



CGA/GGA Joint Technical Advisory Committee

Meeting Agenda

January 12, 2024 | 1:00 p.m.
122 Old Highway 99W, Maxwell, CA 95955

Alternate Meeting Locations:
4485 Spring Meadows Circle, Flagstaff, AZ 86001

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* Indicates an Action Item

1. Call to Order, Roll Call, and Introductions

2. Approval of Minutes (pg. 3)

- a. ***December 1, 2023 CGA/GGA Joint TAC Meeting Minutes (CGA TAC, GGA TAC)**

3. Period of Public Comment

At this time, members of the public may address the Technical Advisory Committee (TAC) Members regarding items that are not on the agenda but are of relevance. The TACs may not act on items not on the agenda.

4. Update on Water Year 2023 Annual Report (10 minutes) (pg. 4)

5. Colusa Subbasin Groundwater Sustainability Plan (GSP) (90 minutes) (pg. 5)

- a. **GSP revision schedule overview**
- b. ***Discussion and potential recommendation to GSAs on approaches for estimating overdraft.**
- c. ***Discussion and potential recommendation to GSAs on updates to Projects and Management Actions.**
- d. ***Discussion and potential recommendation to GSAs on monitoring network and basis of Sustainable Management Criteria for land subsidence.**

- 6. Member Reports and Comments**
- 7. Next meeting**
- 8. Adjourn**

A complete agenda packet, including back-up information, is available for inspection during normal business hours at 1213 Market Street, Colusa, CA 95932 or 225 N. Tehama St., Willows, CA 95988. The full agenda packet can also be found on the CGA and GGA websites: [Agendas and Minutes 2023 | Colusa Groundwater Authority \(CGA\)](#)
<https://www.countyofglenn.net/dept/planning-community-development-services/water-resources/glenn-groundwater-authority/gga>

In compliance with the Americans with Disability Act, if you require special accommodation to participate in this meeting, please contact the Carol Thomas Keefer, CGA Program Manager, at 650-587-7300 X17 or Glenn County Water Resources Division at 530-934-6540 prior to any meeting and arrangements will be made to accommodate you.

Staff Report

To: CGA-GGA Joint TAC

Agenda Item: 2. Approval of Minutes

Date: January 12, 2024

Background

The December 1, 2023 CGA/GGA Joint TAC Meeting minutes are being prepared for review and will be distributed under separate cover.

Recommendation

CGA and GGA Action: Approve the December 1, 2023 CGA/GGA Joint TAC Meeting minutes.

Attachments

- None- December 1, 2023 CGA/GGA Joint TAC Meeting minutes will be distributed under separate cover

Staff Report

To: CGA-GGA Joint TAC

Agenda Item: 4. Update on Water Year 2023 Annual Report

Date: January 12, 2024

Background

The consultant team (Davids Engineering and Lohdorff & Scalmanini Consulting Engineers) has been working diligently to prepare the 2023 Water Year Annual Report which is due April 1, 2024. A brief verbal update will be provided on the status of the report preparations. It is expected the Joint TAC will receive a presentation in February to review the technical components of the report.

Recommendation

Information only.

Attachments

- None

Staff Report

To: CGA-GGA Joint TAC

Agenda Item: 5. Colusa Subbasin Groundwater Sustainability Plan (GSP)

Date: January 12, 2024

Background

On October 26, 2023, the Department of Water Resources (DWR) issued a letter informing the Groundwater Sustainability Agencies (GSAs) of its determination of the Colusa Subbasin GSP to be “incomplete”. The letter outlined specific deficiencies and recommended corrective actions which include:

- a) Re-evaluation of the overdraft conditions in the Subbasin using the most recent data, and include projects and management actions to mitigate overdraft;
- b) Providing a more detailed explanation and justification of the sustainable management criteria for groundwater levels, particularly minimum thresholds and measurable objectives, and quantify the effects of those criteria on beneficial uses; and
- c) Providing a more detailed explanation and justification of sustainable management criteria, monitoring method, and projects and management actions related to land subsidence.

The consultant team (Davids Engineering) has been retained to complete the Colusa Subbasin GSP Revisions to address the identified deficiencies. The work has been broken into two phases, the first of which will provide the consultant team with policy guidance from the GSA Boards. The second phase will include the plan revisions based on the policy direction provided in Phase 1.

The CGA/GGA Joint TAC will receive presentations from the consultant team and engage in discussion on the identified deficiencies and provide recommendations to the GSA Boards.

The consultant team will provide an overview of the GSP revision schedule, followed by discussion on the current and potential approaches for estimating overdraft in the Colusa Subbasin. The consultant team will also review Projects and Management Actions (PMA) and provide recommendations for updating and/or adding new PMAs. The team will also provide information relating to the monitoring network and the basis of Sustainable Management Criteria (SMC) for land subsidence. More detailed discussions on the land subsidence topic are expected to occur at a future Joint TAC meeting.

Recommendation

1. Hear GSP revision schedule overview
2. Discuss and potentially recommend to GSAs an approach for estimating overdraft.

3. Discuss and potentially recommend to GSAs updates to Projects and Management Actions.
4. Discuss and potentially recommend to GSAs a monitoring network and basis of Sustainable Management Criteria for land subsidence.

Attachments

- Presentation (draft) (pg. 7)
- Information about the Colusa Subbasin GSP PMAs:
 - Colusa Subbasin GSP Section 6.2 Projects and Management Actions Summary: Section 6.2.1 from the Colusa GSP (Jan 2022), providing a brief description of all PMAs originally proposed in the GSP. (pg. 26)
 - Colusa Subbasin GSP Section 6.5 Potential Projects and Management Actions: Section 6.5 from the Colusa GSP (Jan 2022), providing details about the potential PMAs originally proposed in the GSP, including those that might be prioritized for implementation. (pg. 36)
 - Colusa Subbasin Projects and Management Actions DRAFT (April 2024): Tabular summary of PMAs from the Colusa GSP (Jan 2022), identifying those where more specificity can be added and suggestions for prioritization. (pg. 76)
- Information about PMAs in Approved GSPs:
 - Select Projects and Management Actions from Approved GSPs with Potential Applicability in the Colusa Subbasin: Tabular summary of PMAs from Approved GSPs that might be applicable to the Colusa Subbasin. (pg. 78)
 - Sample MOU for a Domestic Well Mitigation Program: Sample MOU with agreement to develop a domestic well mitigation program, from the Approved Madera GSP. (pg. 80)
- Information to support project prioritization and implementation:
 - Conceptual Management Zones and PMA Triggers DRAFT: Conceptual areas and triggers for implementing PMAs, summarized from groundwater conditions in the Colusa Subbasin and triggers similar to those proposed in Approved GSPs. (pg. 90)
- Information about SMC:
 - Comparison of Groundwater Level and Subsidence Sustainable Management Criteria with Approved GSPs DRAFT: Tabular summary of SMC for groundwater levels and subsidence in the Colusa Subbasin versus Approved GSPs. (pg. 92)



Colusa Subbasin GSP Revisions

Joint Technical Advisory Committee Meeting

January 12, 2024

Agenda

- 1. Recap of DWR Consultation Meeting #1 (12/19/23)**
- 2. Proposed Revisions: Overdraft**
- 3. GSA Decisions: Projects and Management Actions**
- 4. Proposed Revisions: Subsidence (*If Time*)**
- 5. Next Steps and Timeline**

Recap of DWR Consultation Meeting #1 (12/19/23)

Deficiencies As Outlined in DWR's Review Letter

1. **Overdraft:** “The GSP does not include a reasonable assessment of overdraft conditions and reasonable means to mitigate overdraft.”
2. **Groundwater Levels:** “The GSP does not establish SMC for chronic lowering of groundwater levels in a manner substantially compliant with the GSP regulations.”
3. **Subsidence:** The GSP does not establish SMC for land subsidence in a manner substantially compliant with the GSP regulations.

Our discussions are focused only on these deficiencies and the efforts needed to resolve these sufficiently.

Takeaways from Meeting

- DWR's main concerns, priorities:
 - Existing conditions don't indicate the subbasin is on track to reach sustainability (DWR focused on plans to address/mitigate existing conditions).
 - Undesirable results to GW users and land users need to be more clearly defined and justified (DWR senses that those conditions are happening now).
- Potential GSP revision approaches raised by Colusa Team seem conceptually aligned with DWR's expectations, but:
 - DWR believes that more immediate plans for projects and management actions (PMAs) are needed to mitigate subsidence, overdraft, and groundwater level decline.
 - Actions are warranted immediately.
- If groundwater level SMC are below pre-SGMA levels, wells impacted are the responsibility of the GSAs.

Key Needs to Address Deficiencies

Focus Today

- PMA: DWR’s main concern and focus, all other deficiencies tie into these.
 - PMAs to sufficiently address overdraft by 2042.
 - PMAs to address domestic well impacts (e.g., municipal connections, well mitigation).
 - PMAs to address and mitigate subsidence.
- Overdraft: Revise based on more recent empirical data

Focus in Future Meetings

- GWL:
 - Rephrase/revise URs and MTs to justify why those represent unreasonable conditions for domestic wells, GDEs.
 - Clarify relationship between GWL SMC and subsidence, if revised GWL SMC are lower than pre-SGMA levels.
- Subsidence:
 - Revise SMC, monitoring
 - Use InSAR
 - No long-term subsidence past 2042
 - Evaluate effects of subsidence on critical infrastructure
 - Rephrase/revise URs and MTs to justify why those represent unreasonable conditions for facilities, structures, etc.

Proposed Revisions: Overdraft

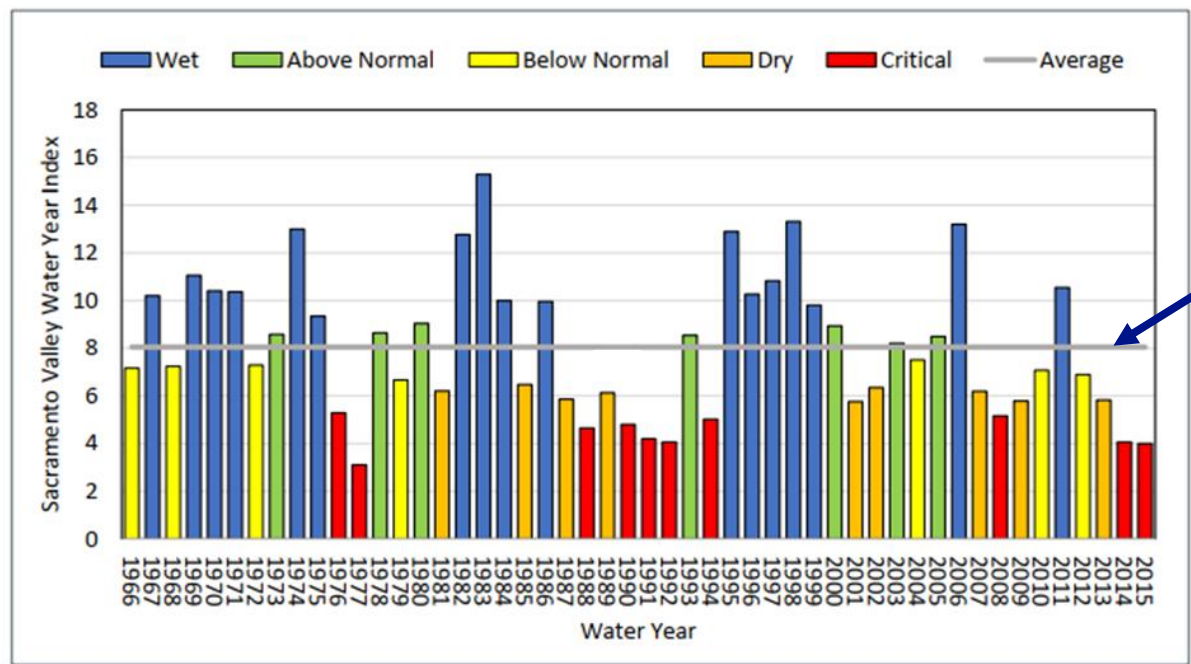
SGMA Regulations Related to Overdraft

- 23 CCR § 354.18.(b)(5):
If overdraft conditions occur [...] include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions.
- 23 CCR § 354.44.(b)(2):
If overdraft conditions are identified [...] describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.

Average Water Year and Water Supply Conditions

- **Proposed current overdraft period: 2016-2021**

- Average water year conditions the same as 1966-2015 (GSP 50-Year long-term average hydrologic period)
- Average water supply within 6% of 1990-2015 average



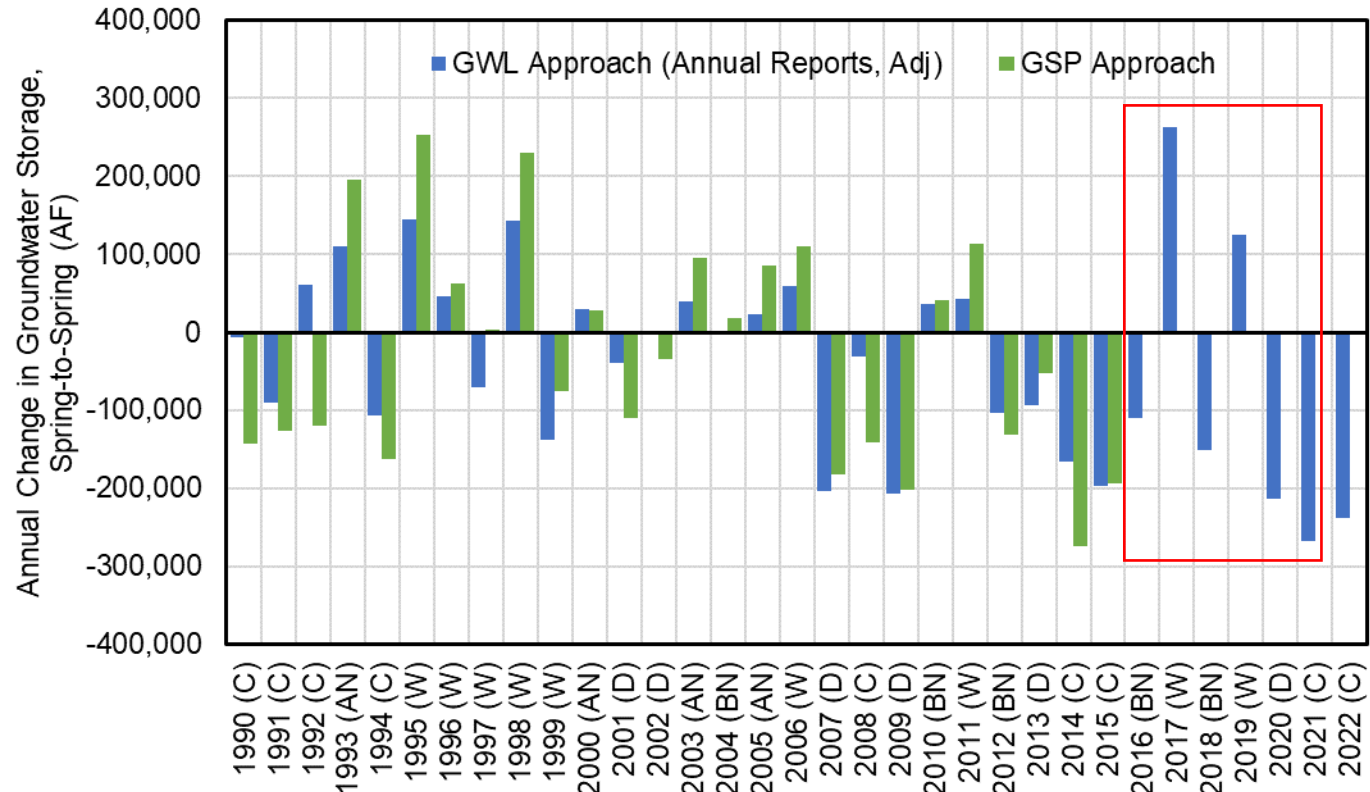
Notes: The average index is 8.1, which is the same as the average for the entire period of record from 1906 through 2019.

Figure 3-38. Sacramento Valley Water Year Index and Water Year Types for a 50-year Period from 1966 to 2015

Period (Years)	Avg. Sac. Valley Water Year Index	Avg. Water Supply (Diversions, AF/yr)	Comment
1966-2015 (50 yr)	8.0	<i>Not available (GSP water budgets began 1990)</i>	GSP 50-Year long-term average hydrologic period
1990-2015 (25 yr)	7.6	1,168,000 AF/yr	GSP historical water budget period
2016-2021 (6 yr)	8.0	1,238,000 AF/yr	Closest to the 1966-2015 average of periods ending in 2021 (prior to initial GSP submittal)

Proposed Revision to Current Overdraft Estimate

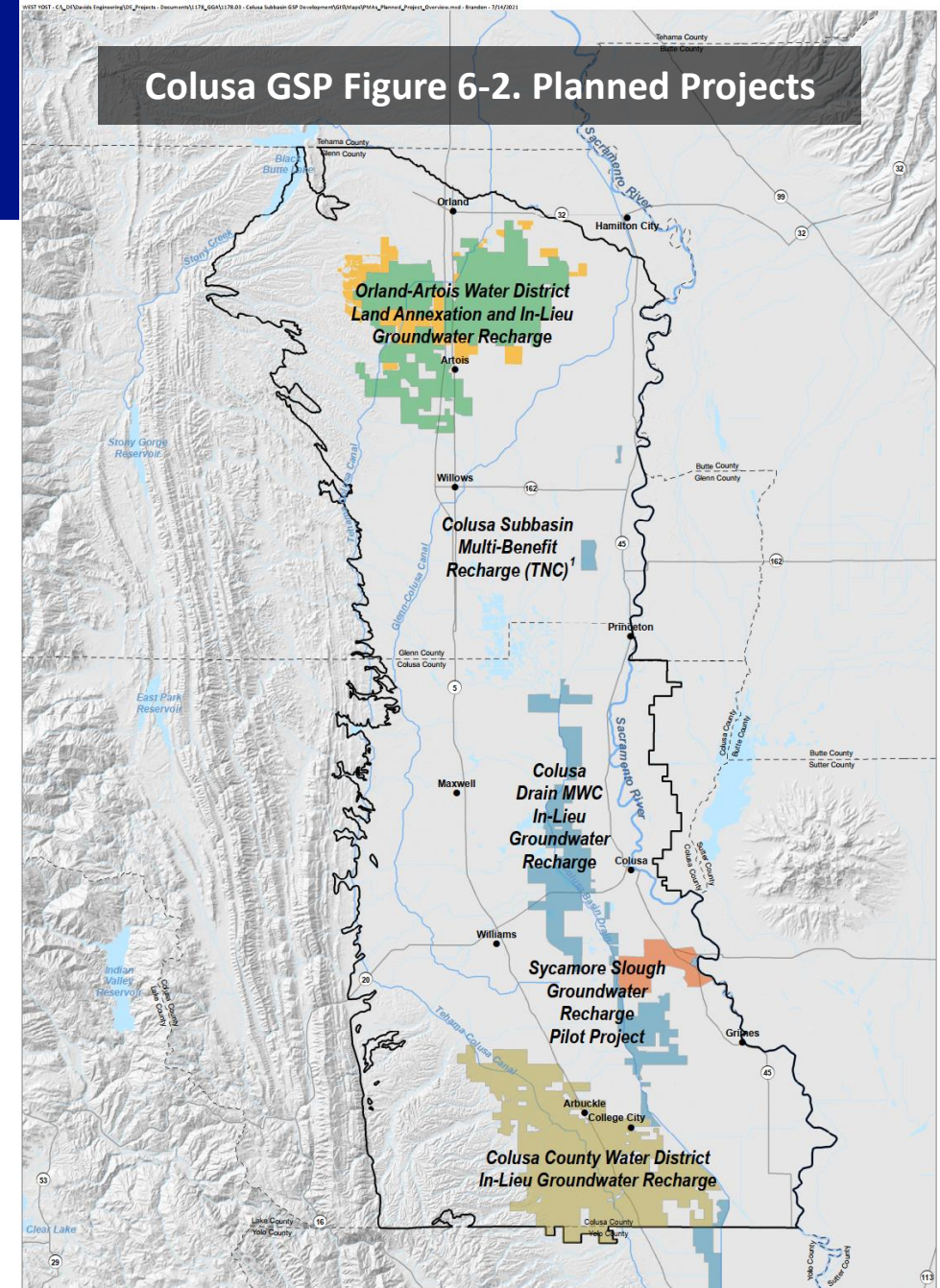
- Recommend re-evaluating overdraft via change in GW storage (based on changes in GWL, *see blue bars to right*)
- Avg. spring-to-spring change in GW storage (GWL Approach):
 - 1990-2015 (26 yr): -28,000 AF/yr
 - Equals GSP Approach 1990-2015 avg. (*see green bars to right*)
 - **2016-2021 (6 yr): -59,000 AF/yr**
 - Proposed revision to current overdraft estimate



