
MEMBERS OF THE PUBLIC MAY ATTEND IN PERSON OR VIEW THE WATER COMMISSION REMOTELY AS VIEW ONLY.

PROVIDE PUBLIC COMMENT - MEMBERS OF THE PUBLIC CAN SUBMIT PUBLIC COMMENT IN ONE OF THREE WAYS:

a. IN PERSON BY ATTENDING THE MEETING AT 25 COUNTY CENTER DRIVE.

b. EMAIL BCWATER@BUTTECOUNTY.NET. WHEN SUBMITTING PUBLIC COMMENT VIA EMAIL, PLEASE INDICATE THE ITEM NUMBER YOUR COMMENT CORRESPONDS TO IN THE SUBJECT LINE. COMMENTS SUBMITTED BEFORE 12:00 P.M. (NOON) WILL BE SENT TO THE FULL WATER COMMISSION ELECTRONICALLY PRIOR TO THE START OF THE MEETING; WHILE COMMENTS SUBMITTED AFTER 12:00 P.M. WILL BE READ INTO THE RECORD AT THE END OF THE CORRESPONDING ITEM NUMBER. COMMENTS RECEIVED AFTER AN AGENDA ITEM HAS BEEN HEARD WILL BE MADE PART OF THE RECORD IF RECEIVED PRIOR TO THE END OF THE MEETING.

COMMENTS ARE LIMITED TO ONE COMMENT, PER ITEM, PER ATTENDEE AND ARE TO BE NO MORE THAN THREE MINUTES IN LENGTH.

INDIVIDUALS WHO NEED SPECIAL ASSISTANCE OR A DISABILITY-RELATED MODIFICATION OR ACCOMMODATION TO PARTICIPATE IN THIS MEETING, OR WHO HAVE A DISABILITY AND WISH TO REQUEST AN ALTERNATIVE FORMAT FOR THE MEETING MATERIALS, SHOULD CONTACT BCWATER@BUTTECOUNTY.NET AS SOON AS POSSIBLE TO ENSURE ARRANGEMENTS FOR ACCOMMODATION.

THE VIDEO OF THE WATER COMMISSION MEETING AND RELATED MATERIALS WILL BE POSTED AT HTTPS://WWW.BUTTECOUNTY.NET/1221/WATER-COMMISSION
ROLL CALL

1. ROLL CALL

2. *APPROVAL OF MINUTES FOR THE JUNE 7, 2023 MEETING

3. PUBLIC MEMBERS WISHING TO ADDRESS THE COMMISSION ON ITEMS NOT LISTED ON THE AGENDA
   THE WATER COMMISSION IS PROHIBITED BY STATE LAW FROM TAKING ACTION ON ANY ITEM PRESENTED IF IT IS NOT LISTED ON THE AGENDA. COMMENTS WILL BE LIMITED TO FIVE MINUTES PER PERSON.

4. *DISCUSSION OF RECHARGE ACTION PLAN AND POSSIBLE FORMATION OF AD HOC COMMITTEE (CHRISTINA BUCK, WATER AND RESOURCE CONSERVATION)

5. *UPDATE ON GRANT FUNDING PURSuits AND DRAFT AWARDS FOR THE VINA AND WYANDOTTE CREEK SUBBASINS (CHRISTINA BUCK, WATER AND RESOURCE CONSERVATION)

6. UPDATE ON ACTIVITIES AND PROJECTS OF THE DEPARTMENT (STAFF, WATER AND RESOURCE CONSERVATION)
   a. *GROUNDWATER SUSTAINABILITY AGENCY (GSAs) ACTIVITIES IN THE BUTTE, VINA, AND WYANDOTTE CREEK SUBBASINS
   b. MIocene UPDATES
   c. STATUS OF TUSCAN WATER DISTRICT FORMATION
   d. WATER WEBINARS HTTPS://WWW.BUTTECOUNTY.NET/1215/SEMINARS

7. FUTURE MEETING DATES AND AGENDA ITEMS
   a. DATE AND LOCATION OF THE NEXT MEETING:
      OCTOBER 4, 2023
      BUTTE COUNTY BOARD OF SUPERVISORS CHAMBERS
      25 COUNTY CENTER DRIVE, OROVILLE
   b. REQUESTS OF THE WATER COMMISSION FOR FUTURE AGENDA TOPICS

8. COMMISSIONERS WISHING TO ADDRESS ITEMS NOT LISTED ON THE AGENDA
   THE WATER COMMISSION IS PROHIBITED BY STATE LAW FROM TAKING ACTION ON ANY ITEM PRESENTED IF IT IS NOT LISTED ON THE AGENDA.

9. *COMMUNICATIONS RECEIVED AND REFERRED
   COPIES OF ALL COMMUNICATIONS ARE AVAILABLE IN THE BUTTE COUNTY DEPARTMENT OF WATER AND RESOURCE CONSERVATION, 308 NELSON AVENUE, OROVILLE, CALIFORNIA.

10. ADJOURNMENT

*Materials attached

CC: Water Commission Mailing List   Window Posting
1. **ROLL CALL**

   **PRESENT:**
   - Commissioner Donna Bayliess, District 1
   - Commissioner Aimee Raymond, District 3
   - Commissioner Fred Montgomery, District 4
   - Commissioner Donnie Stinnett, Landowner – District Water
   - Commissioner Matthew Tennis, Landowner – District Water

   **ABSENT:**
   - Commissioner Tovey Giezentanner, District 2
   - Commissioner Mauny Roethler, District 5
   - Commissioner Davin Arvonen – Private Well
   - Commissioner George “Ernie” Washington – Private Well

2. **APPROVAL OF THE MINUTES FOR THE APRIL 5, 2023 MEETING.**

   Motion made by Commissioner Stinnett to approve the April minutes, motion seconded by Commissioner Montgomery. Motion passed 4-0 with Commissioner Bayliess abstaining.

3. **PUBLIC MEMBERS WISHING TO ADDRESS THE COMMISSION ON ITEMS NOT LISTED ON THE AGENDA**

   **Jim Brobeck** addressed the Commission.
   Information only, no action.

4. **UPDATE FROM FEATHER RIVER DISTRICTS ON HEALTHY RIVERS AND LANDSCAPES (VOLUNTARY AGREEMENTS) (Sean Earley, Richvale Irrigation District)**

   **Richard Harriman** addressed the Commission.
   Information only, no action.

5. **REPORT OUT FROM AD HOC AND CONSIDERATION OF LETTER TO THE DEPARTMENT OF WATER RESOURCES REGARDING RECHARGE AND THE EXECUTIVE ORDER**

   **Jim Brobeck and Richard Harriman** addressed the Commission.
Motion made by Commissioner Raymond to amend the letter to add an additional line, motion seconded by Commissioner Stinnett. Motion passed 5-0 with no abstentions.

Motion made by Commissioner Raymond to forward the letter as amended to the Board of Supervisors and recommend Board signature, motion seconded by Commissioner Tennis. Motion passed 5-0 with no abstentions.

6. **Overview of Spring Groundwater Levels**

Jim Brobeck addressed the Commission.
Information only, no action.

7. **Update on Activities and Projects of the Department**
   a. GSA and SGM Grant Updates
   b. Miocene Updates
   c. Status of Tuscan Water District Formation
   d. Water Webinars [https://www.buttecounty.net/1215/seminars](https://www.buttecounty.net/1215/seminars)

Information only, no action.

8. **Future Meeting Dates and Locations**
   a. Date and location of the next meeting: August 2, 2023
      Board of Supervisors Chambers
      25 County Center Drive, Oroville, CA
   b. Requests of the Water Commission for future agenda topics

Information only, no action.

9. **Commissioners Wishing to Address Items Not Listed on the Agenda**

Information only, no action.

10. **Communications Received and Referred**

Information only, no action.

11. **Adjournment**

Meeting adjourned.
June 27, 2023

Mr. Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
Department of Water Resources

Re: Butte County — Groundwater Recharge Opportunities & Local Agency Needs

Dear Mr. Gosselin:

In response to Governor Newsom’s Executive Order (EO) N-4-23 (and subsequent EO N-7-23), the Butte County Water Commission engaged in a robust discussion about the EO and the opportunities that may arise in Butte County in the coming months to utilize provisions of the EO. While the EO is a commendable step forward by the state to recognize the importance of recharge while reducing flood risks, unfortunately, the Commission identified several aspects of the EO that either create significant challenges or prevent the implementation of additional recharge under the EO within Butte County.

These include:

- A lack of “imminent flood risk” likely to occur through June 1, 2023 (per specified date in EO);
- Management activities in orchards and for rice planting require lands to dry out by this time in the season, so landowners are less open to voluntary inundation of fields; and
- The exclusion of native grasslands and rangeland along the east side of the valley as potential inundation areas due to the EO requirement that lands must have been in active irrigated agricultural cultivation within the last three years.

Although we do not anticipate that local action can be taken this year under EO N-4-23 (or EO N-7-23) to capture floodwater to recharge groundwater, we would like to take this opportunity to share our vision for the role of enhancing recharge to achieve groundwater sustainability within Butte County, as well as our financial needs to advance these efforts.

Statewide, we have experienced a remarkable shift from the past few years with the arrival of 31 atmospheric river storms this winter, in contrast to the preceding driest three-year period in the state’s recorded history. As the Public Policy Institute of California points out, while it may be tempting to think the drought is now over, the recent shift in conditions highlights just how much we need to prepare for wetter wet and drier dry years. Butte County recognizes the need to address declining groundwater levels, particularly in the Vina Subbasin, and is engaged with Groundwater Sustainability Agencies (GSAs) to pursue solutions using a five-pronged approach:
1. Reducing groundwater demand through increased conservation activities;
2. Increasing groundwater recharge during wet periods;
3. Increasing use of available surface water supplies when economical;
4. Land use management to manage water demands, and;
5. Inter-basin coordination

Through this letter we wish to communicate our approach and intent to pursue enhanced natural recharge and our technical and financial needs to make it possible. By “enhancing natural recharge” we mean increasing the extent to which recharge occurs via natural processes by extending the amount of time and/or expanding the area over which water has an opportunity to seep into the ground.

Butte County intends to take the following steps through activities of the Department of Water and Resource Conservation (Department):

**Create a Butte County Groundwater Recharge Action Plan**
The Department will develop a groundwater recharge action plan by January 1, 2024, that provides actionable recommendations that result in the ability to achieve additional groundwater recharge during wet periods, regardless of whether the year is wet or dry. The plan will identify the target amount of recharge that can be achieved by December 31, 2030. This effort will consist of compiling information and data from existing studies to outline the near-term opportunities for actionable recharge that benefit Butte County groundwater conditions.

**Prepare to Implement a Pilot Project during Wet Periods of Water Year 2024**
The Department will utilize the Butte County Technical Advisory Committee, Water Commission, and coordination with landowners to identify diversion points and locations on working agricultural lands where flood water could be routed to enhance natural recharge during wet periods in Water Year 2024. Opportunities for enhancing natural recharge may include:

- Retention of rainfall on agricultural land,
- Diversion of flows during imminent risk of flooding onto agricultural lands,
- Operations of flows within local flood channels (ex. Lindo Channel)

**Learn from Neighboring Subbasins and Others throughout the State**
Other groundwater managers throughout the state and the Sacramento Valley are diverting flood flows, conducting pilot projects for recharge, and designing and expanding recharge projects. Butte County will continue to learn from the experience of others to reduce costs and maximize benefits of local efforts.

In order to pursue these short-term and longer-term recharge goals, technical assistance and funding from the State will be required. Although not a critically over-drafted subbasin, it is important that declining groundwater levels be stabilized in the Vina Subbasin and throughout the Sacramento Valley as quickly as possible. Assistance and funding from the State to support local efforts, as outlined below will help jump start this progress.

**Continue and Expand Technical Assistance to Local Agencies**
DWR through its Sustainable Groundwater Management and Flood-Managed Aquifer Recharge programs is providing valuable technical assistance and guidance to GSAs and other local agencies seeking to enhance recharge this year. We appreciate these efforts and encourage the State to expand these programs in the following ways:

- Provide specialized equipment in Water Year 2024:
  a. Provide equipment for localized geophysical investigations (i.e. towed transient electromagnetic system a.k.a tTEM) to help identify prime recharge areas.
  b. Provide specialized equipment to divert flows during wet periods or when imminent risk of flooding is occurring, such as temporary pumps and siphons being provided in the Tulare Lake Basin for the Temporary Flood Diversion and Groundwater Recharge Support Program.

- Provide technical assistance:
  a. Provide technical assistance to move projects from concept to completed preliminary design so that the County or GSAs can pursue grant dollars for specific projects.
  b. Provide technical assistance to develop localized applications of available modeling tools (such as Eco-FIP used by the Flood-MAR program)
  c. Provide technical assistance to monitor and analyze the effects of recharge efforts

To supplement grant funding, technical assistance activities will advance local efforts to enhance recharge and address flooding concerns.

**Provide Groundwater Recharge Capacity Building Grants**

As a key strategy in the Governor’s California’s Water Supply Strategy, Adapting to a Hotter, Drier Future, the State has outlined a vision for increasing recharge by 500,000 acre-feet annually to help address impacts of declining groundwater levels and impacts to domestic well owners. The Governor and Legislature have committed more than $8.6 billion in the last two budget cycles to build water resilience across the State. However, there is limited capacity at the local level to take advantage of state technical assistance and even grant opportunities. It takes time and resources to apply for competitive grants and to utilize technical assistance resources. Even in light of grant awards announced through the SGM Grant Program, funding through capacity building grants is needed to provide GSAs, or other local agencies implementing GSPs, the ability to fully utilize the programs and resources the State is offering. Non-competitive funding made available to agencies with a spending plan outlining activities to enhance recharge would go a long way to moving more water into aquifers throughout California, not just in critically overdrafted subbasins.

Ensuring a sustainable aquifer system and drought resilient groundwater supplies in Butte County will require action and coordination by GSAs and the County over the implementation period of the GSPs. Local agencies are up to the task of protecting and managing local and regional water supplies that are crucial for our rural communities, environment, and agricultural industry. Recognizing the warmer, drier climate that is likely to dominate our future, we encourage the State to continue to make additional funds and technical assistance available to non-critically over-drafted subbasins. The enhancement of groundwater recharge within Butte County subbasins will greatly help in providing not only essential
water supply resilience, but it will also address drought impacts that have affected groundwater dependent households, communities, and ecosystems over recent decades.

Sincerely,

Tod Kimmelshue
Chair, Butte County Board of Supervisors
### Butte County Board of Supervisors

#### Agenda Transmittal

**Clerk of the Board Use Only**

**Agenda Item:**

<table>
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<th>Subject:</th>
<th>Consideration of a Letter to the Department of Water Resources (DWR) Regarding Local Recharge Opportunities</th>
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<td>Water and Resource Conservation</td>
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<tr>
<td>Contact:</td>
<td>Christina Buck</td>
</tr>
<tr>
<td>Phone:</td>
<td>552-3593</td>
</tr>
<tr>
<td>Meeting Date Requested:</td>
<td>June 27, 2022</td>
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**Regular Agenda ☑  Consent Agenda ☐**

**Department Summary:** *(Information provided in this section will be included on the agenda. Attach explanatory memorandum and other background as necessary).*

At the Butte County Water Commission (Commission) meeting on April 9, 2023, the Department of Water and Resource Conservation provided an update on the status of Governor Newsom’s March 10th Executive Order (EO), N-4-23, which makes it easier for agencies to divert floodwater to recharge groundwater. The EO temporarily lifts regulations and sets specific conditions under which floodwaters can be diverted without permits to boost groundwater recharge and mitigate flooding. In addition to the staff update, the Commission received multiple comments from the public urging the Commission to encourage action be taken this year on groundwater recharge efforts. The Commission engaged staff and ultimately decided to form an Ad-Hoc Committee (Ad-Hoc) to further discuss the recharge issue generally and to determine what, if anything, could be done locally this year under EO N-4-23 to capture floodwater to recharge groundwater. Ad-Hoc members and staff concluded that locally there would not be recharge opportunities under the EO since it was highly unlikely that conditions would arise over the next several months to cause an “imminent risk of flooding.” As a result, the Ad-Hoc redirected their efforts to draft a letter for to be sent to DWR that would address the EO and its limitations locally, identify potential action steps by the County to enhance natural recharge, and identify the local needs to advance recharge efforts. The Ad-Hoc revised and refined a drafted letter and on June 7, 2023 the Commission discussed the letter and amended it by adding one additional bullet point. The Commission unanimously recommended the letter be considered for approval by the Board of Supervisors. The Department recommends the Board approve the letter to DWR and authorize the Chair to sign.

**Fiscal Impact:**

None

**Personnel Impact:**

None

**Action Requested:**

Approve letter and authorize the Chair to sign.

**Administrative Office Review:** Danielle Nuzum, Deputy Chief Administrative Officer

Revised: December 2019
MEMORANDUM

DATE: June 12, 2023

TO: Butte County Board of Supervisors

FROM: Christina Buck, Assistant Director

RE: Local Recharge Opportunities and Consideration of a Letter to the Department of Water Resources

Background

At the Butte County Water Commission (Commission) meeting on April 9, 2023, the Department of Water and Resource Conservation (Department) provided an update on the status of Governor Newsom’s March 10th Executive Order (EO), N-4-23, which makes it easier for agencies to divert floodwater to recharge groundwater. The EO temporarily lifts regulations and sets specific conditions under which flood waters can be diverted without permits to boost groundwater recharge and mitigate flooding (more details below). In addition to the staff update, the Commission received multiple comments from the public urging the Commission to encourage action be taken this year on groundwater recharge efforts. The Commission then engaged in a robust discussion with staff about EO N-4-23 and ultimately decided to form an Ad-Hoc Committee (Ad-Hoc). The purpose of the Ad-Hoc was to further discuss recharge opportunities and to determine what, if anything, could be done locally this year under EO N-4-23 to capture floodwater to recharge groundwater.

Flood Water Recharge Executive Orders

The Governor released two EOs in the spring to streamline the use of floodwater to aid in recharge. There is state and local motivation for action during this wet year given the record snowpack and flooding conditions that continue in the San Joaquin and Tulare Basins coupled with the most severe impacts of unsustainable groundwater use in these areas (severe declines in groundwater levels, increased subsidence, dry wells etc.). EO N-4-23 and, subsequently, N-7-23 authorize diversion of flood flows under the following conditions in the Tulare Lake and San Joaquin Valley Basins until August 31, 2023:

- Imminent risk of flooding is known and noticed by an appropriate local agency (diversions must stop when there is no longer a flood risk)
- Use of existing diversion infrastructure or temporary pumps with simple screens to minimize impacts to fish/other species.
- Water rights permits are suspended
- CEQA and CDFW 1600 compliance is suspended.

In addition, the EOs specify the following compliance requirements for diversions to take place:

1. No new permanent infrastructure or permanent construction
2. Cannot divert water onto:
   a. Dairy land areas
   b. Agriculture fields where pesticides or fertilizer application occurred in the past 30 days
   c. Rangeland/grazing lands, natural habitats
   d. Areas that could cause damage to critical levees/infrastructure, and wastewater or drinking water systems/wells
   e. Areas that would exacerbate flood threats, or health and safety concerns
3. Reporting is required to the Groundwater Sustainability Agencies (GSAs) and State Water Board.

Reports of diversions under the EO are posted online (https://www.waterboards.ca.gov/waterrights/water_issues/programs/groundwater-recharge/).

As of mid-June, over 90,000 acre-feet have been diverted.

The Department of Water Resources (DWR) is facilitating use of temporary flood diversion equipment to support local agencies conveying high flows from rivers that drain towards the Tulare Lake Basin. Temporary pumps and siphons can be mission tasked through the local counties’ Office of Emergency Services (OES) to California OES to DWR. Experience this year has helped the state develop tools and a process to assist local agencies in managing floodwaters while helping some of it get into the ground.

**Current County Policy Related to Recharge**

At the Board of Supervisor meeting on May 9, 2023, staff presented the Groundwater Status Report for the three groundwater subbasins within Butte County. Conclusions and recommendations in the presentation highlighted the downward trend in groundwater levels observed in the Vina Subbasin since around the year 2000 and pointed out that actions are needed to stabilize conditions using a four pronged approach that includes: 1. Demand reduction and water conservation activities, 2. Increasing use of surface water supplies, 3. Land use management, and 4. Increasing recharge. The Vina Groundwater Sustainability Agency (GSA) and Rock Creek Reclamation District GSA are working towards the goal of sustainably managing groundwater through pursuit of local funding and grant funds for Projects and Management Actions and to address data gaps identified in the Groundwater Sustainability Plan (GSP). The County, as a member agency of the Vina GSA (and Wyandotte Creek GSA), has provided leadership and staff support for these efforts.
Increasing natural recharge through flood and water management actions is one of the approaches that can be taken to bolster groundwater conditions and help maintain or achieve drought resilient groundwater supplies in Butte County subbasins. Current Butte County policy supports actions along these lines as shown through the excerpts below from the Butte County State Legislative Platform (January 2023) and 2040 General Plan Water Resource Element.

**2023 State Legislative Platform**

- Support actions that promote natural groundwater recharge, protection of area of origin water rights, existing water right priorities, and local control over water management.

**2023 Federal Legislative Platform**

- Support funding for projects and programs that naturally recharge our groundwater basins.

**2040 General Plan: Water Resources Element**

-W-A3.1 Continue to seek funding for and participate in efforts to conduct comprehensive, countywide mapping of water resources and groundwater recharge areas

-W-A3.3 Seek funds and develop programs that improve the scientific understanding of regional aquifer systems and potential factors related to the sustainability of the county’s water resources

-W-P6.2 The use of permeable surfaces and rainwater catchment/retention systems shall be allowed and encouraged to enhance groundwater recharge

-W-P6.5 Storm water channels should be managed in a way that produces co-benefits, such as supporting recharge, improving water quality, providing recreation areas, and reducing flood risk.

In addition, the Department’s Strategic Plan (approved by the Board on May 24, 2022) identifies related goals and actions to promote and advance recharge within the County through work of the Department:

**Goal 1: Support Solutions to Ensure the Sustainability of Local Water Supplies**

- Collaborate with Butte County Departments (i.e., Public Works and Development Services/Planning Division) and local entities on multi-benefit water resources projects, such as drainage/flood studies, for potential opportunities for managed aquifer recharge consistent with the applicable Groundwater Sustainability Plan (GSP).

**Goal 3: Protect and Manage Groundwater Resources**

- Participate in efforts to conduct comprehensive, countywide mapping of water resources and groundwater recharge areas. (M) (General Plan W-A3.1) (SGMA)
- Consult with other local agencies to explore opportunities to promote recharge within the County.
As stated, the Water Commission formed an Ad-Hoc to further explore opportunities for local recharge in light of the EO. The Ad-Hoc subsequently met with staff on April 24, 2023 and discussed specific and more general local recharge opportunities in Butte County. For example, ideas included: 1. Flooding idled agricultural lands with nearby streamflow during high flow events or with existing water rights when available, 2. Designing instream detention, such as retaining water in Lindo Channel longer, 3. Stormwater retention to give rainfall and runoff an opportunity to slow down and seep into the ground, or 4. Filling canals, ditches, and stock watering ponds during rainfall events. After much discussion, Commission members and staff concluded that locally there would not be recharge opportunities under the EO since it was highly unlikely that conditions would arise over the next several months to cause an “imminent risk of flooding.” As a result, the committee redirected their efforts and decided to draft a letter to be sent from the Board to DWR that would address the EO and its limitations here, identify potential action steps by Butte County to enhance recharge, and identify the local needs to advance recharge efforts. A draft letter was circulated to committee members and the Ad-Hoc met a second time on May 15, 2023 to refine and revise the letter.

On June 7, 2023 the Water Commission discussed the draft letter and amended it by adding one additional bullet point. The Commission unanimously recommended the letter be considered for approval by the Board.

