance from Reclamation. The GSA will rely primarily on contracted consultants to perform the study. Applicant staff and Board members will assist with administrative

tasks, outreach efforts and review of submittals. The lead engineer that would perform the study includes:

**Randy Hopkins, PE.** Mr. Hopkins is a principal water resources engineer with Provost & Pritchard Consulting Group with over 15 years of experience in the California Central Valley. Mr. Hopkins is currently serving as the Interim-Secretary to the MAGSA Board of Directors. Mr. Hopkins has worked on several water related studies in the MAGSA area. He also has personal relationships with water managers at neighboring agencies that could potentially market water to MAGSA. Mr. Hopkins is a licensed civil engineer in California.

#### **(D) Evaluation Criterion D: Department of Interior Priorities (10 points)**

##### **1. Creating a conservation stewardship legacy second only to Teddy Roosevelt**

*a. Utilize science to identify best practices to manage land and water resources and adapt to changes in the environment*

Implementing this project will provide valuable data on the groundwater aquifer including groundwater levels, groundwater quality, and land subsidence in responses to changes in surface water use and groundwater pumping. This data will guide future adaptive management of water resources, including changes to improve land management, conserve water, and address climate change. This information can also be leveraged by other agencies.

*d. Review Interior's water storage, transportation, and distribution systems to identify opportunities to resolve conflicts and expand capacity*

A study of existing water supplies and infrastructure in the San Joaquin Valley river system (Friant System of the Central Valley Project) will be performed to identify available waters for MAGSAs purchase. These surface water purchases will help to reduce water conflicts in the region.

*e. Foster relationships with conservation organizations advocating for balanced stewardship and use of public lands*

MAGSA plans to engage the California Department of Fish and Wildlife, who manage the Kerman Ecological Reserve and Alkali Sink Ecological Reserve in MAGSA. The goal is to engage them in the Water Marketing study, as well as MAGSA's Groundwater Sustainability Plan. The Ecological Reserves could benefit from surface water to develop pond, wetland, and vernal pool habitat, or could sell groundwater credits and generate funds for habitat improvements.

##### **3. Restoring trust with local communities**

*a. Be a better neighbor with those closest to our resources by improving dialogue and relationships with persons and entities bordering our lands*

It is more important than ever to establish collaborative efforts with neighboring agencies and to ensure that water management practices do not negatively impact others in the region. Sharing the results of the Water Marketing Study will show good faith and MAGSA's dedication to improving the health of the groundwater aquifer for all. This project is being proposed partly from a desire to be a better neighbor by stabilizing groundwater levels, returning groundwater flows to normal conditions, and increasing surface water use in the Kings Groundwater Sub-basin.

*b. Expand the lines of communication with Governors, state natural resource offices, fish and wildlife offices, water authorities, county commissioners, Tribes, and local communities*

The Water Marketing Study will open and expand communication with local agencies, the California Department of Fish and Game, and MAGSA landowners. A broad stakeholder outreach program will educate, solicit input and seek stakeholder involvement on the Water Marketing Study.

### **5. Modernizing our infrastructure**

*b. Remove impediments to infrastructure development and facilitate private sector efforts to construct infrastructure projects serving American needs*

The project will help remove impediments to infrastructure development by identifying, evaluating, and prioritizing potential projects. Further, meetings and negotiations will be held with neighboring agencies to discuss use or connection with their conveyance facilities. A study was also completed in MAGSA that *'evaluates leveraging private farmlands in the Kings River Basin to capture flood flows for direct and in lieu recharge, calculates on-farm infiltration rates, assesses logistics, and considers potential water quality issues.'* (Bachand and Associates, 2012). This project, the McMullin On-Farm Recharge Project, is currently being designed and will be constructed in the next few years. This project will serve as a model for similar projects that use imported water and private land.

## **5 . Required Permits or Approvals**

No permits or approvals will be required to complete the Water Marketing Strategy. The Water Marketing Strategy will be a planning document and exempt from the California Environmental Quality Act and National Environmental Policy Act. Appropriate environmental studies and compliance will be performed as projects identified in the study are implemented.

## **6 . Project Budget**

### **Funding Plan and Letters of Commitment**

(i) *How you will make your contribution to the cost share requirement, such as monetary and/or in-kind contributions and source funds contributed by the applicant.*

MAGSA will provide their cost share contributions from existing revenue sources. **Appendix C** includes an annual budget for MAGSA covering 2018 through 2023. The project cost share will come from Item 2.6 – Project Development, which includes budgets beginning at \$230,000/year in 2018 and increasing to \$292,300/year by 2020. This is more than adequate to provide the proposed cost share.

MAGSA recently held a local Proposition election to assess \$19/acre to fund the agency. The Proposition was overwhelmingly approved by the public in June 2018. MAGSA Resolution 2018-01 was passed on June 6, 2018 to assess the property fee. A 2018 Fee Study by Lechowicz and Teng Municipal Consultants estimated that revenues would be \$2,175,000/year, which is the basis for the budget in **Appendix C**. The resolution and fee study are not included due to page limits in this application, but can be provided on request.

(ii) *Describe any in-kind costs incurred before the anticipated Project start date that you seek to include as costs.*

There will be no in-kind costs before the project start date.

(iii) Provide the identity and amount of funding to be provided by funding partners, as well as the required letters of commitment.

The proposed project will not have any funding partners.

(iv) Describe any funding requested or received from other Federal partners.

No other Federal funding was requested or has been received for the project.

(v) Describe any pending funding requests that have not yet been approved, and explain how the project will be affected if such funding is denied.

There are no pending funding requests for the project.