GSA Decisions: Projects and Management Actions

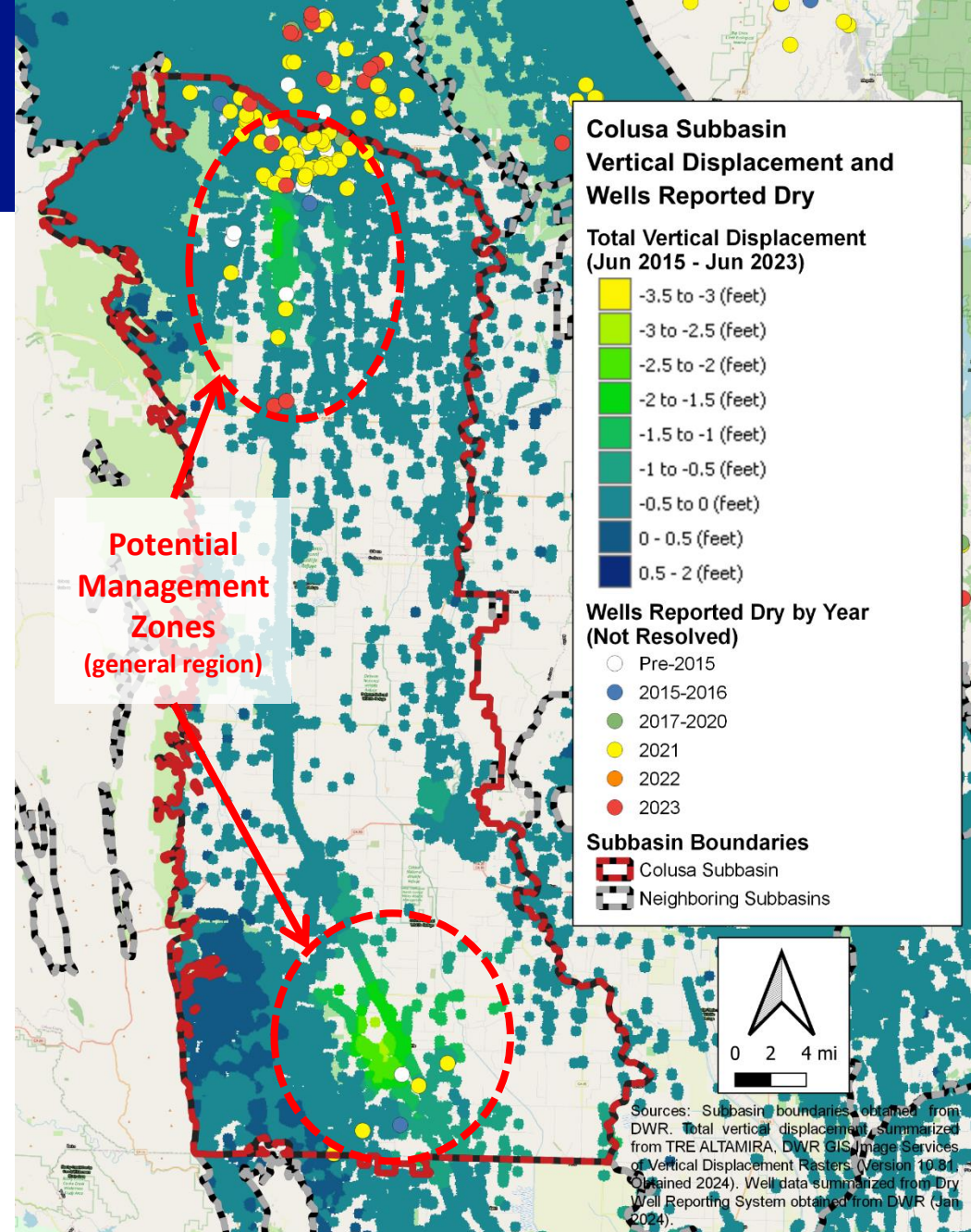
Key Needs and Revisions

- **Need PMAs to sufficiently address overdraft by 2042.**
 - Benefits of planned and ongoing PMAs in GSP are sufficient to offset revised overdraft.
 - Average Annual Benefits = 91 TAF/yr
 - Revised Current Overdraft = -59 TAF/yr
 - DWR’s issues and revisions:
 - Implementation timeline not clear to DWR
 - Add specificity to planned and ongoing projects
 - Benefits not certain in DWR’s view
 - Add specificity to planned and ongoing projects
 - Add PMAs, backstops
 - Potential projects → Planned projects
 - New PMAs if planned projects not sufficient (assess annually and every 5 years)



Key Needs and Revisions

- **Need PMAs to address domestic well impacts (e.g., municipal connections, well mitigation).**
 - Heard from DWR: If groundwater level SMC are below pre-SGMA levels, wells impacted are the responsibility of the GSAs.
 - Add PMAs, backstops to mitigate domestic well impacts, with initial focus in “management zones.”
- **Need PMAs to address and mitigate subsidence.**
 - Add PMAs, backstops to mitigate subsidence , with initial focus in “management zones.”



Revisions (Summarized)

Coordinate with GSAs, Proponents

- Add specificity to planned and ongoing projects
 - Clarify implementation timeline, support and assure estimated benefits
 - Work with project proponents to add specificity
- Add PMAs, backstops
 - Potential projects → Planned projects
 - Work with project proponents to identify which can become “planned”

GSA Decisions Needed

- New PMAs
 - New projects if planned projects are not sufficient
 - Management actions for mitigation of domestic well impacts
 - Management actions for mitigation of subsidence

DWR Recommendations and GSA Decisions for New PMAs

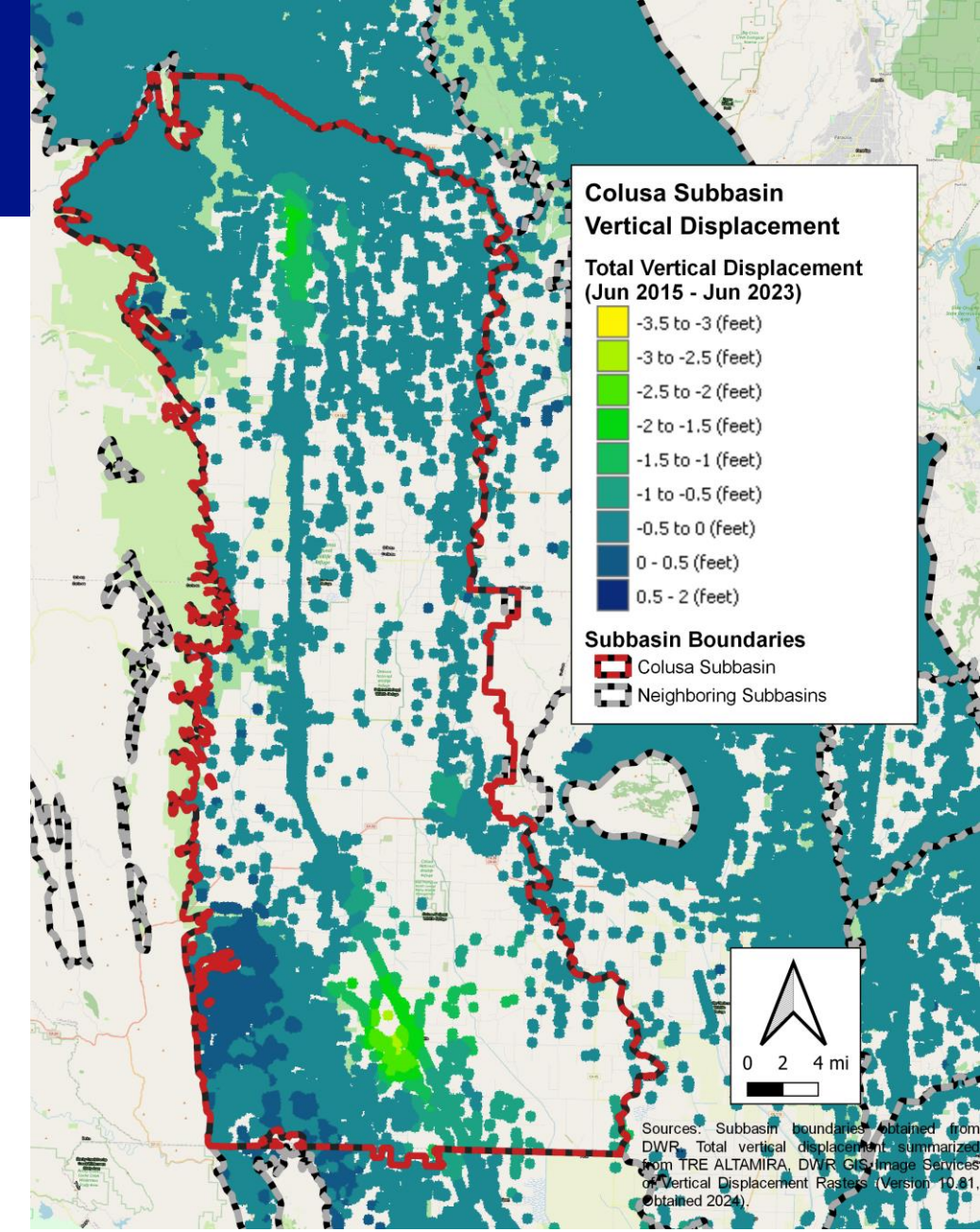
- DWR is seeking more immediate plans for PMAs to mitigate subsidence, overdraft, and groundwater level impacts to domestic wells.
 - Domestic Well Mitigation Program
 - Demand Management or Reduction (opportunity for range of options, action levels)
- GSA Decision Points:
 - What PMAs will be prioritized and how? (Prioritization criteria? Phasing?)
 - Where will PMAs be advanced? (Subbasin-wide? GSA-wide? “Management Zones”?)
 - Who will be responsible for advancing, implementing PMAs? (GSAs? Member agencies? Voluntary vs. compulsory?)
 - When will PMAs be advanced, and by how much? (Specified timeline? Phases? Triggers?)
 - How will PMAs be funded/financed?

Proposed Subsidence Revisions

Subsidence Monitoring and SMC Basis

- Currently based on Sacramento Valley Benchmark Network (last surveyed 2017)
- Recommended revisions, from DWR discussion:
 - Revise monitoring and SMC based on InSAR*, until such a time as the benchmark network is surveyed
 - Revise SMC to clarify SGMA requirement of no subsidence past 2042
- Evaluate effects of subsidence on critical infrastructure (“Infrastructure Impacts Analysis”)
 - Identify critical infrastructure (TCC, I-5, others?)
 - Collect any available data regarding subsidence impacts to critical infrastructure

* InSAR = Interferometric Synthetic Aperture Radar



Next Steps and Timeline

Next Steps and Timeline

- DWR Consultation Meeting #2 on 01/22
 - Propose revisions to overdraft, PMAs and raise questions
 - Receive feedback from DWR on acceptability
 - *Schedule subsequent DWR meetings*
- CGA/GGA Joint Board Meeting at end of January
 - Propose revisions to overdraft, PMAs based on Joint TAC discussions and DWR feedback
 - Receive approval on approach
- Joint TAC Meeting on 02/09
 - Provide technical details to support PMA decisions
 - Management zones, triggers
 - PMA prioritization approach and plans for advancement)
 - Discuss SMC revisions (subsidence, groundwater levels)



Chapter 6

Projects and Management Actions

1 The rest of this chapter is structured as follows. Section 6.2 provides a summary of all (ongoing, planned,
2 and potential) PMAs. The three subsequent sections – Sections 6.3 through 6.5 – describe the PMAs in
3 each of the three categories. Within each category, PMAs are further classified by type (project or
4 management action), which are described in corresponding subsections. Appendix 6A provides additional
5 analysis of water available for recharge and other projects, as well as an assessment of incentives to
6 encourage utilization of surface water supplies. Appendix 6B describes potential demand management
7 action costs and Subbasin agricultural economic conditions. Appendix 6C provides a matrix summary of
8 all planned, ongoing, and potential PMAs. Lastly, Appendix 6D describes modeling of selected PMAs to
9 estimate the effects of those PMAs on groundwater conditions in the Subbasin.

10 6.2 PROJECT AND MANAGEMENT ACTIONS SUMMARY

11 6.2.1 Overview of All Proposed Projects and Management Actions

12 Table 6-2 summarizes all PMAs identified in the Subbasin. Summary information includes the PMA name,
13 type, proponent, and a brief description. PMA types include:

- 14 • **Direct groundwater recharge:** PMAs that recharge groundwater using available surface
15 water, flood water, stormflows, or other surface water supplies.
- 16 • **In-lieu groundwater recharge:** PMAs that offset groundwater pumping by supplying or
17 otherwise incentivizing use of surface water or other surface water supplies “in lieu”
18 of groundwater.
- 19 • **Management action:** Non-structural programs or policies designed to support sustainable
20 groundwater management.
- 21 • **Reduce groundwater demand:** PMAs that reduce or remove sources of groundwater
22 demand and extraction, such as invasive and non-native plant species along
23 riparian corridors.

24 PMAs are grouped into subsections in the table according to their status (planned, ongoing, or potential).
25 As described under Section 6.1 above, ongoing projects are currently being implemented in the Subbasin.
26 Planned PMAs are currently being developed to achieve sustainable management conditions in the
27 Subbasin. Potential PMAs will be implemented in the future, if or as required by changing conditions in
28 the Subbasin.

29 All PMAs are described according to the requirements of 23 CCR §354.44(b). Planned projects are
30 described in detail. Ongoing and potential PMAs are described concisely, reflecting the current
31 operational status and “as-needed” basis of these projects. It is anticipated that additional information
32 will be prepared in annual reports and five-year GSP updates, as needed.

33 Not all PMAs are the responsibility of the GSAs: some PMAs will be completed through a partnership with
34 other agencies and proponents, while other PMAs will be completed by the agency or other proponents
35 with support from the GSAs. The GSAs and/or other project proponents will notify the public and other
36 agencies of the planned or ongoing implementation of PMAs through the communication channels
37 identified in Sections 6.3 through 6.5 (23 CCR §354.44(b)(1)(B)). Noticing will occur as potential projects
38 are being considered for implementation, and as ongoing and planned projects are implemented. Noticing
39 will inform the public and other agencies that the GSA and/or other project proponents are considering
40 or will be implementing the PMA, and will provide a description of the actions that will be taken.

Chapter 6 Projects and Management Actions

1 The following subsections describe the planned, ongoing, and potential PMAs in accordance with the
 2 requirements of 23 CCR §354.44(b). The information presented in this chapter is based on the best available
 3 data and science. The estimated groundwater recharge benefit and capital, operating, and maintenance
 4 costs of developing and operating each project are shown. To the extent possible, project costs are adjusted
 5 and reported on a consistent basis. All costs are indexed using an appropriate index⁴ and reported in current
 6 (2021) dollars. GSAs, districts, and other partners in the Subbasin will further develop projects during the
 7 GSP implementation period and refine estimated costs in GSP annual reports and five-year updates.
 8 Additional information about all PMAs is provided in a matrix format in Appendix 6C.

Table 6-2. Summary of All Projects and Management Actions			
Project/ Management Action Name	Project/ Management Action Type	Proponent	Brief Description
Planned			
<i>Projects</i>			
Colusa County Water District (CCWD) In-Lieu Groundwater Recharge	In-lieu Groundwater Recharge	CCWD	CCWD will utilize 30 taf of additional surface water for irrigation in all years but Shasta Critical years for in-lieu recharge. The additional surface water will be made available through full use of the district's existing Central Valley Project (CVP) contract and annual and multi-year water purchase and transfer agreements. Additional surface water deliveries are estimated to be 27 taf/yr, enabling reduction of groundwater pumping by a like amount.
Colusa Drain MWC (CDMWC) In-Lieu Groundwater Recharge	In-lieu Groundwater Recharge	CDMWC	CDMWC diverters use both ground and surface water because Colusa Drain supplies are insufficient to satisfy all irrigation requirements. This project would provide additional surface supplies averaging approximately 28 taf/yr in the Drain allowing CDMWC diverters to increase their diversions of surface water to provide in-lieu groundwater recharge of a like amount.
Subbasin Multi-Benefit Groundwater Recharge	Direct Groundwater Recharge	CGA, GGA and TNC	The Nature Conservancy (TNC) is partnering with entities for an on-farm, multi-benefit groundwater recharge incentive program. The pilot program was initiated in Colusa County in 2018 and concluded in the spring of 2021, with plans to expand and continue into the future. DWR is a partner in the Subbasin Multi-Benefit Groundwater Recharge project as it moves into the expanded program.

⁴ Either the Implicit Price Deflator or the Engineering News Report Construction Cost Index.

Chapter 6 Projects and Management Actions

Table 6-2. Summary of All Projects and Management Actions

Project/ Management Action Name	Project/ Management Action Type	Proponent	Brief Description
Orland-Artois Water District (OAWD) Land Annexation and Groundwater Recharge	Direct and In-lieu Groundwater Recharge	OAWD	OAWD is planning to annex approximately 12,000 acres of groundwater-dependent agricultural lands. Additional direct recharge may be considered on suitable annexed lands. The project is an area where groundwater levels have been in decline in recent years. It is estimated that a long-term average of approximately 23 taf/yr of surface water would be available, reducing groundwater pumping by approximately 23 taf/yr.
Sycamore Slough Groundwater Recharge Pilot Project	Direct Groundwater Recharge	Landowner	Proctor and Gamble (P&G) and Davis Ranches have entered into an agreement to implement a 10-year groundwater recharge pilot project. A 66-acre field on Davis Ranches will receive surface water for groundwater recharge and provide habitat for migrating shorebirds. Water would be diverted from the Sacramento River during fall/winter months using existing riparian rights or would be available from settlement contract supplies (should the project begin before November 1). An expansion of the project is planned for recharge and revegetation in the neighboring Sycamore and Dry Sloughs.
Ongoing			
<i>Projects</i>			
Reclamation District 108 (RD108) and Colusa County Water District (CCWD) Agreement for Five-Year In-Lieu Groundwater Recharge Project	In-lieu Groundwater Recharge	RD108 and CCWD	CCWD (and Dunnigan Water District [DWD]) purchases surface water from RD108 for distribution within its service area. The agreement expires in 2022. This project supplies additional surface water to CCWD (and DWD) that provides in-lieu recharge.
Glenn-Colusa Irrigation District (GCID) Strategic Winter Water Use for Groundwater Recharge and Multiple Benefits	Direct and In-lieu Groundwater Recharge	GCID	GCID holds a water right for winter water. This project will increase the groundwater recharge and habitat enhancement benefits of winter water use by increasing use for rice straw decomposition, irrigation, and frost control provided that certain constraints can be alleviated.
Sycamore Marsh Farm Direct Recharge Project	Direct Groundwater Recharge	Landowner	Sycamore Marsh Farm is developing a groundwater recharge plan to store groundwater. The plan provides for 205 acres of year-round recharge basins and 163 additional acres of winter recharge areas.

Chapter 6

Projects and Management Actions

Table 6-2. Summary of All Projects and Management Actions

Project/ Management Action Name	Project/ Management Action Type	Proponent	Brief Description
Glenn-Colusa Irrigation District Expansion of In-Basin Program for In-lieu Groundwater Recharge	In-lieu Groundwater Recharge	GCID	GCID has developed arrangements to supply district surface water to neighboring non-district agricultural lands that primarily use groundwater. These temporary arrangements expired in 2020. There is interest in continuing and expanding this in-basin surface water use for in-lieu groundwater recharge. Supplies would potentially be available only in Shasta Non-Critical years.
Orland Unit Water Users Association (OUWUA) Irrigation Modernization for Increased Surface Water Delivery and Reduced Groundwater Pumping	In-lieu Groundwater Recharge	OUWUA	Modernization of OUWUA southside system for more reliable and flexible farm deliveries that will provide incentive for growers to use more surface water and less groundwater.
<i>Management Actions</i>			
Urban Water Conservation in Willows	Management Action	California Water Service – Willows District	This project includes urban water conservation measures through water waste prevention ordinances, metering, conservation pricing, public education, and outreach programs to assess and manage distribution system real loss, water conservation program coordination and staffing support, and other demand management measures.
Potential			
<i>Projects</i>			
Glenn-Colusa Irrigation District In-lieu Groundwater Recharge	In-lieu Groundwater Recharge	GCID	GCID will investigate, develop, and implement measures to incentivize additional use of surface water supplied by GCID, which will provide in-lieu recharge through reduced groundwater pumping.
Westside Streams Diversion for Direct or In-lieu Groundwater Recharge	Direct and In-lieu Groundwater Recharge	CGA and GGA	A portion of western ephemeral stream flows could be diverted for in-lieu or direct groundwater recharge.
Sites Reservoir	Direct and In-lieu Groundwater Recharge	Sites Project Authority	The Sites Project is a new off-stream storage facility that is currently in development. Depending on project operation and yield, there is potential for groundwater benefits to accrue to the Subbasin from Sites Reservoir.