**Action Requested**

Approve the letter and authorize the Chair to sign.
June 27, 2023

Mr. Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
Department of Water Resources

Re: Butte County – Groundwater Recharge Opportunities & Local Agency Needs

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**Learn from Neighboring Subbasins and Others throughout the State**
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Sincerely,

Tod Kimmelshue
Chair, Butte County Board of Supervisors
<table>
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<th>#</th>
<th>Component Name</th>
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### Component Administration and Management

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### Lindo Channel Surface Water Recharge Implementation

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### Agricultural Surface Water Supplies Feasibility Analysis

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### Agricultural Irrigation Efficiency Pilot Program and Education

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<td>4. Analyze Results of Precision Irrigation Pilot Program</td>
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### Groundwater Recharge Feasibility Analysis and Site Evaluation

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<td>5. Stakeholder Engagement, Education, and Outreach</td>
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**Note:** Budget categories are defined by the grant program: a) Component Administration; b) Environmental/Engineering/Design; c) Implementation/Construction; d) Monitoring/Assessment; e) Engagement/Outreach. Each task(s) are assigned to a specific budget category.

The full grant application includes a work plan, budget, and schedule for each Component, available here: [https://www.vinagsa.org/files/61baa1fe7/5Ggrantpackage_Vina.pdf](https://www.vinagsa.org/files/61baa1fe7/5Ggrantpackage_Vina.pdf)
## Wyandotte Creek

**DRAFT GRANT AWARD (based on submitted Work Plan and Budget)**

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<td>3</td>
<td>Response to DWR GSP Determination</td>
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<td>4</td>
<td>Develop Approach for Interconnected Surface Water Sustainable Management Criteria (ISW SMC)</td>
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<td>5</td>
<td>Five-Year GSP Evaluation Report</td>
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<td>6</td>
<td>Update Butte Basin Groundwater Model (BBGM)</td>
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<td>Data Management System (DMS) Enhancements</td>
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<td>$ 5,527,284</td>
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Note: Budget categories are defined by the grant program: a) Component Administration; b) Environmental/Engineering/Design; c) Implementation/Construction; d) Monitoring/Assessment; e) Engagement/Outreach. Each task(s) are assigned to a specific budget category.
July 27, 2023

Christina Buck  
Butte County Department of Water and Resource Conservation  
308 Nelson Ave.  
Oroville, CA 95965  
cbuck@buttecounty.net

RE: Sacramento Valley Basin – Butte Subbasin - 2022 Groundwater Sustainability Plan

Dear Christina Buck,

The Department of Water Resources (Department) has evaluated the groundwater sustainability plan (GSP) submitted for the Sacramento Valley Basin – Butte Subbasin and has determined the GSP is approved. The approval is based on recommendations from the Staff Report, included as an exhibit to the attached Statement of Findings, which describes that the Butte Subbasin GSP satisfies the objectives of the Sustainable Groundwater Management Act (SGMA) and substantially complies with the GSP Regulations. The Staff Report also proposes recommended corrective actions that the Department believes will enhance the GSP and facilitate future evaluation by the Department. The Department strongly encourages the recommended corrective actions be given due consideration and suggests incorporating all resulting changes to the GSP in future updates.

Recognizing SGMA sets a long-term horizon for groundwater sustainability agencies (GSAs) to achieve their basin sustainability goals, monitoring progress is fundamental for successful implementation. GSAs are required to evaluate their GSPs at least every five years and whenever the Plan is amended, and to provide a written assessment to the Department. Accordingly, the Department will evaluate approved GSPs and issue an assessment at least every five years. The Department will initiate the first periodic review of the Butte Subbasin GSP no later than January 28, 2027.

Please contact Sustainable Groundwater Management staff by emailing sgmps@water.ca.gov if you have any questions related to the Department’s assessment or implementation of your GSP.
Thank You,

Steven Springhorn
Supervising Engineering Geologist
Sustainable Groundwater Management

Attachment:
1. Statement of Findings Regarding the Approval of the Sacramento Valley Basin – Butte Subbasin Groundwater Sustainability Plan
STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

STATEMENT OF FINDINGS REGARDING THE
APPROVAL OF THE
SACRAMENTO VALLEY – BUTTE SUBBASIN GROUNDWATER SUSTAINABILITY
PLAN

The Department of Water Resources (Department) is required to evaluate whether a submitted groundwater sustainability plan (GSP or Plan) conforms to specific requirements of the Sustainable Groundwater Management Act (SGMA or Act), is likely to achieve the sustainability goal for the basin covered by the Plan, and whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) The Department is directed to issue an assessment of the Plan within two years of its submission. (Water Code § 10733.4.) This Statement of Findings explains the Department’s decision regarding the Plan submitted by the Biggs-West Gridley Water District Groundwater Sustainability Agency (GSA), the Butte Water District GSA, the City of Biggs GSA, the City of Gridley GSA, the Colusa Groundwater Authority GSA, the County of Butte GSA, County of Glenn GSA, the Reclamation District No. 1004 GSA, the Reclamation District No. 2106 GSA, the Richvale Irrigation District GSA, and the Western Canal Water District GSA (GSAs or Agencies) for the Butte Subbasin (Basin No. 5-021.70).

Department management has discussed the Plan with staff and has reviewed the Department Staff Report, entitled Sustainable Groundwater Management Program Groundwater Sustainability Plan Assessment Staff Report, attached as Exhibit A, recommending approval of the GSP. Department management is satisfied that staff have conducted a thorough evaluation and assessment of the Plan and concurs with staff’s recommendation and all the recommended corrective actions. The Department therefore APPROVES the Plan and makes the following findings:

A. The Plan satisfies the required conditions as outlined in § 355.4(a) of the GSP Regulations (23 CCR § 350 et seq.):

1. The Plan was submitted within the statutory deadline of January 31, 2022. (Water Code § 10720.7(a); 23 CCR § 355.4(a)(1).)

2. The Plan was complete, meaning it generally appeared to include the information required by the Act and the GSP Regulations sufficient to warrant a thorough evaluation and issuance of an assessment by the Department. (23 CCR § 355.4(a)(2).)
3. The Plan, either on its own or in coordination with other Plans, covers the entire Subbasin. (23 CCR § 355.4(a)(3).)

B. The general standards the Department applied in its evaluation and assessment of the Plan are: (1) “conformance” with the specified statutory requirements, (2) “substantial compliance” with the GSP Regulations, (3) whether the Plan is likely to achieve the sustainability goal for the Subbasin within 20 years of the implementation of the Plan, and (4) whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) Application of these standards requires exercise of the Department’s expertise, judgment, and discretion when making its determination of whether a Plan should be deemed “approved,” “incomplete,” or “inadequate.”

The statutes and GSP Regulations require Plans to include and address a multitude and wide range of informational and technical components. The Department has observed a diverse array of approaches to addressing these technical and informational components being used by GSAs in different basins throughout the state. The Department does not apply a set formula or criterion that would require a particular outcome based on how a Plan addresses any one of SGMA’s numerous informational and technical components. The Department finds that affording flexibility and discretion to local GSAs is consistent with the standards identified above; the state policy that sustainable groundwater management is best achieved locally through the development, implementation, and updating of local plans and programs (Water Code § 113); and the Legislature’s express intent under SGMA that groundwater basins be managed through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner. (Water Code § 10720.1(h)) The Department’s final determination is made based on the entirety of the Plan’s contents on a case-by-case basis, considering and weighing factors relevant to the particular Plan and Subbasin under review.

C. In making these findings and Plan determination, the Department also recognized that: (1) The Department maintains continuing oversight and jurisdiction to ensure the Plan is adequately implemented; (2) the Legislature intended SGMA to be implemented over many years; (3) SGMA provides Plans 20 years of implementation to achieve the sustainability goal in a Subbasin (with the possibility that the Department may grant GSAs an additional five years upon request if the GSA has made satisfactory progress toward sustainability); and, (4) local agencies acting as GSAs are authorized, but not required, to address undesirable results that occurred prior to enactment of SGMA. (Water Code §§ 10721(r); 10727.2(b); 10733(a); 10733.8.)
D. The Plan conforms with Water Code §§ 10727.2 and 10727.4, substantially complies with 23 CCR § 355.4, and appears likely to achieve the sustainability goal for the Subbasin. It does not appear at this time that the Plan will adversely affect the ability of adjacent basins to implement their GSPs or impede achievement of sustainability goals.

1. The sustainable management criteria and sustainability goals, which focus on protecting at least 93 percent of shallow production wells and operating within the Subbasin’s sustainable yield by 2027, are sufficiently justified and explained. The Plan relies on credible information and science such as long-term groundwater level data, a reasonable understanding of aquifer properties, and an updated groundwater model to quantify the groundwater conditions that the Plan seeks to avoid and provides an objective way to determine whether the Subbasin is being managed sustainably in accordance with SGMA. (23 CCR § 355.4(b)(1).)

2. The Plan identified and provided reasonable measures and schedules to eliminate data gaps, including additional monitoring and data collection to better improve the groundwater model and better characterize Subbasin conditions. (23 CCR § 355.4(b)(2).)

3. The projects and management actions proposed are designed to improve water management and take advantage of in-lieu and direct recharge opportunities. The projects and management actions are reasonable and commensurate with the level of understanding of the Subbasin setting. The projects and management actions described in the Plan provide a feasible approach to achieving the Subbasin’s sustainability goal and should provide the GSAs with greater versatility to adapt and respond to changing conditions and future challenges during GSP implementation. (23 CCR § 355.4(b)(3).)

4. The Plan provides a detailed explanation of how the varied interests of groundwater uses and users in the Subbasin were considered in developing the sustainable management criteria and how those interests, including shallow domestic wells and groundwater dependent ecosystems, would be impacted by the chosen minimum thresholds. (23 CCR § 355.4(b)(4).)

5. The Plan’s projects and management actions appear feasible at this time and appear capable at preventing undesirable results and ensuring that the Subbasin is managed within its sustainable yield within 20 years. The Department will continue to monitor Plan implementation and reserves the right to change its determination if projects and management actions are not implemented or appear unlikely to prevent undesirable results or achieve sustainability within SGMA timeframes. (23 CCR § 355.4(b)(5).)
6. The Plan includes a reasonable assessment of overdraft conditions and includes reasonable means to mitigate overdraft, if present. (23 CCR § 355.4(b)(6).)

7. At this time, it does not appear that the Plan will adversely affect the ability of an adjacent basin to implement its GSP or impede achievement of sustainability goals in an adjacent basin. The Plan states that the Butte Subbasin GSAs have met multiple times with GSAs in adjacent subbasins, sharing data and information on groundwater conditions and GSP projects to ensure that this Plan will not interfere with the ability of adjacent subbasins to also maintain sustainable groundwater management. There is also an Interbasin Coordination Plan that describes coordination with neighboring GSAs in adjacent subbasins. (23 CCR § 355.4(b)(7).)

8. Because a single plan was submitted for the Subbasin, a coordination agreement was not required. (23 CCR § 355.4(b)(8).)

9. The eleven GSA’s and their associated member agencies have historically managed large surface water canal systems and continually worked to improve groundwater modeling in the Subbasin. The GSAs, and their member agencies, have a history of groundwater management which provides a reasonable level of confidence that the GSAs have the legal authority and financial resources necessary to implement the Plan. (23 CCR § 355.4(b)(9).)

10. Through review of the Plan and consideration of public comments, the Department determines that the GSAs adequately responded to comments that raised credible technical or policy issues with the Plan, sufficient to warrant approval of the Plan at this time. The Department also notes that the recommended corrective actions included in the Staff Report are important to addressing certain technical or policy issues that were raised and, if not addressed before future, subsequent plan evaluations, may preclude approval of the Plan in those future evaluations. (23 CCR § 355.4(b)(10).)

E. In addition to the grounds listed above, DWR also finds that:

1. The Plan considers potential impacts on existing well users and the GSAs developed the Plan’s sustainable management criteria to be protective of these beneficial users of groundwater. The Plan’s compliance with the requirements of SGMA and substantial compliance with the GSP Regulations supports the state policy regarding the human right to water (Water Code § 106.3). The Department developed its GSP Regulations consistent with and intending to further the policy through implementation of SGMA and the Regulations, primarily by achieving sustainable
groundwater management in a basin. By ensuring substantial compliance with the GSP Regulations, the Department has considered the state policy regarding the human right to water in its evaluation of the Plan. (23 CCR § 350.4(g).

2. The Plan acknowledges and identifies interconnected surface waters within the Subbasin. The GSAs propose initial sustainable management criteria to manage this sustainability indicator and measures to improve understanding and management of interconnected surface water. The GSAs acknowledges, and the Department agrees, many data gaps related to interconnected surface water exist. The GSAs should continue filling data gaps, collecting additional monitoring data, and coordinating with resources agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping. Future periodic evaluations of the Plan and amendments to the Plan should aim to improve the initial sustainable management criteria as more information and improved methodology becomes available.

3. Projections of future basin extractions are likely to stay within current and historic ranges, at least until the next periodic evaluation by the GSA and the Department. Basin groundwater levels and other SGMA sustainability indicators are unlikely to substantially deteriorate while the GSA implements the Department’s recommended corrective actions. State intervention is not necessary at this time to ensure that local agencies manage groundwater in a sustainable manner. (Wat. Code § 10720.1(h).)

4. The California Environmental Quality Act (Public Resources Code § 21000 et seq.) does not apply to the Department’s evaluation and assessment of the Plan.
Accordingly, the GSP submitted by the Agencies for the Butte Subbasin is hereby APPROVED. The recommended corrective actions identified in the Staff Report will assist the Department's future review of the Plan's implementation for consistency with SGMA and the Department therefore recommends the Agencies address them by the time of the Department's periodic review, which is set to begin on January 28, 2027, as required by Water Code § 10733.8. Failure to address the Department's Recommended Corrective Actions before future, subsequent plan evaluations, may lead to a Plan being determined incomplete or inadequate.

Signed:

_________________________________
Karla Nemeth, Director
Date: July 27, 2023

Exhibit A: Groundwater Sustainability Plan Assessment Staff Report – Sacramento Valley – Butte Subbasin
The Biggs-West Gridley Water District Groundwater Sustainability Agency (GSA), Butte Water District GSA, City of Biggs GSA, City of Gridley GSA, Colusa Groundwater Authority GSA, County of Butte GSA, County of Glenn GSA, Reclamation District No. 1004 GSA, Reclamation District No. 2106 GSA, Richvale Irrigation District GSA, and Western Canal Water District GSA (collectively referenced to as the GSAs or Agencies) submitted the Butte Subbasin Groundwater Sustainability Plan (GSP or Plan) for the Butte Subbasin (Subbasin) to the Department of Water Resources (Department) for evaluation and assessment as required by the Sustainable Groundwater Management Act (SGMA) and GSP Regulations. The GSP covers the entire Subbasin for the implementation of SGMA.

After evaluation and assessment, Department staff conclude that the Plan includes the required components of a GSP, demonstrates a thorough understanding of the Subbasin based on what appears to be the best available science and information, sets well explained, supported, and reasonable sustainable management criteria to prevent undesirable results as defined in the Plan and proposes a set of projects and management actions that will likely achieve the sustainability goal defined for the Subbasin. Department staff will continue to monitor and evaluate the Subbasin's

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1 Water Code § 10720 et seq.
2 23 CCR § 350 et seq.
3 23 CCR § 350 et seq.
progress toward achieving the sustainability goal through annual reporting and future periodic evaluations of the GSP and its implementation.

- **Based on the current evaluation of the Plan, Department staff recommend the GSP be approved with the recommended corrective actions described herein.**

This assessment includes five sections:

- **Section 1 – Summary:** Overview of Department staff’s assessment and recommendations.
- **Section 2 – Evaluation Criteria:** Describes the legislative requirements and the Department’s evaluation criteria.
- **Section 3 – Required Conditions:** Describes the submission requirements, Plan completeness, and basin coverage required for a GSP to be evaluated by the Department.
- **Section 4 – Plan Evaluation:** Provides an assessment of the contents included in the GSP organized by each Subarticle outlined in the GSP Regulations.
- **Section 5 – Staff Recommendation:** Includes the staff recommendation for the Plan and any recommended or required corrective actions, as applicable.

1 **SUMMARY**

Department staff recommend approval of the Butte Subbasin GSP. The GSAs have identified areas for improvement of their Plan (e.g., improved subbasin modeling parameters, additional monitoring and data collection, and installation of additional wells to improve the understanding of interconnected surface water). Department staff concur that those items are important and recommend the GSAs address them as soon as possible. Department staff have also identified additional recommended corrective actions within this assessment that the GSAs should consider addressing by the first periodic evaluation of the Plan. The recommended corrective actions generally focus on the following:

1. Providing more information about how the proposed minimum thresholds for the chronic lowering groundwater levels may impact beneficial uses and users and other sustainability indicators.
2. Providing more information about the sustainable management criteria for land subsidence, and
3. Filling data gaps, collecting additional monitoring data, and implementing the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing.
Addressing the recommended corrective actions identified in Section 5 of this assessment will be important to demonstrate, on an ongoing basis, that implementation of the Plan is likely to achieve the sustainability goal.

2 EVALUATION CRITERIA

The GSAs submitted a single GSP to the Department to evaluate whether the Plan conforms to specified SGMA requirements and is likely to achieve the sustainability goal for the Butte Subbasin. To achieve the sustainability goal for the Subbasin, the GSP must demonstrate that implementation of the Plan will lead to sustainable groundwater management, which means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results. Undesirable results must be defined quantitatively by the GSAs. The Department is also required to evaluate whether the GSP will adversely affect the ability of an adjacent basin to implement its GSP or achieve its sustainability goal.

For the GSP to be evaluated by the Department, it must first be determined that the Plan was submitted by the statutory deadline, and that it is complete and covers the entire basin. If these conditions are satisfied, the Department evaluates the Plan to determine whether it complies with specific SGMA requirements and substantially complies with the GSP Regulations. Substantial compliance means that the supporting information is sufficiently detailed and the analyses sufficiently thorough and reasonable, in the judgment of the Department, to evaluate the Plan, and the Department determines that any discrepancy would not materially affect the ability of the Agency to achieve the sustainability goal for the basin, or the ability of the Department to evaluate the likelihood of the Plan to attain that goal.

When evaluating whether the Plan is likely to achieve the sustainability goal for the Subbasin, Department staff reviewed the information provided and relied upon in the GSP for sufficiency, credibility, and consistency with scientific and engineering professional standards of practice. The Department’s review considers whether there is a reasonable relationship between the information provided and the assumptions and conclusions made by the GSA, including whether the interests of the beneficial uses and users of groundwater in the basin have been considered; whether sustainable management criteria and projects and management actions described in the Plan are commensurate

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4 Water Code §§ 10727.2, 10727.4.
5 Water Code § 10733(a).
6 Water Code § 10721(v).
7 23 CCR § 354.26 et seq.
8 Water Code § 10733(c).
9 23 CCR § 355.4(a)(1).
11 23 CCR § 350 et seq.
12 23 CCR § 355.4(b).
13 23 CCR § 351(h).
with the level of understanding of the basin setting; and whether those projects and management actions are feasible and likely to prevent undesirable results.14

The Department also considers whether the GSA has the legal authority and financial resources necessary to implement the Plan.15

To the extent overdraft is present in a basin, the Department evaluates whether the Plan provides a reasonable assessment of the overdraft and includes reasonable means to mitigate the overdraft.16 The Department also considers whether the Plan provides reasonable measures and schedules to eliminate identified data gaps.17 Lastly, the Department’s review considers the comments submitted on the Plan and evaluates whether the GSA adequately responded to the comments that raise credible technical or policy issues with the Plan.18

The Department is required to evaluate the Plan within two years of its submittal date and issue a written assessment of the Plan.19 The assessment is required to include a determination of the Plan’s status.20 The GSP Regulations define the three options for determining the status of a Plan: Approved,21 Incomplete,22 or Inadequate.23

Even when review indicates that the GSP satisfies the requirements of SGMA and is in substantial compliance with the GSP Regulations, the Department may recommend corrective actions.24 Recommended corrective actions are intended to facilitate progress in achieving the sustainability goal within the basin and the Department’s future evaluations, and to allow the Department to better evaluate whether the Plan adversely affects adjacent basins. While the issues addressed by the recommended corrective actions do not, at this time, preclude approval of the Plan, the Department recommends that the issues be addressed to ensure the Plan’s implementation continues to be consistent with SGMA and the Department is able to assess progress in achieving the sustainability goal within the basin.25 Unless otherwise noted, the Department proposes that recommended corrective actions be addressed by the submission date for the first periodic assessment.26

The staff assessment of the GSP involves the review of information presented by the GSAs, including models and assumptions, and an evaluation of that information based on

14 23 CCR §§ 355.4(b)(1), (3), (4), and (5).
15 23 CCR § 355.4(b)(9).
16 23 CCR § 355.4(b)(6).
17 23 CCR § 355.4(b)(2).
18 23 CCR § 355.4(b)(10).
19 Water Code § 10733.4(d); 23 CCR § 355.2(e).
20 Water Code § 10733.4(d); 23 CCR § 355.2(e).
21 23 CCR § 355.2(e)(1).
22 23 CCR § 355.2(e)(2).
23 23 CCR § 355.2(e)(3).
24 Water Code § 10733.4(d).
26 23 CCR § 356.4 et seq.
scientific reasonableness, including standard or accepted professional and scientific methods and practices. The assessment does not require Department staff to recalculate or reevaluate technical information provided in the Plan or to perform its own geologic or engineering analysis of that information. The staff recommendation to approve a Plan does not signify that Department staff, were they to exercise the professional judgment required to develop a GSP for the basin, would make the same assumptions and interpretations as those contained in the Plan, but simply that Department staff have determined that the assumptions and interpretations relied upon by the submitting GSA are supported by adequate, credible evidence, and are scientifically reasonable.

Lastly, the Department’s review and approval of the Plan is a continual process. Both SGMA and the GSP Regulations provide the Department with the ongoing authority and duty to review the implementation of the Plan.27 Also, GSAs have an ongoing duty to provide reports to the Department, periodically reassess their plans, and, when necessary, update or amend their plans.28 The passage of time or new information may make what is reasonable and feasible at the time of this review to not be so in the future. The emphasis of the Department’s periodic reviews will be to assess the progress toward achieving the sustainability goal for the basin and whether Plan implementation adversely affects the ability of adjacent basins to achieve their sustainability goals.

3 REQUIRED CONDITIONS

A GSP, to be evaluated by the Department, must be submitted within the applicable statutory deadline. The GSP must also be complete and must, either on its own or in coordination with other GSPs, cover the entire basin.

3.1 SUBMISSION DEADLINE

SGMA required basins categorized as high- or medium-priority and not subject to critical conditions of overdraft to submit a GSP no later than January 31, 2022.29

The GSAs submitted their Plan on January 28, 2022.

3.2 COMPLETENESS

GSP Regulations specify that the Department shall evaluate a GSP if that GSP is complete and includes the information required by SGMA and the GSP Regulations.30

The GSAs submitted an adopted GSP for the entire Subbasin. After an initial, preliminary review, Department staff found the GSP to be complete and appearing to include the

27 Water Code § 10733.8; 23 CCR § 355.6.
28 Water Code §§ 10728 et seq., 10728.2.
29 Water Code § 10720.7(a)(2).
30 23 CCR § 355.4(a)(2).
required information, sufficient to warrant a thorough evaluation by the Department.\(^{31}\) The Department posted the GSP to its website on February 14, 2022.\(^{32}\)

### 3.3 Basin Coverage

A GSP, either on its own or in coordination with other GSPs, must cover the entire basin.\(^{33}\) A GSP that is intended to cover the entire basin may be presumed to do so if the basin is fully contained within the jurisdictional boundaries of the submitting GSAs.

The GSP intends to manage the entire Butte Subbasin and the jurisdictional boundary of the submitting GSAs fully contains the Subbasin (Figure 1).

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\(^{31}\) The Department undertakes a preliminary completeness review of a submitted Plan under section 355.4(a) of the GSP Regulations to determine whether the elements of a Plan required by SGMA and the Regulations have been provided, which is different from a determination, upon review, that a Plan is “incomplete” for purposes of section 355.2(e)(2) of the Regulations.