**Budget Proposal**

**Table 4 - Funding Sources**

Funding Sources	Percent of Total Project Cost	Total Cost by Source
Recipient Funding	50%	\$193,000
Reclamation Funding	50%	\$193,000
Other Federal Funding	None	\$0
Totals	100%	\$386,000

**Table 5 - Budget Proposal**

Budget Item Description	Recipient Funding	Reclamation Funding	Total Cost
Salaries/Wages/Fringes	\$0	\$0	\$0
Travel	\$0	\$0	\$0
Equipment	\$0	\$0	\$0
Supplies/Materials	\$0	\$0	\$0
Contractual/Construction	\$193,000	\$193,000	\$386,000
Other: Contingencies	\$0	\$0	\$0
<b>Total Direct Costs</b>	\$193,000	\$193,000	\$386,000
Indirect Costs – 0.0%	\$0	\$0	\$0
<b>Total Project Costs</b>	\$193,000	\$193,000	\$386,000

Note: See details in **Appendix B** for billing rates and hours for each task

**Budget Narrative**

**Salaries and Wages** – Agency staff and Board members will assist with administrative efforts, attend meetings and workshops, and review work products, but will not seek reimbursement or claim cost share for their time.

**Fringe Benefits** – No fringe benefits will be charged to the project.

**Travel** – Travel expenses will include limited mileage costs for consultants to attend project meetings, workshops and outreach events. These will be billed at the standard IRS mileage rate in effect at the time of the project.

There will be no costs for lodging, per diem or air travel. Since the mileage costs are for consultants they are placed in the Contractual category.

**Equipment** – The project will not require any construction or equipment.

**Materials and Supplies** – The project will not require any materials or supplies.

**Contractual** – Contractual costs will be incurred for consultants to assist with the Water Market Study. **Appendix B** includes an estimate of consultant costs. This estimate was prepared by an engineering consulting firm that also assisted in developing the scope of work, is aware of existing conditions and needs of MAGSA, has extensive experience with water transfers in California, and is also assisting MAGSA with development of their Groundwater Sustainability Plan.

**Environmental and Regulatory Compliance Costs** – The project will not require any environmental documentation or permitting, and therefore will not have any environmental or regulatory compliance costs.

**Other Expenses** – There will be no other expenses.

**Indirect Costs** – The project will not have any indirect costs.

**Total Cost** – The total estimated project cost is \$386,000, with requested funding of \$193,000 and applicant cost share of \$193,000.

## **7 . Environmental and Cultural Resources Compliance**

The project will not include activities involving measurement, monitoring, field work, pilot activities, or ground-breaking activities. Therefore, no environmental or cultural resources compliance, or NEPA documentation, will be required. Consequently, the additional questions on this topic in the Funding Opportunity Announcement are not applicable.

## **8 . Existing Analysis Contributing to Water Marketing Strategy**

**Appendix E** summarizes complementary planning efforts that will assist in the development and eventual implementation of the Water Marketing Strategy. It includes local and statewide planning documents, selected projects from local planning documents, databases, and other water markets/case studies that will be reviewed. **Appendix E** also describes the specific relevancy of each study, and their relation to the three grant application elements.

## **9 . Letters of Support**

Stakeholder letters of support for the project can be found in **Appendix F**. Several stakeholder groups provided letters including local water agencies, regional water agencies, local landowners, and other organizations. Over 30 letters were received, signifying strong support and interest in the project. Letters were received from the following:

Water Agencies: County of Fresno, Kings River Conservation District, Mid-Valley Water District, Raisin City Water District

Local Landowners: Abercrombie Farms, Hardy Farms, Don Cameron, Johnny Verwey, Harguindeguy Farms, Green Leaf Enterprises, Jason Vick, Double E Farms, Hillview Cattle & Farms, Westlawn Ranches, LG Land Corporation, Paul Toste, Sal Rodriguez, Radinoff Farms, Beverly Durham, Jeanne Harguindeguy, Pala Siegel, Michael Naito, Nicole Borges, Kimberlee Durham, Darren Hoff, Stephen Shehadey, R. G. Gunland, Harris

Gunland Vineyard, Firecrest, Inc., Thaden Vick, Kenneth Abrahamian  
Other Organizations: Milk Producers Council

## 10 . Official Resolution

**Appendix D** includes a resolution authorizing the preparation of this application and funding for the Agency's cost share. The resolution was adopted at a MAGSA Board meeting held on July 11, 2018.



**Appendix B: ESTIMATE OF TOTAL PROJECT COST**  
**McMullin Area Groundwater Sustainability Agency**  
**Groundwater Credit and Surface Water Marketing Strategy**