Chapter 6 Projects and Management Actions

Table 6-2. Summary of All Projects and Management Actions

Project/ Management Action Name	Project/ Management Action Type	Proponent	Brief Description
Delevan Pipeline Colusa Basin Drainage Canal System (Colusa Drain) Intertie	Direct and In-lieu Groundwater Recharge	Interested Stakeholder	Intertie between proposed Delevan Pipeline component of the Sites Reservoir Project and the Colusa Drain, providing a connection to downstream water users, and providing protection for the ecosystems, and earthquake resilience.
Orland Unit Water Users Association (OUWUA) Flood Water Conveyance	Direct Groundwater Recharge	OUWUA	Divert Stony Creek water at OUWUA's south diversion and convey it to various locations for direct recharge within the OUWUA service area.
Orland-Artois Water District (OAWD) Direct Groundwater Recharge	Direct Groundwater Recharge	OAWD	OAWD would directly recharge groundwater. A pilot project was conducted in 2017.
Sycamore Slough Colusa Drain Multi-Benefit Recharge Project	Direct Groundwater Recharge	Landowner	Restoration of portions of Sycamore Slough would support diversion of winter flows from the Colusa Drain for recharge and restoration.
Tehama-Colusa Canal Trickle Flow to Ephemeral Streams	Direct Groundwater Recharge	RD108	Operate Tehama-Colusa Canal (TCC) existing gates for discharge into ephemeral streams at a rate where they do not flow out of the Subbasin but recharge the groundwater system.
Enhanced Infiltration of Precipitation on Agricultural Lands	Direct Groundwater Recharge	CGA and GGA	Develop and adoption of on-farm cultural practices to reduce precipitation runoff and increase infiltration, which would result in increased storage of precipitation in the crop root zone, thereby reducing irrigation water requirements and achieving some direct groundwater recharge.
Subbasin Flood-MAR	Direct Groundwater Recharge	CGA and GGA	The CGA and GGA would investigate, develop, and implement a program to divert flood waters within the Subbasin, when available, for spreading across agricultural lands for direct groundwater recharge.
Reclamation District 108 "Boards In" Program	Direct Groundwater Recharge	RD108	RD108 would institute a voluntary or financially incentivized program in which landowners leave spill boards in place during the winter to capture rainfall and hold it on the fields for recharge.
Colusa County Public Water System Water Treatment Plant	In-lieu Groundwater Recharge	Interested Stakeholder	Construct a water treatment plant on the Sacramento River between Colusa and Grimes to provide treated surface water to public water supply systems in Colusa and possibly Sutter and Yolo Counties.

Chapter 6 Projects and Management Actions

Table 6-2. Summary of All Projects and Management Actions

Project/ Management Action Name	Project/ Management Action Type	Proponent	Brief Description
Glenn-Colusa Irrigation District Water Transfers to Tehama-Colusa Canal Authority (TCCA) CVP Contractors	In-lieu Groundwater Recharge	GCID	Evaluate potential for transferring water to CVP contractors served by the TCC for in-lieu groundwater recharge.
Subbasin In-lieu Recharge & Banking Program	In-lieu Groundwater Recharge	South Valley Water Resources Authority	Incentivize taking available contract surface water in-lieu of pumping groundwater, providing dedicated contribution to local groundwater sustainability, with a portion available to San Joaquin Valley partners.
Sycamore Marsh Farm In-lieu Recharge Project	In-lieu Groundwater Recharge	Landowner	Sycamore Marsh Farm is developing an in-lieu groundwater recharge plan, and could partner with additional lands in the CDMWC, allowing for diversion of surface water from CDMWC.
Westside Off-stream Reservoir and In-Lieu Groundwater Recharge	In-lieu Groundwater Recharge	TCCA Contractors	Construct off-stream surface reservoirs along the western edge of the Subbasin and up-slope from the TCC to divert surplus Sacramento River flows (e.g., Section 215 water) into these storage reservoirs. Release stored water on demand to serve lands otherwise served by groundwater.
Management Actions			
Domestic Well Mitigation Program	Management Action	CGA and GGA	To mitigate the effects of domestic well stranding due to groundwater level decline, the CGA and GGA will investigate implementing domestic well mitigation programs in their respective portions of the Subbasin.
Drought Contingency Planning for Urban Areas	Management Action	CGA, GGA, and cities (GSA member agencies)	The CGA and GGA will coordinate with M&I water suppliers dependent on groundwater to encourage drought planning consistent with the GSP.
Long-Term Demand Management Action	Management Action	CGA and GGA	Demand management broadly refers to any water management activity that reduces the consumptive use of irrigation water. A demand management action is one that incentivizes, enables, or possibly requires water users to reduce their consumptive use.
Strategic Short-Term Demand Management	Management Action	CGA and GGA	Develop a voluntary, flexible, short-run financial incentive program to alleviate impacts of drought in target areas through idling lands in drought-affected areas or in participating surface water-using portions of the Subbasin and conveying the saved surface water to the drought-affected areas.

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Table 6-2. Summary of All Projects and Management Actions

Project/ Management Action Name	Project/ Management Action Type	Proponent	Brief Description
Well Abandonment Outreach and Funding Program	Management Action	CGA and GGA	Create a program providing outreach and education to landowners regarding the proper procedures for well decommissioning and abandonment, as well as funding sources. This effort would be accomplished by working with well permitting agencies.
Preservation of Lands Favorable for Recharge	Management Action	CGA and GGA	Working cooperatively with the counties, investigate, design, and implement a program providing incentives to landowners with lands favorable to groundwater recharge to preserve them as agricultural or undeveloped lands on which groundwater recharge.
Review of County Well Permitting Ordinances	Management Action	CGA and GGA	Review and revise the county well permitting processes in the Subbasin to ensure that future well permitting aligns with the Subbasin sustainability goal and that future changes to well permitting are reviewed by the GSAs. The GSAs would work with the counties to review and suggest revisions to ordinances (these are outside of the jurisdiction of the GSAs).
Reduce Non-beneficial Evapotranspiration/ Invasive Species Eradication	Reduce Groundwater Demand	CGA and GGA	Removal of invasive, non-native plant species from riparian corridors and other areas to reduce evapotranspiration from shallow groundwater and support native ecosystem restoration.
Development of a Dedicated Network of Shallow Monitoring Wells for GDE Monitoring	Management Action, Closing Data Gaps	CGA and GGA	Evaluate and develop a dedicated network of shallow monitoring wells specifically planned and sited for monitoring conditions in areas of the Subbasin where GDEs are most likely to be found. This action is also expected to incorporate biological monitoring to inform the location of new shallow monitoring wells and monitor whether GDEs are being impacted by changing groundwater conditions.

1

2 **6.2.2 Benefits of Projects and Management Actions to Sustainability**
3 **Indicators and Communities in the Subbasin**

4 Volumetric benefits of all planned PMAs are identified in Table 6-2 and in Section 6.3. In total, the planned
5 PMAs are expected to provide more than 80 taf/yr in gross average annual benefits at full implementation by
6 offsetting groundwater pumping, providing direct recharge, and otherwise supporting groundwater
7 sustainability. These benefits are expected to address potential sustainability concerns in the projected future
8 conditions water budgets, even under the effects of 2070 CT climate change (Table 6-1). Planned PMAs are
9 expected to help the GSAs achieve the sustainability goal for the Subbasin and avoid reaching the minimum
10 thresholds defined in this GSP under future, changing conditions.

Chapter 6 Projects and Management Actions

1 Table 6-3 summarizes how each type of PMA would benefit sustainability indicators in the Subbasin. All
 2 proposed PMAs are expected to benefit groundwater levels and groundwater storage, whether through direct
 3 or in-lieu groundwater recharge, management of water supplies, or demand reduction. Projects that
 4 incentivize additional use of available surface water in lieu of groundwater are also expected to reduce
 5 depletions of interconnected surface water. Planned PMAs will provide direct and in-lieu groundwater
 6 recharge benefits to the Subbasin, which the GSAs do not expect will significantly affect water quality
 7 conditions, including those experienced by domestic well users and DACs. However, the GSAs are planning to
 8 monitor groundwater quality during GSP implementation (Section 4.2.2), and will investigate additional PMAs
 9 and studies to improve water quality if they find that groundwater quality conditions are approaching MTs.

10 Many of the communities within the Subbasin are considered either a Disadvantaged Community (DAC)
 11 or a Severely Disadvantaged Community (SDAC)⁵. Additionally, nearly all of the Subbasin is considered an
 12 Economically Distressed Area (EDA).⁶ The only area within the Subbasin that is not considered an EDA is
 13 the small portion of the Subbasin that exists within Yolo County (approximately 2.4 square miles, or 1,500
 14 acres). Additional information about DACs, SDACs, and EDAs in the Subbasin is provided in Chapter 2, Plan
 15 Area. To the extent that PMAs are implemented directly in areas where these communities reside – the
 16 majority of areas across the Subbasin – and to the extent that PMAs benefit groundwater conditions
 17 throughout the Subbasin, PMAs are expected to benefit DACs, SDACs, and EDAs and prevent undesirable
 18 results for these communities. Ongoing outreach and implementation of the GSP and PMAs will directly
 19 benefit these communities and ensure that their concerns and feedback continue to be incorporated into
 20 PMA development and implementation.

Table 6-3. Sustainability Indicators Expected to Benefit from Projects and Management Action Types Proposed in the Subbasin

Project/ Management Action Type	Project/Management Action Names	Sustainability Indicators Expected to Directly Benefit				
		GW Levels	GW Storage	SW Depletion	Land Subsidence	Water Quality
Planned						
Direct Groundwater Recharge	Colusa Subbasin Multi-Benefit Groundwater Recharge; Sycamore Slough Groundwater Recharge Pilot Project	X	X	X	X	
In-lieu Groundwater Recharge	CCWD In-Lieu Groundwater Recharge; Colusa Drain MWC In-Lieu Groundwater Recharge	X	X	X	X	
Direct and In-lieu Groundwater Recharge	OAWD Land Annexation and Groundwater Recharge	X	X	X	X	
Ongoing						

⁵ A DAC is identified as a community whose median household income is less than 80 percent of the statewide median household income (MHI), and an SDAC is identified as a community whose median household income (MHI) is less than 60 percent of the statewide MHI.

⁶ Portions of the Subbasin that are identified as EDAs are areas of rural counties with a low population density and a median household income of less than 85 percent of the statewide MHI.

Chapter 6 Projects and Management Actions

Table 6-3. Sustainability Indicators Expected to Benefit from Projects and Management Action Types Proposed in the Subbasin

Project/ Management Action Type	Project/Management Action Names	Sustainability Indicators Expected to Directly Benefit				
		GW Levels	GW Storage	SW Depletion	Land Subsidence	Water Quality
Direct Groundwater Recharge	Sycamore Marsh Farm Direct Recharge Project	X	X	X	X	X
In-lieu Groundwater Recharge	RD 108 and CCWD Agreement for Five-Year In-Lieu Groundwater Recharge Project; GCID Expansion of In-Basin Program for In-lieu Groundwater Recharge; OUWUA Irrigation Modernization for Increased Surface Water Delivery and Reduced Groundwater Pumping	X	X	X	X	
Direct and In-lieu Groundwater Recharge	GCID Strategic Winter Water Use for Groundwater Recharge and Multiple Benefits	X	X	X		
Management Action	Urban Water Conservation in Willows	X	X	X		
Potential						
Direct Groundwater Recharge	OUWUA Flood Water Conveyance; OAWD Direct Groundwater Recharge; Sycamore Slough Colusa Basin Drain Multi-Benefit Recharge Project; TCC Trickle Flow to Ephemeral Streams; Enhanced Infiltration of Precipitation on Agricultural Lands; Colusa Subbasin Flood-MAR; Reclamation District 108 "Boards In" Program	X	X	X		
In-lieu Groundwater Recharge	Colusa Subbasin In-lieu Recharge & Banking Program; Sycamore Marsh Farm In-lieu Recharge Project; GCID In-lieu Groundwater Recharge	X	X	X	X	X
In-lieu Groundwater Recharge	Colusa County Public Water System Water Treatment Plant; Colusa Drain MWC In-Lieu Groundwater Recharge; GCID Water Transfers to TCCA CVP Contractors; Westside Off-stream Reservoir and In-Lieu Groundwater Recharge	X	X	X		
Direct and In-lieu Groundwater Recharge	Westside Streams Diversion for Direct or In-lieu Groundwater Recharge; Sites Reservoir; Delevan Pipeline Colusa Drain Intertie	X	X	X	X	
Management Action	Domestic Well Mitigation Program	X				

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Table 6-3. Sustainability Indicators Expected to Benefit from Projects and Management Action Types Proposed in the Subbasin

Project/ Management Action Type	Project/Management Action Names	Sustainability Indicators Expected to Directly Benefit				
		GW Levels	GW Storage	SW Depletion	Land Subsidence	Water Quality
Management Action	Drought Contingency Planning for Urban Areas; Strategic Short-Term Demand Management; Preservation of Lands Favorable for Recharge; Development of a Dedicated Network of Shallow Monitoring Wells for GDE Monitoring	X	X	X		
Management Action	Review of County Well Permitting Ordinances	X	X	X	X	X
Reduce Groundwater Demand	Reduce Non-beneficial Evapotranspiration/Invasive Species Eradication (Arundo, Eucalyptus, Tamarisk, etc.)	X	X	X		

1

6.3 PLANNED PROJECTS AND MANAGEMENT ACTIONS

2
3 The GGA and CGA have included five groundwater recharge projects that are planned for implementation.
4 All five projects involve the use of surface water for direct or in-lieu recharge. Three of the five projects
5 are substantial in-lieu recharge projects, meaning that they will require regulated surface water sources
6 available on an irrigation demand schedule. These three projects are planning to acquire all or most of
7 the required surface water through transfers of CVP water supplies that are available from other CVP
8 water supply or Settlement Contractors.

9 Figure 6-2 illustrates the location and name of the five planned PMAs in the Subbasin. Planned projects
10 are targeted to areas where groundwater levels have been declining in the Subbasin due primarily to
11 historical and current drought conditions. In addition, recharge opportunities are targeted near the
12 Sacramento River to provide multiple benefits including potential habitat and streamflow benefits.

13

6.5 POTENTIAL PROJECTS AND MANAGEMENT ACTIONS

In addition to the planned and ongoing projects and management actions identified above, the GSAs and other project proponents are considering a number of other potential PMAs that could provide benefits with respect to one or more of the sustainability indicators. These PMAs are still under development and require additional information that would be developed under future monitoring, and as the GSAs continue to identify and fill data gaps and reported in annual reports. This section provides descriptions for these identified potential PMAs.

Figure 6-9 illustrates the location of potential PMAs in the Subbasin.

Potential PMAs are classified by projects and management actions, which are described in the following subsections. Projects are generally structural activities that include direct recharge, in-lieu recharge, and utilization of additional surface water supplies. Management actions are activities to improve water management or reduce groundwater pumping. Potential management actions include two demand management programs, which per 23 CCR §354.44(b)(2), could be rapidly implemented if the Subbasin is approaching minimum thresholds specified in the GSP.

Potential PMAs are described at a reconnaissance-level of detail relative to the planned projects described under Section 6.3, above. However, PMA information is still reported in accordance with 23 CCR §354.44(b). The required information is summarized in a table following the general description for each potential PMA. The information provided with each potential project table maps to the GSP regulation requirements as follows:

- Implementation (§354.44(b)(1)(A))
- Timeline (§354.44(b)(4))
- Notice to public and other agencies (§354.44(b)(1)(B))
- Water source and reliability (§354.44(b)(6))
- Legal authority, permitting processes, and regulatory control (§354.44(b)(3), (§354.44(b)(7))
- Benefits and benefit evaluation methodology (§354.44(b)(5), (§354.44(b)(9))
- Costs (§354.44(b)(8))

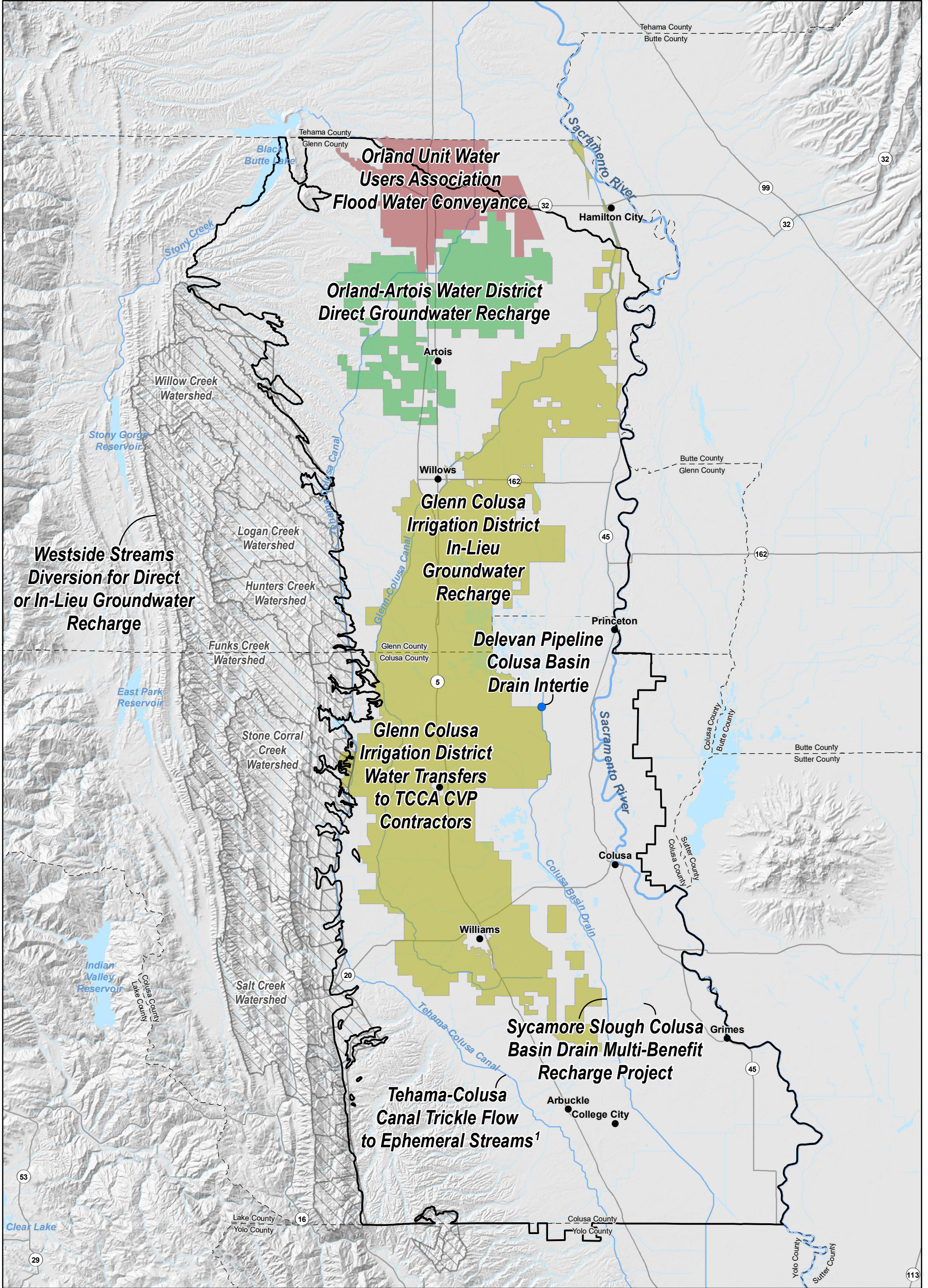


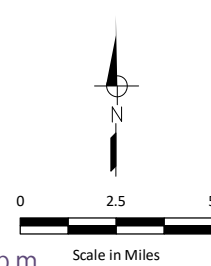
Figure 6-9

- Potential Project Location
- Orland-Artois WD Boundary
- Orland Unit WUA Boundary
- Glenn Colusa ID Boundary
- Westside Stream Watersheds
- Colusa Subbasin Boundary

Horizontal Datum: North American Datum of 1983 (NAD 83), California State Plane Zone II, feet.