\(^{32}\) [https://sgma.water.ca.gov/portal/gsp/preview/98](https://sgma.water.ca.gov/portal/gsp/preview/98).

\(^{33}\) Water Code § 10727(b); 23 CCR § 355.4(a)(3).
4 PLAN EVALUATION

As stated in Section 355.4 of the GSP Regulations, a basin “shall be sustainably managed within 20 years of the applicable statutory deadline consistent with the objectives of the Act.” The Department’s assessment is based on a number of related factors including whether the elements of a GSP were developed in the manner required by the GSP Regulations, whether the GSP was developed using appropriate data and methodologies and whether its conclusions are scientifically reasonable, and whether the GSP, through the implementation of clearly defined and technically feasible projects and management actions, is likely to achieve a tenable sustainability goal for the basin. The Department staff’s evaluation of the likelihood of the Plan to attain the sustainability goal for the Subbasin is provided below.

4.1 ADMINISTRATIVE INFORMATION
The GSP Regulations require each Plan to include administrative information identifying the submitting Agency, its decision-making process, and its legal authority;\textsuperscript{34} a description of the Plan area and identification of beneficial uses and users in the Plan area;\textsuperscript{35} and a description of the ability of the submitting Agency to develop and implement a Plan for that area.\textsuperscript{36}

The eleven GSAs that have formed within the Butte Subbasin in order to implement the GSP are:

- Biggs-West Gridley Water GSA
- Butte Water District GSA
- City of Biggs GSA
- City of Gridley GSA
- Colusa Groundwater Authority GSA
- County of Butte GSA
- County of Glenn GSA
- Reclamation District No. 1004 GSA
- Reclamation District No. 2106 GSA
- Richvale Irrigation District GSA
- Western Canal Water District GSA

Information related to each agency’s contact information, organization and management structure, and legal authority is provided in the GSP.\textsuperscript{37} The GSAs entered into a Cooperation Agreement\textsuperscript{38} for the purpose of developing, adopting, and implementing the

\textsuperscript{34} 23 CCR § 354.6 \textit{et seq}.
\textsuperscript{35} 23 CCR § 354.8 \textit{et seq}.
\textsuperscript{36} 23 CCR § 354.6(e).
\textsuperscript{37} Butte Subbasin GSP, Section 1.3.1, pp. 43-51.
\textsuperscript{38} Butte Subbasin GSP, Appendix 1.B, pp. 135-157.
GSP, and to “cooperatively carry out the purposes of SGMA.” 39 The Coordination Agreement created the Butte Subbasin Advisory Board.

The Butte Subbasin is located within Butte, Colusa, and Glenn counties and includes the cities of Gridley and Biggs. The GSP states that no area of the Subbasin is covered by an alternative and there are no adjudicated areas. 40 The Butte Subbasin is part of the larger Sacramento Valley Groundwater Basin and is bounded to the south by the Sutter Subbasin, to the west by the Sacramento River and the Colusa Subbasin, to the north by the Corning and Vina subbasins, and to the east by the Feather River and the Wyandotte Creek Subbasin (Figure 1). 41 All adjacent groundwater basins are medium and high-priority basins with GSPs under review by the Department.

Land use areas within the Subbasin are classified as agricultural, urban, wetlands, and native vegetation. 42 According to the GSP, state managed lands within the Subbasin are managed by the California Department of Fish and Wildlife, and federally managed lands are managed by the United States Fish and Wildlife Service. 43 The GSP states that there are an estimated 2,439 production wells located within the Subbasin, with the density of production wells being greater in areas without surface water supplies. 44

The GSP provides existing surface water and groundwater monitoring and management programs within the Butte Subbasin. 45 The GSP covers water management and planning documents, 46 surface water monitoring and management programs, 47 groundwater monitoring and management programs, 48 and conjunctive use programs. 49 The GSP states that information and plans developed for these programs have contributed to the development of this GSP and that the “development and implementation of this GSP has and will continue to consider the interests of all beneficial uses and users of groundwater, including agricultural water users, municipal water users, domestic water users, disadvantaged communities, interconnected surface water habitats, groundwater dependent ecosystems, and other stakeholders.” 50

The Butte GSP describes existing water resource monitoring programs, including:

- Northern Sacramento Valley Integrated Regional Water Management Plan, adopted in 2014 and updated in 2020, developed through the collaboration of six

39 Butte Subbasin GSP, Section 1.3, p. 42.
40 Butte Subbasin GSP, Section 2.1.1, p. 58.
41 Butte Subbasin GSP, Figure 1-1, p. 41.
42 Butte Subbasin GSP, Section 2.1.1, p. 58.
43 Butte Subbasin GSP, Section 2.1.1, p. 58.
44 Butte Subbasin GSP, Section 2.1.1, p. 62.
45 Butte Subbasin GSP, Section 2.1.2, pp. 62-66.
46 Butte Subbasin GSP, Section 2.1.2.1, pp. 62-64.
47 Butte Subbasin GSP, Section 2.1.2.2, pp. 64-65.
48 Butte Subbasin GSP, Section 2.1.2.3, pp. 65-66.
49 Butte Subbasin GSP, Section 2.1.2.4, p. 66.
50 Butte Subbasin GSP, Section 2.1.2.1, p. 64.
counties (Butte, Colusa, Glenn, Shasta, Sutter, and Tehama) with the purposes of enhancing coordination of the water resources in the region.\textsuperscript{51}

- Feather River Regional Agricultural Water Management Plan, adopted in 2014 and updated in 2021, developed for the irrigation water suppliers along the Feather River.\textsuperscript{52}

- Agricultural Water Management Plans, updated in 2021, that cover several irrigation districts throughout the Subbasin.\textsuperscript{53}

- Groundwater Management Plans, developed by three separate counties (Butte, Colusa, and Glenn) within the Subbasin.\textsuperscript{54}

- General Plans (Butte County, Glenn County, Colusa County, City of Biggs, City of Gridley) cover portions of the Butte Subbasin.\textsuperscript{55}

The GSP addresses program limitations on operational flexibility in the Subbasin, per the GSP Regulations, \textsuperscript{56} regarding surface water and groundwater monitoring and management programs. The GSP states that the continued operation of these programs will support tracking the GSP implementation progress by providing data on water availability, as well as inflows and outflows from the Subbasin, for both surface water and groundwater. The GSP states that surface water delivery limitations will limit operational flexibility by reducing available surface water supplies for conjunctive use programs.\textsuperscript{57}

The GSP provides a list of surface water focused projects and management actions\textsuperscript{58} that can be implemented, as needed, to “support the sustainable management of the Subbasin.”\textsuperscript{59} The GSP states that existing programs are limited by data gaps\textsuperscript{60} that will be filled by additional monitoring and data collection\textsuperscript{61} that will result in improving Subbasin condition characterization.\textsuperscript{62}

The GSP states that several water districts within the Butte Subbasin practice conjunctive use of surface and groundwater supplies to “encourage grower use of surface water when available.”\textsuperscript{63} The GSP further states that these conjunctive use programs “reduce groundwater pumping and increase groundwater recharge, providing increased groundwater supplies available for use in dry years.”\textsuperscript{64} The Western Canal Water District,

\textsuperscript{51} Butte Subbasin GSP, Section 2.1.2.1, pp. 62-63.
\textsuperscript{52} Butte Subbasin GSP, Section 2.1.2.1, p. 63.
\textsuperscript{53} Butte Subbasin GSP, Section 2.1.2.1, p. 63.
\textsuperscript{54} Butte Subbasin GSP, Section 2.1.2.1, pp. 63-64.
\textsuperscript{55} Butte Subbasin GSP, Section 2.1.2.1, p. 64.
\textsuperscript{56} 23 CCR §§ 354.8 (d).
\textsuperscript{57} Butte Subbasin GSP, Section 2.1.2.2, p. 65.
\textsuperscript{58} Butte Subbasin GSP, Section 5.10, pp. 286-303.
\textsuperscript{59} Butte Subbasin GSP, Section 2.1.2.2, p. 65.
\textsuperscript{60} Butte Subbasin GSP, Section 4.4, pp. 231-232.
\textsuperscript{61} Butte Subbasin GSP, Section 5.9, pp. 283-285.
\textsuperscript{62} Butte Subbasin GSP, Section 2.1.2.3, p. 66.
\textsuperscript{63} Butte Subbasin GSP, Section 2.1.2.4, p. 66.
\textsuperscript{64} Butte Subbasin GSP, Section 2.1.2.4, p. 66.
Richvale Irrigation District, Biggs-West Gridley Water District, and Butte Water District receive surface water from the Feather River via the Thermalito Afterbay, and Reclamation District No. 1004 receives surface water from the Sacramento River.

The General Plans of Butte, Colusa, and Glenn counties, as well as those of the cities of Briggs and Gridley, are applicable to the GSP. The GSP describes the land use and water resources elements of each applicable general plan.65

Additional GSP elements mentioned in the Butte Subbasin GSP are:

- Wellhead protection
- Well abandonment/destruction
- Well construction policies
- Migration of contaminated groundwater
- Replenishment of groundwater extraction
- Conjunctive use
- Efficient water management practices
- Relationships with state and federal agencies

The GSP states that “these elements will be described in more detail in the final GSP.” 66 Department staff encourage the GSAs to provide details regarding the mentioned additional GSP elements in the next periodic evaluation.

The GSP’s discussion and presentation of administrative information covers the specific items listed in the GSP Regulations in an understandable format using appropriate detail. Department staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the quality, data, and discussion of this subject in the GSP. The administrative information included in the Plan substantially complies with the requirements outlined in the GSP Regulations.

4.2 BASIN SETTING

GSP Regulations require information about the physical setting and characteristics of the basin and current conditions of the basin, including a hydrogeologic conceptual model; a description of historical and current groundwater conditions; and a water budget accounting for total annual volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions.67

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65 Butte Subbasin GSP, Section 2.1.3, pp. 67-72.
66 Butte Subbasin GSP, Section 2.1.4, p. 72.
67 23 CCR § 354.12.
4.2.1 Hydrogeologic Conceptual Model

The hydrogeologic conceptual model is a non-numerical model of the physical setting, characteristics, and processes that govern groundwater occurrence within a basin, and represents a local agency’s understanding of the geology and hydrology of the basin that support the geologic assumptions used in developing mathematical models, such as those that allow for quantification of the water budget. 68 The GSP Regulations require a descriptive hydrogeologic conceptual model that includes a written description of geologic conditions, supported by cross sections and maps, 69 and includes a description of basin boundaries and the bottom of the basin, 70 principal aquifers and aquitards, 71 and data gaps. 72

The GSP provides a comprehensive description of the hydrogeologic conceptual model that provides details based on the best available information to describe the groundwater systems in the Subbasin. 73 The Subbasin is in the central portion of the Sacramento Valley Groundwater Basin, and is bounded by the Vina Subbasin to the north, the Corning Subbasin to the northwest, Colusa Subbasin to the west, Sutter Subbasin to the south, and Wyandotte Creek Subbasin to the east. The GSP sufficiently describes the lateral boundaries of the basin, and states that the boundaries are jurisdictional in nature, with groundwater flowing across each of the defined boundaries to some degree.

The Subbasin, as part of the Sacramento Valley, was formed from the near-continuous deposition of marine and continentally derived sediments on top of an older Jurassic Basement. These sediments thin near the margins of the Sacramento Valley and range from 12,000 to 19,000 feet below ground surface (bgs) at their deepest. The shift from marine to continentally derived sediment plays a major role in the salinity of the Subbasin’s aquifers, with marine sediments commonly containing brackish or saline groundwater. 74

The Sutter Buttes, the buried Colusa Dome located west of Sutter Buttes, and the Willows Fault impede groundwater flow in the south and southwest portion of the Subbasin. Both the Sutter Buttes and the buried Colusa Dome likely were caused by magmatic intrusion along the Willows Fault and may cause groundwater to move upward, resulting in shallow groundwater and wetlands in the southern portion of the Subbasin. 75

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69 23 CCR §§ 354.14 (a), 354.14 (c).
70 23 CCR §§ 354.14 (b)(2-3).
71 23 CCR § 354.14 (b)(4) et seq.
72 23 CCR § 354.14 (b)(5).
73 Butte Subbasin GSP, Section 2.2.1, pp. 79-114.
74 Butte Subbasin GSP, Section 2.2.1.1, p. 80.
75 Butte Subbasin GSP, Section 2.2.1.7 and Section 2.2.2.2.2, pp. 107-109; p. 126.
The GSP states that the bottom of the Subbasin is defined by the base of three continentally derived water-bearing formations: the Tehama, Tuscan, and Laguna formations. The base of these formations is generally accepted as the base of fresh water in the Northern Sacramento Valley, and this boundary is corroborated by geophysical logs and data collected from monitoring wells installed in the Subbasin within the last 25 years.76

The GSP identifies two principal aquifers: the primary aquifer and the very deep aquifer.77 The primary aquifer is described as a combination of the very shallow, shallow, intermediate, and deep zones, which generally extend to 700 feet bgs; the very deep aquifer is composed of the very deep zone below 700 feet bgs.78 The GSP states that the primary justification for separating these zones into two aquifers is that the very deep zone displays distinctly different groundwater elevations and slower, more gradual changes in groundwater levels. Although wells screened below 700 feet bgs showed similar characteristics and patterns in observed water levels, they generally have higher water levels than wells screened in the primary aquifer, indicating an upward vertical gradient from confined or semi-confined groundwater conditions in the very deep aquifer. Despite the distinct water levels, the similar seasonal groundwater elevation trends are the basis of the GSP’s conclusion that there is likely some degree of connectivity between all zones, and confining layers, when present, do not fully separate the aquifers.79

The Plan does not reference formation names in the aquifer descriptions and states that additional analysis of well logs is needed to identify the geologic formations making up the aquifer materials of the principal aquifers.80 The GSP provides a range of specific yield values for “areas within the Subbasin” but does not provide values for other aquifer properties, including hydraulic conductivity, transmissivity and storage, for the two aquifers because of limited available data.81 The GSP identifies these deficiencies as a data gap and Department staff encourage the GSAs to prioritize addressing the uncertainties in the hydrogeologic conceptual model related to the physical characterization of the principal aquifers and discuss progress in addressing the issues in the next periodic evaluation.82

The GSP reports that groundwater quality in the Subbasin is generally good but is characterized by elevated total dissolved solids (TDS) concentrations compared to the eastern margins of the valley. The Plan identifies localized high concentrations of manganese, iron, magnesium, TDS, conductivity, and calcium. The GSP also states that the base of fresh water rises to almost 400 feet bgs near the Colusa Dome and Willows.

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76 Butte Subbasin GSP, Section 2.2.1.2, p. 80.
77 Butte Subbasin GSP, Section 2.2.1.8, pp. 109-110.
78 Butte Subbasin GSP, Section 2.2.1.8, p. 109.
79 Butte Subbasin GSP, Section 2.2.1.8, pp. 109-110.
80 Butte Subbasin GSP, Section 2.2.1.8, p. 110.
81 Butte Subbasin GSP, Section 2.2.1.8.3, p. 112.
82 23 CCR § 354.14 (b)(4).
in contrast to 1,600 to 1,800 feet bgs nearby to the south. Fault due to the intrusion of saline and brackish water associated with faulting and the formation of the Sutter Buttes.83

The GSP lists five data gaps within the hydrogeologic conceptual model:

1. Limited understanding of recharge characteristics within the Subbasin.
2. The need for improved monitoring.
4. The need for further Airborne Electromagnetic method (AEM) data collection, and
5. Limited transmissivity and storativity data to characterize the principal aquifers.84

Department staff encourage the GSAs to continue fill the identified data gaps and provide updates regarding progress made in the GSP’s next periodic evaluation.

Although the Plan lacks some detail and Department staff encourage clarifying information in the GSP periodic evaluation, the information provided in the GSP that comprises the hydrogeologic conceptual model substantially complies with the requirements outlined in the GSP Regulations. In general, the Plan’s descriptions of the regional geologic setting, the Plan area’s physical characteristics, the identification of the principal aquifer, and hydrogeologic conceptual model appear to utilize the best available science. Department staff are aware of no significant inconsistencies or contrary technical information to that presented in the Plan.

4.2.2 Groundwater Conditions

The GSP Regulations require a written description of historical and current groundwater conditions for each of the applicable sustainability indicators and groundwater dependent ecosystems that includes the following: groundwater elevation contour maps and hydrographs,85 a graph depicting change in groundwater storage,86 maps and cross-sections of the seawater intrusion front,87 maps of groundwater contamination sites and plumes,88 maps depicting total subsidence,89 identification of interconnected surface water systems and an estimate of the quantity and timing of depletions of those systems,90 and identification of groundwater dependent ecosystems.91

The GSP provided a total of seven hydrographs that depict long-term groundwater elevations for the principal aquifer(s).92 The period of records for hydrographs provided

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83 Butte Subbasin GSP, Section 2.2.1.8.4, p. 112.
84 Butte Subbasin GSP, Section 2.2.1.9, pp. 113-114.
85 23 CCR §§ 354.16 (a) (1-2).
86 23 CCR § 354.16 (b).
87 23 CCR § 354.16 (c).
88 23 CCR § 354.16 (d).
89 23 CCR § 354.16 (e).
90 23 CCR § 354.16 (f).
91 23 CCR § 354.16 (g).
92 Butte Subbasin GSP, Figure 2-24, p. 128.
in the GSP vary, but generally begin in the mid-2000s, with some beginning as early as the mid-1990s, and extending through 2019. Hydrographs representing groundwater conditions in the principal aquifer(s) indicate generally stable groundwater levels throughout the Subbasin; however, the Plan states that instances of groundwater level decline have occurred in the Subbasin, particularly between during 2007 - 2016. The GSP associates these declines with increased municipal groundwater pumping attributed to droughts in 2007-2016. Groundwater levels recovered to pre-2015 levels in 2020.

The GSP includes a description of the change in groundwater storage, as well a graph, demonstrating the annual and cumulative change in groundwater storage. As indicated in the graph, groundwater storage has generally decreased in dry and critical years and increased in wet years. Between 2000 and 2018 the cumulative change in storage appears to be approximately a loss of 165,000 acre-feet. Additional estimates of change in storage are provided in the GSP’s water budget discussion for historical, current, and future scenarios. The historical loss of storage averages -9,800 acre-feet per year, the current loss of storage is -1,200 acre-feet per year, and the projected loss of storage ranges between -1,300 and -2,000 acre-feet per year depending on the timeline and climate change assumptions.

The GSP includes a description of current and historical groundwater quality in the Subbasin. The GSP states that irrigated agriculture is the predominant land use in the Subbasin, and groundwater quality monitoring and management follows the Groundwater Quality Trend Monitoring Work Plan for compliance with the Central Valley Regional Board’s Irrigated Lands Regulatory Program (ILRP), with additional water quality monitoring conducted by the counties. The GSP asserts that water quality in the Subbasin is generally good, and the majority of agricultural lands show very low levels of nitrates in groundwater; however, few details are provided in the GSP’s Groundwater Conditions section of the GSP. Statements are provided in the that GSP that arsenic concentrations found in the vicinity of the Sutter Buttes are a concern, and that elevated levels of salinity and other constituents (TDS, chloride, arsenic, and boron) are present in the Sacramento Valley, but few details are provided.

A search was conducted of known or potentially impacted groundwater contamination sites in the Subbasin, and the GSP states that no active Department of Toxic Substances Control Cleanup Program Sites were identified. Because no known contamination sites or known contamination plumes were identified in the Subbasin, no map of known groundwater contamination was included in the description of groundwater conditions.

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93 Butte Subbasin GSP, Section 2.2.2.2.4, p. 134.
94 Butte Subbasin GSP, Section 2.2.2.2.4, pp. 130-132.
95 Butte Subbasin GSP, Figure 2-25, p. 132.
96 Butte Subbasin GSP, Figure 2-25, p. 132.
97 Butte Subbasin GSP, Table 2-8, p. 157.
98 Butte Subbasin GSP, Section 2.2.2.4, pp. 132-134.
99 Butte Subbasin GSP, Section 2.2.2.4.2, pp. 133-134.
Department staff note there may be one or more regulated contamination sites based on publicly available data from the State Water Resources Control Board’s GeoTracker website and encourage the GSAs to reassess the existence of contaminant plumes in the Subbasin, and if found, fully describe them in the next periodic evaluation as required in the GSP Regulations.

The GSP states that the Subbasin is located far from coastal areas and that seawater intrusion is not a relevant sustainability indicator for the Subbasin.100

The GSP includes data showing the range of cumulative subsidence observed within the Subbasin between 2008 and 2017 as reported by Sacramento Valley GPS Subsidence Monitoring Program, and a range of annual subsidence rates calculated from the cumulative totals.101 Additional information using the Department’s InSAR data for the period between 2015 and 2019 was also provided. According to the information presented in the GSP, cumulative subsidence using the Sacramento Valley GPS data show total subsidence of +0.054 to -0.083 feet, and the InSAR data show cumulative subsidence of +0.25 to -0.50 feet, with annual rates using InSAR of +0.063 to -0.125 feet per year. The GSP acknowledges that both the Sacramento Valley GPS monuments and InSAR monitor changes in land surface elevations and the data do not distinguish between elastic and inelastic subsidence; however, based on the data shown in tables and figures, the cumulative subsidence observed indicate that inelastic subsidence is not significant in the Subbasin.102

The GSP identifies interconnected surface water in the Subbasin at nine locations including creeks, canals, sloughs, and the Sacramento and Feather Rivers. The timing and amount of surface water-groundwater interaction was estimated for the primary streams in the subbasin using the BBGM.103 Monthly net gains to streamflow from groundwater were estimated for the historical period from water year 2000 to 2018. On average, streams traversing or bounding the subbasin are currently estimated to gain approximately 495,000 acre-feet annually. Excluding the Sacramento River, streams traversing or bounding the subbasin are currently estimated to gain approximately 212,000 acre-feet annually. The GSP indicates that all streams in the Subbasin are gaining.

The GSP defines groundwater-dependent ecosystems (GDEs) per SGMA’s definition as “ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface.”104 The GSP uses the Natural Communities Commonly Associated with Groundwater database as a starting point to analyze GDE’s in the subbasin. Aerial photographs for years 2007, 2009, 2013, and 2015

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100 Butte Subbasin GSP, Section 2.2.2.4, p. 132.
101 Butte Subbasin GSP, Section 2.2.2.5.2, p. 136; Table 2-4, p. 136.
102 Butte Subbasin GSP, Table 2-4, p. 136; Figures 2-26 and 2-27, pp. 138-139.
103 Butte Subbasin GSP, Section 2.2.2.6.2, p.145.
104 Butte Subbasin GSP Appendices, Appendix 2E, p. 1290.
were analyzed for land use changes, vegetation types, and water source.\textsuperscript{105} GIS was then used to determine proximity of GDEs to irrigated agriculture and refine the NCCAG dataset. The GSP provides a map of the subbasin with potential GDEs.\textsuperscript{106}

Department staff conclude that the GSP’s discussion and presentation of groundwater conditions covers the specific items listed in the regulations in an understandable format using appropriate data.

### 4.2.3 Water Budget

GSP Regulations require a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical; current; and projected water budget conditions,\textsuperscript{107} and the sustainable yield.\textsuperscript{108}

The GSP utilizes the Butte Basin Groundwater Model to calculate annual water budgets. This model began development in 1992 and has been updated over time to simulate historical groundwater conditions through water year 2018.\textsuperscript{109} The water budgets are estimated for both the Land and Surface Water System and Groundwater System, and the information is provided in tabular and graphical formats for both systems.\textsuperscript{110} A summary of water budget assumptions is provided.\textsuperscript{111} The Plan states that the water budgets will be refined and updated over time as part of GSP implementation in the Subbasin.