STAFF HOURS	Contracted Costs							Totals			
	Principal Engineer	Senior Engineer	Associate Engineer	Senior Hydrogeologist	Water Resources Specialist	GIS Specialist	Administrative Assistant	Photocopies	Mileage	Total Engineering Hours	Total Cost
Rate / Hour	\$180	\$150	\$125	\$160	\$135	\$135	\$70				
<b>Task 1 Project Reporting and Administration</b>											
Task 1.1 Project Work Plan	8	8					2	\$0	\$0	18	\$2,780
Task 1.2 Project Coordination	20						10	\$0	\$0	30	\$4,300
Task 1.3 Invoicing		12					12	\$50	\$0	24	\$2,690
Task 1.4 Monitoring and Reporting	4	10	10					\$50	\$0	24	\$3,520
Task 1.5 Technical Reports	10	10	10				10	\$100	\$0	40	\$5,350
										<b>Task 1 Total =</b>	<b>\$18,640</b>
<b>Task 2 Outreach and Partnership Building</b>											
Task 2.1 Communication and Outreach Plan		16	16				8	\$50	\$0	40	\$5,010
Task 2.2 Identity/Engage Potential Transfer Partners	60	60						\$0	\$100	120	\$19,900
Task 2.3 Identify/Engage GSA Stakeholders		20	20					\$0	\$50	40	\$5,550
Task 2.4 Public Outreach	10	40	40	10			20	\$100	\$200	120	\$16,100
Task 2.5 Technical Workshops	40	40	40				20	\$0	\$200	140	\$19,800
										<b>Task 2 Total =</b>	<b>\$66,360</b>
<b>Task 3 Scoping and Planning Activities</b>											
Task 3.1 Surface Water Market Evaluation	40	40	40		40	10		\$0	\$0	170	\$24,950
Task 3.2 Groundwater Credit System Evaluation	40	80	40	40	40	10		\$0	\$0	250	\$37,350
Task 3.3 Evaluate Infrastructure Requirements/Constraints	20	200	180			20	10	\$100	\$100	430	\$59,700
Task 3.4 Legal/Water Rights Issues	40				40			\$0	\$0	80	\$12,600
Task 3.5 Quantity of Available Supplies	10	40	60	20				\$0	\$0	130	\$18,500
Task 3.6 Evaluate Socioeconomic and Environmental Impacts			50	20	50			\$0	\$0	120	\$16,200
Task 3.7 Economic Analyses	10	60	60		20			\$0	\$0	150	\$21,000
										<b>Task 3 Total =</b>	<b>\$190,300</b>
<b>Task 4 Market Development and Implementation</b>											
Task 4.1 Implementation Plan	40	120	120	40	40		20	\$50	\$50	380	\$53,500
Task 4.2 Legal Framework	10	20			20			\$0	\$0	50	\$7,500
Task 4.3 Monitoring Plan		40	20	40		10		\$0	\$0	110	\$16,250
Task 4.4 Decision Support Tools	20	40	40	20	40			\$0	\$0	160	\$23,200
Task 4.5 Identify Future Pilot Programs	10	20	20	10	10			\$0	\$0	70	\$10,250
										<b>Task 4 Total =</b>	<b>\$110,700</b>
<b>Total Hours:</b>	392	876	766	200	300	50	112				
<b>Total Cost:</b>	\$70,560	\$131,400	\$95,750	\$32,000	\$40,500	\$6,750	\$7,840	\$500	\$700	2,696	\$386,000