Note:

1. The Tehama-Colusa Canal (TCC) Trickle Flow to Ephemeral Streams project will occur at various points along the TCC where it intersects ephemeral streams, not in the location called out on the map.
2. There are an additional 14 potential projects and management actions that are not depicted on the map. This is due to either subbasin-wide implementation or the planning process not being far enough along to locate these projects at this time.



Selected Potential Projects and Management Actions Overview

**Colusa Groundwater Authority
and Glenn Groundwater Authority**
Colusa Subbasin
Groundwater Sustainability Plan

Chapter 6 Projects and Management Actions

6.5.1 Potential Projects

This section describes potential projects that would be implemented if determined to be necessary or desirable under future monitoring of the Subbasin. Potential projects include direct and in-lieu recharge opportunities that could be implemented across the Subbasin, as well as local and regional (e.g., Sites) storage projects. Table 6-27 summarizes the potential projects included in the GSP. The following subsections provide project descriptions for each project.

Project ^(a)	Project Type	Proponent
Glenn-Colusa Irrigation District In-lieu Groundwater Recharge	In-lieu Groundwater Recharge	GCID
Westside Streams Diversion for Direct or In-lieu Groundwater Recharge	Direct and In-lieu Groundwater Recharge	CGA and GGA
Sites Reservoir	Direct and In-lieu Groundwater Recharge	Sites Project Authority
Delevan Pipeline Colusa Drain Intertie	Direct and In-lieu Groundwater Recharge	Landowner
Orland Unit Water Users Association Flood Water Conveyance	Direct Groundwater Recharge	Ouwua
Orland-Artois Water District Direct Groundwater Recharge	Direct Groundwater Recharge	OAWD
Sycamore Slough Colusa Basin Drain Multi-Benefit Recharge Project	Direct Groundwater Recharge	Landowner
Tehama-Colusa Canal Trickle Flow to Ephemeral Streams	Direct Groundwater Recharge	RD108
Enhanced Infiltration of Precipitation on Agricultural Lands	Direct Groundwater Recharge	CGA and GGA
Colusa Subbasin Flood-MAR	Direct Groundwater Recharge	CGA and GGA
Reclamation District 108 "Boards In" Program	Direct Groundwater Recharge	RD108
Colusa County Public Water System Water Treatment Plant	In-lieu Groundwater Recharge	Landowner
Glenn-Colusa Irrigation District Water Transfers to TCCA CVP Contractors	In-lieu Groundwater Recharge	GCID
Colusa Subbasin In-lieu Recharge & Banking Program	In-lieu Groundwater Recharge	South Valley Water Resources Authority
Sycamore Marsh Farm In-lieu Recharge Project	In-lieu Groundwater Recharge	Landowner
Westside Off-stream Reservoir and In-Lieu Groundwater Recharge	In-lieu Groundwater Recharge	TCCA Contractors
(a) Fourteen projects and management actions are not depicted on the map in Figure 6-9. These projects and management actions are excluded either because they will be implemented subbasin-wide or because the planning process is not far enough along to locate these projects at this time.		

7

Chapter 6 Projects and Management Actions

1 **6.5.1.1 Glenn-Colusa Irrigation District In-lieu Groundwater Recharge**

2 Despite GCID having highly reliable surface water supplies, a small percentage of district lands rely
 3 primarily on groundwater for irrigation supply. GCID will investigate, develop, and implement measures
 4 to incentivize associated growers to utilize surface water supplied by GCID, which will provide in-lieu
 5 recharge through reduced groundwater pumping. A summary of the project is provided in Table 6-28.

Item	Description
Implementation	GCID proposed this planned project for GSP implementation in the GCID service area. The project will provide in-lieu groundwater recharge through increased surface water utilization. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early planning stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The source is the Sacramento River under GCID's contractual rights according to its Sacramento River Water Right Settlement contract and under an appropriate water right for diversion and use of "winter water" from November 1 through March 31 each year. Settlement contract water supplies are subject to 25% reductions in Shasta Critical years; appropriate winter water subject to availability and curtailments according to water right Term 91.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review will be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation will be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early planning stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.

Table 6-28. Glenn-Colusa Irrigation District In-lieu Groundwater Recharge Summary

Item	Description
Costs	This project is currently in the early planning stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

1

2 **6.5.1.2 Westside Streams Diversion for Direct or In-lieu Groundwater Recharge**

3 There are numerous ephemeral streams that originate in the Coastal Range to the west of the Subbasin
 4 and flow eastward into the Subbasin. A portion of the winter and spring flows along these many streams
 5 could be diverted for a variety of in-lieu and direct groundwater recharge efforts in the Subbasin.

6 An analysis was completed to evaluate the potential recharge of diversions from the six largest streams
 7 along the western side of the Subbasin: Willow Creek, Logan Creek, Hunters Creek, Funks Creek, Stone
 8 Corral Creek, and Salt Creek¹¹. A map of these watersheds and streams is shown on Figure 6-10. It is noted
 9 that other streams and creeks, such as Walker Creek and Hambright Creek, also provide significant
 10 recharge benefits and offer potential recharge opportunities. However, for the purposes of this
 11 preliminary analysis, only the six streams listed above were considered based on their size and available
 12 monthly flow estimates.

13 All of the westside streams considered in this preliminary analysis are tributary to the Colusa Drain, which
 14 flows southward out of the Subbasin at the Colusa-Yolo County boundary. The Colusa Drain is tributary to
 15 the Sacramento River near Knights Landing in Yolo County and has an average annual discharge of 358,000
 16 acre-feet¹², including irrigation return flows as well as westside natural streamflow.

17 During periods of flow in the winter and spring, some portion of these flows could be diverted for either
 18 1) off-stream storage and subsequent use for irrigation, or 2) direct groundwater recharge through
 19 Flood-MAR¹³, dedicated recharge basins, or modified stream beds. A summary of the project is provided
 20 in Table 6-29.

21

¹¹ The location for Sites Reservoir is within the Funks and Stone Corral Creek watersheds. After construction of Sites Reservoir, flow through these creeks would primarily be inflow to Sites Reservoir and would no longer be available for downstream diversion and use within the Subbasin unless water were released into these creeks from Sites Reservoir in a pattern that matched historical flows.

¹² Average annual discharge of Colusa Drain at Knights Landing, 1986 through 2011.

¹³ Flood-MAR stands for Flood-Managed Aquifer Recharge. It is a groundwater recharge strategy that takes advantage of periods of high flow to divert flood waters for aquifer recharge on agricultural lands or other working landscapes (i.e., wildlife refuges or flood bypasses).

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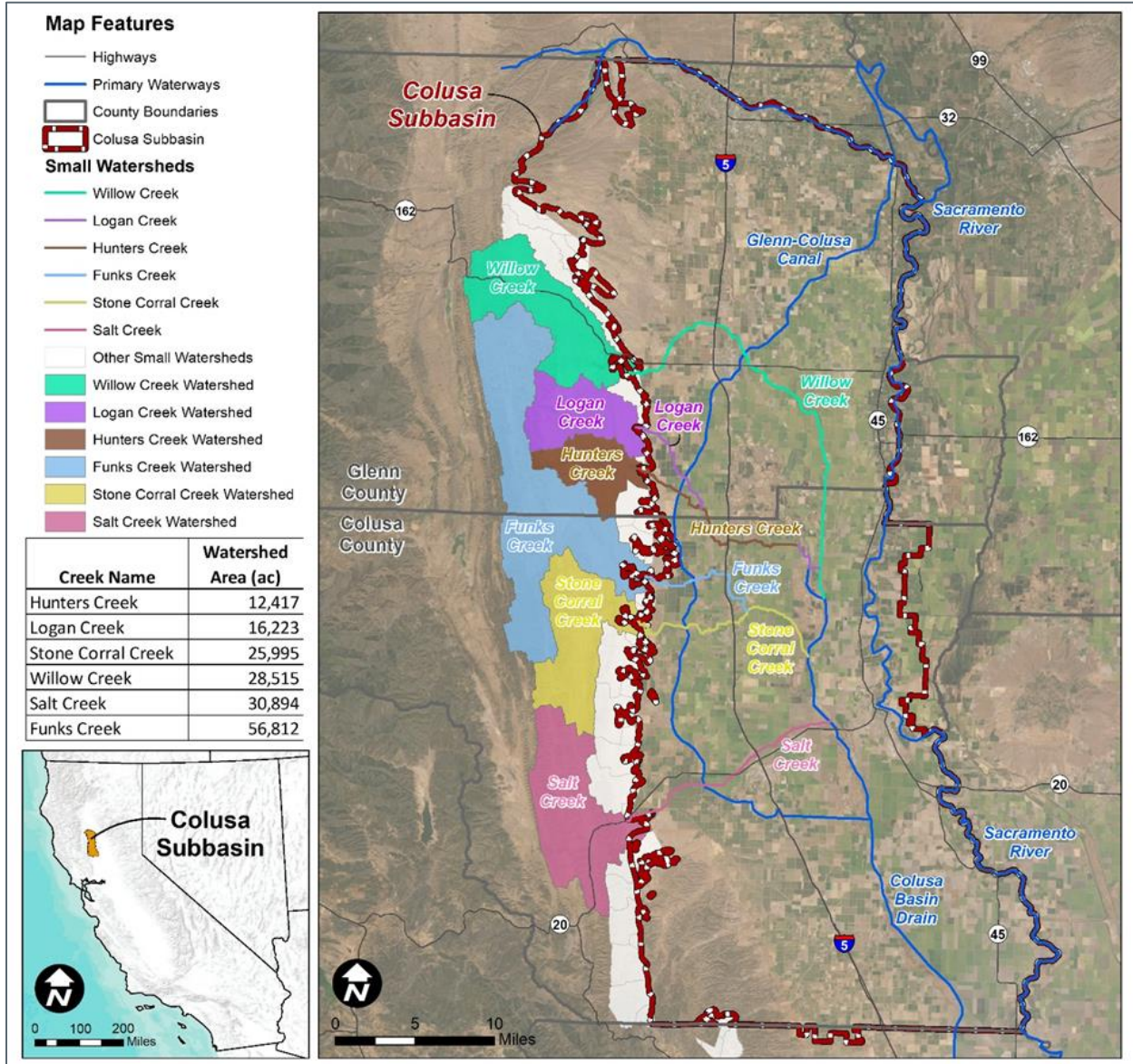


Figure 6-10. Watershed Area and Stream Path through Colusa Subbasin for the Six Largest Westside Streams

- 1
- 2
- 3
- 4
- 5

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Table 6-29. Westside Streams Diversion for Direct or In-lieu Groundwater Recharge Summary

Item	Description
Implementation	This potential project is proposed by CGA and GGA and would be implemented in Colusa and Glenn Counties. The additional water diverted could be used as supplemental irrigation water to provide in-lieu recharge or be diverted to provide direct recharge through Flood-MAR, dedicated recharge basins, or modified stream beds. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The water source would be the Westside Streams, which includes Willow Creek, Logan Creek, Hunters Creek, Funks Creek, Stone Corral Creek, Salt Creek, and potentially smaller streams. Water will only be available during periods of runoff occurring during heavy precipitation events or wet years.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Multi-benefits would include reduced flood impacts to the extent that diversions reduce the severity of downstream flooding. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

1

2

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1 A new water right (or rights) through the State Water Resources Control Board (SWRCB) would have to
2 be obtained for this water use. While it is recognized that water rights permitting can take significant time
3 to complete, this potential project is not intended to be implemented quickly. Thus, there is considered
4 to be sufficient time to complete water rights permitting for this project.

5 New diversion, conveyance, and recharge infrastructure would also have to be constructed. This
6 infrastructure would likely be located on private property through collaborative arrangements with
7 landowners. Depending on the scale of implementation, this project would be expected to result in an
8 average annual benefit ranging from roughly 1,000 af to 16,000 af for the Subbasin. The estimated costs
9 of the project will vary depending on the scale of implementation.

10 This project concept has already been explored by two private landowners in the Subbasin and
11 implemented on a small scale. One project captures storm water runoff on private lands for groundwater
12 recharge through an underground recharge structure designed to mimic a residential septic leach field,
13 and the other considers diversion of flood flows off of Sand Creek into an existing gravel pit (former
14 excavation site) adjacent to the creek to facilitate direct groundwater recharge.

15 As described below, evaluation of this project by the CGA and/or the GGA and interested parties within
16 the Subbasin will be done in conjunction with evaluation of the full suite of potential PMAs under
17 consideration by the GSAs. A series of increasingly detailed studies, culminating in a feasibility study,
18 would be required to evaluate project costs and benefits to determine whether or not to proceed with
19 implementation. Because the outcomes of these studies are uncertain, the project implementation
20 schedule cannot be determined at this time. Public noticing for this project as it progresses will be done
21 in accordance with the general plan outlined in the Notice/Communication section of the GSP.

22 The water source would be natural flow from these six ephemeral streams (and potentially other, smaller
23 westside streams) that flow into the Subbasin from the Coastal Range. To provide preliminary estimates,
24 the timing and volume of these flows, expressed as an average monthly flow, were estimated using
25 C2VSim model rainfall-runoff algorithms. The original C2VSim small watershed rootzone parameters were
26 used in the analysis, and flows runoff from these small Coastal range watersheds into the Subbasin were
27 extracted from the C2VSim small watershed output file. Substantial flow does not occur through these
28 creeks in every year and depends on the seasonal timing and volume of precipitation. Based on simulated
29 rainfall-runoff, this water source is highly variable from year to year, including years of essentially zero
30 runoff, and from month to month within years. When flow does occur, it is typically between the months
31 of December and June and largely occurs between January and April.

32 A pre-requisite for studying this project concept would be to install stream gages and conduct monitoring
33 to gather multiple years of streamflow records, including stream discharge, water quality measurements,
34 and sediment loads at different flows and for the rising and falling legs of runoff hydrographs. A design
35 objective would be to divert low sediment load flows, probably on the falling leg of runoff events, to
36 minimize the potential for clogging of recharge facilities. Water quality monitoring would also be required
37 to evaluate flow through these streams and determine whether or not poor water quality exists and may
38 impact beneficial uses provided through diversion for direct or in-lieu recharge.

39 This project would require the design and construction of new diversion and conveyance facilities, as well
40 as either off-stream storage facilities or recharge facilities (i.e., spreading basins)¹⁴. Further study would

¹⁴ In some cases, these facilities may already be in place and would only need to be repurposed to facilitate this new water use.

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1 need to be conducted to identify estimated volumes of water available for diversion and suitable locations
 2 for diversion and recharge facilities; these analyses would result in more detailed information about size
 3 and capacity of required infrastructure improvements, construction requirements. and estimated costs.

4 Further investigation into this project will provide more detailed information of project costs and benefits,
 5 which, in comparison with the current and projected conditions of the Subbasin, will allow for
 6 determination of whether or not the project should be implemented, and at what scale, to contribute to
 7 sustainable operation of the Subbasin. The results of any further analysis will be reported in the annual
 8 reports. If implemented, monitoring and quantification of benefits would be accomplished by the GSAs in
 9 coordination with other stakeholders and partners.

10 The timing and volume of flows into the Subbasin through these six creeks have been modeled and
 11 evaluated to estimate preliminary potential project benefits. Assuming a range of maximum flow
 12 thresholds that can be diverted from each of the six streams when they are flowing, the volumes available
 13 for diversion can be calculated. These numbers are long-term annual averages; in some years, no water
 14 would be available, while in other years volumes greater than those seen in Table 6-30 would be available.
 15 These numbers only represent an initial estimate of potential project benefit volumes and require more
 16 in-depth evaluation to verify their accuracy. As shown, initial estimated volumes range from roughly
 17 1,000 af to 16,000 af at different levels of implementation.

Table 6-30. Timing and Volume (af) of Flows into the Subbasin

Maximum Flow Threshold	Dec.	Jan.	Feb.	March	April	May	June	Total
Flow = 10 cfs	170	240	204	186	157	165	30	1,153
Flow = 20 cfs	286	589	386	523	459	324	68	2,635
Flow = 40 cfs	406	1,266	979	1,575	1,281	507	68	6,082
Flow = 60 cfs	406	1,817	1,590	2,770	1,854	628	181	9,246
Flow = 80 cfs	499	2,571	1,970	3,699	2,432	708	181	12,061
Flow = 100 cfs	615	3,462	2,467	5,252	2,961	927	181	15,865

18

19 Project costs will depend on the scale of implementation and other factors and will need to be estimated
 20 through further study, including an economic analysis and finance strategy designed to outline
 21 alternatives for meeting the costs for project implementation.

22 **6.5.1.3 Sites Reservoir**

23 The Sites Project would utilize existing infrastructure to divert unregulated and unappropriated flow from
 24 the Sacramento River at Red Bluff and Hamilton City and convey water to a new off stream reservoir west
 25 of the town of Maxwell. New and existing facilities would move water into and out of the reservoir, with
 26 ultimate release back to the Sacramento River system via existing canals and a new pipeline located near
 27 Dunnigan. The reservoir capacity would be between 1.3 maf and 1.5 maf depending on the project
 28 alternative selected. The reservoir would be operated in coordination with the State Water Project and
 29 Central Valley Project, yielding approximately 250,000 to 300,000 af in dry and critical years, and more in
 30 other year types. The managing agency is the Sites Project Authority. A summary of the project is provided
 31 in Table 6-31.

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Table 6-31. Sites Reservoir Summary	
Item	Description
Implementation	The Sites Project Authority proposed this project concept which would be located in the Antelope Valley west of the Subbasin. The project may provide direct and in-lieu groundwater recharge through utilization of surface water from this project, as available. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing will be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The source would be Sacramento River under new appropriative water rights. Settlement contract water supply is subject to 25% reductions in Shasta Critical years. New water rights would have junior priority and therefore would be subject to senior rights and water right Term 91
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review will be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation is being initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water (to the extent that project yield is dedicated to recharge projects). This project is currently in the early conceptual stage. Thus, the expected yield of this project for the Subbasin specifically has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits is being quantified through post project monitoring. Additional benefits could include increased local, regional, and statewide water supply reliability, climate change resiliency, recreation, and increased cold water pool for endangered salmon. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	The full cost of the project is \$5.2 billion. The portion of this which would be covered by Subbasin water users specifically is uncertain at this time.

1

2 **6.5.1.4 Delevan Pipeline Colusa Drain Intertie**

3 This project would construct an intertie between the proposed Delevan Pipeline component of the Sites
 4 Reservoir Project and the Colusa Drain. Currently, the only proposed intertie is the Dunnigan intertie. This
 5 intertie would provide a connection to downstream water users to utilize surface water storage from Sites

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- 1 Reservoir, improve conjunctive use, and potentially decrease groundwater pumping. This intertie would
- 2 also provide protection for the ecosystems upstream of the proposed Dunnigan intertie and redundancy
- 3 in case the TCC becomes inoperable due to subsidence or earthquake damage. A summary of the project
- 4 is provided in Table 6-32.

Item	Description
Implementation	A landowner proposed this project concept, which would be located at the intersection of Colusa Drain and the proposed Delevan Pipeline. The project would provide direct and in-lieu groundwater recharge through utilization of surface water. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The source would be Sacramento River under new appropriative water rights (conveyed to Sites Reservoir and through Delevan Pipeline). The reliability is uncertain at this time.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and will be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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6.5.1.5 Orland Unit Water Users Association Flood Water Conveyance

During periods of high flow and reservoir release on Stony Creek, water would be diverted at OUWUA's south diversion and conveyed to various locations for direct recharge within the OUWUA service area. Direct groundwater recharge could be conducted by OUWUA or by participating landowners and growers who have the ability to assist with groundwater recharge. Types of recharge facilities that may be used include creek beds, existing irrigation canals and laterals, agricultural fields, new, dedicated recharge basins, and, potentially, dry groundwater production wells. For example, flood water may be conveyed through existing facilities from the South Canal into the "Low Line Ditch" and Hambright Creek, or flood water may be strategically delivered to provide recharge in fields where groundwater levels have declined. Existing water rights may be used for this project, or a new water right (or rights) through the SWRCB may need to be obtained. While it is recognized that water rights permitting can take significant time to complete, this potential project is not intended to be implemented quickly. Thus, there is considered to be sufficient time to complete any necessary water rights permitting for this project. A summary of the project is provided in Table 6-33.

Table 6-33. Orland Unit Water Users Association Flood Water Conveyance Summary

Item	Description
Implementation	OUWUA proposed this potential project for GSP implementation in the OUWUA service area. The project would provide direct groundwater recharge through utilization of high flow and reservoir release on Stony Creek. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The source would be Stony Creek flood releases that cannot be held in Stony Creek reservoirs. This would be highly variable year to year depending on hydrology.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.