The historical period encompasses data from 2000 to 2018, the current conditions reflect information from water year 2018 (the current conditions considered data from 1971-2018), and the model uses a 50-year period from 1971 to 2018 with 2004 and 2005 repeated after 2018 to develop a projected water budget.\textsuperscript{112} The GSP includes a discussion and estimates of inflows and outflows for each system.\textsuperscript{113} For the groundwater system in particular, the main components of inflows are deep percolation, subsurface inflows from adjacent basins or from the foothill area, and stream seepage, while the main components of outflows are groundwater pumping, subsurface outflows to adjacent basins, stream accretions, and western boundary net outflows.\textsuperscript{114}

The GSP states that historical and current groundwater pumping in the Subbasin has averaged 142,000 acre-feet per year and 162,800 acre-feet per year,\textsuperscript{115} respectively, for

\textsuperscript{105} Butte Subbasin GSP Appendices, Appendix 2E, p. 1291.
\textsuperscript{106} Butte Subbasin GSP Appendices, Appendix 2E, Figure 1, p. 1295, Figure 2 p. 1296.
\textsuperscript{107} 23 CCR §§ 354.18 (a), 354.18 (c) et seq.
\textsuperscript{108} 23 CCR § 354.18 (b)(7).
\textsuperscript{109} Butte Subbasin GSP, Section 2.2.3.2, p. 148.
\textsuperscript{110} Butte Subbasin GSP, Section 2.2.3.4, pp. 148-173.
\textsuperscript{111} Butte Subbasin GSP, Table 2-6, p. 149.
\textsuperscript{112} Butte Subbasin GSP, Section 2.2.3.1, p. 147.
\textsuperscript{113} Butte Subbasin GSP, Section 2.2.3.4, pp. 154-155.
\textsuperscript{114} Butte Subbasin GSP, Table 2-8, p. 157.
\textsuperscript{115} Butte Subbasin GSP, Section 3.2.2, p. 186.
agricultural, urban and industrial, and managed wetland purposes. The projected groundwater pumping ranges between 162,600 and 210,500 acre-feet per year depending on the model’s climate change scenario.

For the groundwater system, the historical water budget reports an average decline in groundwater storage of 9,800 acre-feet per year and the current water budget reports an average decline in groundwater storage of 1,200 acre-feet per year. The GSP presents three projected water budget scenarios: future conditions with no climate change, future conditions with 2030 climate change, and future conditions with 2070 climate change. The estimated change in storage for the three projected water budget scenarios are a decline in storage of 1,300, 1,500, and 2,000 acre-feet per year, respectively.\(^\text{116}\)

The Subbasin’s sustainable yield has been developed for the current and projected water budget scenarios and considers groundwater pumping estimates and change in storage calculations. The sustainable yield for each of the four scenarios is the difference between pumping and the estimated annual overdraft – the sustainable yield for the current water budget is 161,500 acre-feet and the sustainable yield for the three projected scenarios is 161,300 acre-feet (no climate change), 187,900 acre-feet (2030 climate change), and 208,500 acre-feet (2070 climate change).\(^\text{117}\) The GSP appears to use the 2070 climate change estimates, with an average decrease in storage of 2,000 acre-feet, to assess sustainability for the Subbasin, but this is not clear. As previously indicated, the historical water budget estimates show an average annual decrease in storage of 9,800 acre-feet per year, and the GSP acknowledges that operation of the Subbasin within the sustainable yield will likely require the incorporation of projects and management actions to account for projected overdraft. Department staff encourage the GSAs to provide a clear designation of the water budget model scenario they are using to plan for Subbasin sustainability in the next periodic evaluation.

The GSP recognizes opportunities to improve water accounting and the water budget estimation,\(^\text{118}\) including the refining of:

- Surface water diversion estimates.
- Groundwater pumping estimates.
- Deep percolation estimates.
- Urban lands water budgets.
- Characterization of interbasin flows and net outflows along western boundary.

Department staff encourage the GSAs to refine these important elements of the water budget estimation and provide updates on progress made in the next periodic evaluation.

\(^{116}\) Butte Subbasin GSP, Table 2-10, p. 174.

\(^{117}\) Butte Subbasin GSP, Section 2.2.3.7, p. 174; Table 2-10, p. 174.

\(^{118}\) Butte Subbasin GSP, Section 2.2.3.8, pp. 175-176.
Overall, Department staff conclude the historical, current, and projected water budgets included in the Plan substantially comply with the requirements outlined in the GSP Regulations. The GSP provides the required historical, current, and future accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the Subbasin including an estimate of the sustainable yield and projected future water demands.

4.2.4 Management Areas
The GSP Regulations provide the option for one or more management areas to be defined within a basin if the GSA has determined that the creation of the management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives, provided that undesirable results are defined consistently throughout the basin.\(^{119}\)

The GSP did not use management areas.

4.3 SUSTAINABLE MANAGEMENT CRITERIA
GSP Regulations require each Plan to include a sustainability goal for the basin and to characterize and establish undesirable results, minimum thresholds, and measurable objectives for each applicable sustainability indicator, as appropriate. The GSP Regulations require each Plan to define conditions that constitute sustainable groundwater management for the basin including the process by which the GSA characterizes undesirable results and establishes minimum thresholds and measurable objectives for each applicable sustainability indicator.\(^{120}\)

4.3.1 Sustainability Goal
GSP Regulations require that GSAs establish a sustainability goal for the basin. The sustainability goal should be based on information provided in the GSP’s basin setting and should include an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation.\(^{121}\)

The sustainability goal for the Subbasin is “to maintain, through a cooperative and partnered approach, locally managed sustainable groundwater resources to preserve and enhance the economic viability, social well-being, and culture of all Beneficial Uses and Users without experiencing undesirable results.”\(^{122}\) Per the GSP, the sustainability goal provides a qualitative description of the objectives and desired conditions of the Butte Subbasin, and it is supported by locally-defined undesirable results and quantitative minimum thresholds, measurable objectives, and interim milestones. The GSP describes an approach to achieve the sustainability goal through implementation of projects, management actions, and adaptive management, and states that “projects and

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\(^{119}\) 23 CCR § 354.20.
\(^{120}\) 23 CCR § 354.22 et seq.
\(^{121}\) 23 CCR § 354.24.
\(^{122}\) Butte Subbasin GSP, Section 4.1.2, p. 200.
management actions identified as ‘ongoing’ or ‘planned’ are described in the complete level of detail required under 23 CCR §354.44(b).”

Based on review of the GSP, Department staff find that the GSP’s discussion and presentation of information related to the Subbasin’s sustainability goal covers the specific items listed in the GSP Regulations.

4.3.2 Sustainability Indicators
Sustainability indicators are defined as any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results. Sustainability indicators thus correspond with the six undesirable results – chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon, significant and unreasonable reduction of groundwater storage, significant and unreasonable seawater intrusion, significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies, land subsidence that substantially interferes with surface land uses, and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water – but refer to groundwater conditions that are not, in and of themselves, significant and unreasonable. Rather, sustainability indicators refer to the effects caused by changing groundwater conditions that are monitored, and for which criteria in the form of minimum thresholds are established by the agency to define when the effect becomes significant and unreasonable, producing an undesirable result.

GSP Regulations require that GSAs provide descriptions of undesirable results including defining what are significant and unreasonable potential effects to beneficial uses and users for each sustainability indicator. GSP Regulations also require GSPs provide the criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.

GSP Regulations require that the description of minimum thresholds include the information and criteria relied upon to establish and justify the minimum threshold for each sustainability indicator. GSAs are required to describe how conditions at minimum thresholds may affect beneficial uses and users, and the relationship between the minimum thresholds for each sustainability indicator, including an explanation for how the

123 Butte Subbasin GSP, Section 5.3, p. 235.
124 23 CCR § 351(ah).
125 Water Code § 10721(x).
126 23 CCR §§ 354.26 (a), 354.26 (b)(c).
127 23 CCR § 354.26 (b)(2).
128 23 CCR § 354.28 (b)(1).
129 23 CCR § 354.28 (b)(4).
GSA has determined conditions at each minimum threshold will avoid causing undesirable results for other sustainability indicators.\footnote{23 CCR § 354.28 (b)(2).}

GSP Regulations require that GSPs include a description of the criteria used to select measurable objectives, including interim milestones, to achieve the sustainability goal within 20 years.\footnote{23 CCR § 354.30 (a).} GSP Regulations also require that the measurable objectives be established based on the same metrics and monitoring sites as those used to define minimum thresholds.\footnote{23 CCR § 354.30 (b).}

The following subsections thus consolidate three facets of sustainable management criteria: undesirable results, minimum thresholds, and measurable objectives. Information, as presented in the Plan, pertaining to the processes and criteria relied upon to define undesirable results applicable to the Subbasin, as quantified through the establishment of minimum thresholds, are addressed for each applicable sustainability indicator. A submitting agency is not required to establish criteria for undesirable results that the agency can demonstrate are not present and are not likely to occur in a basin.\footnote{23 CCR § 354.26 (d).}

### 4.3.2.1 Chronic Lowering of Groundwater Levels

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the chronic lowering of groundwater, the GSP Regulations require the minimum threshold for chronic lowering of groundwater levels to be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results that is supported by information about groundwater elevation conditions and potential effects on other sustainability indicators.\footnote{23 CCR § 354.28(c)(1) et seq.}

The GSP states that “Chronic lowering of groundwater levels is considered to be significant and unreasonable when it reduces the long-term viability of Beneficial Uses and Users over the planning and implementation horizon of this GSP,” and that “Long-term viability is expected to be reduced when a significant number of wells and environmental users are no longer able to extract sufficient groundwater to supply beneficial uses.”\footnote{Butte Subbasin GSP, Section 4.2.1.1, p. 203.} The GSP also states that “It is anticipated that groundwater levels will fluctuate over time, including periodic decreases in groundwater levels during times of drought…and recovery during normal or wet years,” and that “These periodic fluctuations in groundwater level should not impact the long-term viability of Beneficial Uses and Users, unless recovery periods do not occur and there is a consistent decrease in groundwater levels over a longer period of time, which will be observed through the Monitoring Networks.”\footnote{Butte Subbasin GSP, Section 4.2.1.1, p. 203.}
The GSP identifies undesirable results for the chronic lowering of groundwater levels as occurring in the primary aquifer (monitoring depths less than 700 feet bgs) “when 25% of representative monitoring wells (i.e., 11 of 41 representative monitoring wells) fall below their minimum groundwater elevation thresholds for 24 consecutive months,” and in the very deep aquifer “when 25% of representative monitoring wells (i.e., three (3) of 10 representative monitoring wells) fall below their minimum groundwater elevation thresholds for 24 consecutive months.”137 The GSP states that “These criteria are based on review of current groundwater conditions and consultation with Subbasin stakeholders from which it was determined that minimum threshold exceedances at 25% of representative monitoring wells represented a ‘significant’ number of affected wells, and that exceedance of these levels for 24 consecutive months or longer (e.g. no recovery of groundwater levels through two consecutive seasonal high periods) will potentially harm the ‘long-term viability’ of affected beneficial uses and users.”138 The GSP notes that “groundwater elevations in all wells were well above the minimum threshold during their latest measurements collected in 2021, indicating that the Subbasin currently does not have an undesirable condition for the chronic lowering of groundwater levels.”139

The GSP lists potential causes of undesirable results for the chronic lowering of groundwater levels as groundwater pumping that exceeds the average sustainable yield in the Subbasin, and future changes in precipitation in the contributing watersheds.”140 The GSP also states that potential local impacts to groundwater levels could be caused by changed conditions with regards to the reliability of surface water supplies for multiple beneficial uses including irrigation, reductions in the amount of precipitation and/or changes in stream flows that recharge the Butte Subbasin due to changes in conditions upstream from the Subbasin, and increases in the consumptive use of groundwater due to increases in agricultural development on lands without surface water supplies.141

The GSP identifies the potential effects of undesirable results for the chronic lowering of groundwater levels and states that “Implementation of the GSP is intended to avoid these effects by monitoring and implementing projects and management actions, as necessary, to maintain groundwater levels above the minimum thresholds.”142

Minimum thresholds are set for both the primary aquifer and the very deep aquifer. For both aquifers, the GSP states that, “[minimum thresholds] are defined for individual wells as the groundwater level beyond which supply is depleted and may lead to undesirable results for Beneficial Uses and Users near that location” and that “the [minimum threshold] at each well is defined through evaluation of local well conditions and responsiveness to

137 Butte Subbasin GSP, Section 4.2.1.2, p. 203.
138 Butte Subbasin GSP, Section 4.2.1.2, pp. 203-204.
139 Butte Subbasin GSP, Section 4.2.1.5, p. 205.
140 Butte Subbasin GSP, Section 4.2.1.3, p. 204.
141 Butte Subbasin GSP, Section 4.2.1.3, p. 204.
142 Butte Subbasin GSP, Section 4.2.1.4, p. 204.
local monitoring.” The GSP also states that “by avoiding these minimum thresholds, groundwater levels are protective of nearby well infrastructure.”

For the primary aquifer, the GSP states that “[minimum thresholds] for primary aquifer groundwater level representative monitoring wells were calculated using a process designed to be protective of domestic wells while also allowing for conjunctive use and groundwater extraction by agriculture.”

The primary aquifer’s minimum thresholds were calculated based on the shallowest of two criteria: 1) the depth associated with the 7th 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.” The GSP reasons that “by selecting the shallowest value above, these criteria are protective of the beneficial use most vulnerable to undesirable results.” However, the GSP then states that “if the resulting value is shallower than the observed historic low, the minimum threshold is set as 10 feet deeper than the observed historic low to allow for a margin of operational flexibility.” Examples are provided in the GSP to demonstrate how the various criteria were used to select the minimum thresholds for each of the representative monitoring site wells. A figure showing locations of the 41 primary aquifer representative monitoring network wells and their minimum thresholds is provided and well construction details for primary aquifer wells and their calculated minimum thresholds are presented in a table. Hydrographs for all primary aquifer representative monitoring network wells, including minimum thresholds, are also provided in an appendix.

For the very deep aquifer, the GSP states that “the minimum threshold for … groundwater level representative monitoring wells was calculated using the same process as the primary aquifer.” The GSP also states that “setting minimum thresholds using this methodology is protective of the Beneficial Uses of the very deep groundwater aquifer, including agricultural, municipal, and domestic uses, because the minimum threshold is calculated to be at a level that allows for adequate flexibility to compensate for drought periods (e.g. 2015) while protecting up to 93% of supply wells greater than 700 feet deep (the minimum depth of the very deep aquifer representative monitoring network), thereby avoiding undesirable results.” A figure showing locations of the ten very deep aquifer

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143 Butte Subbasin GSP, Section 4.3.1, pp. 211-212.
144 Butte Subbasin GSP, Section 4.3.1, p. 212.
145 Butte Subbasin GSP, Section 4.3.1.1, p. 212.
146 Butte Subbasin GSP, Section 4.3.1.1, p. 212.
147 Butte Subbasin GSP, Section 4.3.1.1, p. 212.
148 Butte Subbasin GSP, Section 4.3.1.1, p. 212.
149 Butte Subbasin GSP, Section 4.3.1.1, p. 213.
150 Butte Subbasin GSP, Figure 4-1, p. 215; Table 4-1, p. 217.
152 Butte Subbasin GSP, Section 4.3.1.6, p. 218.
153 Butte Subbasin GSP, Section 4.3.1.6, p. 218.
representative monitoring network wells and their minimum thresholds is provided and a table includes well construction details and the calculated minimum thresholds.\textsuperscript{154} Hydrographs for all very deep aquifer representative monitoring network wells, including minimum thresholds, are included in an appendix.\textsuperscript{155}

Department staff note that while the GSA states the proposed minimum thresholds for the chronic lowering of groundwater levels will be protective of approximately 93 percent of supply wells, the GSP does not disclose the number of wells that may be impacted or the location within the Subbasin where these wells are located. The GSA should disclose any impacts to beneficial uses and users (including well owners) that may occur in the Subbasin. Department staff encourage the GSA to utilize the Department's Drinking Water Guidance as appropriate during plan implementation to assist with evaluating and assessing any potential impacts that may occur. Department staff recommend the GSAs consider the potential impacts to supply wells, including domestic wells, and identify the number and location of potentially impacted wells at the selected minimum thresholds for chronic lowering of groundwater levels (see \textit{Recommended Corrective Action 1a}).

Further, Department staff note the GSA does not access how the proposed minimum thresholds for the chronic lowering of groundwater levels may impact other sustainability indicators (e.g., groundwater storage, depletion of interconnected surface water, etc.). Considering the GSA is choosing to manage the Subbasin below historic lows, understanding this relationship will be important during plan implementation. Department staff recommend the GSA provide a description of the relationship between established minimum thresholds for the chronic lowering of groundwater levels and how they avoid undesirable results for each of the other sustainability indicators (see \textit{Recommended Corrective Action 1b}).

The measurable objectives for both the primary aquifer and the very deep aquifer “were calculated for each well as the average of the last five years of measured groundwater level data.” The GSP states that “this method is generally representative of both drought and recovery conditions within the Subbasin as most wells utilize data collected between 2012 and 2017,”\textsuperscript{156} and that “the measurable objective calculation is a static value; it will not be updated as a rolling five-year average incorporating more recent data as it is collected.”\textsuperscript{157}

Regarding interim milestones, the GSP states for both the primary aquifer and the very deep aquifer that, “since groundwater levels are already at or near [measurable objectives], it is reasonable to set the interim milestones equal to the [measurable objectives] to provide numerical metrics for GSAs to track maintenance of the Subbasin's sustainability goal relative to the overall sustainability goal, ensuring that the basin

\textsuperscript{154} Butte Subbasin GSP, Figure 4-3, p. 219; Table 4-2, p. 222.  
\textsuperscript{155} Butte Subbasin GSP, Appendix 4.A, pp. 1352-1361.  
\textsuperscript{156} Butte Subbasin GSP, Section 4.3.1.2, p. 214.  
\textsuperscript{157} Butte Subbasin GSP, Section 4.3.1.2, p. 214.
remains sustainable.” 158 Hydrographs showing the measurable objectives for representative monitoring network wells are provided in an appendix.159

Despite the clarifying recommended corrective action, the GSP’s discussion of minimum threshold and measurable objectives for the chronic lowering of groundwater levels seems to be comprehensive and includes adequate support, justification, and information to understand the GSA’s process, analysis, and rationale. Although Department staff have requested the GSA further evaluate the potential impacts to beneficial uses and users and evaluate the potential impacts to other sustainability indicators at the proposed minimum thresholds, this does not preclude plan approval at this time since the Subbasin is not experiencing overdraft and proposed to maintain water levels near the historical range. Staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

4.3.2.2 Reduction of Groundwater Storage
In addition to components identified in 23 CCR §§ 354.28 (a-b), for the reduction of groundwater storage, the GSP Regulations require the minimum threshold for the reduction of groundwater storage to be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.160

The GSP states that “the undesirable result for the reduction of groundwater storage is a result that would cause significant and unreasonable reduction in the long-term viability of Beneficial Uses and Users over the planning and implementation horizon of this GSP.” 161 The GSP uses the sustainable management criteria established for groundwater levels for the reduction of groundwater storage indicator, and therefore considers “significant and unreasonable” as “when a significant number of wells and environmental users are no longer able to extract sufficient groundwater to supply beneficial uses.”162

The GSP justifies the use of groundwater levels as a proxy for groundwater storage by stating that “change in groundwater storage is directly correlated to changes in groundwater elevation in unconfined aquifers” and that “by setting minimum thresholds for groundwater levels, storage is also effectively managed.” 163 The GSP states, “Because of the Butte Subbasin’s interconnection with nearby surface water bodies, measurable changes in storage are a small portion of the overall available storage in the

158 Butte Subbasin GSP, Section 4.3.1.4, p. 214.
160 23 CCR § 354.28(c)(2).
161 Butte Subbasin GSP, Section 4.3.2, p. 222.
162 Butte Subbasin GSP, Section 4.2.1.1, p. 203.
163 Butte Subbasin GSP, Section 4.2.2.2, p. 205.
Subbasin." While Department staff agree that storage is directly related to groundwater levels, it is encouraged that the GSAs provide a more detailed discussion regarding the correlation or groundwater levels to groundwater storage in the Subbasin in the next periodic evaluation.

The GSP notes that potential causes of undesirable results are groundwater pumping that exceeds the average sustainable yield in the Subbasin and/or decreases in precipitation in the contributing watersheds in the future. The GSP further explains that the potential effects of undesirable results include “the dewatering of existing groundwater infrastructure and changes in irrigation practices and crops grown and could adversely affect groundwater dependent ecosystems and property values” and that “reaching undesirable results for reduction of groundwater in storage could adversely affect the many beneficial uses of groundwater in the Subbasin, including domestic and irrigation uses.”

The GSP uses the same minimum thresholds for reduction of groundwater storage that it does for chronic lowering of groundwater levels. The GSP states that “the undesirable result for the reduction of groundwater storage is monitored by proxy using the groundwater levels and is considered to occur during GSP implementation if either 25 [percent] of primary aquifer representative monitoring wells (i.e., 11 of 41 representative monitoring wells) or very deep aquifer representative monitoring wells (i.e., 3 of 10 representative monitoring wells) fall below their minimum groundwater elevation thresholds for 24 consecutive months.” The GSP further adds that “The 25 percent of the RMS wells below [minimum thresholds] for 24 consecutive months criterion was estimated to be an indicator of a significant, widespread problem indicating undesirable results.”

The GSP uses the same measurable objectives for reduction of groundwater storage that it does for chronic lowering of groundwater levels. As previously stated in the discussion of groundwater levels, the [groundwater storage] measurable objectives for both the primary aquifer and the very deep aquifer “were calculated for each well as the average of the last five years of measured groundwater level data.” The GSP states that “this method is generally representative of both drought and recovery conditions within the Subbasin as most wells utilize data collected between 2012 and 2017,” and that “the measurable objective calculation is a static value; it will not be updated as a rolling five-year average incorporating more recent data as it is collected.”

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164 Butte Subbasin GSP, Section 4.3.2.1, p. 223.
165 Butte Subbasin GSP, Section 4.2.2.3, p. 205.
166 Butte Subbasin GSP, Section 4.2.2.4, pp. 205-206.
167 Butte Subbasin GSP, Section 4.2.2.4, p. 206.
168 Butte Subbasin GSP, Section 4.2.2.5, p. 206.
169 Butte Subbasin GSP, Section 4.2.2.5, p. 206.
170 Butte Subbasin GSP, Section 4.3.1.2, p. 214.
171 Butte Subbasin GSP, Section 4.3.1.2, p. 214.
Regarding interim milestones for the reduction of groundwater storage, the GSP states for both the primary aquifer and the very deep aquifer that, "since groundwater levels are already at or near [measurable objectives], it is reasonable to set the interim milestones equal to the [measurable objectives] to provide numerical metrics for GSAs to track maintenance of the Subbasin’s sustainability goal relative to the overall sustainability goal, ensuring that the basin remains sustainable."\(^{172}\)

The GSP’s discussion of minimum thresholds and measurable objectives for the reduction of groundwater storage seems to be comprehensive and includes adequate support, justification, and information to understand the GSAs' process, analysis, and rationale. Department staff find that the GSP's discussion and presentation of information covers the specific items listed in the GSP Regulations in an understandable format using appropriate data and assumptions. Staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

### 4.3.2.3 Seawater Intrusion

In addition to components identified in 23 CCR §§ 354.28 (a-b), for seawater intrusion, the GSP Regulations require the minimum threshold for seawater intrusion to be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results.\(^{173}\)

The GSP states that "Seawater intrusion is not an applicable sustainability indicator because seawater intrusion is not present and is not likely to occur in the Butte Subbasin due to the distance between the Subbasin and the Pacific Ocean, bays, deltas, or inlets. Therefore, there is no possibility of an undesirable result due to seawater intrusion and establishing criteria for undesirable results because of seawater intrusion is not required."\(^{174}\)

Department staff regard the GSAs' rationale for not setting sustainable management criteria for seawater intrusion to be reasonable given the location of the Subbasin.