TOTAL ESTIMATED PROJECT COST: **\$386,000**

McMullin Area GSA 5-year Budget

Category	FY <sup>a</sup> 2017-2018	FY <sup>a</sup> 2018-2019	FY <sup>a,b</sup> 2019-2020	FY <sup>a,b</sup> 2020-2021	FY <sup>a,b</sup> 2021-2022	FY <sup>a,b</sup> 2022-2023	TOTAL
<b>1 GSA Administration</b>							
1.1 Public Outreach (KRCD)	\$ 20,000	\$ 25,000	\$ 25,800	\$ 26,600	\$ 27,400	\$ 28,200	\$ 133,000
1.2 Office Supplies / Postage / Outreach Materials		\$ 5,000	\$ 5,200	\$ 5,400	\$ 5,600	\$ 5,800	\$ 27,000
1.3 Insurance	\$ 3,000	\$ 5,000	\$ 5,200	\$ 5,400	\$ 5,600	\$ 5,800	\$ 27,000
1.4 Fiscal Agent Services/Annual Audit	\$ 10,000	\$ 10,000	\$ 10,300	\$ 10,600	\$ 10,900	\$ 11,200	\$ 53,000
1.5 Other/Miscellaneous Overhead	\$ 5,000	\$ 10,000	\$ 10,300	\$ 10,600	\$ 10,900	\$ 11,200	\$ 53,000
<b>ITEM 1 SUBTOTAL</b>	<b>\$ 38,000</b>	<b>\$ 55,000</b>	<b>\$ 56,800</b>	<b>\$ 58,600</b>	<b>\$ 60,400</b>	<b>\$ 62,200</b>	<b>\$ 293,000</b>
<b>2 Professional Services</b>							
2.1 Agency Management	\$ 208,000	\$ 350,000	\$ 360,600	\$ 371,400	\$ 382,500	\$ 394,000	\$ 1,858,500
<i>General Manager<sup>c</sup></i>		\$ 240,000	\$ 247,200	\$ 254,600	\$ 262,200	\$ 270,100	
<i>Legal - General</i>		\$ 25,000	\$ 25,800	\$ 26,600	\$ 27,400	\$ 28,200	
<i>Legal - GSA Subbasin and Interbasin Coordination</i>		\$ 20,000	\$ 20,600	\$ 21,200	\$ 21,800	\$ 22,500	
<i>Sub-Basin Coordination</i>		\$ 65,000	\$ 67,000	\$ 69,000	\$ 71,100	\$ 73,200	
2.2 Prop 218 Elections / Funding		\$ 43,000	\$ 44,400	\$ 45,800	\$ 47,200	\$ 48,600	\$ 229,000
<i>Engineering Consultant</i>		\$ 12,000	\$ 12,400	\$ 12,800	\$ 13,200	\$ 13,600	
<i>Rate Consultant</i>		\$ 6,000	\$ 6,200	\$ 6,400	\$ 6,600	\$ 6,800	
<i>Legal Review</i>		\$ 25,000	\$ 25,800	\$ 26,600	\$ 27,400	\$ 28,200	
2.3 Groundwater Sustainability Plan Preparation	\$ 234,000	\$ 569,900	\$ 370,050				\$ 939,950
<i>Draft GSP Preparation</i>							
<i>Project Coordination and Management</i>		\$ 12,000	\$ 6,000				
<i>Public Outreach</i>		\$ 41,300	\$ 20,400				
<i>Committee Meetings</i>		\$ 18,400	\$ 9,100				
<i>Board Meetings</i>		\$ 19,600	\$ 9,700				
<i>Executive Summary</i>		\$ 12,600					
<i>Introduction</i>		\$ 12,400					
<i>Plan Area</i>		\$ 38,900					
<i>Basin Setting</i>		\$ 101,000	\$ 49,700				
<i>Monitoring Network</i>		\$ 82,900	\$ 40,900				
<i>Sustainable Management Criteria</i>		\$ 52,800	\$ 26,000				
<i>Projects and Management Actions</i>		\$ 98,400	\$ 48,500				
<i>Plan Implementation</i>		\$ 34,800	\$ 17,200				
<i>References</i>		\$ 7,800	\$ 3,800				
<i>Appendices/Supporting Documentation</i>		\$ 7,000	\$ 3,500				
<i>Final GSP Preparation</i>							
<i>Address Comments from GSA Sponsors</i>			\$ 51,450				
<i>Address Public Comments</i>			\$ 47,950				
<i>Submit Plan to State</i>			\$ 4,950				
<i>Legal Review</i>		\$ 30,000	\$ 30,900				
<i>DWR Grant</i>		\$ (107,143)	\$ (107,143)				
2.4 Legal, Litigation Reserve	\$ 20,000	\$ 100,000	\$ 103,000	\$ 106,100	\$ 109,300	\$ 112,600	\$ 531,000
2.5 Grant Writing		\$ 100,000	\$ 103,000	\$ 106,100	\$ 109,300	\$ 112,600	\$ 531,000
2.6 Project Development		\$ 230,000	\$ 283,900	\$ 292,300	\$ 301,100	\$ 310,100	\$ 1,417,400
<i>Feasibility Analysis</i>		\$ 100,000	\$ 150,000	\$ 154,500	\$ 159,100	\$ 163,900	
<i>Environmental Review</i>		\$ 50,000	\$ 51,500	\$ 53,000	\$ 54,600	\$ 56,200	
<i>Hydrogeologic Analysis</i>		\$ 50,000	\$ 51,500	\$ 53,000	\$ 54,600	\$ 56,200	
<i>Legal Review</i>		\$ 30,000	\$ 30,900	\$ 31,800	\$ 32,800	\$ 33,800	
2.7 Governmental Relations/ Legislative Advocate		\$ 50,000	\$ 51,500	\$ 53,000	\$ 54,600	\$ 56,200	\$ 265,300
<b>ITEM 2 SUBTOTAL</b>	<b>\$ 462,000</b>	<b>\$ 1,442,900</b>	<b>\$ 1,316,450</b>	<b>\$ 974,700</b>	<b>\$ 1,004,000</b>	<b>\$ 1,034,100</b>	<b>\$ 5,772,150</b>
<b>3 Monitoring and Implementation</b>							
3.1 Monitoring and Implementation		\$ 215,000	\$ 371,500	\$ 572,100	\$ 589,300	\$ 607,100	\$ 2,355,000
<i>Monitoring Wells</i>		\$ 100,000	\$ 103,000	\$ 106,100	\$ 109,300	\$ 112,600	
<i>Well Design</i>		\$ 15,000	\$ 15,500	\$ 16,000	\$ 16,500	\$ 17,000	
<i>Data Management System Development</i>		\$ 100,000	\$ 103,000				
<i>Data Gathering</i>			\$ 100,000	\$ 200,000	\$ 206,000	\$ 212,200	
<i>Data and Water Budget Model &amp; Analysis</i>			\$ 50,000	\$ 250,000	\$ 257,500	\$ 265,300	
<b>ITEM 3 SUBTOTAL</b>	<b>\$ -</b>	<b>\$ 215,000</b>	<b>\$ 371,500</b>	<b>\$ 572,100</b>	<b>\$ 589,300</b>	<b>\$ 607,100</b>	<b>\$ 2,355,000</b>
<b>ITEM 4 - 15% RESERVE / CONTINGENCY</b>	<b>\$ -</b>	<b>\$ 256,900</b>	<b>\$ 261,700</b>	<b>\$ 240,800</b>	<b>\$ 248,100</b>	<b>\$ 255,500</b>	<b>\$ 606,520</b>
<b>TOTAL ESTIMATED BUDGET (ITEMS 1 - 4)</b>	<b>\$ 500,000</b>	<b>\$ 1,969,800</b>	<b>\$ 2,006,450</b>	<b>\$ 1,846,200</b>	<b>\$ 1,901,800</b>	<b>\$ 1,958,900</b>	<b>\$ 9,683,150</b>
<b>AVERAGE COST PER ACRE<sup>d</sup></b>		<b>\$ 17.17</b>	<b>\$ 17.49</b>	<b>\$ 16.09</b>	<b>\$ 16.57</b>	<b>\$ 17.07</b>	
<b>5-YEAR AVERAGE COST PER ACRE</b>		<b>\$ 16.88</b>					

Notes: a Fiscal Year (FY) is July 1 - June 30  
b Assumes 3% per year increase for FY2019-20 through FY2022-23.  
c Assumes \$180,000 per year salary plus \$60,000 for taxes, benefits  
d MAGSA Assessable Acres = 114,749 +/-  
MAGSA Total Acres = 120,635 +/-

BEFORE THE BOARD OF DIRECTORS  
*of the*  
MCMULLIN AREA GROUNDWATER SUSTAINABILITY AGENCY

11th day of July , 2018

PRESENT: *D. Cameron, M. Abercrombie, B. Pacheco, J. Singh, J. Rai*

ABSENT: *none*

**RESOLUTION NO. 2018 - 02**

**RESOLUTION OF THE MCMULLIN AREA GROUNDWATER  
SUSTAINABILITY AGENCY FOR A GRANT FROM THE UNITED STATES  
BUREAU OF RECLAMATION WATERSMART GRANTS: WATER  
MARKETING STRATEGY GRANTS FOR FISCAL YEAR 2018**

The following Resolution is hereby offered and read:

**WHEREAS**, the McMullin Area Groundwater Sustainability Agency (“MAGSA”) is a public agency and eligible to submit an application for funding from the WaterSMART Grants: Water Marketing Strategy Grants (“Grant Program”) for fiscal year 2018;

**WHEREAS**, the MAGSA would like to develop a Water Marketing Program in conformance with United States Bureau Reclamation guidelines that address water marketing approaches, legal issues of water rights, available water, socioeconomic and environmental impacts, implementation and monitoring, and have the project partially funded with monies from the Grant Program;

**WHEREAS**, MAGSA will commit to the financial and legal obligations associated with receipt of financial assistance under the Grant Program;

**WHEREAS**, the MAGSA Board of Directors has reviewed and supports the proposed Grant Program application;

**WHEREAS**, the MAGSA has the full capability to provide the amount of funding and/or in-kind contributions specified in the funding plan;

**WHEREAS**, if selected for a grant, the MAGSA will work with the United States Bureau of Reclamation to meet established deadlines for entering into a cooperative agreement.