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Table 6-33. Orland Unit Water Users Association Flood Water Conveyance Summary

Item	Description
Benefits and benefit evaluation methodology	OUWUA would be responsible for operating and monitoring the project. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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2 **6.5.1.6 Orland-Artois Water District Direct Groundwater Recharge**

3 OAWD is interested in recharging groundwater through Managed Aquifer Recharge (MAR) on agricultural
 4 land to improve aquifer conditions, especially in the groundwater cone of depression to the west of Artois.
 5 A pilot project for MAR was conducted in 2017 on the VanTol site using water from a Section 215
 6 Temporary Water Contract from USBR. The 215 water is low-cost but is only available during high flow
 7 conditions in rivers and streams. A summary of the project is provided in Table 6-34.

Table 6-34. Orland-Artois Water District Direct Groundwater Recharge Summary

Item	Description
Implementation	OAWD proposed this project concept for GSP implementation in the OAWD service area. The project would provide direct groundwater recharge through MAR. OAWD completed a pilot project for MAR in 2017. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The source would be Sacramento River Section 215 water. This would be highly variable, and available only during periods of high flow in Sacramento River and tributaries.

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Item	Description
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and would be reported in GSP annual reports and five-year updates when known. An additional benefit would be possible ponded habitat for migratory birds depending on timing of flooding. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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2 **6.5.1.7 Sycamore Slough Colusa Basin Drain Multi-Benefit Recharge Project**

3 This project would restore portions of the Sycamore Slough through voluntary landowner participation in
 4 a multi-benefit recharge project. The recharge site will be hosted by Davis Ranches, a participating
 5 landowner within the Sycamore Mutual Water Company service. Water would be sourced from the
 6 Sacramento River during high flows in the system. The Sycamore Mutual Water Company is a Sacramento
 7 River Settlement Contractor, and could use a portion of its existing settlement contract water supplies for
 8 recharge if the project is initiated prior to November 1. If the project is initiated after November 1, water
 9 could be accessed using existing riparian water rights exercised for beneficial use (habitat). Field flooding
 10 would provide recharge, restoration, and multi-benefits such as winter floodplain habitat for migrating
 11 shorebirds/waterfowl as the field is pulse flooded, or habitat for monarch butterflies and other pollinator
 12 species. A summary of the project is provided in Table 6-35.

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Item	Description
Implementation	This project would conduct multi-benefit groundwater recharge on fields within the Sycamore Mutual Water Company service area, restoring portions of the Sycamore Slough. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The source would be the Sacramento River. Water could be accessed through existing riparian water rights or from existing settlement contract supplies (if the project is initiated before November 1). This source is expected to be reliable, but the precise volume of available water is unknown at this time.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Multi-benefits include ponded habitat for migratory birds, along with other environmental benefits. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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1 **6.5.1.8 Tehama-Colusa Canal Trickle Flow to Ephemeral Streams**

2 The TCC has existing gates that are used to dewater sections of the canal. The gates discharge into ephemeral
 3 streams that intersect the canal. Water could be discharged from the TCC into these streams at a rate where they
 4 do not flow out of the Subbasin but recharge the groundwater system. Flow measurement devices would need
 5 to be added to the gates. Surface water for recharge would be Sacramento River available water under existing
 6 Bureau of Reclamation water supply contracts held by Tehama-Colusa Canal contractors, existing water rights
 7 settlement contracts, and annual Section 215 contracts. A summary of the project is provided in Table 6-36.

Table 6-36. TCC Trickle Flow to Ephemeral Streams Summary

Implementation	RD108 proposed this project concept which would be located at TCC and ephemeral stream crossings. The project would provide direct groundwater recharge through utilization of surface water. While this project is proposed for areas along the TCC, this concept could be applied throughout the Subbasin. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The source would be the Sacramento River (conveyed through TCC). Water could be supplied under existing Reclamation water supply contracts held by Tehama- Colusa Canal contractors, existing water rights settlement contracts, and annual Section 215 contracts. The reliability is uncertain at this time.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.

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Table 6-36. TCC Trickle Flow to Ephemeral Streams Summary

Item	Description
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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2 **6.5.1.9 Enhanced Infiltration of Precipitation on Agricultural Lands**

3 Current cultural practices, particularly in almond orchards, tend to reduce infiltration and increase runoff of
 4 precipitation. Development and adoption of on-farm cultural practices to reduce precipitation runoff and
 5 increase infiltration would result in increased storage of precipitation in the crop root zone, thereby reducing
 6 irrigation water requirements and groundwater pumping. Additionally, to the extent that infiltrated
 7 precipitation percolates through the root zone, this would result in increased direct groundwater recharge.
 8 The resulting in-lieu and direct recharge would benefit groundwater levels and reducing runoff could reduce
 9 soil erosion and provide water quality benefits. This project is proposed as a potential research management
 10 action; for example, a collaborative initiative between the GSAs and University of California Cooperative
 11 Extension, the Natural Resources Conservation Service, local resource conservation district, California State
 12 University Chico, or other interested organizations. A summary of the project is provided in Table 6-37.

Table 6-37. Enhanced Infiltration of Precipitation on Agricultural Lands Summary

Item	Description
Implementation	This potential project is proposed by CGA and GGA and would be implemented across the Subbasin through cooperating growers. The project would provide in-lieu groundwater recharge through storage of precipitation in the root zone, and direct groundwater recharge through increased percolation of precipitation. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The main source of water providing additional recharge is precipitation. The reliability would be variable.

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Table 6-37. Enhanced Infiltration of Precipitation on Agricultural Lands Summary

Item	Description
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Other benefits would include reduction of soil erosion and water quality benefits.
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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2 **6.5.1.10 Colusa Subbasin Flood-MAR**

3 The CGA and GGA, in coordination with landowners and other agencies, would investigate, develop, and
 4 implement a program to divert flood waters within the Subbasin, when available, for spreading across
 5 agricultural lands or other working landscapes for direct groundwater recharge. A summary of the project
 6 is provided in Table 6-38.

Table 6-38. Colusa Subbasin Flood-MAR Summary

Item	Description
Implementation	CGA and GGA proposed this project concept which would be implemented across the Subbasin with cooperating growers. The project would provide direct groundwater recharge through cooperating grower properties using flood waters when available. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The source and reliability of flood water for recharge are to be determined.

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Table 6-38. Colusa Subbasin Flood-MAR Summary

Item	Description
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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2 **6.5.1.11 Reclamation District 108 "Boards In" Program**

3 RD108, in coordination with landowners, would institute a voluntary or financially incentivized program
 4 in which landowners leave their spill boards in place during the winter months to capture rainfall and hold
 5 it on their fields for recharge. The project would occur in any fields with spill boards throughout RD108,
 6 though the program concept could be expanded across the Subbasin. A summary of the project is provided
 7 in Table 6-39.

Table 6-39. Reclamation District 108 "Boards In" Program Summary

Item	Description
Implementation	RD108 proposed this project, which would be implemented in coordination with landowners in fields with spill boards throughout RD108. The program concept could also be expanded Subbasin-wide. The project would institute a voluntary or financially incentivized program in which landowners leave their spill boards in place during the winter months to capture rainfall and hold it on their fields for recharge. This project is ready for implementation now, but may also be initiated, monitored, and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the conceptual stage, but could be implemented immediately. However, the precise start and completion dates for this project have yet to be determined and would be provided in GSP annual reports and five-year updates when known.

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Table 6-39. Reclamation District 108 "Boards In" Program Summary

Item	Description
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings, and environmental/regulatory permitting notification.
Water source & reliability	This project relies on precipitation, not on water sources outside the Subbasin.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the conceptual stage. Assuming that approximately 20% of rice fields in RD108 participate each year, the estimated average annual recharge benefit of the project over the 2022 to 2065 period is approximately 1.8 taf/yr. The actual yield of this project would be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This project is currently in the conceptual stage. Thus, the anticipated costs of this project, if any, have yet to be determined and would be reported in GSP annual reports and five-year updates when known. It is anticipated that the project will have no costs if implemented as a voluntary program. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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6.5.1.12 Colusa County Public Water System Water Treatment Plant

This project would construct a water treatment plant on the Sacramento River between the Cities of Colusa and Grimes to provide treated surface water to public water supply systems in Colusa and possibly Sutter and Yolo Counties. A summary of the project is provided in Table 6-40.

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Item	Description
Implementation	A landowner proposed this potential project which would be implemented in Colusa County. By increasing the surface water available for drinking water supply this project would provide in-lieu groundwater recharge. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and will be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The water source would be the Sacramento River under new appropriative water rights. The reliability is uncertain at this time.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Other benefits would be improved drinking water quality, and less threat to 1) Arbuckle and Dunnigan facing loss of well supply, 2) Grimes and Princeton’s drinking well arsenic contamination, and 3) Williams’ elevated salinity (TDS) levels. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and will be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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6.5.1.13 Glenn-Colusa Irrigation District Water Transfers to TCCA CVP Contractors

GCID is exploring the possibility of transferring surface water to Central Valley Project (CVP) contractors served by the TCC to provide in-lieu groundwater recharge and reduce groundwater pumping. The water to be transferred would be Sacramento River water available to GCID under its water rights settlement contract that is temporarily surplus to GCID's needs under certain conditions. Transferred water would be diverted into the Tehama-Colusa Canal at the Red Bluff Pumping Plant and Fish Screen facility rather than at the GCID pumping plant and fish screen facility north of Hamilton City. Priority would be placed on transfers to CVP contractors in areas where groundwater levels have been declining over the past approximately 20 years, particularly in the areas around the cities of Orland and Arbuckle. A summary of the project is provided in Table 6-41.

Item	Description
Implementation	GCID proposed this potential project for GSP implementation with participating TCCA CVP contractors. The project would provide in-lieu groundwater recharge through increased CVP water utilization. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The source would be the Sacramento River under GCID's existing contractual rights according to its Sacramento River Water Right Settlement contract. Settlement contract water supplies are subject to 25 percent reductions in Shasta Critical years.
Legal authority, permitting processes, and regulatory control	GSAs, Districts and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. These analyses may include: flow measurement consistent with SBx7-7 (23 CCR §931-938), ET analysis, reductions in GW use, well monitoring, determination of infiltration rates, water balance analysis, as-built drawings and stream gaging. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.

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Table 6-41. Glenn-Colusa Irrigation District Water Transfers to TCCA CVP Contractors Summary

Item	Description
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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2 **6.5.1.14 Colusa Subbasin In-Lieu Recharge & Banking Program**

3 The project would incentivize landowners to take surplus contract surface water in-lieu of pumping
 4 groundwater by providing financial incentives (subsidizing surface water costs) to make surface water less
 5 expensive than groundwater. If needed, South Valley would subsidize the cost of new distribution systems
 6 to facilitate the delivery of additional surface water or provide funds to districts to implement other
 7 programs. The magnitude of such payments would depend on the size of the banking project but could
 8 exceed \$100,000 per year per district. A predetermined portion of the additional water brought into the
 9 districts would be dedicated to contributing to local groundwater sustainability and some portion of the
 10 remaining quantities would be available for delivery, directly or by exchange, to South Valley members in
 11 the San Joaquin Valley. Additional groundwater production wells may need to be constructed to enable
 12 recovery of banked water. Such facilities would be paid for by South Valley but located and constructed
 13 in coordination with local districts. A summary of the project is provided in Table 6-42.

Table 6-42. Colusa Subbasin In-Lieu Recharge & Banking Program Summary

Item	Description
Implementation	The South Valley Water Resources Authority proposed this project concept which would be located within the districts who participate. The project would provide direct and in-lieu groundwater recharge through utilization of surface water from this project, as available. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	To be determined.

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Table 6-42. Colusa Subbasin In-Lieu Recharge & Banking Program Summary

Item	Description
Legal authority, permitting processes, and regulatory control	GSAs, Districts and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, depletion of interconnected surface water, land subsidence, and potentially groundwater quality. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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2 **6.5.1.15 Sycamore Marsh Farm In-Lieu Recharge Project**

3 Sycamore Marsh Farm is in the process of developing an in-lieu groundwater recharge plan. Sycamore
 4 Marsh Farm encompasses approximately 420 acres in the Colusa Drain Mutual Water Company (CDMWC)
 5 and has an additional 449 acres that could potentially be annexed into the CDMWC, allowing for diversion
 6 of surface water from CDMWC. A summary of the project is provided in Table 6-43.

Table 6-43. Sycamore Marsh Farm In-Lieu Recharge Project Summary

Item	Description
Implementation	The landowner proposed this project concept for GSP implementation which would be located on their property. The project would provide in-lieu groundwater recharge through annexation into CDMWC. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and would be provided in GSP annual reports and five-year updates when known.

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Table 6-43. Sycamore Marsh Farm In-Lieu Recharge Project Summary

Item	Description
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The source for this project would be the Colusa Drain. The reliability is still to be determined.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, depletion of interconnected surface water, land subsidence, and potentially groundwater quality. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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6.5.1.16 Westside Off-stream Reservoir and In-Lieu Groundwater Recharge

TCCA Contractors would construct off-stream surface reservoirs along the western edge of the Subbasin and up-slope from the TCC. They would divert surplus Sacramento River flows (e.g., Section 215 water) at the Red Bluff Pumping Plant and Fish Screen, and convey water through the TCC and pump water up into storage reservoir(s). Stored water would be released into the TCC for irrigation supply to enable reduction of groundwater pumping (i.e., in-lieu groundwater recharge). New pumping plants on the TCC and new storage impoundments would need to be planned, designed, and constructed subject to a determination of economic and environmental feasibility. A summary of the project is provided in Table 6-44.

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Table 6-44. Westside Off-stream Reservoir and In-Lieu Groundwater Recharge Summary	
Item	Description
Implementation	TCCA Contractors proposed this project concept for GSP implementation which would be located on the western edge of the Subbasin. The project would provide in-lieu groundwater recharge through increased storage of surface water. This project may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	The source for this project would be Sacramento River Section 215 water. The reliability is highly variable; available only during periods of high flow in the Sacramento River and tributaries.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The project proponent would identify funding sources to cover project costs as part of project development. These may include grants, fees, loans, and other assessments.

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6.5.2 Potential Management Actions

This section describes potential management actions that would be implemented if determined to be necessary under future monitoring of the Subbasin. Table 6-45 summarizes the potential management actions included in the GSP. The following subsections provide descriptions for each management action.

Table 6-45. Summary of Potential Management Actions

Management Action ^(a)	Management Action Type	Proponent
Domestic Well Mitigation Program	Management Action	CGA and GGA
Drought Contingency Planning for Urban Areas	Management Action	CGA, GGA, and cities (GSA member agencies)
Long-Term Demand Management Action	Management Action	CGA and GGA
Strategic Short-Term Demand Management	Management Action	CGA and GGA
Well Abandonment Outreach and Funding Program	Management Action	CGA and GGA
Preservation of Lands Favorable for Recharge	Management Action	CGA and GGA
Review of County Well Permitting Ordinances	Management Action	CGA and GGA
Reduce Non-beneficial Evapotranspiration/Invasive Species Eradication	Reduce Groundwater Demand	CGA and GGA
Development of a Dedicated Network of Shallow Monitoring Wells for GDE Monitoring	Management Action, Closing Data Gaps	CGA and GGA

(a) Fourteen projects and management actions are not depicted on the map in Figure 6-9. These projects and management actions are excluded either because they will be implemented subbasin-wide or because the planning process is not far enough along to locate these projects at this time.

6.5.2.1 Domestic Well Mitigation Program

Groundwater level measurable objectives (MOs) adopted for sustainable management of the Subbasin operation are based on the most recent five years of measured water levels in each representative monitoring well (generally 2015 through 2020 with some exceptions), and therefore should be highly protective of domestic water supply wells. However, it is possible that in certain portions of the Subbasin groundwater levels will fall below the adopted MOs and approach the adopted minimum thresholds (MTs) as projects and management actions are being implemented for recovery of groundwater levels. As a consequence, it is possible that that some domestic wells will go dry in the future.

To mitigate the effects of domestic well stranding due to groundwater level decline, the CGA and GGA will investigate implementing domestic well mitigation programs in their respective portions of the Subbasin. These programs may consider supporting consolidation of smaller public water systems and expansion of larger public water systems to cover domestic users that may see impacts to their existing wells. The exact details of the potential domestic well mitigation programs have yet to be determined, but will be reported in GSP annual reports and five-year updates when known. Outreach to domestic well users, including those in DACs, SDACs, and EDAs, will occur throughout program development and implementation using the communication pathways identified in Chapter 2 and in Table 6-46. Outreach will be conducted to ensure that the interests and feedback of domestic well users are known and considered throughout the development and implementation of these programs.

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1 Program development would involve establishing a funding mechanism to accumulate mitigation funds,
 2 establishing a process and criteria for determining when dewatered wells are eligible for mitigation
 3 funding, and establishing criteria for scaling mitigation payments (for example, relatively new dewatered
 4 wells might qualify for more funding than old wells). Possible mechanisms that could be used to generate
 5 well mitigation funds include a groundwater extraction fee (which would require flow measurement at
 6 each well) and a per well assessment (which would not require measurement). A summary of the program
 7 is provided in Table 6-46.

Item	Description
Implementation	CGA and GGA proposed this potential management action for GSP implementation which would occur across the Subbasin. The action would respond to potentially changing conditions in the Subbasin and would be implemented as needed if groundwater levels fall. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This action is currently in the early conceptual stage. Thus, the start and completion dates have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	Not applicable for this demand management action.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual proponents have the authority to plan and implement management actions. Required permitting and regulatory review would be initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit is groundwater levels, as this management action would alleviate problems associated with potential changes in conditions. The expected yield of this management action is not quantified as it is proposed for responding to changing conditions. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This management action is currently in the early conceptual stage. Thus, the anticipated costs have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development of this management action. These may include grants, fees, loans, and other assessments.

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1 **6.5.2.2 Drought Contingency Planning for Urban Areas**

2 The CGA and GGA will coordinate with cities, towns, and other municipal and industrial water suppliers,
 3 which are all fully dependent on groundwater in the Subbasin, to encourage drought contingency planning
 4 and drought preparedness in a manner consistent with sustainable groundwater management according
 5 to the GSP. A summary of the management action is provided in Table 6-47.

Table 6-47. Drought Contingency Planning for Urban Areas Summary	
Item	Description
Implementation	CGA, GGA, and cities (GSA member agencies) proposed this potential management action for GSP implementation which would occur across the Subbasin. The action would reduce the demand for groundwater pumping. This action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This action is currently in the early conceptual stage. Thus, the start and completion dates have yet to be determined and will be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	Not applicable for this management action.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement management actions. Required permitting and regulatory review would be initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The sustainability indicators expected to benefit are groundwater levels, groundwater storage, and depletions of interconnected surface water. This management action is currently in the early conceptual stage. Thus, the expected yield has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This management action is currently in the early conceptual stage. Thus, the anticipated costs have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development of this management action. These may include grants, fees, loans, and other assessments.

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1 **6.5.2.3 Long-Term Demand Management Action**

2 The planned PMAs described in this chapter will be pursued by the Colusa Subbasin GSAs to achieve and
3 maintain sustainable groundwater conditions. The GSAs have also included a potential demand
4 management program as a “backstop” to other PMAs. Events that may trigger this management action
5 include, but are not limited to: severe, prolonged drought conditions result in groundwater levels
6 approaching MT in specific parts of the Subbasin; other PMAs are not achieving the expected level of
7 benefits; or new information about projected future conditions show that sustainability objectives will
8 not be met. This section describes the demand management action.

9 Demand management broadly refers to any water management activity that reduces the consumptive
10 use of irrigation water. To be effective for purposes of sustainable groundwater management, demand
11 management must result in a reduction in net groundwater pumping (pumping net of recharge). That is,
12 it must reduce consumptive use or irrecoverable losses into a saline water body. Activities that, for
13 example, reduce canal seepage or reduce deep percolation from irrigation will not be effective. They may
14 decrease quantity of water diverted or applied but they also reduce recharge to usable groundwater, so
15 do not improve the net pumping from the aquifer.

16 For purposes here, a demand management action is one that incentivizes, enables, or requires water users
17 to reduce their consumptive use, but does not dictate exactly how users have to do it. Users can respond
18 to demand management by changing to lower water-using crops, water-stressing crops (providing less
19 water than the crop would normally consume for full yield), reducing evaporation losses, and reducing
20 irrigated acreage.