### 4.3.2.4 Degraded Water Quality

In addition to components identified in 23 CCR §§ 354.28 (a-b), for degraded water quality, the GSP Regulations require the minimum threshold for degraded water quality to be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin.

\(^{172}\) Butte Subbasin GSP, Section 4.3.1.4, p. 214.
\(^{173}\) 23 CCR § 354.28(c)(3).
\(^{174}\) Butte Subbasin GSP, Section 4.3.3, p. 223.
In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.\footnote{23 CCR § 354.28(c)(4).}

The GSP states that the undesirable result for degraded water quality is “a result stemming from a causal nexus between groundwater quantity related activities, such as groundwater extraction or groundwater recharge, and groundwater quality that causes significant and unreasonable effects to Beneficial Uses and Users including reduction in the long-term viability of these uses over the planning and implementation horizon of this GSP.”\footnote{Butte Subbasin GSP, Section 4.2.4.1, p. 206.} The GSP indicates that “salinity is the primary constituent of concern in the Butte Subbasin due to concerns around the migration of connate water upwelling from the very deep aquifer near the Sutter Buttes” and that “salinity will be assessed by measuring electrical conductivity in samples collected from representative monitoring site wells.”\footnote{Butte Subbasin GSP, Section 4.3.4.1, p. 223.}

The effects of degraded water quality in the Subbasin “could potentially cause a shortage in supply to groundwater users without additional treatment, with domestic wells being most vulnerable as treatment costs or access to alternate supplies can be high for small users. High levels of salinity can impact both drinking water uses and agricultural uses, as there are maximum values associated with aesthetics (taste, color, and odor) for drinking water and crop health and yield for agriculture.”\footnote{Butte Subbasin GSP, Section 4.2.4.3, p. 207.}

The GSP indicates that “undesirable results are considered to occur during GSP implementation if 25% of [representative monitoring site (RMS)] wells (i.e., 3 of 9 RMS wells) exceed the established threshold value for [electrical conductivity] for 24 consecutive months.”\footnote{Butte Subbasin GSP, Section 4.2.4.4, p. 207.} These criteria were “estimated to be an indicator of a significant, widespread problem causing undesirable results.”\footnote{Butte Subbasin GSP, Section 4.2.4.4, pp. 207-208.} The nine representative monitoring site wells are all screened in the primary aquifer and the GSP states that “As part of this GSP, the GSAs will establish a new groundwater quality monitoring network for the very deep aquifer using the very deep aquifer [representative monitoring site] wells used for monitoring groundwater levels.”\footnote{Butte Subbasin GSP, Section 4.2.4.4, p. 208.} Undesirable results for the very deep aquifer use the same criteria applied to the primary aquifer.

The minimum threshold for electrical conductivity (representing salinity) in water quality representative monitoring wells was set as either 900 microsiemens/centimeter (\(\mu s/cm\)) or the measured historical high, whichever is greater, and the minimum threshold was set based on best available data, the Butte County Basin Management Objective program, and maximum contamination levels (MCLs).\footnote{Butte Subbasin GSP, Section 4.3.4.1, pp. 223-224.}

The current water quality monitoring
network is presented on a figure in the GSP. The GSP adds that “because of the short record of available groundwater quality data, the GSAs will review and revise the preliminary minimum thresholds and approach during the 5-year GSP update” and that the representative monitoring network may be expanded. The GSP further states that “historical electrical conductivity values, calculated from total dissolved solids (TDS) measurements at the nine [representative monitoring site] wells, are all below the minimum threshold levels, and only one measurement of the 49 in the historic record between 1958 and 2018 exceeded 900 μs/cm, with averages ranging from approximately 250 to 580 μs/cm.” Department staff agree with the GSAs that a more robust dataset is needed and that a representative monitoring network should be identified for the assessment of the very deep aquifer by the next periodic evaluation.

The GSP indicates that “the GSAs will also consider setting minimum thresholds for other constituents as part of the 5-year update” and will take into consideration maximum contaminant levels, local conditions and historical measurements, and agricultural requirements related to water quality regulatory programs. Department staff encourage the GSAs to include other water quality constituents in the Subbasin’s GSP to ensure groundwater is sustainably managed and coordinate with the Sutter Buttes Water Quality Interbasin Working Group, as indicated, to propose and develop projects to protect or improve groundwater quality.

The preliminary measurable objective for salinity is set at 700 μs/cm for agricultural use, which the GSP states is consistent with the Butte County Basin Management Objectives, and that measurable objectives for other constituents will be considered as part of the 5-year update and evaluation of the GSP. Department staff encourage the GSAs to provide detailed information on all water quality constituents of concern and to discuss how existing groundwater quality conditions efforts may impact the GSAs' ability to manage groundwater.

Department staff find that the GSP’s discussion of the minimum threshold and measurable objectives for degraded water quality seems to be comprehensive and includes adequate support, justification, and information to understand the GSAs’ process, analysis, and rationale. Department staff find that the GSP’s discussion and presentation of information covers the specific items listed in the GSP Regulations in an understandable format using appropriate data and assumptions. Staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

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183 Butte Subbasin GSP, Figure 3.3, p. 190.
184 Butte Subbasin GSP, Section 4.3.4.1, p. 224.
185 Butte Subbasin GSP, Section 4.2.4.5, p. 208.
186 Butte Subbasin GSP, Section 4.3.4.1, p. 224.
187 Butte Subbasin GSP, Section 4.3.4.1, p. 224.
188 Butte Subbasin GSP, Section 4.3.4.2, p. 224.
4.3.2.5 Land Subsidence

In addition to components identified in 23 CCR §§ 354.28 (a-b), the GSP Regulations require the minimum threshold for land subsidence to be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency’s rationale for establishing minimum thresholds in light of those effects and maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum thresholds and measurable objectives.

The GSP defines the undesirable result for inelastic land subsidence as “a result due to groundwater extraction that causes significant and unreasonable reduction in the viability of the use of critical infrastructure over the planning and implementation horizon of this GSP.” The GSP acknowledges that “if inelastic land subsidence conditions were to reach undesirable results levels, the effects could potentially cause damage to local infrastructure such as canals, roadways, and bridges. Excessive subsidence may also lead to decreased groundwater storage resulting from the irreversible compression of portions of the underlying aquifers.”

Department staff note that the GSAs have not established what amount of subsidence would be considered “significant and unreasonable” in the Subbasin but also understand that, according to the GSP, “land subsidence has not been an issue in the Butte Subbasin (the current subsidence rate has been measured to be less than 0.0325 feet per 5 years), even during the 2015 drought when groundwater levels were lower due to surface water curtailments and increased groundwater extractions.” The GSP notes that “critical infrastructure that could be affected by subsidence includes Union Pacific Railroad facilities, irrigation district facilities including conveyance infrastructure, bridges, state and county roads and highways, and U.S. Highway 99.” The GSP adds that “while the sensitivity of local infrastructure to land subsidence is not well understood, water conveyance infrastructure is likely the most sensitive to land subsidence” and “should additional information be developed on the vulnerability of Subbasin infrastructure to subsidence, these minimum thresholds may be refined.”

Land subsidence, for the purposes of tracking sustainable conditions in the GSP, is monitored by the Department’s Sacramento Valley Monument Network and an undesirable result is considered to occur “when 25 [percent] of representative monitoring

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189 23 CCR § 354.28(c)(5).
190 23 CCR §§ 354.28(c)(5)(A-B).
191 Butte Subbasin GSP, Section 4.2.5.1, p. 208.
192 Butte Subbasin GSP, Section 4.2.5.3, p. 209.
193 Butte Subbasin GSP, Section 4.3.5, p. 225.
194 Butte Subbasin GSP, Section 2.2.2.5.1, p. 134.
195 Butte Subbasin GSP, Section 4.3.5.1, p. 226.
locations (i.e., 8 of 31 benchmarks) measure a subsidence rate greater than 0.5 feet per 5 years." 196 The GSP states that this is “consistent with the nearby Yuba Subbasin’s GSP,” and that “twenty-five percent of the monument network measuring a subsidence rate greater than the [minimum threshold] was estimated to be an indicator of a significant, widespread problem potentially resulting in undesirable results." 197 Department staff note that this definition could result in localized occurrences of land subsidence that are not considered undesirable results and encourage the GSAs to provide more information regarding how the proposed criteria avoid significant and unreasonable conditions in the Subbasin.

The GSP also states that “observations from the GPS Subsidence Monitoring Network will be supplemented by InSAR data” 198 and that “the frequency of reporting is dependent on the work performed by DWR and by NASA’s JPL.” 199 However, it is not clear how the InSAR data will be incorporated into minimum threshold assessment. Department staff recommend the GSAs provide a description of how the InSAR data will be incorporated into identifying undesirable results for land subsidence (see Recommended Corrective Action 2a).

The GSP does not clearly state when data will be collected from the Department’s Sacramento Valley Monument Network. Instead, the GSP states data has been collected two times from the network historically and the GSA will rely on the Department to collect data in the future; however, there is no commitment that this data will be collected on a routine basis. Given the GSA’s definition of undesirable results which requires a certain amount of subsidence over a 5-year period, measurements from the land subsidence monitoring network must be collected at a minimum of every 5-years to evaluate whether undesirable results are occurring in the subbasin. Department staff recommend the GSAs provide a description of how undesirable results will be evaluated since it is unclear at what frequency data will be collected from the Sacramento Valley GPS Subsidence Monitoring Network. If data is not collected at a minimum of every 5-years from the network, another method should likely be utilized to ensure undesirable results are not occurring on the Subbasin (see Recommended Corrective Action 2b).

The minimum thresholds for inelastic land subsidence were selected to represent conditions that are just above conditions that could collectively generate undesirable results in the Subbasin, and the GSP acknowledges that the sensitivity of local infrastructure to land subsidence is not well understood. The GSP states that "the minimum threshold for inelastic land subsidence has been set at 0.5 feet over a 5-year period (or 0.1 foot per year) at each of the monitoring locations in the Butte Subbasin" and further adds that “this level of subsidence is considered unlikely to cause a significant and unreasonable reduction in the viability of the use of water conveyance infrastructure.

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196 Butte Subbasin GSP, Section 4.2.5.4, p. 209.
197 Butte Subbasin GSP, Section 4.2.5.4, p. 209.
198 Butte Subbasin GSP, Section 3.5.1, p. 192.
199 Butte Subbasin GSP, Section 3.5.2, p. 192.
over the planning and implementation horizon of this GSP, based on input from water managers.”

The measurable objective for land subsidence “has been set at 0.25 feet of subsidence per 5-year period at each site (0.05 feet over 1 years; 1 foot over 20 years).” The measurable objective represents one-half of the minimum threshold, which is noted as being twice the potential error (0.17 feet) in the benchmark measurements reported by the monitoring network. Because the Subbasin “does not currently have any monuments with statistically significant inelastic land subsidence” the GSP has not set any interim milestones.

The GSP’s discussion of land subsidence is comprehensive and includes adequate support, justification, and information to understand the GSA’s process, analysis, and rationale. Although a recommend corrective action was identified, which requires the GSAs to provide more information about how an undesirable result will be detected, this does not preclude plan approval as it appears that the subbasin has not experienced, and is unlikely to experience, land subsidence based on information presented in the GSP. Based on review of the sustainable management criteria established for land subsidence and materials referenced in the GSP, Department staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

4.3.2.6 Depletions of Interconnected Surface Water

SGMA defines undesirable results for the depletion of interconnected surface water as those that have significant and unreasonable adverse impacts on beneficial uses of surface water and are caused by groundwater conditions occurring throughout the basin. The GSP Regulations require that a Plan identify the presence of interconnected surface water systems in the basin and estimate the quantity and timing of depletions of those systems. The GSP Regulations further require that minimum thresholds be set based on the rate or volume of surface water depletions caused by groundwater use, supported by information including the location, quantity, and timing of depletions, that adversely impact beneficial uses of the surface water and may lead to undesirable results.

The GSP identifies interconnected surface water in the Subbasin in multiple stream reaches and the Sacramento River using the BBGM, classifying each stream reach as losing or gaining over the period from 2000 to 2018. The GSAs further analyze each identified reach by comparing spring groundwater elevation to streambed depth and

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200 Butte Subbasin GSP, Section 4.3.5.1, p. 226.
201 Butte Subbasin GSP, Section 4.3.5.2, p. 226.
202 Butte Subbasin GSP, Section 4.3.5.4, p. 226.
203 Water Code § 10721(6).
204 23 CCR § 354.16 (f).
205 23 CCR § 354.28 (c)(6).
206 Butte Subbasin GSP, Section 2.2.2.6, p. 140.
concludes “the available information suggests that streams are connected to the groundwater system and likely experienced gains in streamflow historically.” 207 Department staff conclude that the GSAs have sufficiently identified interconnected surface water in the Subbasin.

The GSP provides an estimate of the rate and volume of surface water depletions due to groundwater pumping as the sustainable management criteria, as required by the GSP Regulations.208 The GSP proposes to use a network of groundwater monitoring wells and use groundwater levels as a proxy for depletion of interconnected surface water. The GSP states that “the hydraulic gradient between stream stage and the primary aquifer is the principal factor influencing stream-aquifer exchanges and monitoring groundwater levels near interconnected surface waters provides information about this gradient, how it may change over time and space, and how that may influence interconnected surface waters”. Due to this, the GSAs proposes that monitoring groundwater levels in the vicinity of a stream or river is considered a reasonable proxy for monitoring depletions of surface water.”209 The GSAs have not provided sufficient technical justification for the use of groundwater elevations as a proxy for quantifying the location, quantity, and timing of depletions of interconnected surface water due to groundwater extraction. As a result, the GSAs have not demonstrated by adequate evidence that groundwater elevation can serve as a sustainability indicator for the depletions of interconnected surface water.

The GSP defines the undesirable result for depletion of interconnected surface waters as “a result that causes significant and unreasonable adverse effects on Beneficial Uses and Users of interconnected surface waters within the Butte Subbasin over the planning and implementation horizon of this GSP.”210 The potential effects of an undesirable result occurring is described in the GSP as “if depletions of interconnected surface waters were to reach undesirable results levels, the effects could potentially reduce groundwater contribution to surface water courses (e.g. rivers and creeks), result in a reduction of the number of days per year a stream in the Subbasin flows, lower stream flows, and/or result in increased temperatures that could potentially impact riverine and riparian habitats through the reduction in the contribution of cooler groundwater flows to the surface water course.”211 Potential causes of undesirable results are tied to groundwater production that could result in lowering of groundwater elevations in the primary aquifer near surface water bodies, which the GSP states could change the hydraulic gradient between the water surface elevation in the surface water course and the groundwater elevation, resulting in increased depletions of surface water to groundwater.212

207 Butte Subbasin GSP, Section 2.2.2.6, p. 143.
208 23 CCR § 354.28 (c)(6).
210 Butte Subbasin GSP, Section 4.2.6.1, pp. 209-210.
An undesirable result for depletions of interconnected surface water will be identified as occurring “when 25% of interconnected surface water representative monitoring wells (i.e., 3 of 12 representative monitoring wells) fall below their minimum thresholds for 24 consecutive months.” 213 The GSP states that “exceedance of these levels...for 24 consecutive months or longer (as indicated by a lack of groundwater level recovery over two consecutive seasonal high periods) will potentially harm the “long-term viability” of affected beneficial uses and users.” 214 The criteria were estimated to be an indicator of a significant, widespread problem, potentially leading to undesirable results.

The minimum thresholds for depletion of interconnected surface waters were set at 10 feet below the measured historical low for each of the representative monitoring wells. The GSP states that “the minimum threshold was selected such that levels would be protective of the beneficial use of interconnected surface water and of shallower groundwater near streams and rivers, including those of shallower domestic users and potential groundwater dependent ecosystems,” and that “the additional 10 feet in depth below the measured historical low (during which no undesirable results were observed) is intended to provide an appropriate margin of operational flexibility during GSP implementation.” 215

The measurable objective was calculated for each representative monitoring well using the average of the last five years of groundwater levels measured data. 216 Measurable objectives for the current representative monitoring network wells are provided in a table 217 and graphically in an appendix. 218 Additionally, interim milestones have been set at the measurable objective. 219 Department staff note that the measurable objectives and interim milestones for depletions of interconnected surface water are the same as those established for groundwater levels.

The GSP recognizes that there are data gaps for monitoring interconnected surface water depletion using the current representative monitoring network. The GSP states that “the GSAs recommend that 10 locations be added to the interconnected surface water depletion representative monitoring network to provide a more robust interconnected surface water monitoring network in the Subbasin.” 220 These wells would be installed shallower than 30 feet [below ground surface] and would be installed near existing groundwater dependent ecosystems and surface water gages.” 221 A figure showing locations of the 12 current and 10 planned representative monitoring network wells is

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215 Butte Subbasin GSP, Section 4.3.6.1, p. 227.
216 Butte Subbasin GSP, Section 4.3.6.2, p. 228.
217 Butte Subbasin GSP, Table 4-3, p. 232.
220 Butte Subbasin GSP, Section 4.3.6.4, p. 231.
221 Butte Subbasin GSP, Section 4.4, p. 231.
The monitoring well installation project is described with more detail in Section 5.9 of the GSP. Department staff encourage the GSA to provide documentation related to filling data gaps and improving the methodology to estimate the location, quantity, and timing of depletions of interconnected surface waters as required by the Regulations.

Department staff understand that quantifying depletions of surface water from groundwater extractions is a complex task that likely requires developing new, specialized tools, models, and methods to understand local hydrogeologic conditions, interactions, and responses. During the initial review of GSPs, Department staff have observed that most GSAs have struggled with this new requirement of SGMA. However, staff believe that most GSAs will more fully comply with regulatory requirements after several years of Plan implementation that includes projects and management actions to address the data gaps and other issues necessary to understand, quantify, and manage depletions of interconnected surface waters. Accordingly, Department staff believes that affording GSAs adequate time to refine their Plans to address interconnected surface waters is appropriate and remains consistent with SGMA’s timelines and local control preferences.

The Department will continue to support GSAs in this regard by providing, as appropriate, financial and technical assistance to GSAs, including the development of guidance describing appropriate methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water caused by groundwater extractions. Once the Department’s guidance related to depletions of interconnected surface water is publicly available, the GSA, where applicable, should consider incorporating appropriate guidance approaches into their future periodic updates to the GSP. GSAs should consider availing themselves of the Department’s financial or technical assistance, but in any event must continue to fill data gaps, collect additional monitoring data, and implement strategies to better understand and manage depletions of interconnected surface water caused by groundwater extractions and define segments of interconnectivity and timing within their jurisdictional area. Furthermore, GSAs should coordinate with local, state, and federal resources agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion.

4.4 MONITORING NETWORK

The GSP Regulations describe the monitoring network that must be developed for each sustainability indicator including monitoring objectives, monitoring protocols, and data reporting requirements. Collecting monitoring data of a sufficient quality and quantity is necessary for the successful implementation of a groundwater sustainability plan. The GSP Regulations require a monitoring network of sufficient quality, frequency, and

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222 Butte Subbasin GSP, Figure 3-6, p. 198.
223 23 CCR § 354.16(f).
distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan. 224 Specifically, a monitoring network must be able to monitor impacts to beneficial uses and users, 225 monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds, 226 capture seasonal low and high conditions, 227 include required information such as location and well construction and include maps and tables clearly showing the monitoring site type, location, and frequency. 228 Department staff encourage GSAs to collect monitoring data as specified in the GSP, follow SGMA data and reporting standards, 229 fill data gaps identified in the GSP prior to the first periodic evaluation, 230 update monitoring network information as needed, follow monitoring best management practices, 231 and submit all monitoring data to the Department’s Monitoring Network Module immediately after collection including any additional groundwater monitoring data that is collected within the Plan area that is used for groundwater management decisions. Department staff note that if GSAs do not fill their identified data gaps, the GSA’s basin understanding may not represent the best available science for use to monitor basin conditions.

The GSP has identified 51 monitoring wells to include in the groundwater level monitoring network. Of the 51 wells, the GSP assigned 41 wells as representative wells in the primary aquifer which are less than 700 feet bgs, and ten wells in the very deep aquifer which are greater than 700 feet bgs. 232 However, there are a total of 55 wells uploaded to the Department’s SGMA Portal Monitoring Network Module (MNM), with 45 wells located within the primary aquifer and ten wells in the very deep aquifer. Additionally, there are three principal aquifers identified in the MNM: primary, deep, and very deep, while the GSP only describes two principal aquifers – the primary aquifer and the very deep aquifer. Five wells are completed in the deep aquifer, four of which are not included in the GSP, which accounts for the difference in number of wells between the GSP and MNM. The Department’s review of the groundwater level monitoring network is based on information provided in the MNM rather than the information provided in the GSP. Department staff encourage the GSA to rectify these inconsistencies in future evaluations of the Plan.

The GSP proposes to use the groundwater level monitoring network as a proxy for the groundwater storage monitoring network because changes in groundwater storage are directly dependent on changes in groundwater levels. 233 As discussed in the paragraph

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224 23 CCR § 354.32.  
225 23 CCR § 354.34(b)(2).  
226 23 CCR § 354.34(b)(3).  
227 23 CCR § 354.34(c)(1)(B).  
228 23 CCR §§ 354.34(g-h).  
229 23 CCR § 352.4 et seq.  
230 23 CCR § 354.38(d).  
232 Butte Subbasin GSP, Section 3.2.2, p. 185.  
233 Butte Subbasin GSP, Section 3.1, p. 178.
above, Department staff recommend that the wells identified in the GSP are consistent with the wells uploaded to the Department’s MNM.

The GSP has identified eight monitoring wells to include in the monitoring network for the degraded water quality sustainability indicator. \(^{234}\) Two of the wells in the proposed degraded water quality monitoring network are screened in the primary aquifer and the remaining six wells are screened in the very deep aquifer. \(^{235}\) The GSP states that the water quality monitoring schedule will be annual \(^{236}\) and that the GSP’s monitoring network will add to water quality monitoring conducted by other state and local agencies including: the Department, Irrigated Lands Regulatory Program, State Water Resources Control Board, California Rice Commission, and Sutter Buttes Water Quality Inter-basin Working Group. \(^{237}\) The GSP provides a map identifying the location of the representative monitoring sites for degradation of water quality and representative monitoring sites have been identified in the monitoring network module; however, the GSP did not report the monitoring site type or measurement frequency for the degraded water quality monitoring network in tabular format, as required by the GSP Regulations. \(^{238}\) Providing this information in the next periodic evaluation will provide the Department additional clarity on how other water quality programs are being leveraged by the Subbasin to comply with the requirements of the GSP Regulations and SGMA.

The GSP identifies 29 sites from the Sacramento Valley GPS Subsidence Monitoring Network that will be included in the Subbasin’s subsidence monitoring network. \(^{239}\) The GSP also states that observations from the GPS Subsidence Monitoring Network will be supplemented by InSAR data \(^{240}\) and that the frequency of reporting is dependent on the work performed by the Department and by NASA’s JPL. \(^{241}\) In addition to the GPS monuments, data from three extensometers will be collected and analyzed. Department staff note it is unclear at what frequency data will be collected from the Sacramento Valley GPS Subsidence Monitoring Network.

The GSP has identified 12 shallow stream-adjacent monitoring wells and four stream gages to include in the interconnected surface water monitoring network. \(^{242}\) Each of the shallow stream gages collect hourly data, however, the frequency of groundwater monitoring is not stated in this section. \(^{243}\) Also, Department staff note that the location of the stream gauges are not identified in the GSP. Providing this information in a future periodic evaluation will be important during plan implementation. The shallow monitoring

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\(^{234}\) Butte Subbasin GSP, Section 3.4.1, p. 187.
\(^{235}\) Butte Subbasin GSP, Table 3-3, p. 189.
\(^{236}\) Butte Subbasin GSP, Section 3.4.2, p. 191.
\(^{237}\) Butte Subbasin GSP, Section 3.4.1, p. 188.
\(^{238}\) 23 CCR § 354.34 (h).
\(^{239}\) Butte Subbasin GSP, Section 3.5.1, p. 191.
\(^{240}\) Butte Subbasin GSP, Section 3.5.1, p. 192.
\(^{241}\) Butte Subbasin GSP, Section 3.5.2, p. 192.
\(^{242}\) Butte Subbasin GSP, Section 3.6.1, p. 196.
\(^{243}\) Butte Subbasin GSP, Section 3.6.2, p. 196.
wells in the network are adjacent to Sacramento River, Butte Creek, Little Dry Creek, Dry Creek, Angel Slough, and Feather River. The GSP states that there are ten planned monitoring wells to be added to the surface water interaction monitoring network.