**NOW, THEREFORE, BE IT RESOLVED** by the Board of Directors of the McMullin Area Groundwater Sustainability Agency that pursuant and subject to all of the terms and provisions of the WaterSMART: Water Marketing Strategy Grant Application, and amendments thereto, hereby approves the proposed Grant Program application by this Agency to be submitted to the United States Bureau of Reclamation for a grant to perform a Water Market Strategy Study.

The Chair of the Board of Directors and/or General Manager is hereby authorized and directed to prepare the necessary data, make investigations, sign, and file such application with the United States Bureau of Reclamation.

Upon motion of Director Singh, seconded by Director Abercrombie, and on the following roll call vote, to wit:

AYES: Directors Cameron, Abercrombie, Pacheco, Singh, Rai

NOES:

ABSENT:

ABSTAINING:

the foregoing Resolution is hereby adopted on the 11<sup>th</sup> day of July, 2018.

  
\_\_\_\_\_  
Chairperson of the Board of Directors

ATTEST:

I hereby certify that I am the Secretary of the McMullin Area Groundwater Sustainability Agency and that the foregoing Resolution was duly adopted by the Board of Directors of said Agency at the meeting duly held in Kerman, California on July 11, 2018, at which meeting a quorum of said Board of Directors was at all times present and acting.

IN WITNESS WHEREOF, I have hereunto set my hand and seal of said District this 11<sup>th</sup> day of JULY, 2018.

  
\_\_\_\_\_  
Secretary of the Board of Directors

**McMullin Groundwater Sustainability Agency**

**Application for a Water Marketing Strategy Grant**

***Appendix E – References and Related Documents***

## APPENDIX E - REFERENCES AND RELATED DOCUMENTS

Planning Documents	Lead Agency	Author	Date	Support for Water Market	Relevancy to Water Market	Web Address
Draft McMullin Area GSA Groundwater Sustainability Plan (GSP) McMullin On-Farm Flood Capture Project, Phase 1, Conceptual Design	McMullin GSA  McMullin GSA	Provost & Pritchard Consulting Group Banchard & Associates	2018  2014	Element 1, 2 & 3  Element 2 & 3	The GSP will be developed concurrently with the Water Market. It will define the water that needs to be imported and include a detailed groundwater monitoring plan.  This study evaluates a large on-farm recharge project within MAGSA	Not available since it is still being developed, but information can be found here: <a href="http://mcmullinarea.org/gsp/">http://mcmullinarea.org/gsp/</a> <a href="http://rd.tetrattech.com/?pursuit=WaterQuality&amp;proj=100-LCC-T31035">http://rd.tetrattech.com/?pursuit=WaterQuality&amp;proj=100-LCC-T31035</a>
Kings Basin Integrated Regional Water Management Plan (IRWMP)	Kings Basin Water Authority	Kings Basin Water Authority	2012	Element 2 & 3	The IRWMP acts as a funding source for project implementation and will be instrumental in obtaining funding for proposed projects. Several MAGSA projects are on the IRWMP project list for consideration.	<a href="http://www.kingsbasinauthority.org/governance/governing-documents/irwmp/">http://www.kingsbasinauthority.org/governance/governing-documents/irwmp/</a>
Groundwater Recharge Feasibility Study, Prepared for Raisin City Water District	Raisin City Water District	WRIME	2012	Element 2 & 3	This study will be utilized to determine the feasibility of surface water recharge and locations for implementation as well as potential to recharge surface water and surface water quantities that could be utilized	See attached Cover and Table of Contents. Additional sections can be provided on request.
Raisin City Water District, Infrastructure Master Plan	Raisin City Water District	Provost & Pritchard Consulting Group	2018	Element 2 & 3	This study identified potential projects in Raisin City Water District that could use imported water  This plan identifies challenges, goals, and methods of implementation for the Raisin City Water District. This will be used to assist in outreach, planning and implementation of the Water Market as well as analyze the	See attached Cover and Table of Contents. Additional sections can be provided on request.
Raisin City Water District, 2016 Strategic Plan	Raisin City Water District	Provost & Pritchard Consulting Group	2016	Element 1, 2 & 3	potential challenges to implementation.  This study evaluates on-farm recharge potential as part of a pilot study in MAGSA, and provides useful	<a href="http://www.fresnofafco.org/documents/staff-reports/October%202016/Strategic%20Plan%202016-1003.pdf">http://www.fresnofafco.org/documents/staff-reports/October%202016/Strategic%20Plan%202016-1003.pdf</a>
Implications of Using On-Farm Flood Flow Capture to Recharge Groundwater and Mitigate Flood Risks Along the Kings River, CA	Kings River Conservation District	Blanchard & Associates	2012	Element 2	information for future project development	<a href="http://aquaticcommons.org/11289/1/CIG%20On%20Farm%20Flood%20Capture%20Fact%20Sheet.pdf">http://aquaticcommons.org/11289/1/CIG%20On%20Farm%20Flood%20Capture%20Fact%20Sheet.pdf</a>