21 The following types of demand management activities are included under this management action:

- 22 • **Allocation.** Under an allocation, the different sources of groundwater are quantified and
23 allocated to individual parcels, wells, or entities (such as, for example, farming operations).
24 Sources of groundwater that can be included in the allocation can include the sustainable
25 yield, natural recharge, imported water recharge, new developed recharge sources, and, for
26 a limited period of time, overdraft (sometimes called “transitional water”). By defining the
27 quantities of groundwater available to individuals this can incentivize reductions in use and
28 development of new recharge opportunities. Allocation design may include specific
29 considerations for managed wetlands and other habitat uses of water.

30 Implementing an allocation does not necessarily result in reducing groundwater use. For
31 example, if the allocation is greater than historical use this would not be a constraint for
32 groundwater users and would not result in less consumptive groundwater use. In the
33 context of GSP implementation, the allocation is typically tied to the sustainable yield of the
34 Subbasin. When the sustainable yield (including yield of other PMAs like recharge projects)
35 is less than current pumping, the effect of an allocation is an overall reduction in net
36 groundwater use.

37 An allocation is a rigid method for implementing demand management. It effectively limits
38 water use on a well, parcel, or operation basis. This could require idling land or switching
39 crop on lands that have insufficient allocation to meet crop demand, which imposes costs
40 on water users (e.g., growers). There are ways to increase the flexibility of allocations to
41 reduce the costs of demand management. For example, the allocation could be defined as
42 an average over a period of time rather than a fixed amount every year, or users could be
43 allowed to carry over unused allocation into the next year.

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- 1 • **Allocation + Water Market.** An allocation that is less than historical water use can be
2 coupled with a water market. A groundwater market is another way to increase the
3 flexibility of an allocation to reduce costs of demand management. A market is an institution
4 that allows willing buyers and sellers to exchange groundwater allocation (“credits”). The
5 market allows groundwater users to shift allocation to higher-valued uses. Defining an
6 allocation across an entire farming operation establishes a kind of market in which the
7 owner or manager moves water to produce the highest return (e.g., remove an older block
8 of an orchard and use the allocation to meet crop demand on a more productive block).
9 More broadly, a market allows a means to exchange allocation with another groundwater
10 user, whether for a single season or using a multi-year trade. Willing sellers trade a part of
11 their allocation to willing buyers in exchange for a payment that the seller expects will
12 exceed the return he/she would have earned from using the water for irrigation. This
13 additional flexibility reduces the cost to the GSA’s users of achieving demand reduction
14 under an allocation.

15 Development of a water market institution is a complex process that encompasses more
16 than defining the groundwater allocation. The water market requires an administrator
17 (e.g., the GSA or a third party) and methods for monitoring, enforcement, and accounting of
18 groundwater use. It also requires development of market rules that determine what sources
19 of the allocation are tradeable, under what conditions, and over what periods of time. For
20 example, market rules would consider, and possibly limit, the potential impacts of local
21 concentrations of groundwater pumping if trades occur within specific areas. Other market
22 rules might consider habitat and ecosystem service benefits. Finally, the water market
23 requires a marketplace for buyers and sellers to post bids, review prices, and execute deals.
24 The GSAs would consider these factors in the future if a groundwater market is considered.

- 25 • **Land Repurposing.** Land repurposing programs are more targeted than an allocation or
26 market program but maintain flexibility for participants by its voluntary nature. Such a
27 program would provide a financial incentive to willing participants for their currently
28 irrigated lands to be repurposed into other, non-irrigated uses. Programs can focus on
29 short-term drought conditions, or they can provide multi-year reductions in demand if that
30 is needed under some conditions. For longer-term programs, lands can be repurposed to
31 achieve other multi-benefit objectives - for example, to create habitat corridors or to
32 support local endangered species¹⁵.

33 Land repurposing programs typically include incentives to stop irrigating. These incentives
34 need, at minimum, to exceed the return to farming on a parcel. An additional incentive may
35 be provided to convert land into an alternative use. For example, the United States
36 Department of Food and Agriculture (USDA) Conservation Reserve Enhancement Program
37 (CREP¹⁶) will pay lands to forgo irrigation and offer an additional per acre payment to
38 convert lands into different types of habitats. Other land repurposing program
39 considerations might consider strategic location of repurposed lands considering proximity
40 to protected areas (e.g., National Wildlife Refuges).

¹⁵ See, for example: Environmental Defense Fund, Strategic Land Repurposing. The Nature Conservancy, Rewilding Agricultural Lands.

¹⁶ Note that CREP is state-specific and is not currently being implemented in California.

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- **Other financial incentives.** Demand management can also be achieved through a range of other financial incentives. This could include positive financial incentives to reduce consumptive groundwater use. It could also include groundwater extraction fees that disincentivize groundwater use. Financial incentives could consider public benefits (e.g., habitat) separately from private benefits (e.g., irrigation) of water use.

As described above, the demand management action could be triggered if required under future monitoring by the GSAs. The following principles would guide development of the demand management program; these are in no order of preference and the GSAs recognize that tradeoffs exist among these principles:

- Minimize the economic impacts of any demand management
- Maintain established water rights
- Incentivize investment in water supply infrastructure
- Incentivize economically efficient water use
- Complement other PMAs such as direct and in-lieu recharge projects in aggregate, and in specific regions
- Allow sufficient program flexibility for groundwater pumpers to adjust over time
- Ensure access for domestic water users (de minimis domestic use as defined by SGMA is less than 2 af annually per user for domestic purposes only)

This potential management action will be evaluated further in GSP annual reports and five-year updates, as required by conditions in the Subbasin. Appendix 6B summarizes the economic value of irrigated agriculture to the Subbasin and quantifies the direct economic costs of demand management. Table 6-48 summarizes GSP regulation requirements and describes how the management action meets those requirements.

Table 6-48. Long-Term Demand Management Action Summary

Item	Description
Implementation	CGA and GGA proposed this management action for GSP implementation, but it would only be implemented if groundwater conditions in the Subbasin, or specific areas of the Subbasin, require it. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This action is currently in the early conceptual stage. Thus, the start and completion dates have yet to be determined and would be provided in GSP annual reports and five-year updates when known, and only if the management action is triggered for implementation.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	Not applicable for this demand management action.

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Table 6-48. Long-Term Demand Management Action Summary

Item	Description
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement management actions. Required permitting and regulatory review would be initiated through consultation with applicable governing agencies. This would likely include local county agencies, as appropriate.
Benefits and benefit evaluation methodology	The measurable objective expected to benefit is groundwater levels, as this management action would reduce net pumping to achieve sustainability conditions in specific areas. The expected yield of this management action is not quantified because: 1) it will only be triggered if necessary, and 2) the scale of the demand management program is flexible. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This management action is currently in the early conceptual stage. Thus, the anticipated costs have yet to be determined and would be reported in GSP annual reports and five-year updates when known, and only if the management action is triggered for implementation. The proponent would identify funding sources to cover costs as part of development of this management action. These may include grants, fees, loans, and other assessments.

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2 **6.5.2.4 Strategic Temporary Land Idling for Drought and Localized Short-Term Groundwater**
3 **Management**

4 The Colusa Subbasin GSP identified potential areas of concern in the Subbasin where groundwater levels
5 have declined significantly over recent years due to disproportionate reliance on groundwater to meet
6 crop irrigation demands. Planning and constructing projects (e.g., conveyance or recharge) to offset
7 short-run impacts of drought and local groundwater level impacts would take time and require substantial
8 capital costs. This program is a potential management action that would provide the GSAs with a
9 voluntary, flexible, short-run response to alleviate impacts in local areas of concern.

10 The program would be focused on specific drought-affected areas with sustainability challenges. It would
11 be voluntary and provide financial incentives (payments) to encourage participation. Payment terms and
12 other conditions would be specified as part of program design. Two potential structures for the program
13 are: 1) participating groundwater-using lands in drought-affected areas in the Subbasin would be idled
14 and the quantified groundwater saved would be left in the ground to alleviate sustainability challenges,
15 or 2) participating surface water-using lands anywhere in the Subbasin would be idled, and the saved
16 surface water would be conveyed to replace groundwater pumping in other areas of the Subbasin with
17 groundwater sustainability challenges.

18 Appendix 6B summarizes the economic value of irrigated agriculture to the Subbasin and quantifies the
19 direct economic costs of demand management in the potential areas of concern. A summary of the
20 management action is provided in Table 6-49.

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Projects and Management Actions

Table 6-49. Strategic Temporary Land Idling for Drought and Localized Short-Term Groundwater Management Summary	
Item	Description
Implementation	CGA and GGA proposed this management action concept for GSP implementation which would occur across the Subbasin. The action would reduce the demand for groundwater pumping. This action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This action is currently in the early conceptual stage. Thus, the start and completion dates have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	Not applicable for this demand management action.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual proponents have the authority to plan and implement management actions. Required permitting and regulatory review would be initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The measurable objectives expected to benefit are groundwater levels, groundwater storage, and depletions of interconnected surface water in areas with potential sustainability challenges. The expected yield of this management action will depend on the level of participation and water needs. There is also potential for multi-benefits on temporarily idled lands, depending on program design.
Costs	This management action is currently in the early conceptual stage. Thus, the anticipated costs have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development of this management action. These may include grants, fees, loans, and other assessments.

1

2 **6.5.2.5 Well Abandonment Outreach and Funding Program**

3 The CGA and GGA will coordinate with Colusa and Glenn counties, respectively, to create a program
 4 providing outreach and education to landowners regarding the proper procedures for well
 5 decommissioning and abandonment, as well as a funding source to assist landowners with these
 6 procedures. This effort would be accomplished through coordination between the GSAs and well
 7 permitting agencies. This program is anticipated to improve the Subbasin well inventory and potentially
 8 have water quality benefits, as improperly abandoned wells are a potential point source for water quality
 9 contaminant transport from the ground surface to the underlying groundwater system. A summary of the
 10 management action is provided in Table 6-50.

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Item	Description
Implementation	CGA and GGA proposed this management action concept for GSP implementation which would occur across the Subbasin. The action would respond to potentially changing conditions in the Subbasin and would be implemented as needed based on the number of wells abandoned and water quality concerns. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This action is currently in the early conceptual stage. Thus, the start and completion dates have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	Not applicable for this management action.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement management actions. Required permitting and regulatory review would be initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The measurable objective expected to benefit is water quality. The expected yield of this management action is not quantified as it is proposed for responding to changing conditions. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This management action is currently in the early conceptual stage. Thus, the anticipated costs have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development of this management action. These may include grants, fees, loans, and other assessments.

1

2 **6.5.2.6 Preservation of Lands Favorable for Recharge**

3 The CGA and GGA will coordinate with those agencies having authority over land use planning in Colusa
 4 and Glenn counties, respectively, to investigate, design, and implement a program providing incentives to
 5 landowners with lands favorable to groundwater recharge to preserve them as agricultural or
 6 undeveloped lands on which groundwater recharge will be possible in perpetuity. An update of ongoing
 7 coordination will appear in annual reports. A summary of the management action is provided in
 8 Table 6-51.

Chapter 6

Projects and Management Actions

Item	Description
Implementation	CGA and GGA proposed this management action concept for GSP implementation which would occur across the Subbasin. The action could help create additional direct groundwater recharge in the future. This action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This action is currently in the early conceptual stage. Thus, the start and completion dates have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	Not applicable for this management action.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement management actions. Required permitting and regulatory review would be initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The measurable objectives expected to benefit are groundwater levels, groundwater storage, and depletions of interconnected surface water. This management action is currently in the early conceptual stage. Thus, the expected yield has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This management action is currently in the early conceptual stage. Thus, the anticipated costs have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development of this management action. These may include grants, fees, loans, and other assessments.

1

2 **6.5.2.7 Review of County Well Permitting Ordinances**

3 Modification to well regulations is one potential mechanism to ensure that groundwater sustainability is
 4 achieved and maintained in the Subbasin. Well permitting regulations can help avoid adverse impacts on
 5 groundwater beneficial users by reducing the potential for mutual well interference or streamflow
 6 depletion through limitations on well screen depths, well spacing, and/or setbacks.

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- 1 This management action would review and suggest potential revisions to the county well permitting
 2 processes in the Subbasin to ensure that:
- 3 • Future well permitting aligns with the subbasin sustainability goal
 - 4 • Future changes to well permitting are reviewed by the GSAs
- 5 Through this management action, the Counties and GSAs would coordinate to establish processes
 6 whereby the GSAs would review and agree upon future changes to well permitting requirements. This
 7 coordination could occur through the potential framework for coordination between the Counties and
 8 GSAs that is described in Chapter 7, Plan Implementation. The Counties would also review existing well
 9 permitting processes and assess whether additional well permitting requirements are warranted to
 10 maintain sustainable groundwater conditions in the Subbasin. Existing well regulations may be modified
 11 to help protect water quality, allow for appropriate screening, require depths be deeper than MTs, and
 12 avoid interference or impacts of pumping on neighboring wells. Efforts may also be designed to be
 13 protective of domestic wells.
- 14 A summary of the management action is provided in Table 6-52.

Item	Description
Implementation	This management action would review and suggest potential revisions to the county well permitting processes in the Subbasin to ensure that future well permitting aligns with the Subbasin sustainability goal and that future changes to well permitting are reviewed by the GSAs. This action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This action is currently in the early conceptual stage. Thus, the start and completion dates have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	Not applicable for this management action.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement management actions, and Counties have the authority to review and modify county well permitting ordinances. Required permitting and regulatory review would be initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.

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Table 6-52. Review of County Well Permitting Ordinances Summary

Item	Description
Benefits and benefit evaluation methodology	All sustainability indicators may benefit from changes in groundwater pumping that result from revisions to county well permitting ordinances. This management action is currently in the early conceptual stage. Thus, the expected yield has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Evaluation of benefits will be based on analysis of pre- and post-project measurements supported by modeling. Measured parameters will include surface water deliveries, groundwater levels, and others to be determined. Modeling will be done with the C2VSimFG-Colusa model used for GSP development.
Costs	This management action is currently in the early conceptual stage. Thus, the anticipated costs have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development of this management action. These may include grants, fees, loans, and other assessments.

1

2 **6.5.2.8 Reduce Non-beneficial Evapotranspiration**

3 This project would remove the invasive, non-native plant species (i.e., *Arundo donax*, eucalyptus,
4 tamarisk, etc.) from riparian corridors and other areas they may be present. This would provide both a
5 reduction in evapotranspiration from shallow groundwater and native ecosystem restoration. A summary
6 of the management action is provided in Table 6-53.

Table 6-53. Reduce Non-beneficial Evapotranspiration Summary

Item	Description
Implementation	This potential project is proposed by CGA and GGA and would be implemented across the Subbasin. This action could be done in coordination with neighboring GSAs, especially along Stony Creek. The project would reduce groundwater demand by reducing evapotranspiration. This action may be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, if sustainable levels are not reached following implementation of other projects and management actions. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This project is currently in the early conceptual stage. Thus, the start and completion dates for this project have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	Not applicable.

Chapter 6
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Table 6-53. Reduce Non-beneficial Evapotranspiration Summary

Item	Description
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The measurable objectives expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This project is currently in the early conceptual stage. Thus, the expected yield of this project has yet to be determined and would be reported in GSP annual reports and five-year updates when known. Other benefits would include decreased ET, increased native vegetation and habitat, and decreased sediment trapping.
Costs	This project is currently in the early conceptual stage. Thus, the anticipated costs of this project have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development of this management action. These may include grants, fees, loans, and other assessments.

1

2 **6.5.2.9 Development of a Dedicated Network of Shallow Monitoring Wells for GDE Monitoring**

3 This action would evaluate and develop a dedicated network of shallow monitoring wells specifically
 4 planned and sited for monitoring conditions in areas of the Subbasin where GDEs are most likely to be
 5 found. Although the GSAs used the best available scientific data and information to assess potential GDEs
 6 within the Subbasin during GSP development, significant data gaps exist in the understanding of GDEs and
 7 associated species in those GDEs. This action would be developed to close those data gaps, prioritizing
 8 installation of new monitoring sites in locations where the GSAs determine that GDEs are most likely to
 9 be found. It is expected that this action would also incorporate biological monitoring to collect biological
 10 data (e.g., biological surveys, remote sensing indexes, and/or assessment of vegetation rooting depth
 11 information). This data would be used to inform the location of new shallow monitoring wells and monitor
 12 whether GDEs are being impacted by changing groundwater conditions. A summary of the management
 13 action is provided in Table 6-54.

14

Chapter 6 Projects and Management Actions

Item	Description
Implementation	This potential action is proposed by CGA and GGA and would be implemented across the Subbasin, focusing on areas determined during GSP development as most likely to be a GDE, and areas where GDE-related data gaps exist. This action could be done in coordination with neighboring GSAs and agencies, especially along Stony Creek and the Sacramento River. The action would evaluate and develop a dedicated network of shallow monitoring wells specifically planned and sited for monitoring conditions in areas of the Subbasin where GDEs are most likely to be found. This action is expected to be implemented and would be monitored and quantified with respect to groundwater conditions, as needed, during GSP implementation in order to close data gaps related to GDEs. This will be done in the context of Sustainable Management Criteria defined in Chapter 5 to ensure sustainable operation of the Subbasin.
Timeline	This action is currently in the early conceptual stage. Thus, the start and completion dates for this action have yet to be determined and would be provided in GSP annual reports and five-year updates when known.
Notice to public and other agencies	Public and/or Inter-Agency Noticing would be facilitated through GSA board meetings, GSA and/or cooperating agency website(s), GSA newsletter, member agency newsletter, inter-basin coordination meetings, member agency governing body public meetings, GSP annual report(s), public scoping meetings and environmental/regulatory permitting notification.
Water source & reliability	Not applicable.
Legal authority, permitting processes, and regulatory control	GSAs, Districts, and individual project proponents have the authority to plan and implement projects. Required permitting and regulatory review would be project specific and initiated through consultation with applicable governing agencies. Governing agencies for which consultation would be initiated may include, but is not limited to: DWR, SWRCB, CDFW, Flood Board, Regional Water Boards, USFWS, NMFS, LAFCO, County of Colusa and/or Glenn and CARB.
Benefits and benefit evaluation methodology	The measurable objectives expected to benefit are groundwater levels, groundwater storage, and depletion of interconnected surface water. This action is currently in the early conceptual stage. Thus, the expected yield of this action has yet to be determined and would be reported in GSP annual reports and five-year updates when known.
Costs	This action is currently in the early conceptual stage. Thus, the anticipated costs of this action have yet to be determined and would be reported in GSP annual reports and five-year updates when known. The proponent would identify funding sources to cover costs as part of development of this action. These may include grants, fees, loans, and other assessments.