The GSP provides a map identifying the location of the representative monitoring sites for degradation of water quality and representative monitoring sites have been identified in the monitoring network module, however, the GSP did not report, the monitoring site type or measurement frequency for the degraded water quality monitoring network in tabular format, as required by the GSP Regulations. Providing this information in the next periodic evaluation will provide the Department additional clarity on how other water quality programs are being leveraged by the Basin to comply with the requirements of the GSP Regulations and SGMA.

Overall, the Plan describes in sufficient detail a monitoring network that promotes the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the Plan area and evaluate changing conditions that occur through Plan implementation. The GSP provides a good explanation for the conclusion that the monitoring network is supported by the best available information and data and is designed to ensure adequate coverage of sustainability indicators. The Plan also describes existing data gaps and the steps that will be taken to fill data gaps and improve the monitoring network. Department staff consider the information presented in the Plan to satisfy the general requirements of the GSP Regulations regarding monitoring network.

4.5 PROJECTS AND MANAGEMENT ACTIONS

The GSP Regulations require a description of the projects and management actions the submitting Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin. Each Plan’s description of projects and management actions must include details such as: how projects and management actions in the GSP will achieve sustainability, the implementation process and expected benefits, and prioritization and criteria used to initiate projects and management actions.

The GSP describes 25 projects and management actions (PMAs) that the GSAs propose to implement in the Subbasin. The GSP states that the goals of the PMAs were developed in accordance with 23 CCR §354.44 and may be implemented to support ongoing sustainability, adapt to changing conditions in the Subbasin, or maintain other water management objectives. Based on estimates provided in the GSP, the annual

244 Butte Subbasin GSP, Section 3.6.2, p. 196.
245 Butte Subbasin GSP, Section 3.6.1, p. 196.
246 23 CCR § 354.44 (a).
247 23 CCR § 354.44 (b) et seq.
248 Butte Subbasin GSP, Table 5-2, pp. 236-239.
249 Butte Subbasin GSP, Section 5.3, pp. 234-235.
benefits to be provided by these projects and management actions at full implementation\textsuperscript{250} are more than sufficient to offset the projected future annual overdraft in the Subbasin.\textsuperscript{251}

The PMAs are categorized into three groups.\textsuperscript{252} The groups include the following:

1. **Ongoing**: Projects and management actions in this category are planned to be completed prior to 2042.

2. **Planned**: Projects and management actions in this category are available if continued monitoring indicates that they are needed to meet the sustainability goal by 2042, or to maintain other water management objectives.

3. **As Needed**: Projects and management actions in this category are proposed as potential projects that GSAs may wish to implement in the future.

Of the 25 total PMAs presented in the GSP, three are identified as “Ongoing” and four are identified as “Planned.” The remaining 18 are identified as “As Needed.” The GSP states that “As Needed” PMAs will be implemented in the future to complement and support groundwater sustainability planning efforts, whether by supporting water management goals, facilitating regional coordination, or improving data and monitoring. The GSP states that only PMAs identified as “Ongoing” or “Planned” are described in the complete level of detail required under 23 CCR §354.44(b), while “As Needed” PMAs are described in less detail in the GSP. The GSP states that “additional information and projects will be provided in annual reports and periodic GSP updates when known.”\textsuperscript{253}

The GSP includes summary tables for all three groups of PMAs. The tables include a description of the PMA type, the proponent, a brief description, and the project status.\textsuperscript{254} The GSP provides tables\textsuperscript{255} that summarize the estimated groundwater recharge benefit and capital, as well as operating and maintenance costs of Ongoing and Planned PMAs. “PMA cost information is limited for many other proposed PMAs because a detailed feasibility assessment has not been completed. GSAs will further develop PMAs during the GSP implementation period and refine estimated costs as PMAs are identified for implementation.”\textsuperscript{256}

**Ongoing**

The GSP states that the Subbasin has three PMAs that are currently in place and will continue to be implemented by proponents and partner agencies. The GSP provides a detailed description of the Ongoing PMAs, including: Project Description; Measurable

\textsuperscript{250} Butte Subbasin GSP, Tables 5-4 and 5-5, pp. 241-242.
\textsuperscript{251} Butte Subbasin GSP, Table ES-1, p. 26.
\textsuperscript{252} Butte Subbasin GSP, Table 5-2, pp. 236-237.
\textsuperscript{253} Butte Subbasin GSP, Section 5.3, p. 235.
\textsuperscript{254} Butte Subbasin GSP, Table 5-2, pp. 236-237.
\textsuperscript{255} Butte Subbasin GSP, Table 5-4–5-5, pp. 241-242.
\textsuperscript{256} Butte Subbasin GSP, Section 5.3, p. 235.
Objective; Public Noticing; Permitting and Regulatory Process; Schedule for Implementation; Implementation; Expected Benefits; Legal Authority; and Estimated Costs and Funding Plan as required by GSP regulations.\textsuperscript{257} The Ongoing PMAs, with brief descriptions, include:

1. System Modernization (Biggs-West Gridley Water District)\textsuperscript{258}
   a. Upgrade and modernize system infrastructure to improve system operability and efficiency, reduce operational spillage, and enhance the timing of farm deliveries.

2. System Modernization (Richvale Irrigation District [RID])\textsuperscript{259}
   a. Upgrade and modernize system infrastructure to improve system operability and efficiency, reduce operational spillage, and enhance the timing of farm deliveries.

3. Boundary Flow and Primary Spill Measurement (Western Canal Water District)\textsuperscript{260}
   a. Install measurement and monitoring equipment at boundary outflow and spillage sites to allow real-time monitoring and adjustment to upstream operations.
   b. Real-time monitoring will be implemented through the establishment of a District Supervisory Control and Data Acquisition system.

The GSP states that “Ongoing PMAs are planned to be completed prior to 2042, and the expected yield of these PMAs are expected to support GSAs in achieving the GSP sustainability goal and responding to changing conditions in the Subbasin.”\textsuperscript{261}

Planned

The GSP states that the Subbasin has four PMAs that are currently planned and will be implemented or started by proponents and partner agencies if continued monitoring indicates that they are needed to meet the sustainability goal by 2042, or to maintain other water management objectives.\textsuperscript{262} The GSP provides a detailed description of the Planned PMAs, including: Project Description; Measurable Objective; Public Noticing; Permitting and Regulatory Process; Schedule for Implementation; Implementation; Expected Benefits; Legal Authority; and Estimated Costs and Funding Plan as required by GSP regulations.\textsuperscript{263} The Ongoing PMAs, with brief descriptions, include:

1. Dual Source Irrigation Systems\textsuperscript{264}
   a. Incentivize the use of irrigation systems capable of using both surface water and groundwater.

\textsuperscript{257} 23 CCR § 354.44 (b).
\textsuperscript{258} Butte Subbasin GSP, Section 5.4, pp. 243-252.
\textsuperscript{259} Butte Subbasin GSP, Section 5.4, pp. 243-252.
\textsuperscript{260} Butte Subbasin GSP, Section 5.5, pp. 252-260.
\textsuperscript{261} Butte Subbasin GSP, Table 5-2, p. 236.
\textsuperscript{262} Butte Subbasin GSP, Table 5-2, p. 236.
\textsuperscript{263} 23 CCR § 354.44 (b).
\textsuperscript{264} Butte Subbasin GSP, Section 5.6, pp. 260-271.
b. These systems will increase use of surface water and on-farm recharge of surface water, and offset groundwater pumping.

2. Multi-Benefit Recharge\[265\]
   a. Will provide groundwater recharge through normal farming operations while also providing critical wetland habitat for waterbirds migrating along the Pacific Flyway
   b. Fields with soil and cropping conditions conducive to groundwater recharge will be flooded and maintained with shallow depths.
   c. Water will be sourced from existing water rights contracts, depending on availability.
   d. GSAs may also consider financial compensation for participation to offset field preparation, irrigation, and water costs.

3. Grower Education\[266\]
   a. The program will provide growers with educational resources that help them to plan and implement on-farm practices that simultaneously support groundwater sustainability and maintain or improve agricultural productivity.

4. Installation of Additional Shallow Monitoring Wells\[267\]
   a. Install 10 shallow monitoring wells in key areas of the Subbasin to support monitoring of interconnected surface water and groundwater dependent ecosystems.

As Needed

The GSP categorizes 18 PMAs “As Needed.” These PMAs are proposed as potential PMAs that GSAs may wish to implement, as needed, if future monitoring indicates the occurrence of undesirable results in the Subbasin.\[268\] As Needed PMAs are described in less detail than required by GSP regulations.\[269\] The GSP states that “additional project development and description will occur as these projects are needed, or as GSAs pursue their implementation to support ongoing sustainability or maintain other water management objectives.”\[270\] The As Needed PMAs include:

1. Alternate Delivery to RID Secondary via Kelleher Dam\[271\]
2. Boundary Flow and Primary Spill Measurement (Butte Water District)\[272\]
3. Boundary Flow and Primary Spill Measurement (RID)\[273\]
4. Develop Partnerships to Implement Project Addressing Regional Water Management\[274\]

\[265\] Butte Subbasin GSP, Section 5.7, pp. 271-277.
\[266\] Butte Subbasin GSP, Section 5.8, pp. 271-283.
\[267\] Butte Subbasin GSP, Section 5.9, pp. 283-285.
\[268\] Butte Subbasin GSP, Section 5.10, p. 286.
\[269\] 23 CCR § 354.44 (b).
\[270\] Butte Subbasin GSP, Section 5.10, p. 286.
\[271\] Butte Subbasin GSP, Section 5.10.4.1, pp. 296-297.
\[272\] Butte Subbasin GSP, Section 5.10.2.1, pp. 291-292.
\[273\] Butte Subbasin GSP, Section 5.10.4.2, pp. 297-298.
\[274\] Butte Subbasin GSP, Section 5.10.1.4, p. 289.
5. On-Farm Irrigation Systems Improvement Financing\textsuperscript{275}
6. Recycled Water Use\textsuperscript{276}
7. Surface Water Outflow Monitoring Improvements\textsuperscript{277}
8. Pressurized Irrigation System Delivery Improvements\textsuperscript{278}
9. Conjunctive Use Increase\textsuperscript{279}
10. Little Butte Creek Reservoir Main Canal Bypass Project\textsuperscript{280}
11. M&T – Llano Seco Fish Screen Project\textsuperscript{281}
12. Monitoring Well Improvements\textsuperscript{282}
13. Parrott Phelan Diversion Restoration Project\textsuperscript{283}
14. Re-Establish Historical Monitoring Locations and Identify New Sites\textsuperscript{284}
15. Removal of Bottlenecks on the Sutter-Butte Main Canal\textsuperscript{285}
16. Shu Fly/Cherokee Project\textsuperscript{286}
17. System Modernization (Butte Water District)\textsuperscript{287}
18. System Modernization (Western Canal Water District)\textsuperscript{288}

The GSP states that, as implementation proceeds, the GSAs will continue to accept additional PMAs proposed by agencies and stakeholders. The GSAs will continue to maintain a list of all proposed PMAs on the GSP website.\textsuperscript{289}

The Plan adequately describes proposed projects and management actions in a manner that is generally consistent and substantially complies with the GSP Regulations. The projects and management actions, which focus largely on refining the GSAs' understanding of basin conditions and avoiding undesirable results, are directly related to the sustainable management criteria and present a generally feasible approach to achieving the sustainability goal of the Plan area. As projects and management actions are implemented, the Department expects that progress be included in annual reports and any addition or removal of project and management actions be documented in periodic evaluations.

\textsuperscript{275} Butte Subbasin GSP, Section 5.10.1.2, pp. 287-288.
\textsuperscript{276} Butte Subbasin GSP, Section 5.10.1.1, pp. 286-287.
\textsuperscript{277} Butte Subbasin GSP, Section 5.10.1.3, p. 288.
\textsuperscript{278} Butte Subbasin GSP, Section 5.10.2.3, p. 293.
\textsuperscript{279} Butte Subbasin GSP, Section 5.10.5.3, pp. 302-303.
\textsuperscript{280} Butte Subbasin GSP, Section 5.10.5.2, pp. 300-302.
\textsuperscript{281} Butte Subbasin GSP, Section 5.10.3.1, pp. 294-295.
\textsuperscript{282} Butte Subbasin GSP, Section 5.10.1.6, p. 290.
\textsuperscript{283} Butte Subbasin GSP, Section 5.10.3.2, pp. 295-296.
\textsuperscript{284} Butte Subbasin GSP, Section 5.10.1.5, pp. 289-290.
\textsuperscript{285} Butte Subbasin GSP, Section 5.10.2.4, p. 294.
\textsuperscript{286} Butte Subbasin GSP, Section 5.10.4.3, pp. 298-299.
\textsuperscript{287} Butte Subbasin GSP, Section 5.10.2.2, pp. 292-293.
\textsuperscript{288} Butte Subbasin GSP, Section 5.10.5.1, pp. 299-300.
\textsuperscript{289} Butte Subbasin GSP, Section 5.3, p. 243.
4.6 CONSIDERATION OF ADJACENT BASINS/SUBBASINS

SGMA requires the Department to “…evaluate whether a groundwater sustainability plan adversely affects the ability of an adjacent basin to implement their groundwater sustainability plan or impedes achievement of sustainability goals in an adjacent basin.”290 Furthermore, the GSP Regulations state that minimum thresholds defined in each GSP be designed to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.291

Subbasins adjacent to the Butte Subbasin include Vina, Wyandotte Creek, Sutter, Colusa, and Corning. The Butte Subbasin GSAs have met multiple times with GSAs in adjacent subbasins, sharing data and information on groundwater conditions and GSP projects to ensure that this Plan will not interfere with the ability of adjacent subbasins to also maintain sustainable groundwater management.292 There is also an Interbasin Coordination Plan that describes coordination with neighboring GSAs in adjacent subbasins.293

Department staff currently have no information that would indicate groundwater management in the Subbasin will adversely affect groundwater conditions in the adjacent subbasins at this time. Department staff will continue to review periodic evaluations to the Plan to assess whether implementation of the GSP is potentially impacting adjacent basins.

4.7 CONSIDERATION OF CLIMATE CHANGE AND FUTURE CONDITIONS

The GSP Regulations require a GSA to consider future conditions and project how future water use may change due to multiple factors including climate change.294

Since the GSP was adopted and submitted, climate change conditions have advanced faster and more dramatically. It is anticipated that the hotter, drier conditions will result in a loss of 10 percent of California’s water supply. As California adapts to a hotter, drier climate, GSAs should be preparing for these changing conditions as they work to sustainably manage groundwater within their jurisdictional areas. Specifically, the Department encourages GSAs to:

1. Explore how their proposed groundwater level thresholds have been established in consideration of groundwater level conditions in the Subbasin based on current and future drought conditions.

290 Water Code § 10733(c).
291 23 CCR § 354.28(b)(3).
292 Butte Subbasin GSP, Executive Summary, p. 18.
293 Butte Subbasin GSP, Section 5.12, p. 303.
294 23 CCR § 354.18.
2. Explore how groundwater level data from the existing monitoring network will be used to make progress towards sustainable management of the Subbasin given increasing aridification and effects of climate change, such as prolonged drought.

3. Take into consideration changes to surface water reliability and that impact on groundwater conditions.

4. Evaluate updated watershed studies that may modify assumed frequency and magnitude of recharge projects, if applicable.

5. Continually coordinate with the appropriate groundwater users, including but not limited to domestic well owners and state small water systems, and the appropriate overlying county jurisdictions developing drought plans and establishing local drought task forces\textsuperscript{295} to evaluate how their Plan’s groundwater management strategy aligns with drought planning, response, and mitigation efforts within the basin.

5 STAFF RECOMMENDATION

Department staff recommend approval of the GSP with the recommended corrective actions listed below. The Butte Subbasin GSP conforms with Water Code Sections 10727.2 and 10727.4 of SGMA and substantially complies with the GSP Regulations. Implementation of the GSP will likely achieve the sustainability goal for the Butte Subbasin. The GSAs have identified several areas for improvement of their Plan and Department staff concur that those items are important and should be addressed as soon as possible. Department staff have also identified additional recommended corrective actions that should be considered by the GSAs for the first periodic assessment of the GSP. Addressing these recommended corrective actions will be important to demonstrate that implementation of the Plan is likely to achieve the sustainability goal.

The recommended corrective actions include:

**RECOMMENDED CORRECTIVE ACTION 1**

Revise the sustainable management criteria for the chronic lowering of groundwater levels as follows:

a. Provide more information about how the proposed minimum thresholds for the chronic lowering groundwater levels may impact beneficial uses and users. Specifically, consider the impact of the selected minimum threshold levels on supply wells. The consideration should identify the degree/extent of potential impact including the percentage, number, and location of potentially impacted...
wells at the proposed minimum thresholds for chronic lowering of groundwater levels.

b. Evaluate how the proposed minimum thresholds for the chronic lowering of groundwater levels may impact other sustainability indicators (e.g., groundwater storage, depletion of interconnected surface water, etc.).

**Recommended Corrective Action 2**

Revise the sustainable management criteria for land subsidence as follows:

a. Provide a description of how the InSAR data will be incorporated into identifying undesirable results for land subsidence.

b. Describe how undesirable results will be evaluated since it is unclear at what frequency data will be collected from the Sacramento Valley GPS Subsidence Monitoring Network. If data is not collected at a minimum of every 5-years from the network, another method should be utilized to ensure undesirable results are not occurring on the Subbasin.

**Recommended Corrective Action 3**

Department staff understand that estimating the location, quantity, and timing of stream depletion due to ongoing, Subbasin-wide pumping is a complex task and that developing suitable tools may take additional time; however, it is critical for the Department’s ongoing and future evaluations of whether GSP implementation is on track to achieve sustainable groundwater management. The Department plans to provide guidance on methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water and support for establishing specific sustainable management criteria in the near future. This guidance is intended to assist GSAs to sustainably manage depletions of interconnected surface water.

In addition, the GSAs should work to address the following items by the first periodic evaluation:

a. Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions.

b. Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing.

c. Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion within the GSAs’ jurisdictional area.
July 27, 2023

Christina Buck
Butte County Department of Water and Resource Conservation
308 Nelson Ave
Oroville, CA 95965
cbuck@buttecounty.net

RE: Sacramento Valley Basin – Vina Subbasin - 2022 Groundwater Sustainability Plan

Dear Christina Buck,

The Department of Water Resources (Department) has evaluated the groundwater sustainability plan (GSP) submitted for the Sacramento Valley Basin – Vina Subbasin and has determined the GSP is approved. The approval is based on recommendations from the Staff Report, included as an exhibit to the attached Statement of Findings, which describes that the Vina Subbasin GSP satisfies the objectives of the Sustainable Groundwater Management Act (SGMA) and substantially complies with the GSP Regulations. The Staff Report also proposes recommended corrective actions that the Department believes will enhance the GSP and facilitate future evaluation by the Department. The Department strongly encourages the recommended corrective actions be given due consideration and suggests incorporating all resulting changes to the GSP in future updates.

Recognizing SGMA sets a long-term horizon for groundwater sustainability agencies (GSAs) to achieve their basin sustainability goals, monitoring progress is fundamental for successful implementation. GSAs are required to evaluate their GSPs at least every five years and whenever the Plan is amended, and to provide a written assessment to the Department. Accordingly, the Department will evaluate approved GSPs and issue an assessment at least every five years. The Department will initiate the first periodic review of the Vina Subbasin GSP no later than January 28, 2027.

Please contact Sustainable Groundwater Management staff by emailing sgmps@water.ca.gov if you have any questions related to the Department’s assessment or implementation of your GSP.
Thank You,

_Steven Springhorn_
Supervising Engineering Geologist
Sustainable Groundwater Management

Attachment:
1. Statement of Findings Regarding the Approval of the Sacramento Valley Basin – Vina Subbasin Groundwater Sustainability Plan
STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

STATEMENT OF FINDINGS REGARDING THE
APPROVAL OF THE
SACRAMENTO VALLEY – VINA SUBBASIN GROUNDWATER SUSTAINABILITY PLAN

The Department of Water Resources (Department) is required to evaluate whether a submitted groundwater sustainability plan (GSP or Plan) conforms to specific requirements of the Sustainable Groundwater Management Act (SGMA or Act), is likely to achieve the sustainability goal for the basin covered by the Plan, and whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) The Department is directed to issue an assessment of the Plan within two years of its submission. (Water Code § 10733.4.) This Statement of Findings explains the Department’s decision regarding the Plan submitted by the Rock Creek Reclamation District Groundwater Sustainability Agency (GSA) and Vina GSA (collectively referred to as the GSAs or Agencies) for the Vina Subbasin (Basin No. 5-021.57).

Department management has discussed the Plan with staff and has reviewed the Department Staff Report, entitled Sustainable Groundwater Management Program Groundwater Sustainability Plan Assessment Staff Report, attached as Exhibit A, recommending approval of the GSP. Department management is satisfied that staff have conducted a thorough evaluation and assessment of the Plan and concurs with staff’s recommendation and all the recommended corrective actions. The Department therefore APPROVES the Plan and makes the following findings:

A. The Plan satisfies the required conditions as outlined in § 355.4(a) of the GSP Regulations (23 CCR § 350 et seq.):

1. The Plan was submitted within the statutory deadline of January 31, 2022. (Water Code § 10720.7(a); 23 CCR § 355.4(a)(1).)

2. The Plan was complete, meaning it generally appeared to include the information required by the Act and the GSP Regulations sufficient to warrant a thorough evaluation and issuance of an assessment by the Department. (23 CCR § 355.4(a)(2).)

3. The Plan, either on its own or in coordination with other Plans, covers the entire Subbasin. (23 CCR § 355.4(a)(3).)

B. The general standards the Department applied in its evaluation and assessment of the Plan are: (1) “conformance” with the specified statutory requirements, (2) “substantial compliance” with the GSP Regulations, (3) whether the Plan is likely
to achieve the sustainability goal for the Vina Subbasin within 20 years of the implementation of the Plan, and (4) whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) Application of these standards requires exercise of the Department’s expertise, judgment, and discretion when making its determination of whether a Plan should be deemed “approved,” “incomplete,” or “inadequate.”

The statutes and GSP Regulations require Plans to include and address a multitude and wide range of informational and technical components. The Department has observed a diverse array of approaches to addressing these technical and informational components being used by GSAs in different basins throughout the state. The Department does not apply a set formula or criterion that would require a particular outcome based on how a Plan addresses any one of SGMA’s numerous informational and technical components. The Department finds that affording flexibility and discretion to local GSAs is consistent with the standards identified above; the state policy that sustainable groundwater management is best achieved locally through the development, implementation, and updating of local plans and programs (Water Code § 113); and the Legislature’s express intent under SGMA that groundwater basins be managed through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner. (Water Code § 10720.1(h)) The Department’s final determination of a Plan is made based on the entirety of the Plan’s contents on a case-by-case basis, considering and weighing factors relevant to the particular Plan and Subbasin under review.

C. In making these findings and Plan determination, the Department also recognized that: (1) The Department maintains continuing oversight and jurisdiction to ensure the Plan is adequately implemented; (2) the Legislature intended SGMA to be implemented over many years; (3) SGMA provides Plans 20 years of implementation to achieve the sustainability goal in a Subbasin (with the possibility that the Department may grant GSAs an additional five years upon request if the GSAs have made satisfactory progress toward sustainability); and, (4) local agencies acting as GSAs are authorized, but not required, to address undesirable results that occurred prior to enactment of SGMA. (Water Code §§ 10721(r); 10727.2(b); 10733(a); 10733.8.)