## APPENDIX E - REFERENCES AND RELATED DOCUMENTS

Planning Documents	Lead Agency	Author	Date	Support for Water Market	Relevancy to Water Market	Web Address
Coordinated Long-Term Operation of the Central Valley Project and State Water Project, Final Environmental Impact Statement	U.S. Department of the Interior, Bureau of Reclamation	Mid-Pacific Region, Bay-Delta Office	2015	Element 1, 2 & 3	Will be used to verify the policies and regulations of the State and Federal water projects, assist in initiating outreach, and defining potential policy issues	<a href="https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=23658">https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=23658</a>
California Water Plan Update	California Department of Water Resources	California Department of Water Resources	2013	Element 2	Will be used to ensure the plans and projects are compatible with the California Water Plan and water management strategies	<a href="https://water.ca.gov/Programs/California-Water-Plan/Water-Plan-Updates">https://water.ca.gov/Programs/California-Water-Plan/Water-Plan-Updates</a>
California Bulletin 118 2003 Update	California Department of Water Resources	California Department of Water Resources	2003	Element 2	Will be used to assess the hydrology and capacity of the soils and aquifer below the MAGSA.	<a href="https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/Statewide-Reports/Bulletin_118_Update_2003.pdf">https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/Statewide-Reports/Bulletin_118_Update_2003.pdf</a>
Trading Sustainably: Critical Considerations for Local Groundwater Markets Under the Sustainable Groundwater Management Act	UC Berkeley School of Law	Nylen et al	2017	Element 1 & 2	Will be used as a guidebook to analyze general considerations for groundwater markets, outreach and planning	<a href="https://www.law.berkeley.edu/research/cee/research/wheeler/trading-sustainably/">https://www.law.berkeley.edu/research/cee/research/wheeler/trading-sustainably/</a>
<b>Selected Projects from Local Studies</b>				Element 2 & 3	Assists with groundwater recharge	
Grantland Recharge Project	McMullin GSA			Element 2 & 3	Assists with importing and recharging surface water	
Mid-Valley WD James Bypass Surface Water Supply and Recharge Project	Mid-Valley Water District			Element 2 & 3	Assists with importing and recharging surface water	
Mid-Valley WD South Sandridge Canal Water Supply and Recharge Project	Mid-Valley Water District			Element 2 & 3	Assists with importing and recharging surface water	
Raisin City WD Stinson North Canal Water Supply and Recharge Project	Raisin City Water District			Element 2 & 3	Assists with importing and recharging surface water	
McMullin On-Farm Flood Capture Project, Phase 2&3, Terranova Ranch	McMullin GSA			Element 2 & 3	Assists with diverting and recharging surface water on farm fields	
<b>Databases</b>				Element 2	Water Resources Data for Planning	<a href="http://cdec.water.ca.gov">http://cdec.water.ca.gov</a>
California Department of Water Resources/California Data Exchange Center	DWR	State of California	2018	Element 2	Evapotranspiration and meteorological data for planning	<a href="https://cimis.water.ca.gov/">https://cimis.water.ca.gov/</a>
California Irrigation Management Information System	DWR	State of California	2018	Element 2		
<b>Other Markets/Case Studies</b>				Location	Operator	Implementation year
Recharge Net Metering in the Pajaro Valley	California	Pajaro Valley Water Management Agency	2016		Utilized net recharge metering to allow landowners to generate credits for recharging stormwater. Acts as a true marketing system where revenue can be generated by recharging water	
Colorado-Big Thompson Project	Colorado	Norther Colorado Water Conservation District	1957		Largest water transfer project in Colorado. Operated with the help of USBR. Exchanges allow lease of water during surplus and water is brokered by a host of private entities.	

## APPENDIX E - REFERENCES AND RELATED DOCUMENTS

Planning Documents	Lead Agency	Author	Date	Support for Water Market	Relavency to Water Market	Web Address
North Platte Project	Nebraska	Mammoth Trading Works	2014	Irrigation can only happen on properties or acreages that are licensed. Trade between landowners for groundwater access is based on acreage.		
Kern Water Bank	California	Kern Water Bank Authority	1995	Works to provide recharge using recharge ponds and extraction via wells. Also serves to protect habitat and groundwater dependent wetlands.		
Truckee Meadows Groundwater Bank	Nevada	Truckee Meadows Water Authority	2000	Consists of an aquifer storage and recovery program that tracks water and serves as an accounting system for credits and withdrawals.		
Eastern Snake Plain Aquifer Managed Recharge	Idaho	Idaho Water Resource Board	2006	Incentivizes allowing seepage from canals.		
Murray-Harling Water Market	Australia	Murray-Darling Basin Commission	2000	One of the largest and most successful water markets.		

Raisin City Water District

# Infrastructure Master Plan

June 2018

**ADMINISTRATIVE DRAFT**

Prepared for:  
Raisin City Water District

Prepared by:  
Provost & Pritchard Consulting Group  
2505 Alluvial Ave, Clovis, California 93611

# Table of Contents

1	Introduction.....	1-1
1.1	Purpose and Goals.....	1-1
1.2	Background.....	1-2
1.3	Project Area.....	1-2
1.4	Scope of the Study/Project.....	1-4
2	Water Supply.....	2-1
2.1	Water Rights.....	2-1
2.1.1	State Water Project Supplies.....	2-1
2.1.2	Central Valley Project Supplies.....	2-1
2.1.3	Kings River Supplies.....	2-3
2.2	Possible Implications.....	2-5
2.3	Water Rights Permit Process.....	2-6
3	Favorable Recharge Areas.....	3-1
3.1	SAGBI Ranking.....	3-1
4	Grantland Area Recharge Project.....	4-1
4.1	Project Description.....	4-1
4.2	Location.....	4-1
4.3	Soils.....	4-3
4.4	Water Supply.....	4-5
4.5	Prior Studies and Reports.....	4-5
4.6	Existing Facilities.....	4-5
4.7	Required New Facilities.....	4-5
4.8	Project Benefits.....	4-8
4.9	Economic Analysis.....	4-8
4.10	Permitting and Regulatory Requirements.....	4-9
4.11	Next Steps.....	4-9
5	Fresno City Wastewater Treatment Plant Recharge Basins, FID Lower Dry Creek Canal System.....	5-1
5.1	Project Description.....	5-1
5.2	Location.....	5-3
5.3	Water Supply.....	5-3
5.4	Prior Studies and Reports.....	5-4
5.5	Existing Facilities.....	5-4