1
2

Colusa Subbasin GSP Projects and Management Actions (Jan 2022)
With Suggestions for Added Specificity and Prioritization in GSP Revisions (Apr 2024)

GSP	Project or Management Action	Status	Name	Proponent	Type (If Indicated)	Benefit to Management Zones*	Suggest Added Specificity (Timeline, Benefits)	Suggest Prioritization ("Planned" Now or If Trigger)	Note	Average Annual Benefit (AF/year, If Specified)
Colusa	Project	Planned	Colusa County Water District (CCWD) In-Lieu Groundwater Recharge	CCWD	In-lieu Groundwater Recharge	Yes	X		Currently Planned	27,000
Colusa	Project	Planned	Colusa Drain MWC (CDMWC) In-Lieu Groundwater Recharge	CDMWC	In-lieu Groundwater Recharge	Potentially	X		Currently Planned	28,000
Colusa	Project	Planned	Subbasin Multi-Benefit Groundwater Recharge	CGA/GGA/TNC	Direct Groundwater Recharge	Potentially			Currently Planned	5,200
Colusa	Project	Planned	Orland-Artois Water District (OAWD) Land Annexation and Groundwater Recharge	OAWD	Direct and In-lieu Groundwater Recharge	Yes	X		Currently Planned	22,500
Colusa	Project	Planned	Sycamore Slough Groundwater Recharge Pilot Project	Landowner	Direct Groundwater Recharge				Currently Planned	500
Colusa	Project	Ongoing	Reclamation District 108 (RD108) and CCWD Agreement for Five-Year In-Lieu Groundwater Recharge Project	RD108/CCWD	In-lieu Groundwater Recharge	Yes	X		Currently Ongoing	8,000
Colusa	Project	Ongoing	Glenn-Colusa Irrigation District (GCID) Strategic Winter Water Use for Groundwater Recharge and Multiple Benefits	GCID	Direct and In-lieu Groundwater Recharge				Currently Ongoing	TBD
Colusa	Project	Ongoing	Sycamore Marsh Farm Direct Recharge Project	Landowner	Direct Groundwater Recharge				Currently Ongoing	TBD
Colusa	Project	Ongoing	GCID Expansion of In-Basin Program for In-lieu Groundwater Recharge	GCID	In-lieu Groundwater Recharge	Potentially	X		Currently Ongoing	TBD
Colusa	Project	Ongoing	Orland Unit Water Users Association (OUWUA) Irrigation Modernization for Increased Surface Water Delivery and Reduced Groundwater Pumping	OUWUA	In-lieu Groundwater Recharge	Yes	X		Currently Ongoing	TBD
Colusa	Management Action	Ongoing	Urban Water Conservation in Willows	California Water Service - Willows	Management Action				Currently Ongoing	2
Colusa	Project	Potential	GCID In-lieu Groundwater Recharge	GCID	In-lieu Groundwater Recharge					TBD
Colusa	Project	Potential	Westside Streams Diversion for Direct or In-lieu Groundwater Recharge	CGA/GGA	Direct and In-lieu Groundwater Recharge	Potentially	X	X	Potential SB122 connection	TBD
Colusa	Project	Potential	Sites Reservoir	Sites Project Authority	Direct and In-lieu Groundwater Recharge					TBD
Colusa	Project	Potential	Delevan Pipeline Colusa Basin Drainage Canal System (Colusa Drain) Intertie	Landowner	Direct and In-lieu Groundwater Recharge					TBD
Colusa	Project	Potential	Orland Unit Water Users Association (OUWUA) Flood Water Conveyance	OUWUA	Direct Groundwater Recharge	Yes	X	X	Potential SB122 connection	TBD
Colusa	Project	Potential	OAWD Direct Groundwater Recharge	OAWD	Direct Groundwater Recharge					TBD
Colusa	Project	Potential	Sycamore Slough Colusa Drain Multi-Benefit Recharge Project	Landowner	Direct Groundwater Recharge					TBD
Colusa	Project	Potential	Tehama-Colusa Canal Trickle Flow to Ephemeral Streams	RD108	Direct Groundwater Recharge	Potentially	X	X		TBD
Colusa	Project	Potential	Enhanced Infiltration of Precipitation on Agricultural Lands	CGA/GGA	Direct Groundwater Recharge					TBD
Colusa	Project	Potential	Colusa Subbasin Flood-MAR	CGA/GGA	Direct Groundwater Recharge	Potentially	X	X	Potential SB122 connection	TBD
Colusa	Project	Potential	Reclamation District 108 "Boards In" Program	RD108	Direct Groundwater Recharge	Potentially	X	X		1,800
Colusa	Project	Potential	Colusa County Public Water System Water Treatment Plant	Landowner	In-lieu Groundwater Recharge					TBD
Colusa	Project	Potential	GCID Water Transfers to Tehama-Colusa Canal Authority (TCCA) CVP Contractors	GCID	In-lieu Groundwater Recharge					TBD

Colusa Subbasin GSP Projects and Management Actions (Jan 2022)
With Suggestions for Added Specificity and Prioritization in GSP Revisions (Apr 2024)

GSP	Project or Management Action	Status	Name	Proponent	Type (If Indicated)	Benefit to Management Zones*	Suggest Added Specificity (Timeline, Benefits)	Suggest Prioritization ("Planned" Now or If Trigger)	Note	Average Annual Benefit (AF/year, If Specified)
Colusa	Project	Potential	Colusa Subbasin In-lieu Recharge & Banking Program	South Valley Water Resources Authority	In-lieu Groundwater Recharge					TBD
Colusa	Project	Potential	Sycamore Marsh Farm In-lieu Recharge Project	Landowner	In-lieu Groundwater Recharge					TBD
Colusa	Project	Potential	Westside Off-stream Reservoir and In-Lieu Groundwater Recharge	TCCA Contractors	In-lieu Groundwater Recharge					TBD
Colusa	Management Action	Potential	Domestic Well Mitigation Program	CGA/GGA	Management Action	Yes	X	X	Identified by DWR	TBD
Colusa	Management Action	Potential	Drought Contingency Planning for Urban Areas	CGA/GGA/Cities	Management Action					TBD
Colusa	Management Action	Potential	Long-Term Demand Management Action	CGA/GGA	Management Action	Yes	X	X	Identified by DWR (Long/Short-Term not specified)	TBD
Colusa	Management Action	Potential	Strategic Short-Term Demand Management	CGA/GGA	Management Action	Yes	X	X	Identified by DWR (Long/Short-Term not specified)	TBD
Colusa	Management Action	Potential	Well Abandonment Outreach and Funding Program	CGA/GGA	Management Action					TBD
Colusa	Management Action	Potential	Preservation of Lands Favorable for Recharge	CGA/GGA	Management Action					TBD
Colusa	Management Action	Potential	Review of County Well Permitting Ordinances	CGA/GGA	Management Action	Yes	X	X		TBD
Colusa	Management Action	Potential	Reduce Non-beneficial Evapotranspiration/Invasive Species Eradication	CGA/GGA	Reduce Demand					TBD
Colusa	Management Action	Potential	Development of a Dedicated Network of Shallow Monitoring Wells for GDE Monitoring	CGA/GGA	Management Action, Closing Data Gaps					TBD

* Management Zones refer to areas of the subbasin where PMAs will be focused to address the most significant subsidence, groundwater level impacts, and adverse groundwater conditions. These would be generally delineated around the Orland-Artois area and Arbuckle-College City area.

**Select Projects and Management Actions from Approved GSPs
With Potential Applicability in the Colusa Subbasin**

Subbasin	GSP	Project or Management Action (If Indicated)	Status (If Indicated)	Name	Type (If Indicated)	Average Annual Benefit (AF/year, If Specified)
Butte	Butte	Project	Planned	Butte Water District (BWD) Dual Source Irrigation Systems	In-Lieu Recharge	9,772
Butte	Butte	Project	Planned	Multi-Agency / Jurisdictions Multi-Benefit Recharge	Direct Recharge	
Butte	Butte	Management Action	Planned	Multi-Agency / Jurisdictions Grower Education	Improved Water Management	
Butte	Butte	Management Action	Potential	Multi-Agency / Jurisdictions Develop Partnerships to Implement Project Addressing Regional Water Management	Improved Water Management	
Butte	Butte	Management Action	Potential	Multi-Agency / Jurisdiction / Landowner Facilitate use of available recycled water that otherwise would not be used beneficially, meets all health and safety criteria, and does not harm crops or soils	Improved Water Management	
Yolo	Yolo	Management Action	Ongoing	Yolo Subbasin Preparedness through Increased Groundwater Recharge and Managed Aquifer Recharge Projects		
Yolo	Yolo	Management Action	Ongoing	Yolo Subbasin Conjunctive Water Use Program		
Yolo	Yolo	Management Action	Ongoing	Yolo Subbasin Increased outreach and information sharing of groundwater resources and knowledge within the Yolo Subbasin.		
Yolo	Yolo	Management Action	Potential	Yolo Subbasin Domestic Well Impact Mitigation Program		
Yolo	Yolo	Management Action	Potential	Yolo Subbasin Coordination Efforts with Land Use Planning Entities		
Yolo	Yolo	Management Action	Potential	Coordinated Response to Minimum Threshold Exceedances in the Yolo Subbasin		
Yolo	Yolo	Project	Potential	Yolo Subbasin Identification of Locations Vulnerable to Damage from Subsidence - Catalog of Infrastructure Damage Reports		
Yolo	Yolo	Project	Potential	Winter Diversions from Tehama-Colusa Canal		
Yolo	Yolo	Project	Potential	Trickle flow to ephemeral streams in North Yolo		
Yolo	Yolo	Project	Potential	Additional Extensometers in North Yolo MA		
Yolo	Yolo	Project	Ongoing	YCFCWCD Winter Recharge		
Yolo	Yolo	Project	Potential	Improved hydrologic flows, increased runoff retention, and improved watershed health in the Capay Valley		
Yolo	Yolo	Project	Potential	North Yolo Boards In Program		
Yolo	Yolo	Project	Ongoing	Cover cropping, rangeland improvements, and other agricultural practices to improve groundwater recharge in the Yolo Subbasin		
Vina	Vina	Project	Planned	Scoping for Flood Managed Aquifer Recharge (FloodMAR)/Surface Water Supply and Recharge for Vina GSA, RCRCD GSA, local landowners, other entities to be determined	Direct Recharge, In-lieu Recharge	
Vina	Vina	Project	Planned	Community Water Education Initiative for Vina GSA, CSUC, CWE, Chico State Enterprises, local landowners, other entities to be determined	Education and Outreach	
Vina	Vina	Project	Potential	Community Monitoring Program for Vina GSA, CSUC, Chico Ecological Reserves, local landowners, other entities To be determined	Monitoring	
Vina	Vina	Project	Potential	Rangeland Management and Water Retention for Vina GSA, CSUC, Chico State Enterprises, other entities to be determined	Conservation	
Vina	Vina	Project	Conceptual	Extend Orchard Replacement for Vina GSA, local landowners, other entities to be determined	Conservation	

**Select Projects and Management Actions from Approved GSPs
With Potential Applicability in the Colusa Subbasin**

Subbasin	GSP	Project or Management Action (If Indicated)	Status (If Indicated)	Name	Type (If Indicated)	Average Annual Benefit (AF/year, If Specified)
Vina	Vina	Management Action		Domestic Well Mitigation: increasing number of domestic groundwater wells go dry in the Vina Subbasin, the GSAs	Management Action	
Vina	Vina	Management Action		Well Permitting Ordinance	Management Action	
Vina	Vina	Management Action		Expansion of Water Purveyors' Service Area	Management Action	
Sutter	Sutter	Project	Planned	Butte Water District Dual Source Irrigation Systems	In-Lieu Recharge	
Sutter	Sutter	Project	Planned	Multi-Agency/GSA Multi-Benefit Recharge	Direct Recharge	
Sutter	Sutter	Management Action	Planned	Multi-Agency/GSA Grower Education	Improved Water Management	
Sutter	Sutter	Project	Potential	Multi-Agency/GSA Rice Field Infiltration Study to Promote FloodMAR Projects	Direct Recharge	
Madera	Madera	Project		MID On-Farm Recharge	Direct Recharge	510
Madera	Madera	Project		Madera County Millerton Flood Release Imports	Direct and In- Lieu Recharge	7,060
Madera	Madera	Project		Madera County Chowchilla Bypass Flood Flow Recharge Phase 1	Direct Recharge	12,710
Madera	Madera	Project		Madera County Chowchilla Bypass Flood Flow Recharge Phase 2	Direct Recharge	26,470
Madera	Madera	Management Action		Madera County Demand Management	Management Action	90,000
Madera	Madera	Management Action		Domestic Well Mitigation Program	Management Action	

MEMORANDUM OF UNDERSTANDING ESTABLISHING A DOMESTIC WELL MITIGATION PROGRAM FOR THE MADERA SUBBASIN OF THE SAN JOAQUIN VALLEY GROUNDWATER BASIN

This Memorandum of Understanding (“MOU”) is entered into this ___ day of _____ 2023 (the “Effective Date”), by and between the Groundwater Sustainability Agencies of the COUNTY OF MADERA (“COUNTY”), the CITY OF MADERA (“CITY”), the MADERA IRRIGATION DISTRICT (“MID”), the MADERA WATER DISTRICT (“MWD”), and the GRAVELLY FORD WATER DISTRICT (“GFWD”), collectively hereinafter referred to as the “Parties,” or individually as the “Party.”

RECITALS

- A. **WHEREAS**, groundwater and surface water resources within the Madera Subbasin of the San Joaquin Valley Groundwater Basin (DWR Bulletin 118 No. 5-22.06) (Subbasin) are vitally important resources, in that they provide the foundation to maintain and fulfill current and future environmental, agricultural, domestic, municipal, and industrial needs, and to maintain the economic viability, prosperity, and sustainable management of the Subbasin; and
- B. **WHEREAS**, agriculture has been prominent in making Madera County one of the world’s foremost agricultural areas and plays a major role in the economy of Madera County; and
- C. **WHEREAS**, in 2014 the California Legislature passed a statewide framework for sustainable groundwater management, known as the Sustainable Groundwater Management Act, California Water Code § 10720-10737.8 (SGMA), pursuant to Senate Bill 1168, Senate Bill 1319, and Assembly Bill 1739, which was approved by the Governor on September 16, 2014. and went into effect on January 1, 2015; and
- D. **WHEREAS**, the Subbasin has been designated by the California Department of Water Resources (DWR) as a high-priority subbasin in a condition of critical groundwater overdraft and is subject to the requirements of SGMA; and
- E. **WHEREAS**, SGMA requires that all medium and high priority groundwater basins in California be managed by a Groundwater Sustainability Agency (GSA), or multiple GSAs, and that such management be implemented pursuant to an approved Groundwater Sustainability Plan (GSP), or multiple GSPs; and
- F. **WHEREAS**, there are seven GSAs within the Subbasin as set-forth in Exhibit A; and
- G. **WHEREAS**, County, City, MID, and MWD have developed one GSP; Root Creek Water District has developed one GSP; GFWD has developed one GSP; and New Stone Water District has developed one GSP, such that the Subbasin is governed by four separate GSPs unified through the Subbasin Coordination Agreement; and
- H. **WHEREAS**, in January 2020, the Parties submitted four GSPs to DWR; and

- I. **WHEREAS**, the Parties agree, and as SGMA allows, a transition to sustainability over the 20-year GSP Implementation Period is in the best overall interest of the Subbasin, although this approach is expected to result in some continued groundwater level declines during the GSP Implementation Period; and
- J. **WHEREAS**, the Parties agree that as a result of the continued decline in groundwater levels anticipated to occur over the GSP Implementation Period, there may be adverse impacts to some domestic and municipal wells in the Subbasin; and
- K. **WHEREAS**, the Parties acknowledge that the number of domestic and municipal wells dewatered during implementation of the GSP (prior to 2040) is heavily dependent on precipitation and snowpack during that time period; and
- L. **WHEREAS**, the Parties acknowledge that wet conditions may result in few dewatered wells; and
- M. **WHEREAS**, the Parties acknowledge that substantial numbers of domestic and municipal wells may be dewatered if prolonged drought occurs during implementation of the GSP, while project and management actions are still being developed and implemented; and
- N. **WHEREAS**, the Parties acknowledge that they cannot control groundwater conditions not caused by regional groundwater conditions; and
- O. **WHEREAS**, the Parties do not intend to resolve or otherwise mitigate for issues related to normal wear and tear; and
- P. **WHEREAS**, the Parties as part of their future analysis agree to review potential impacts to both domestic and municipal wells in the Subbasin; and
- Q. **WHEREAS**, the Parties have reviewed and considered the content and recommendations set-forth by Self-Help Enterprises, Leadership Counsel for Justice and Accountability, and the Community Water Center in their publication titled, “Framework for a Drinking Water Well Impact Mitigation Program.”
- R. **NOW, THEREFORE**, in consideration of the mutual promises, covenants and conditions contained herein and these Recitals, which are hereby incorporated herein by this reference, the Parties agree to review and consider mitigation for domestic and municipal well impacts resulting from declining groundwater levels that occur from groundwater management activities outlined in the four GSPs through development of a Domestic Well Mitigation Program (Program) as follows:

AGREEMENT

1. **POTENTIAL PROGRAM MITIGATION MEASURES.** Potential Program mitigation measures may include, but are not limited to:
 - a. Short-term solutions in emergencies, such as delivery of bottled water and/or water tanks.
 - b. Setting well pump at deeper depths, replacement of well pump, or well replacement.
 - c. Residential water treatment equipment.
 - d. Connection to or development of public water systems to serve impacted communities.
 - e. Municipal service connections.

2. **PROPORTIONATE RESPONSIBILITY.** The Parties agree to work cooperatively together to determine the proportionate responsibility of each Party.

3. **FUNDING.** The Parties agree to fund the Program on an annual basis consistent with the final determination of each Party's proportionate responsibility.

4. **PROGRAM DEVELOPMENT COMMITTEE.** The Parties shall establish a Program Development Committee (Committee) that will oversee Program development. The Committee shall include at least one technical staff representative from each of the Parties. The Committee will define the purpose, objectives, roles, responsibilities, requirements, and potential outcomes of the Program. Items for consideration and development by the Committee include, but are not limited to:
 - a. Definitions
 - b. Property eligibility
 - c. Property owner eligibility
 - d. Program application process
 - e. Preferred contractors
 - f. Preliminary inspection process
 - g. Program form development
 - h. Priority
 - i. Eligible mitigation
 - j. Non-eligible mitigation
 - k. Maximum mitigation award
 - l. Recordation of mitigation award

5. **PROGRAM ORGANIZATIONAL STRUCTURE.** To aid the Committee in Program development and implementation, a DRAFT Program organizational structure is as shown in Exhibit B. That shown in Exhibit B is only a DRAFT and shall not limit or otherwise constrain the Committee in their analysis.

6. **PROGRAM IMPLEMENTATION.** To aid the Committee in Program development and implementation, a DRAFT implementation flowchart is as shown in Exhibit C. That shown in Exhibit C is only a DRAFT and shall not limit or otherwise constrain the Committee in their analysis.

7. **TERM.** The Program shall be developed within the first 5 years of GSP implementation (by 2025) and upon implementation, shall continue for the duration of the GSP Implementation Period, until groundwater sustainability is achieved and/or as otherwise directed by the Parties.

8. **PROGRAM MANAGEMENT.** Program management shall be facilitated by one of the Parties. If one of the Parties doesn't elect to program management duties and through recommendation of the Coordination Workgroup and approval of the Parties, Program management shall be facilitated through a third party.

9. **ENVIRONMENTAL REVIEW.** The Parties agree to cooperatively complete any environmental review as may be determined necessary for Program implementation. Any costs associated with environmental review shall be per the proportionate share as set-forth in this MOU.

10. **NOTICES.** All notices required or permitted by the MOU shall be made in writing, and may be delivered in person (by hand or by courier) or may be sent regular, certified, or registered mail or U.S. Postal Service Express Mail, with postage prepaid, or by facsimile transmission, or by electronic transmission (email) and shall be deemed sufficiently given if served in a manner specified in this Section 16. The addresses and addressees noted below are the Party's designated address and addressee for deliver or mailing notices.

To Madera County:	County of Madera Stephanie Anagnoson 200 W 4 th Street, 4 th Floor Madera, CA 93637
To MID:	Madera Irrigation District Thomas Greci 12152 Road 28 1/4 Madera, CA 93637
To GFWD:	Gravelly Ford Water District Don Roberts 18811 Road 27 Madera, CA 93638
To City:	City of Madera

Keith Helmuth
428 East Yosemite Avenue
Madera, CA 93638

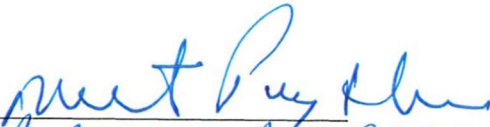
To MWD:

Madera Water District
Melanie J. Aldridge
1663 N. Schnoor Street, Suite 105
Madera, CA 93638

Any Party may, by written notice to each of the other Parties, specify a different address for notice. Any notice sent by registered or certified mail, return receipt requested, shall be deemed given on the date of delivery shown on the receipt card, or if no delivery date is shown, three days after the postmark date. If sent by regular mail, the notice shall be deemed given 48 hours after it is addressed as required in this section and mailed with postage prepaid. Notices delivered by United States Express Mail or overnight courier that guarantee next day delivery shall be deemed given 24 hours after delivery to the Postal Service or overnight courier. Notices transmitted by facsimile transmission or similar means (including email) shall be deemed delivered upon telephone or similar confirmation of delivery (confirmation report from fax machine is sufficient), provided a copy is also delivered via personal delivery or mail. If notice is received after 4:00 p.m. or on a Saturday, Sunday or legal holiday, it shall be deemed received on the next business day.

IN WITNESS WHEREOF, the Parties have caused this MOU to be executed, each signatory hereto represents that he/she has been appropriately authorized to enter into this MOU on behalf of the Party whom he/she signs.