D. The Plan conforms with Water Code §§ 10727.2 and 10727.4, substantially complies with 23 CCR § 355.4, and appears likely to achieve the sustainability goal for the Vina Subbasin. It does not appear at this time that the Plan will adversely affect the ability of adjacent basins to implement their GSPs or impede achievement of sustainability goals.
1. The sustainable management criteria and sustainability goals, which focus on having stable groundwater levels for the long term and operating the Subbasin within its sustainable yield, are sufficiently justified and explained. The Plan relies on credible information and science such as long-term groundwater level data, a reasonable understanding of aquifer properties, and an updated groundwater model to quantify the groundwater conditions that the Plan seeks to avoid and provides an objective way to determine whether the Subbasin is being managed sustainably in accordance with SGMA. (23 CCR § 355.4(b)(1).)

2. The Plan has identified reasonable measures and schedules to eliminate data gaps such as collecting data from active domestic wells to adjust minimum thresholds, installing additional wells and other monitoring sites to analyze the interaction of streams and groundwater pumping, and updating and refining the Butte Basin Groundwater Model. Refinement of the groundwater model is expected to a) eliminate the data gap related to the interconnect surface water and develop appropriate sustainable management criteria, b) help understand the net outflow at the western boundary, and c) support evaluation of projects or GSP updates as appropriate and warranted). (23 CCR § 355.4(b)(2).)

3. The projects and management actions proposed are designed to address the groundwater level decline in the Subbasin through an adaptive management strategy that, if implemented in a reasonable and timely manner, will likely achieve the sustainability goal defined for the Subbasin. The GSAs plan to mitigate the groundwater level decline by implementing projects and management actions that will increase direct and in-lieu recharge, promote water conservation, and enhance monitoring in the Subbasin. The projects and management actions are reasonable and commensurate with the level of understanding of the Subbasin setting. The projects and management actions described in the Plan provide a feasible approach to achieving the Subbasin’s sustainability goal and should provide the GSA(s) with greater versatility to adapt and respond to changing conditions and future challenges during GSP implementation. (23 CCR § 355.4(b)(3).)

4. The Plan provides a detailed explanation of how the varied interest of groundwater uses and users in the Subbasin were considered in developing the sustainable management criteria and how those interests, including beneficial uses and users of groundwater including domestic well owners, would be impacted by the chosen minimum thresholds. Furthermore, the GSP includes a management action entitled “Domestic Well Mitigation” that aims to potentially provide resources to well owners impacted by groundwater management and lowering groundwater levels.
planned under the GSAs’ management of the Subbasin. Under this management action, the GSAs plan to collect data on domestic wells to determine which well owners potentially need assistance; secure financial resources to assist with the repair, replacement, and deepening of domestic wells; and provide emergency response to well owners including supplying bottled water and potable water for sanitation. (23 CCR § 355.4(b)(4).)

5. The Plan’s projects and management actions appear feasible at this time and appear capable of preventing undesirable results and ensure that the Subbasin is managed within its sustainable yield within 20 years. The Department will continue to monitor Plan implementation and reserves the right to change its determination if projects and management actions are not implemented or appear unlikely to prevent undesirable results or achieve sustainability within SGMA timeframes. (23 CCR § 355.4(b)(5).)

6. The Plan includes a reasonable assessment of overdraft conditions and includes reasonable means to mitigate overdraft, if present. (23 CCR § 355.4(b)(6).)

7. At this time, it does not appear that the Plan will adversely affect the ability of an adjacent basin to implement its GSP or impede achievement of sustainability goals in an adjacent basin. The Plan states collaboration and coordination with 10 adjacent basins began in 2020 which will be continued during the Plan implementation period to ensure that undesirable results will be avoided, and sustainability will be achieved at the regional level. (23 CCR § 355.4(b)(7).)

8. Because a single plan was submitted for the Subbasin, a coordination agreement was not required. (23 CCR § 355.4(b)(8).)

9. The GSAs’ member agency, Butte County, has a groundwater management plan, established monitoring networks, and Basin Management Objectives for groundwater level, groundwater quality related to seawater intrusion, and land subsidence. The Butte County’s history of groundwater management and its participation in the Department’s groundwater elevation and subsidence monitoring programs provide a reasonable level of confidence that the GSA(s) has the legal authority and financial resources necessary to implement the Plan. (23 CCR § 355.4(b)(9).)

10. Through review of the Plan and consideration of public comments, the Department determines that the GSA(s) adequately responded to comments that raised credible technical or policy issues with the Plan, sufficient to warrant approval of the Plan at this time. The Department also
notes that the recommended corrective actions included in the Staff Report are important to addressing certain technical or policy issues that were raised and, if not addressed before future, subsequent plan evaluations, may preclude approval of the Plan in those future evaluations. (23 CCR § 355.4(b)(10).)

E. In addition to the grounds listed above, DWR also finds that:

1. The Plan focuses on the protection of sustainably constructed domestic wells because dewatering domestic wells is a concern in the Subbasin. Per the GSP, the minimum thresholds aim to protect most domestic wells, including those not constructed sustainably. Domestic wells are generally shallower than other well types; therefore, the minimum threshold water level that is protective of domestic users is considered protective of other beneficial users too. The GSAs plans to implement a mitigation program for domestic well owners to assist with the repair, replacement, and deepening of wells; and provide emergency response to well owners including supplying bottled water and potable water for sanitation. The Plan’s compliance with the requirements of SGMA and substantial compliance with the GSP Regulations supports the state policy regarding the human right to water (Water Code § 106.3). The Department developed its GSP Regulations consistent with and intending to further the policy through implementation of SGMA and the Regulations, primarily by achieving sustainable groundwater management in a basin. By ensuring substantial compliance with the GSP Regulations, the Department has considered the state policy regarding the human right to water in its evaluation of the Plan. (23 CCR § 350.4(g).)

2. The GSAs have an adaptive management approach in regard to managing groundwater; therefore, there will be continued monitoring, assessment of groundwater conditions, and evaluation of benefits obtained from projects and management actions. The GSAs plan to implement the groundwater allocation to manage groundwater demand only in the event that the proposed projects fail to achieve interim milestones and the Subbasin is projected to not be able to achieve sustainability goals by 2042.

3. The Plan acknowledges and identifies interconnected surface waters within the Subbasin. The GSA(s) proposes initial sustainable management criteria to manage this sustainability indicator and measures to improve understanding and management of interconnected surface water. The GSA(s) acknowledge(s), and the Department agrees, many data gaps related to interconnected surface water exist. The GSA(s) should continue filling data gaps, collecting additional monitoring data, and
coordinating with resources agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping. Future updates to the Plan should aim to improve the initial sustainable management criteria as more information and improved methodology becomes available.

4. Projections of future basin extractions are likely to stay within current and historic ranges, at least until the next periodic evaluation by the GSA and the Department. Basin groundwater levels and other SGMA sustainability indicators are unlikely to substantially deteriorate while the GSA implements the Department’s recommended corrective actions. State intervention is not necessary at this time to ensure that local agencies manage groundwater in a sustainable manner. (Wat. Code § 10720.1(h).)

5. The California Environmental Quality Act (Public Resources Code § 21000 et seq.) does not apply to the Department’s evaluation and assessment of the Plan.

Accordingly, the GSP submitted by the Agencies for the Vina Subbasin is hereby APPROVED. The recommended corrective actions identified in the Staff Report will assist the Department’s future review of the Plan’s implementation for consistency with SGMA and the Department therefore recommends the Agencies address them by the time of the Department’s periodic review, which is set to begin on January 28, 2027, as required by Water Code § 10733.8. Failure to address the Department’s Recommended Corrective Actions before future, subsequent plan evaluations, may lead to a Plan being determined incomplete or inadequate.

Signed:

______________________________
Karla Nemeth, Director
Date: July 27, 2023

Exhibit A: Groundwater Sustainability Plan Assessment Staff Report – Sacramento Valley – Vina Subbasin
The Rock Creek Reclamation District Groundwater Sustainability Agency (GSA) and Vina GSA (collectively referred to as the GSAs or Agencies) submitted the Sacramento Valley – Vina Groundwater Subbasin Groundwater Sustainability Plan (GSP or Plan) for the Vina Subbasin (Subbasin) to the Department of Water Resources (Department) for evaluation and assessment as required by the Sustainable Groundwater Management Act (SGMA)¹ and GSP Regulations.² The GSP covers the entire Subbasin for the implementation of SGMA.

After evaluation and assessment, Department staff conclude that the Plan includes the required components of a GSP, demonstrates a thorough understanding of the Subbasin based on what appears to be the best available science and information, sets well explained, supported, and reasonable sustainable management criteria to prevent undesirable results as defined in the Plan, and proposes a set of projects and management actions that will likely achieve the sustainability goal defined for the Subbasin.³ Department staff will continue to monitor and evaluate the Subbasin's progress toward achieving the sustainability goal through annual reporting and future periodic evaluations of the GSP and its implementation.

- **Based on the current evaluation of the Plan, Department staff recommend the GSP be approved with the recommended corrective actions described herein.**

This assessment includes five sections:

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¹ Water Code § 10720 et seq.
² 23 CCR § 350 et seq.
³ 23 CCR § 350 et seq.
Section 1 – Summary: Overview of Department staff’s assessment and recommendations.

Section 2 – Evaluation Criteria: Describes the legislative requirements and the Department’s evaluation criteria.

Section 3 – Required Conditions: Describes the submission requirements, Plan completeness, and basin coverage required for a GSP to be evaluated by the Department.

Section 4 – Plan Evaluation: Provides an assessment of the contents included in the GSP organized by each Subarticle outlined in the GSP Regulations.

Section 5 – Staff Recommendation: Includes the staff recommendation for the Plan and any recommended or required corrective actions, as applicable.

1 SUMMARY

Department staff recommend approval of the Vina Subbasin GSP. The GSA(s) have identified areas for improvement of their Plan (e.g., collecting data from active domestic wells to adjust minimum thresholds, installing additional wells and other monitoring sites to analyze interaction of streams and groundwater pumping, updating and refining the Butte Basin Groundwater Model a) to eliminate the data gap related to the interconnect surface water and develop appropriate sustainable management criteria, b) to understand the net outflow at the western boundary, and c) to support evaluation of projects or GSP updates as appropriate and warranted). Department staff concur that those items are important and recommend the GSA(s) address them as soon as possible. Department staff have also identified additional recommended corrective actions within this assessment that the GSA(s) should consider addressing by the first periodic evaluation of the Plan. The recommended corrective actions generally focus on the following:

(1) Improving the understanding of water quality conditions in the Subbasin, coordinating with lead regulatory agencies, and updating the GSP with information about how ongoing regulatory programs operating in the Subbasin may impact groundwater management,

(2) Continuing to fill data gaps, collecting additional monitoring data, coordinating with resource agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping, and potentially refine sustainable management criteria,

(3) Evaluating the potential impacts to beneficial uses and users of groundwater from the proposed sustainable management criteria for the chronic lowering of groundwater levels and revising the definition of undesirable results and language pertaining to significant and unreasonable lowering of groundwater level, and
(4) Establishing a monitoring network and sustainable management criteria for land subsidence.

Addressing the recommended corrective actions identified in Section 5 of this assessment will be important to demonstrate, on an ongoing basis, that implementation of the Plan is likely to achieve the sustainability goal.

2 EVALUATION CRITERIA

The GSA(s) submitted a single GSP to the Department to evaluate whether the Plan conforms to specified SGMA requirements and is likely to achieve the sustainability goal for the Vina Subbasin. To achieve the sustainability goal for the Subbasin, the GSP must demonstrate that implementation of the Plan will lead to sustainable groundwater management, which means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results. Undesirable results must be defined quantitatively by the GSAs. The Department is also required to evaluate whether the GSP will adversely affect the ability of an adjacent basin to implement its GSP or achieve its sustainability goal.

For the GSP to be evaluated by the Department, it must first be determined that the Plan was submitted by the statutory deadline, and that it is complete and covers the entire basin. If these conditions are satisfied, the Department evaluates the Plan to determine whether it complies with specific SGMA requirements and substantially complies with the GSP Regulations. Substantial compliance means that the supporting information is sufficiently detailed and the analyses sufficiently thorough and reasonable, in the judgment of the Department, to evaluate the Plan, and the Department determines that any discrepancy would not materially affect the ability of the Agency to achieve the sustainability goal for the basin, or the ability of the Department to evaluate the likelihood of the Plan to attain that goal.

When evaluating whether the Plan is likely to achieve the sustainability goal for the Subbasin, Department staff reviewed the information provided and relied upon in the GSP for sufficiency, credibility, and consistency with scientific and engineering professional standards of practice. The Department’s review considers whether there is a reasonable relationship between the information provided and the assumptions and conclusions.

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4 Water Code §§ 10727.2, 10727.4.
5 Water Code § 10733(a).
6 Water Code § 10721(v).
7 23 CCR § 354.26 et seq.
8 Water Code § 10733(c).
9 23 CCR § 355.4(a)(1).
11 23 CCR § 350 et seq.
12 23 CCR § 355.4(b).
13 23 CCR § 351(h).
made by the GSAs, including whether the interests of the beneficial uses and users of groundwater in the basin have been considered; whether sustainable management criteria and projects and management actions described in the Plan are commensurate with the level of understanding of the basin setting; and whether those projects and management actions are feasible and likely to prevent undesirable results.\textsuperscript{14}

The Department also considers whether the GSA has the legal authority and financial resources necessary to implement the Plan.\textsuperscript{15}

To the extent overdraft is present in a basin, the Department evaluates whether the Plan provides a reasonable assessment of the overdraft and includes reasonable means to mitigate the overdraft.\textsuperscript{16} The Department also considers whether the Plan provides reasonable measures and schedules to eliminate identified data gaps.\textsuperscript{17} Lastly, the Department’s review considers the comments submitted on the Plan and evaluates whether the GSAs adequately responded to the comments that raise credible technical or policy issues with the Plan.\textsuperscript{18}

The Department is required to evaluate the Plan within two years of its submittal date and issue a written assessment of the Plan.\textsuperscript{19} The assessment is required to include a determination of the Plan’s status.\textsuperscript{20} The GSP Regulations define the three options for determining the status of a Plan: Approved,\textsuperscript{21} Incomplete,\textsuperscript{22} or Inadequate.\textsuperscript{23}

Even when review indicates that the GSP satisfies the requirements of SGMA and is in substantial compliance with the GSP Regulations, the Department may recommend corrective actions.\textsuperscript{24} Recommended corrective actions are intended to facilitate progress in achieving the sustainability goal within the basin and the Department’s future evaluations, and to allow the Department to better evaluate whether the Plan adversely affects adjacent basins. While the issues addressed by the recommended corrective actions do not, at this time, preclude approval of the Plan, the Department recommends that the issues be addressed to ensure the Plan’s implementation continues to be consistent with SGMA and the Department is able to assess progress in achieving the sustainability goal within the basin.\textsuperscript{25} Unless otherwise noted, the Department proposes

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\textsuperscript{14} 23 CCR §§ 355.4(b)(1), (3), (4), and (5).
\textsuperscript{15} 23 CCR § 355.4(b)(9).
\textsuperscript{16} 23 CCR § 355.4(b)(6).
\textsuperscript{17} 23 CCR § 355.4(b)(2).
\textsuperscript{18} 23 CCR § 355.4(b)(10).
\textsuperscript{19} Water Code § 10733.4(d); 23 CCR § 355.2(e).
\textsuperscript{20} Water Code § 10733.4(d); 23 CCR § 355.2(e).
\textsuperscript{21} 23 CCR § 355.2(e)(1).
\textsuperscript{22} 23 CCR § 355.2(e)(2).
\textsuperscript{23} 23 CCR § 355.2(e)(3).
\textsuperscript{24} Water Code § 10733.4(d).
\textsuperscript{25} Water Code § 10733.8.
\end{flushleft}
that recommended corrective actions be addressed by the submission date for the periodic assessment.26

The staff assessment of the GSP involves the review of information presented by the GSAs, including models and assumptions, and an evaluation of that information based on scientific reasonableness, including standard or accepted professional and scientific methods and practices. The assessment does not require Department staff to recalculate or reevaluate technical information provided in the Plan or to perform its own geologic or engineering analysis of that information. The staff recommendation to approve a Plan does not signify that Department staff, were they to exercise the professional judgment required to develop a GSP for the basin, would make the same assumptions and interpretations as those contained in the Plan, but simply that Department staff have determined that the assumptions and interpretations relied upon by the submitting GSAs are supported by adequate, credible evidence, and are scientifically reasonable.

Lastly, the Department’s review and approval of the Plan is a continual process. Both SGMA and the GSP Regulations provide the Department with the ongoing authority and duty to review the implementation of the Plan.27 Also, GSAs have an ongoing duty to provide reports to the Department, periodically reassess their plans, and, when necessary, update or amend their plans.28 The passage of time or new information may make what is reasonable and feasible at the time of this review to not be so in the future. The emphasis of the Department’s periodic reviews will be to assess the progress toward achieving the sustainability goal for the basin and whether Plan implementation adversely affects the ability of adjacent basins to achieve their sustainability goals.

3 REQUIRED CONDITIONS

A GSP, to be evaluated by the Department, must be submitted within the applicable statutory deadline. The GSP must also be complete and must, either on its own or in coordination with other GSPs, cover the entire Subbasin.

3.1 SUBMISSION DEADLINE

SGMA required basins categorized as high- or medium-priority and not subject to critical conditions of overdraft to submit a GSP no later than January 31, 2022.29

The GSA(s) submitted their Plan on January 28, 2022.

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26 23 CCR § 356.4 et seq.
27 Water Code § 10733.8; 23 CCR § 355.6.
28 Water Code §§ 10728 et seq., 10728.2.
29 Water Code § 10720.7(a)(2).
3.2 COMPLETENESS

GSP Regulations specify that the Department shall evaluate a GSP if that GSP is complete and includes the information required by SGMA and the GSP Regulations.\(^{30}\)

The GSA(s) submitted an adopted GSP for the entire Subbasin. After an initial, preliminary review, Department staff found the GSP to be complete and appearing to include the required information, sufficient to warrant a thorough evaluation by the Department.\(^{31}\) The Department posted the GSP to its website on February 14, 2022.\(^{32}\)

3.3 BASIN COVERAGE

A GSP, either on its own or in coordination with other GSPs, must cover the entire basin.\(^{33}\) A GSP that is intended to cover the entire basin may be presumed to do so if the basin is fully contained within the jurisdictional boundaries of the submitting GSAs.

The GSP intends to manage the entire Vina Subbasin and the jurisdictional boundary of the submitting GSA(s) fully contains the Subbasin.\(^{34}\)

4 PLAN EVALUATION

As stated in Section 355.4 of the GSP Regulations, a basin “shall be sustainably managed within 20 years of the applicable statutory deadline consistent with the objectives of the Act.” The Department’s assessment is based on a number of related factors including whether the elements of a GSP were developed in the manner required by the GSP Regulations, whether the GSP was developed using appropriate data and methodologies and whether its conclusions are scientifically reasonable, and whether the GSP, through the implementation of clearly defined and technically feasible projects and management actions, is likely to achieve a tenable sustainability goal for the basin. The Department staff’s evaluation of the likelihood of the Plan to attain the sustainability goal for the Subbasin is provided below.

4.1 ADMINISTRATIVE INFORMATION

The GSP Regulations require each Plan to include administrative information identifying the submitting Agency, its decision-making process, and its legal authority;\(^{35}\) a description of the Plan area and identification of beneficial uses and users in the Plan area;\(^{36}\) and a

\(^{30}\) 23 CCR § 355.4(a)(2).
\(^{31}\) The Department undertakes a preliminary completeness review of a submitted Plan under section 355.4(a) of the GSP Regulations to determine whether the elements of a Plan required by SGMA, and the Regulations have been provided, which is different from a determination, upon review, that a Plan is “incomplete” for purposes of section 355.2(e)(2) of the Regulations.
\(^{32}\) https://sgma.water.ca.gov/portal/gsp/preview/86
\(^{33}\) Water Code § 10727(b); 23 CCR § 355.4(a)(3).
\(^{34}\) Vina Subbasin GSP, Section 1.1.4, p. 42, Figure ES-2, p.24.
\(^{35}\) 23 CCR § 354.6 et seq.
\(^{36}\) 23 CCR § 354.8 et seq.
description of the ability of the submitting Agency to develop and implement a Plan for that area.37

A single GSP covering the entire Vina Subbasin was prepared and submitted to the Department by the Vina GSA and Rock Creek Reclamation District GSA. The Vina GSA which covers the larger portion of the Subbasin was formed by the County of Butte, the City of Chico, and Durham Irrigation District through a Joint Power Agreement.38 A five-member GSA Board serves the policy-making role for SGMA implementation and is composed of five seats.39 The five board members are representatives from the agricultural community, domestic well users, the County of Butte, the City of Chico, and Durham Irrigation District.40 The decision-making process of the Vina GSA is reaching a consensus among board members who have equal and full voting rights.41 The GSP states that the Vina GSA possesses the ability to exercise powers granted by the Joint Power Agreement, SGMA, and the common powers of its members.42 Rock Creek Reclamation District GSA covers the portion of the Subbasin within its jurisdictional boundary.43 The Rock Creek Reclamation District, formed in 1985 under the State Reclamation Act, provides flood control and groundwater sustainability services.44 A seven-member Board of Trustees, elected by the landowners, manages Rock Creek Reclamation District GSA with input from its SGMA ad-hoc committee.45 The role of the ad-hoc committee is to facilitate the coordination between Rock Creek Reclamation District GSA and Vina GSA.46 The GSP states that several joint meetings were held between the two GSAs during the development of the GSP.

The Vina Subbasin is located within Butte County which also includes the City of Chico and Mechoopda tribal area.47 The Subbasin is part of the larger Sacramento Valley Groundwater Basin and is bounded to the north by Los Molinos and Corning Subbasins; to the south by Butte and Wyandotte Creek Subbasins; and to the east by the Sierra Nevada geomorphic province as shown in Figure 1.48 All the adjacent groundwater basins are medium and high-priority basins with their GSPs under review by the Department.

37 23 CCR § 354.6(e).
38 Vina Subbasin GSP, Section 1.1.4.1, p. 43.
39 Vina Subbasin GSP, Section 1.1.4.1, p. 43.
40 Vina Subbasin GSP, Section 1.1.4.1, p. 43.
41 Vina Subbasin GSP, Section 1.1.4.1, pp. 43-45.
42 Vina Subbasin GSP, Section 1.1.4.1, p. 43.
43 Vina Subbasin GSP, Section 1.1.4.1, p. 43.
44 Vina Subbasin GSP, Section 1.1.4.2, pp. 47-48.
45 Vina Subbasin GSP, Section 1.1.4.2, p. 48.
46 Vina Subbasin GSP, Section 1.1.4.2, p. 48.
47 Vina Subbasin GSP, Section 1.2.1, pp. 49-52.
48 Vina Subbasin GSP, Section 1.2.1, pp. 49-52.
The GSP states that land use in the Subbasin is dominated by agriculture with other land use types being industrial, urban, and undeveloped. The GSP also provides a map showing three land use types: agricultural areas, developed areas, and “other” land use; however, the GSP does not appear to provide the quantitative information regarding the total area for each land use type. The GSP states that both agricultural and urban land uses rely on a combination of surface water and groundwater. The GSP provides a list of beneficial uses and users of groundwater in the Subbasin and further identifies potential stakeholder groups and their engagement purpose. The GSP states that more than 4,000 domestic wells are recorded per the Department’s Online System for Well Completion Reports (OSWCR) database as being located within the Vina Subbasin; however, the GSP adds that the data within this database cannot be guaranteed to be always accurate or precise.
The County of Butte has been monitoring groundwater since 2000 under Butte County Code regarding groundwater conservation and protection.\textsuperscript{53} In 2004, the County Code required the establishment of monitoring networks and Basin Management Objectives for groundwater level, groundwater quality related to seawater intrusion, and land subsidence.\textsuperscript{54} The Basin Management Objective program transitioned to SGMA implementation through a revision to the County Code in 2019.\textsuperscript{55} Additionally, the Butte County Department of Water and Resources Conservation Program has been collaborating with the Department’s monitoring programs by volunteering as the monitoring entity for the California Statewide Groundwater Elevation Monitoring Program for the Vina Subbasin and analyzing the data from the Department’s subsidence monitoring program to develop an understanding of land subsidence in the Subbasin.\textsuperscript{56}

In addition to the monitoring programs, the County of Butte has a Groundwater Management Plan that covers the entire County except for the areas covered by an Urban Water Management Plan developed for the City of Chico.\textsuperscript{57} The Groundwater Management Plan supports groundwater sustainability through groundwater level and quality management, inelastic land subsidence prevention, and groundwater replenishment.\textsuperscript{58} Furthermore, the Butte County General Plan 2030 and the Chico 2030 General Plan are intended to promote water conservation, improve water quality, protect groundwater recharge areas, and utilize reclaimed wastewater.\textsuperscript{59} Given the history of groundwater monitoring and management in the Subbasin by the GSAs, the County of Butte and the City of Chico, and the transition of ongoing programs to SGMA implementation, Department staff believe that the GSAs have the ability to implement the GSP in the Subbasin.