5.6	Required New Facilities.....	5-4
5.7	Project Benefits.....	5-5
5.8	Economic Analysis.....	5-6
5.9	Permitting and Regulatory Requirements.....	5-7
5.10	Next Steps .....	5-8
6	Fresno City Wastewater Treatment Plant Recharge Basins, FID Houghton Canal System.....	6-1
6.1	Project Description .....	6-1
6.2	Location .....	6-3
6.3	Water Supply.....	6-3
6.4	Prior Studies and Reports .....	6-4
6.5	Existing Facilities.....	6-4
6.6	Required New Facilities.....	6-4
6.7	Project Benefits.....	6-7
6.8	Economic Analysis.....	6-7
6.9	Permitting and Regulatory Requirements.....	6-8
6.10	Next Steps .....	6-9
7	McMullin On-Farm Flood Capture Project, Phases 2 and 3.....	7-1
7.1	Project Description .....	7-1
7.2	Location .....	7-1
7.3	Soils.....	7-3
7.4	Water Supply.....	7-5
7.5	Prior Studies and Reports .....	7-5
7.6	Existing Facilities.....	7-6
7.7	Required New Facilities.....	7-6
7.8	Project Benefits.....	7-6
7.9	Economic Analysis.....	7-7
7.10	Permitting and Regulatory Requirements.....	7-8
7.11	Next Steps .....	7-8
8	Stinson North Canal Water Supply and Recharge Project.....	8-1
8.1	Project Description .....	8-1
8.2	Location .....	8-1
8.3	Soils.....	8-3
8.4	Water Supply.....	8-5
8.5	Prior Studies and Reports .....	8-5

8.6	Existing Facilities.....	8-5
8.7	Required New Facilities.....	8-5
8.8	Project Benefits.....	8-6
8.9	Economic Analysis.....	8-6
8.10	Permitting and Regulatory Requirements.....	8-7
8.11	Next Step.....	8-7
9	Consolidated ID Wristen Ditch Intertie.....	9-1
9.1	Project Description.....	9-1
9.2	Location.....	9-1
9.3	Soils.....	9-3
9.4	Water Supply.....	9-5
9.5	Prior Studies and Reports.....	9-5
9.6	Existing Facilities.....	9-5
9.7	Required New Facilities.....	9-6
9.8	Project Benefits.....	9-7
9.9	Economic Analysis.....	9-7
9.10	Permitting and Regulatory Requirements.....	9-8
9.11	Next Steps.....	9-8
10	Southwest Groundwater Banking Project.....	10-1
10.1	Project Description.....	10-1
10.2	Location.....	10-3
10.3	Soils.....	10-3
10.4	Water Supply.....	10-5
10.5	Prior Studies and Reports.....	10-5
10.6	Existing Facilities.....	10-6
10.7	Required New Facilities.....	10-6
10.8	Project Benefits.....	10-6
10.9	Economic Analysis.....	10-7
10.10	Permitting and Regulatory Requirements.....	10-7
10.11	Next Steps.....	10-8
11	Approvals Potentially Needed.....	11-1
11.1	Laws, Regulations and Permits.....	11-1
11.1.1	Federal.....	11-1
11.1.2	State.....	11-2

11.1.3 Local..... 11-3

12 Conclusions and Recommendations..... 12-1

12.1 Summary of Findings..... 12-1

12.2 Recommendations..... 12-1

12.3 Areas of Additional Research / Next Steps..... 12-4

13 Bibliography/References ..... 13-1

# List of Figures

Figure 1-1. Project Locations and Raisin City Water District.....	1-3
Figure 4-1. Grantland Area Recharge Project Location & Facilities .....	4-2
Figure 4-2. SAGBI Rating Soils near the Grantland Area Recharge Project.....	4-4
Figure 4-3. Channel Capacity Improvements Highlighted in LMC Hydraulic Analysis Summary .....	4-7
Figure 5-1. Aerial Photograph of Lower Dry Creek Project and Existing Site .....	5-2
Figure 5-2. Lower Dry Creek Canal Lift Station (Conceptual).....	5-5
Figure 6-1. Houghton Canal Project Location & Facilities.....	6-2
Figure 6-2. Houghton Canal Lift Station (Conceptual) .....	6-5
Figure 6-3. RWTF Turnout for Basins 38-44.....	6-6
Figure 7-1. McMullin On-Farm Flood Capture Project Location, Phases & Facilities.....	7-2
Figure 7-2. SAGBI Rating Soils near the McMullin On-Farm Flood Protection Project .....	7-4
Figure 8-1. Stinson North Canal Project Location & Facilities.....	8-2
Figure 8-2. SAGBI Rating Soils near the Stinson North Canal Project.....	8-4
Figure 9-1. Wristen Ditch Intertic Project Location & Facilities .....	9-2
Figure 9-2. SAGBI Rating Soils near the Wristen Ditch Project .....	9-4
Figure 10-1. Southwest Banking Project Location & Facilities .....	10-2
Figure 10-2. SAGBI Rating Soils near the Southwest Banking Project.....	10-4

# List of Tables

Table 2-1. Historic Friant CVP Water Supply Availability and Allocation by Year.....	2-2
Table 2-2. Floodwater Discharge at James Bypass Gaging Station Since the construction of Pine Flat Dam (1954/55 – 2015/16).....	2-4
Table 4-1. Summary of Probable Construction Cost for Grantland.....	4-8
Table 4-2. Summary of Cost per AF for Grantland Area Recharge Project.....	4-9
Table 5-1. Recharge Basins for Lower Dry Creek Canal.....	5-3
Table 5-2. Flow Rates Based on Assumed Infiltration Rates when Maximum Flows Available.....	5-3
Table 5-3. Summary of Maximum and Typical Recharge Volume.....	5-6
Table 5-4. Summary of Probable Construction Cost for Lower Dry Creek .....	5-7
Table 5-5. Summary of Cost per AF for Lower Dry Creek.....	5-7
Table 6-1. Recharge Basins for Houghton Canal .....	6-3
Table 6-2. Flow Rates Based on Assumed Infiltration Rates when Maximum Flows Available.....	6-4
Table 6-3. Summary of Maximum and Typical Recharge Volume.....	6-7
Table 6-4. Summary of Probable Construction Cost for Houghton Canal.....	6-8