County of Madera


ROBERT L. POYTARESS
CHAIRMAN PRO-TEM

3.21.23
Date

Madera Irrigation District


Thomas Greci

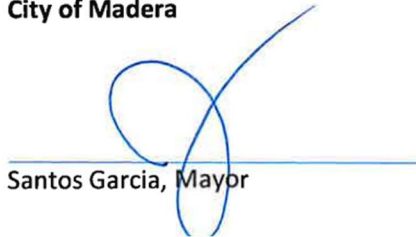
3/21/2023
Date

Gravelly Ford Water District


Don Roberts

3-21-23
Date

City of Madera


Santos Garcia, Mayor

March 21, 2023
Date

Madera Water District


Phil Janzen

3-21-23
Date

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EXHIBIT A

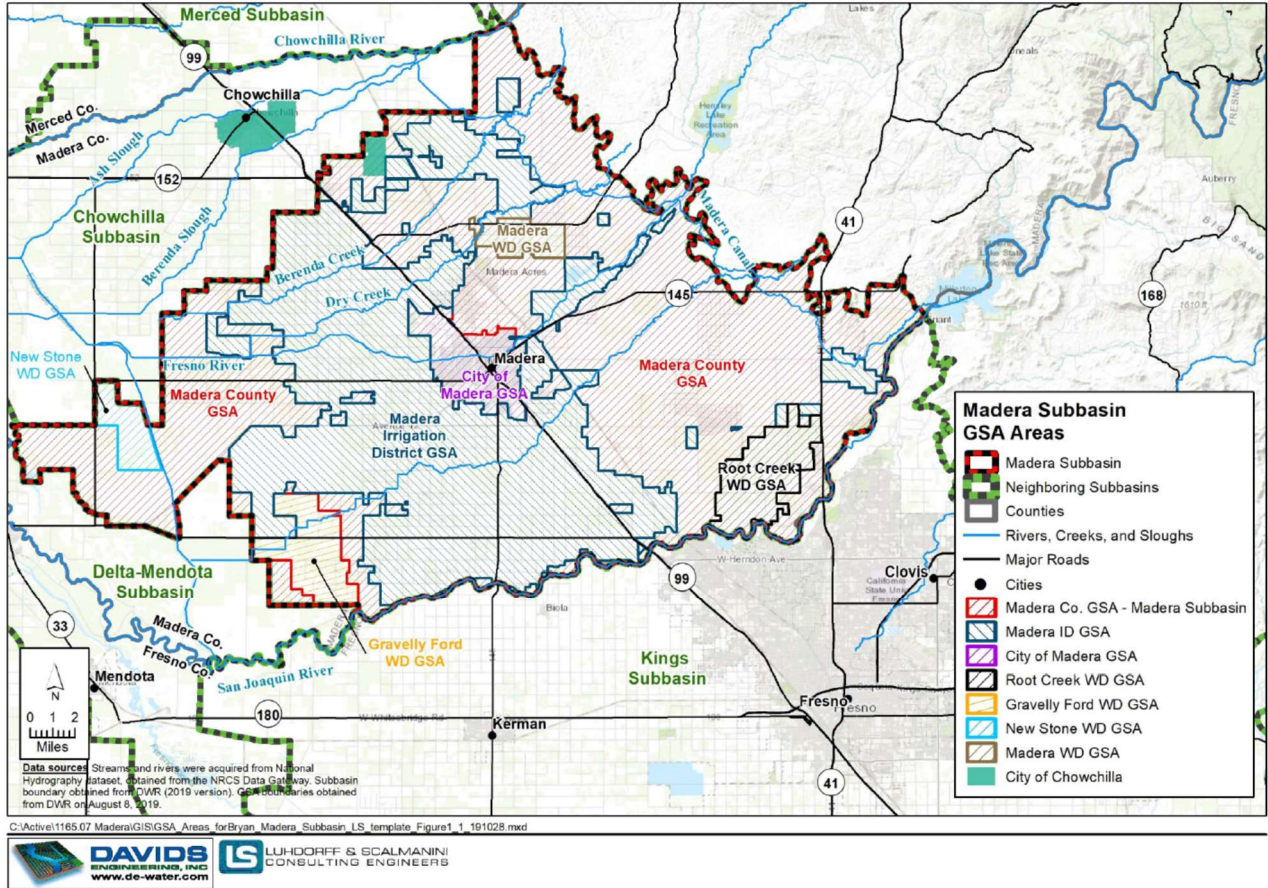
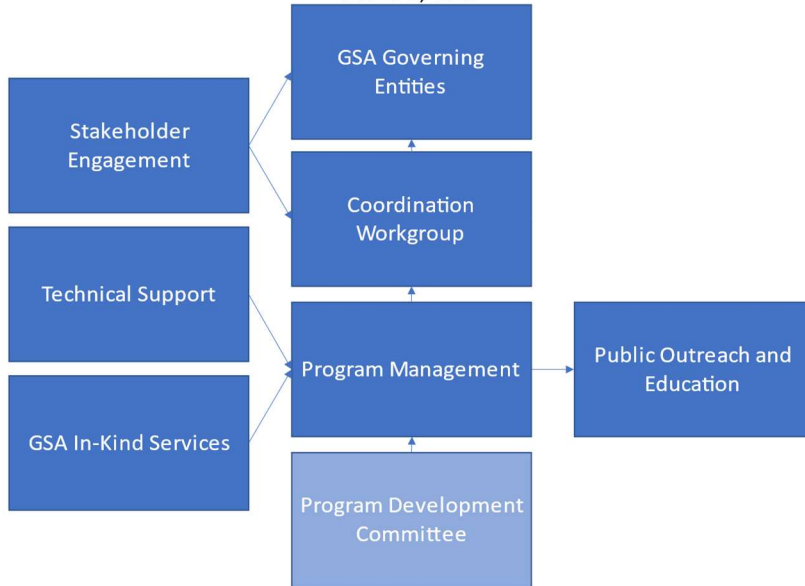


EXHIBIT B

DRAFT

Madera Subbasin – Domestic Well Mitigation Program Organizational Structure March 5, 2023



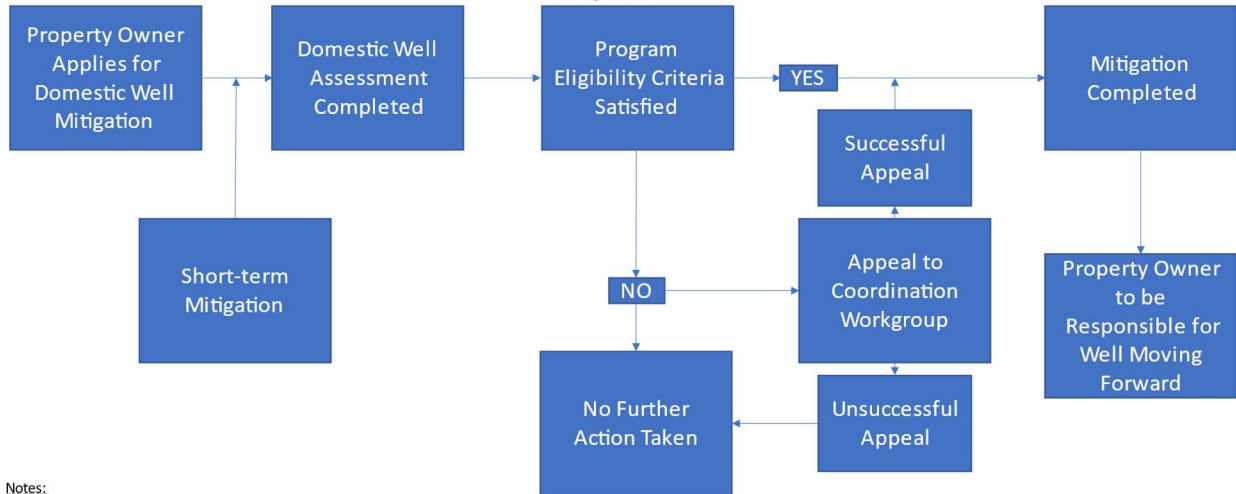
Notes:

1. That shown herein is subject to revision by the Parties.
2. Public Outreach and Engagement is a necessary component as outlined by Self-Help Enterprises, Leadership Counsel for Justice and Accountability, and the Community Water Center in their publication titled, "Framework for a Drinking Water Well Impact Mitigation Program."
3. The Madera Subbasin Coordination Workgroup is defined in the Madera Subbasin Coordination Agreement entered into January 22, 2020.

EXHIBIT C

DRAFT

Madera Subbasin – Domestic Well Mitigation Program Implementation Flowchart March 5, 2023



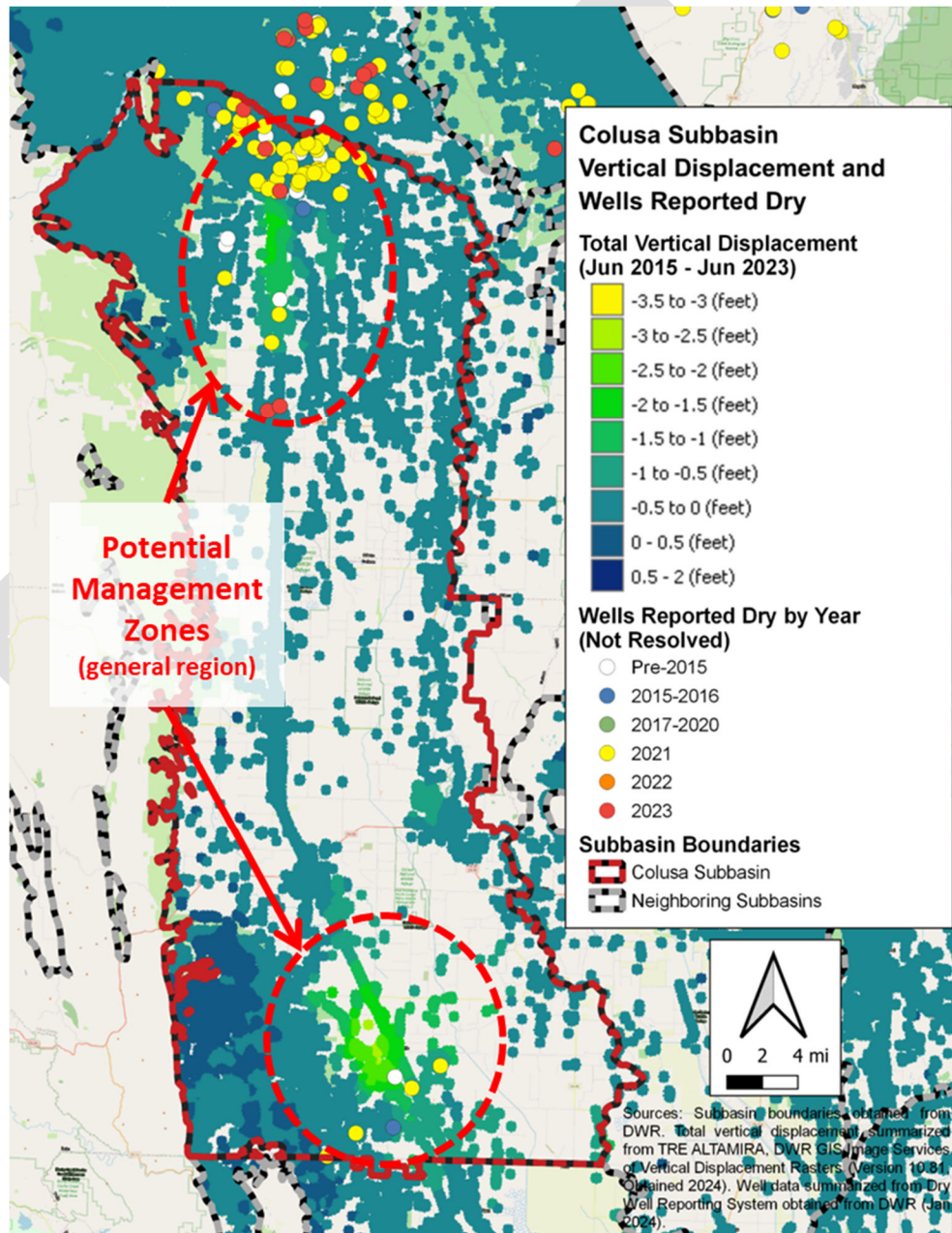
Notes:

1. Steps shown herein are intended to demonstrate critical decision points and is not intended to be indicative of all steps that may be required.
2. That shown herein is subject to revision by the Madera Subbasin GSAs.
3. The GSAs have reviewed and considered the content and recommendations set forth by Self-Help Enterprises, Leadership Counsel for Justice and Accountability, and the Community Water Center in their publication titled, "Framework for a Drinking Water Well Impact Mitigation Program."

Conceptual Management Zones and PMA Triggers (DRAFT)

1 Conceptual Management Zones

Management Zones refer to areas of the subbasin where PMAs would be focused to address the most significant subsidence, groundwater level impacts, and adverse groundwater conditions. It is proposed that these be generally delineated around the Orland-Artois and Arbuckle-College City areas. The precise delineation will be determined through further technical analysis and discussion with the GSAs.



2 Conceptual PMA Triggers

The following conceptual PMA triggers are summarized from approved GSPs, with further conceptual refinement for the conceptual “management zone” areas proposed in the Colusa Subbasin. These PMA triggers are proposed only for conceptual discussion at this time. The precise rates and conditions for which the triggers would be activated will be determined through further technical analysis and discussion with the GSAs.

- Subsidence triggers:
 - Within “management zones”
 - Acute: Subsidence at a rate of XX ft/year measured over 1 year in any 1 square mile (1 section) within the zone
 - Chronic: Subsidence persisting at an average rate of XX ft/year for 5 years in any 1 square mile (1 section) within the zone
 - Anywhere in the subbasin
 - Acute: Subsidence at a rate of XX ft/year measured over 1 year in any 36 square mile area (township) within the subbasin
 - Chronic: Subsidence persisting at an average rate of XX ft/year for 5 years in any 36 square mile area (township) within the subbasin
- Groundwater level (GWL) triggers:
 - Within “management zones”
 - Tied to minimum thresholds (MTs): MT exceedance at 1 representative monitoring site (RMS) well within the zone for two consec. fall measurements (same site)
 - Tied to domestic wells: GWL at any RMS wells within the zone drop to within 10 feet of the minimum depth/perforations of XX (percent or number) of domestic wells within that zone for two consec. fall measurements
 - Anywhere in the subbasin
 - Tied to MTs: MT exceedance at three RMS sites (same sites) for two consec. fall measurements
 - Tied to domestic wells: GWL at an RMS well drop to within 10 feet of the minimum depth/perforations of XX (percent or number) of domestic wells within a Theissen polygon around that RMS for two consec. fall measurements
- Types of actions triggered:
 - Study impacts of subsidence and GWL decline (in management zone, or in area of subbasin where otherwise occurring)
 - Capacity issues?
 - Roadway issues?
 - Well issues?
 - Mitigate impacts through mitigation management actions
 - If mitigation not possible, trigger other projects or management actions until such as time as other projects come online. Actions could include any of the following or others:
 - Program to bring in alternate sources of water (transfers, out of district sales)
 - Well/pumping restrictions
 - Multi-benefit land repurposing

Comparison of Groundwater Level and Subsidence Sustainable Management Criteria with Approved GSPs

Groundwater Level Sustainable Management Criteria

Note there is some paraphrasing and rearranging of text for comparison.

Subbasin	Undesirable Result (UR) Occurs When	Minimum Threshold (MT)	Measurable Objective (MO)
Colusa	25% of RMS continuously below their MT for 24 consecutive months	The lower of: 1. The elevation corresponding to the 20 th percentile of nearby domestic well depths, or 2. 50% of measured historical groundwater elevation range below the historical measured low elevation.	Mean of the most recent 5 years of available groundwater elevation measurements up to 2020 (a fixed value, not a rolling average).
Nearby Subbasins in the Sacramento Valley			
Butte	25% of RMS continuously below their MT for 24 consecutive months	Step 1: The shallowest of the following criteria: 1. The depth associated with the 7 th percentile of nearby domestic wells, to protect domestic wells, or 2. The range of historically measured groundwater levels or 20 feet (whichever is greater) below the observed historic low, to protect conjunctive use by agriculture. Step 2: The deeper of step 1, or the measured low + 10 ft	Mean of the most recent 5 years of available groundwater elevation measurements (generally 2012-2017)
Sutter	25% of RMS drop below the MT concurrently over two consecutive seasonal high measurements.	The deepest of: 1. The historical low from at each RMS, or 2. 90% of the average groundwater elevation from the projected water budget (baseline condition over 60-year period) at each RMS with a 50% artificial increase in ET, or 3. The average operating range for the following aquifer zones: - Shallow AZ and AZ-1 = 8.0 feet - AZ-2 and AZ-3 = 16.5 feet	Average of the available historical record at each representative monitoring site.
Vina	Two RMS within a MA exceeding MTs for two consecutive non-dry years (W, AN, BN).	Set through process evaluating depths of “sustainably constructed domestic wells” in the vicinity of the RMS and setting at level that is “protective of the majority of the domestic wells,” (precise metrics not immediately clear from main GSP text)	Set based on groundwater trend line from data since 2000, set at the point the trend line reaches in 2030
Yolo	MT exceedance in 51 percent or more RMS in two (2) MAs.	Different methods in different MAs, e.g. 1) RMS drops below pre-2016 low for two consecutive fall measurements. 2) Criteria 1 plus 20% range below the low. 3) No MTs where no GW used	Average of available fall (Sep.-Dec.) records for 2000-2011 period, evaluated as five-year running average.

Groundwater Level Sustainable Management Criteria, Continued...

Note there is some paraphrasing and rearranging of text for comparison.

Subbasin	Undesirable Result (UR) Occurs When	Minimum Threshold (MT)	Measurable Objective (MO)
Colusa	25% of RMS continuously below their MT for 24 consecutive months	The lower of: 1. The elevation corresponding to the 20 th percentile of nearby domestic well depths, or 2. 50% of measured historical groundwater elevation range below the historical measured low elevation.	Mean of the most recent 5 years of available groundwater elevation measurements up to 2020 (a fixed value, not a rolling average).
<i>Critically Overdrafted Subbasins in the San Joaquin Valley</i>			
Kings (e.g., McMullin Area GSP)	15% of RMS exceed fall below their MT during a single monitoring event	Set at elevation below MO to allow operational flexibility during a 5-year drought (generally the actual decline in 2012-2016 increased by 20%)	Set based on the decline in GWL at each RMS between 1997-2012 (a period with average surface water deliveries), and an incremental mitigation correction planned to reach sustainable levels by 2040 (10-40% correction every 5 years through 2040)
Madera (e.g., Joint GSP)	Same 30% of RMS fall below MT for two consecutive fall measurements	Fall 2015 groundwater elevation (measured if available; otherwise estimated from groundwater model with adjustment for offset from historical data)	Fall 2010 groundwater elevation (measured if available; otherwise estimated from groundwater model with adjustment for offset from historical data)
Merced	Greater than 25% of RMS fall below their MT in 2 consecutive years	Fall 2015 groundwater elevation	November or October 2011 groundwater elevation (measured, or estimation if historical record not available)

Subsidence Sustainable Management Criteria

Subbasin	Undesirable Result Occurs When	Minimum Threshold	Measurable Objective
Colusa	20% or more monitoring sites (benchmarks) experience subsidence rates above the MT	0.5 feet per five years	0.25 feet per five years
<i>Nearby Subbasins in the Sacramento Valley</i>			
Butte	25 percent of monitoring locations fall below MT	0.5 feet per five years	0.25 feet per five years
Sutter	25% or more RMS exceed the MT over the 5-year monitoring period.	0.5 feet per five years, representing the point at which water conveyance and levee infrastructure become sensitive to land subsidence.	0.25 feet per five years, representing the range of error for land survey measurements
Vina	<i>GWL are a proxy.</i>	<i>GWL are a proxy.</i>	<i>GWL are a proxy.</i>
Yolo	MT exceedance in over 25 percent of RMS in the MA/sub-MA in three (3) or more MA/sub-MAs in the same reporting year.	Differs in different MA/sub-MA. Generally: <ul style="list-style-type: none"> • 0-3.0 cm/year, evaluated as a 5-year average. • Max percent of area: 25% 	The same rates and percentages as the MT, but calculated as a 3-year average.
<i>Critically Overdrafted Subbasins in the San Joaquin Valley</i>			
Kings (e.g., McMullin Area GSP and North Fork Kings GSP)	Loss of conveyance capacity of the river channels or existing irrigation canals has occurred as a result of land subsidence	<ul style="list-style-type: none"> • Cumulative subsidence of 3 feet (typical freeboard in irrigation canals) • <i>To address subsidence before reaching the MT, subsidence of 1 foot within a 36 mi² area (a township) would trigger management actions.</i> 	<ul style="list-style-type: none"> • 1 inch per year over an area of 36 mi² (allowing for error of InSAR data) • Cumulative subsidence of 0 inches over 20 years
Madera (e.g., Joint GSP)	Average subsidence across 75% or more RMS exceeding MT for two consecutive years (after 2040).	0 feet/year, subject to uncertainty of +/-0.16 feet/year	0 feet/year, subject to uncertainty of +/-0.16 feet/year
Merced	Exceedance of MT at 3 or more RMS (out of 4 total) for 2 consecutive years	0 ft/year, subject to uncertainty of +/-0.16 feet/year	0 ft/year (long-term average)