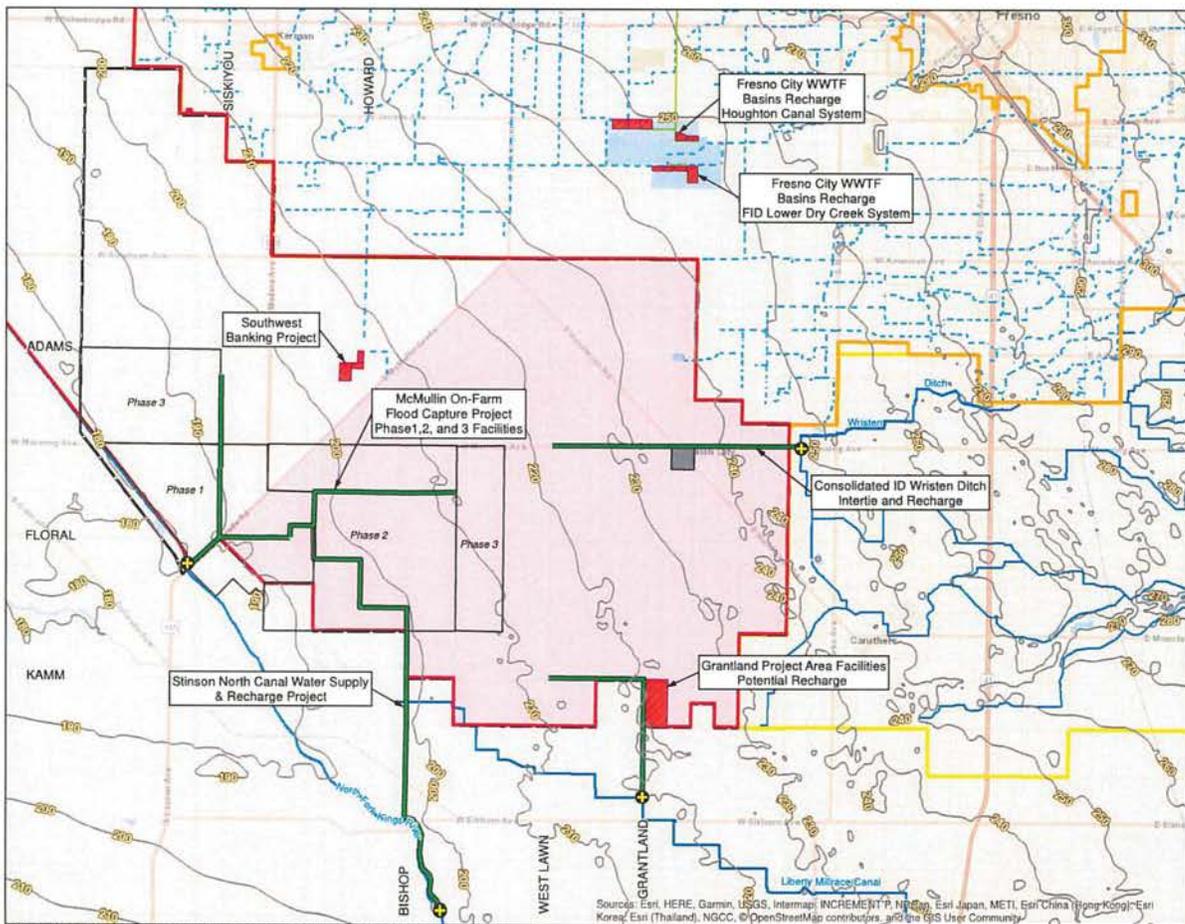
Table 6-5. Summary of Cost per AF for Houghton Canal .....	6-8
Table 7-1. Summary of Probable Construction Cost for Phase 2 .....	7-7
Table 7-2. Summary of Probable Construction Cost for Phase 3 .....	7-7
Table 7-3. Summary of Cost per AF for McMullin Phase 2 & 3 .....	7-8
Table 8-1. Summary of Probable Construction Cost for Stinson North Canal .....	8-6
Table 8-2. Summary of Cost per AF for Stinson North Canal .....	8-6
Table 9-1. Estimated Recharge Demand for the Wristen Ditch.....	9-5
Table 9-2. Summary of Probable Construction Cost for Wristen Ditch Intertie.....	9-7
Table 9-3. Summary of Cost per AF for Wristen Ditch Intertie.....	9-7
Table 10-1. Summary of Probable Construction Cost for Southwest Banking Project.....	10-7
Table 10-2. Summary of Cost per AF for Southwest Banking Project.....	10-7
Table 12-1. Project Cost & Yield Summary .....	12-1
Table 12-2. Preliminary Project Ranking or Scoring Criteria.....	12-3

## Appendices

Appendix A Tables and Hydrographs of Historical Flood Flows at James Bypass Gaging Station

Appendix B Conceptual Construction Cost by Project

**Raisin City WD**  
**Infrastructure Master Plan**  
**Projects**



- + Proposed Project Turnout or Pump Station
- Proposed Facility
- Proposed Dedicated Recharge Area
- USGS Ground Elevation Contour (ft. NAVD83)
- McMullin Area GSA
- Raisin City Community
- Raisin City WD
- Raisin City WD SOI
- FID
- CID
- CID Facility
- FID Facility

  
  
 0 1 2  
 Miles

Source: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NOAA, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, ©OpenStreetMap contributors, and the GIS User Community