The GSP’s discussion and presentation of administrative information covers the specific items listed in the GSP Regulations in an understandable format using appropriate detail. Department staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the quality, data, and discussion of this subject in the GSP. The administrative information included in the Plan substantially complies with the requirements outlined in the GSP Regulations.

\subsection*{4.2 Basin Setting}

GSP Regulations require information about the physical setting and characteristics of the basin and current conditions of the basin, including a hydrogeologic conceptual model; a description of historical and current groundwater conditions; and a water budget.

\textsuperscript{53} Vina Subbasin GSP, Section 1.4.1, p. 74.
\textsuperscript{54} Vina Subbasin GSP, Section 1.4.1, p. 74.
\textsuperscript{55} Vina Subbasin GSP, Section 1.4.1, pp. 74-75.
\textsuperscript{56} Vina Subbasin GSP, Section 1.4.2, p. 75, Section 1.6, p. 77.
\textsuperscript{57} Vina Subbasin GSP, Section 1.3.1, p. 65.
\textsuperscript{58} Vina Subbasin GSP, Section 1.3.1, p. 65.
\textsuperscript{59} Vina Subbasin GSP, Section 1.3.6.1, pp. 66-70, Section 1.3.6.2, pp. 70-73.
accounting for total annual volume of groundwater and surface water entering and leaving
the basin, including historical, current, and projected water budget conditions.  

4.2.1 Hydrogeologic Conceptual Model
The hydrogeologic conceptual model is a non-numerical model of the physical setting,
characteristics, and processes that govern groundwater occurrence within a basin, and
represents a local agency’s understanding of the geology and hydrology of the basin that
support the geologic assumptions used in developing mathematical models, such as
those that allow for quantification of the water budget. The GSP Regulations require a
descriptive hydrogeologic conceptual model that includes a written description of geologic
conditions, supported by cross sections and maps, and includes a description of basin
boundaries and the bottom of the basin, principal aquifers and aquitards, and data
gaps.

The Subbasin is surrounded by medium and high-priority groundwater basins in all
directions except for the eastern boundary where it is bounded by the edge of alluvium.
Groundwater flows across these boundaries to some degree because the boundaries
with adjacent groundwater basins are jurisdictional in nature. Additionally, per the GSP,
no known structural properties (i.e., faults) significantly restrict groundwater flow within
the Subbasin. The continentally derived formations including the major freshwater-
bearing zones in the Subbasin are underlain by marine deposits. The bottom of the
basin is defined as the base of fresh groundwater-bearing formations, which vary in depth
from 800 to 1,200 feet below ground surface.

The GSP describes the groundwater system in the Subbasin as a single principal aquifer
with multiple stratigraphic zones. The GSP identifies the zones as Quaternary Deposits,
Tehama/Upper Tuscan, and the Lower Tuscan units. Although the GSP states that the
zones exhibit different hydrogeologic properties, the GSP reports that similarity in the

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60 23 CCR § 354.12.
Conceptual Model, December 2016: https://water.ca.gov/-/media/DWR-Website/Web-
Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-
62 23 CCR §§ 354.14 (a), 354.14 (c).
63 23 CCR §§ 354.14 (b)(2-3).
64 23 CCR § 354.14 (b)(4) et seq.
65 23 CCR § 354.14 (b)(5).
66 Vina Subbasin GSP, Section 2.1.1.1, p. 84.
67 Vina Subbasin GSP, Section 2.1.1.1, p. 84.
68 Vina Subbasin GSP, Section 2.1.8.1, p. 110.
69 Vina Subbasin GSP, Section 2.1.1.2, pp. 84-85.
70 Vina Subbasin GSP, Section 2.1.1.2, pp. 84-85.
71 Vina Subbasin GSP, Section 2.1.8.1, p. 110.
72 Vina Subbasin GSP, Section 2.1.8.1, p. 110.
groundwater levels, recorded at wells screened in various aquifer zones, provides evidence to support the GSP’s treatment of these zones as a single principal aquifer.\(^{73}\)

The GSP acknowledges that hydrographs, pumping tests, and water level data suggest a varying degree of connectivity between the aquifer zones.\(^{74}\) The GSP states that a pump test demonstrated that, in some cases, low-permeability lahar units caused different discrete aquifer zones to be hydraulically disconnected, while in other cases the lahar layers functioned as a leaky aquitard, allowing a delayed hydraulic connection between aquifer zones.\(^{75}\) However, the GSP further states that hydrographs for nested shallow and deep wells show nearly identical water level measurements indicating the aquifers are hydrologically connected and behave as one hydrogeologic unit, with an exception of a nested well which shows weak communication between the aquifer zones.\(^{76}\) The GSP provides reasonable and persuasive evidence that because of hydraulic connectivity between aquifer zones and comparable patterns of groundwater levels in nested wells screened in shallow and deep aquifer zones, the various stratigraphic zones form a single principal aquifer in the Subbasin.\(^{77}\)

Despite the determination that a single principal aquifer is defined in the Subbasin, Department staff believe the GSP provides inconsistent information regarding geologic formations that comprise the aquifer zones. The first inconsistency is regarding the role of the Laguna Formation as a part of the principal aquifer. The GSP identifies the Tehama, Tuscan, and Laguna Formations as the major fresh groundwater-bearing zones\(^{78}\) but the GSP also discusses Tuscan, Tehama, and Riverbank and Modesto Formations as the primary groundwater-producing formations.\(^{79}\) It is unclear to staff if the Laguna Formation is a primary water-producing zone in the Subbasin. The second inconsistency is regarding the litho-stratigraphic placement of the Laguna Formation in the Subbasin. Figure 2-8 shows the Tuscan Formation overlying Laguna Formation;\(^{80}\) however, Table 2-2 shows the Laguna Formation overlying the Tehama and Tuscan Formations.\(^{81}\) Because of these discrepancies, the GSP’s lithostratigraphic description of geologic formations is inconsistent and unclear. Department staff encourage the GSA to provide clarification regarding the Laguna Formation and other formations that make up the principal aquifer in the Subbasin and update the hydrogeological conceptual model section to provide consistent information.

\(^{73}\) Vina Subbasin GSP, Section 2.2.2.2, p. 123.
\(^{74}\) Vina Subbasin GSP, Section 2.1.8.1, p. 110.
\(^{75}\) Vina Subbasin GSP, Section 2.1.8.1, p. 110.
\(^{76}\) Vina Subbasin GSP, Section 2.2.2.2, pp. 119-124.
\(^{77}\) Vina Subbasin GSP, Section 2.1.8.1, p. 110.
\(^{78}\) Vina Subbasin GSP, Executive Summary, p. 25 & Section 2.1.1.2, p. 84.
\(^{79}\) Vina Subbasin GSP, Section 2.1.5, pp. 102-104.
\(^{80}\) Vina Subbasin GSP, Figure 2-8, p. 97.
\(^{81}\) Vina Subbasin GSP, Table 2.2, p. 99.
The GSP identifies several data gaps relevant to development and understanding of the hydrogeologic conceptual model of the basin.\(^{82}\) The highly variable aquifer characteristics and varying degrees of vertical hydrologic connectivity between geologic units are identified as a data gap.\(^{83}\) The GSP also notes the lack of sufficient data to analyze the interaction of surface water with groundwater pumping within the primary aquifer system.\(^{84}\) The GSP plans to address these data gaps primarily through additional data collection and interconnected surface water monitoring.\(^{85}\) Furthermore, the GSP also provides cost estimates and schedules for addressing data gaps.\(^{86}\)

The information provided in the GSP that comprises the hydrogeologic conceptual model substantially complies with the requirements outlined in the GSP Regulations. In general, the Plan’s descriptions of the regional geologic setting, the Plan area’s physical characteristics, the identification of the principal aquifer, and hydrogeologic conceptual model appear to utilize the best available science. Department staff are aware of no significant inconsistencies or contrary technical information to that presented in the Plan.

4.2.2 Groundwater Conditions

The GSP Regulations require a written description of historical and current groundwater conditions for each of the applicable sustainability indicators and groundwater dependent ecosystems that includes the following: groundwater elevation contour maps and hydrographs,\(^{87}\) a graph depicting change in groundwater storage,\(^{88}\) maps and cross-sections of the seawater intrusion front,\(^{89}\) maps of groundwater contamination sites and plumes,\(^{90}\) maps depicting total subsidence,\(^{91}\) identification of interconnected surface water systems and an estimate of the quantity and timing of depletions of those systems,\(^{92}\) and identification of groundwater dependent ecosystems.\(^{93}\)

The GSP divides the Subbasin into three management areas: Vina North, Vina Chico, and Vina South. The GSP discusses groundwater conditions in relation to the management areas. For more information on the management areas outlined in the GSP, please see Management Areas (Section 4.2.4).

The GSP identifies 12 hydrographs as representative hydrographs which depict long-term groundwater elevation trends in the Subbasin.\(^{94}\) The GSP provides additional

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\(^{82}\) Vina Subbasin GSP, Section 4.10, p. 226.  
\(^{83}\) Vina Subbasin GSP, Section 2.1.8.1, p. 110.  
\(^{84}\) Vina Subbasin GSP, Section 3.8.1, p. 198.  
\(^{85}\) Vina Subbasin GSP, Section 5.4.1, p. 251; Section 5.4.4, p. 252.  
\(^{86}\) Vina Subbasin GSP, Section 6.1.5, p. 256; Section 6-3, p. 258; Figure 6-1, p. 259.  
\(^{87}\) 23 CCR § 354.16 (a) (1-2).  
\(^{88}\) 23 CCR § 354.16 (b).  
\(^{89}\) 23 CCR § 354.16 (c).  
\(^{90}\) 23 CCR § 354.16 (d).  
\(^{91}\) 23 CCR § 354.16 (e).  
\(^{92}\) 23 CCR § 354.16 (f).  
\(^{93}\) 23 CCR § 354.16 (g).  
\(^{94}\) Vina Subbasin GSP, Figure 2-15, 2-16, and 2-17, pp. 120-122.
hydrographs in Appendix 3-C, for wells identified as representative monitoring sites for chronic lowering of groundwater level, which also show long-term groundwater level data.\textsuperscript{95} The GSP states that the 2001 and 2016 Water Resource Inventory and Analysis Reports produced by Butte County show groundwater levels have been declining over the past 20 years.\textsuperscript{96} Based on a cursory review of the hydrographs by Department staff, it appears that in the past 20 years, groundwater elevation levels have declined up to 30 feet in the Vina North and Vina Chico management areas and up to 40 feet in the Vina South management area.\textsuperscript{97} The observations that the groundwater level decline in the Vina South management area is more prominent compared to the other two management areas is supported by the GSP, as it states the Vina South management area displays a more pronounced response to the drought than wells to the north.\textsuperscript{98} Department staff note that every well in the Subbasin does not show a groundwater level decline, as groundwater levels have been stable in some wells, and has increased in at least one well.\textsuperscript{99}

While the hydrographs show a long-term decline in groundwater levels over the past 20 to 30 years, they do not show an obvious historical high groundwater level because cyclic fluctuations of groundwater levels have been occurring over a four-to-seven-year period,\textsuperscript{100} and the historical data provided are for various date ranges starting from the 1940s to the 2000s. Based on the review of the hydrographs, it appears to Department staff that historical low groundwater levels were observed during 2014-2015 in multiple wells.\textsuperscript{101} The groundwater elevation contour maps show that groundwater flows from the north toward the southwestern corner of the Subbasin.\textsuperscript{102} Locally, groundwater flows toward the City of Chico and Durham because they are groundwater depression areas.\textsuperscript{103}

The GSP states that groundwater levels during recent dry-year cycles are lower than groundwater levels in earlier dry-year cycles, and this downward trend during dry years indicates an overall decline in groundwater storage.\textsuperscript{104} The GSP reports that between 2000 and 2018, there has been a cumulative decline in groundwater storage of about 400,000 acre-feet.\textsuperscript{105} The annual storage decline during the same period is reported as 19,600 acre-feet per year.\textsuperscript{106} Per the GSP, this annual change in storage is about 0.1 percent of the total freshwater storage of the Subbasin which is about 16,000,000 acre-

\textsuperscript{95} Vina Subbasin GSP, Appendix 3-C, pp. 311-331.
\textsuperscript{96} Vina Subbasin GSP, Section 2.2.1, p. 113.
\textsuperscript{97} Vina Subbasin GSP, Figure 2-15, 2-16, and 2-17, pp. 120-122.
\textsuperscript{98} Vina Subbasin GSP, Section 2.2.2.2, p. 123.
\textsuperscript{99} Vina Subbasin GSP, Figure 2-15, 2-16, and 2-17, pp. 120-122.
\textsuperscript{100} Vina Subbasin GSP, Section 2.2.2.3, p. 124.
\textsuperscript{101} Vina Subbasin GSP, Figure 2-15, 2-16, and 2-17, pp. 120-122.
\textsuperscript{102} Vina Subbasin GSP, Figure 2-10, to 2-13, pp. 115-118.
\textsuperscript{103} Vina Subbasin GSP, Section 2.2.2.2, p. 119.
\textsuperscript{104} Vina Subbasin GSP, Section 2.2.2.3, p. 124, Figure 2-17, p. 125.
\textsuperscript{105} Vina Subbasin GSP, Section 2.2.2.3, p. 124.
\textsuperscript{106} Vina Subbasin GSP, Section 2.3.4, p. 160, Table 2-8, p.163.
feet. The Plan does not specify how much of the 16 million acre-feet of groundwater in storage in the Vina Subbasin is accessible and/or useable.

The GSP states that seawater intrusion is not an applicable sustainability indicator for this Subbasin because it is located far from the coastline. Department staff consider the GSP’s conclusion to be reasonable as the nearest coastline is about 100 miles away from the Subbasin.

The GSP identifies total dissolved solids (TDS), calcium, nitrate, halogenated solvents, tetrachloroethene (PCE), trichloroethene (TCE), perfluorooctanesulfonic acid (PFOS), and per- and polyfluoroalkyl substance (PFAS) as the water quality constituents of concern in the Subbasin. The groundwater quality description includes a map showing the location of contaminant sites; however, the extent and the location of the contaminant plumes within the Subbasin are not shown on the map. A water quality chart shows that, between 2008 and 2020, specific conductance, which is an indirect measure of TDS, has been relatively stable in the representative monitoring wells.

The GSP identifies metal manufacturing sites and dry cleaning operations that have caused water quality degradation in the Subbasin. The GSP also identifies military clean-up and underground storage tank sites, as well as land disposal sites, all of which are active contamination remediation sites. However, the GSP does not provide sufficient information on the water quality constituents of concern related to these sites, such as the change in contamination concentrations over time, if the water quality degradation is local or regional, or how the groundwater extraction is affecting the water quality. The GSP mentions the localized high concentration of calcium, nitrate, and TDS in the Chico area but lacks the detail to understand the factors that may have caused the elevated concentration, and it is uncertain to Department staff whether the GSA believes these concentrations are high enough to affect the supply and the beneficial uses of groundwater.

The GSP states that the groundwater quality in the Subbasin is currently monitored by Butte County, Sacramento Valley Water Quality Coalition, State Drinking Water Program, California Department of Toxic Substances Control (DTSC), and the United States Environmental Protection Agency (USEPA). Per the GSP, water quality data collected by Sacramento Valley Water Quality Coalition for compliance with the Central Valley Regional Board’s Irrigated Lands Regulatory Program is an important set of data because

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107 Vina Subbasin GSP, Section 2.2.2.3, p. 124.
108 Vina Subbasin GSP, Section 2.2.3, p. 125.
109 Vina Subbasin GSP, Section 2.2.4, pp. 125-129.
110 Vina Subbasin GSP, Figure 2-18, p. 127.
111 Vina Subbasin GSP, Figure 3-5, p. 193.
112 Vina Subbasin GSP, Section 2.2.4.1, pp. 126-129.
113 Vina Subbasin GSP, Section 2.2.4.1, pp. 126-129.
114 Vina Subbasin GSP, Section 2.2.4.1, p. 125.
irrigated agriculture is the predominant land use in the Vina Subbasin.\textsuperscript{115} The GSP states that PFOS and PFAS will not be monitored by the GSAs for SGMA implementation but GSAs will be attentive to the effect the presence of these contaminants may have on groundwater management.\textsuperscript{116}

The GSP’s description of groundwater quality conditions in the Subbasin includes relevant topics such as water quality constituents of concern, and some discussion of the factors that have caused water quality degradation; however, Department staff conclude that the Plan is also lacking important details related to groundwater quality. Department staff recommend the GSAs provide additional information in the GSP outlining the location and extent of contamination plumes, identifying which constituents are being monitored under various regulatory programs, and thoroughly describing ongoing remediation efforts within the Subbasin (see \textit{Recommended Corrective Action 1a}). Further, the GSAs should evaluate whether groundwater management activities, including groundwater production under the jurisdiction of the GSAs, may influence the migration of contaminant plumes (see \textit{Recommended Corrective Action 1b}). Because the GSP acknowledges that the aquifer used for drinking water supply is potentially affected by the contaminants,\textsuperscript{117} the GSAs should also evaluate how existing groundwater quality issues and existing contamination plumes present in the Subbasin may be impacting beneficial uses and users of groundwater (see \textit{Recommended Corrective Action 1c}). Lastly, Department staff recommend the GSAs coordinate with the lead agencies overseeing these remediation sites regularly and update the Plan to explain how existing groundwater quality conditions and/or remediation efforts may impact the GSAs’ ability to manage groundwater (see \textit{Recommended Corrective Action 1d}).

The GSP states that no land subsidence has been recorded in Butte County to date\textsuperscript{118} and “inelastic land subsidence due to groundwater withdrawal is unlikely to result in an Undesirable Result in the Vina Subbasin”.\textsuperscript{119} The GSP includes two maps showing the stations and displacement values from the Sacramento Valley Global Positioning System (GPS) study of 2008 to 2017,\textsuperscript{120} and the Department’s Interferometric Synthetic Aperture Radar (InSAR) displacement data coverage between 2015 and 2019.\textsuperscript{121} Land subsidence observations from the GPS Subsidence Monitoring stations show a total cumulative displacement range of 0.176 to -0.074 feet between 2008 to 2017, and the InSAR data shows a total cumulative displacement range of 0.25 to -0.25 feet between 2015-2019.\textsuperscript{122} Per the GSP, inelastic land subsidence has not occurred in the Subbasin because of

\textsuperscript{115} Vina Subbasin GSP, Section 2.2.4.1, p. 126.
\textsuperscript{116} Vina Subbasin GSP, Section 2.2.4.1, p. 126.
\textsuperscript{117} Vina Subbasin GSP, Section 2.2.4.1, p. 126.
\textsuperscript{118} Vina Subbasin GSP, Section 2.2.5.1, p. 129.
\textsuperscript{119} Vina Subbasin GSP, Section 2.2.5.2, p. 131.
\textsuperscript{120} Vina Subbasin GSP, Figure 2-19, p. 132.
\textsuperscript{121} Vina Subbasin GSP, Figure 2-20, p. 133.
\textsuperscript{122} Vina Subbasin GSP, Table 2-4, p. 131.
relatively stable groundwater levels and subsurface materials are not prone to compaction.\textsuperscript{123}

The GSP identifies interconnected surface water systems and estimates the quantity and timing of depletions of those systems based on Butte Basin Groundwater Model.\textsuperscript{124} While the GSP states it provides an estimate for the quantity and timing of depletions, it is unclear to Department staff whether these values represent depletion due to groundwater pumping or the overall interaction between groundwater and surface water in the Subbasin. The GSP classifies the stream reaches as either Gaining (> 80% of the time), Losing (>80% of the time), or Mixed.\textsuperscript{125} The GSP states that most of the streams that traverse from the foothills to the Sacramento River lose water to the groundwater system, whereas the Sacramento River shows net gaining conditions along the reaches adjacent to the Subbasin. Between 2000 and 2018, the streams traversing the Subbasin lost about 16,650 acre-feet per year to the groundwater system, and the Sacramento River gained approximately 50,600 acre-feet per year.\textsuperscript{126} According to this data, there is a net annual gain of about 33,950 acre-feet per year by the surface water system from the groundwater system. However, Department staff note the water budget section of the GSP provides different data for stream gains and losses for the same period.\textsuperscript{127}

The water budget summary table for the groundwater system shows that the average annual inflow from the surface water system to the groundwater system was 20,800 acre-feet, and the outflow from the groundwater system to the surface water system was 3,700 acre-feet.\textsuperscript{128} This shows there is a net annual loss of about 17,100 acre-feet per year of surface water to groundwater. The Plan does not explain what caused the discrepancy in stream gains and losses between the two estimates. Due to the difference in estimates between the groundwater conditions description and the water budget information, it is unclear to Department staff whether the annual depletion of surface water to groundwater is a positive 33,950 acre-feet or negative 17,100 acre-feet. Department staff recommend that the GSAs review the model inputs/outputs and provide consistent information regarding stream loss and gains throughout the GSP. Further, Department staff recommend the GSA clarify whether these values simply represent the overall interaction between the surface water and groundwater system or the quantity of depletion due to groundwater pumping (see \textbf{Recommended Corrective Action 2}).

The GSP states that the groundwater model incorporates the interaction of surface water and groundwater at a regional scale, but concedes that significant data gaps that limit calibration of the groundwater response to the uppermost layer of the model.\textsuperscript{129}

\begin{footnotesize}
\begin{enumerate}
\item Vina Subbasin GSP, Section 4.5.1, p. 213.
\item Vina Subbasin GSP, Section 2.2.6, p. 131-144.
\item Vina Subbasin GSP, Section 2.2.6.3, p. 140-141, Figure 2-26, p.142.
\item Vina Subbasin GSP, Section 2.2.6.4, p. 144.
\item Vina Subbasin GSP, Table 2-8, p. 163.
\item Vina Subbasin GSP, Table 2-8, p. 163.
\item Vina Subbasin GSP, p. 200.
\end{enumerate}
\end{footnotesize}
Department staff note that the GSAs plan to complete the first model update by 2027 and the second model update by 2032. Department staff encourage the GSAs to refine the model prior to the next periodic evaluation of the Plan and provide information on the interaction of surface water and groundwater at a reasonable scale, thereby eliminating the data gap related to groundwater response to the uppermost layer of the model.

The GSP utilizes the Natural Communities Commonly Associated with the Groundwater (NCCAG) dataset to identify GDEs. Per the GSP, the NCCAG dataset defines two habitat classes: wetland features commonly associated with the surface expression of groundwater under natural, unmodified conditions; and vegetation types commonly associated with the sub-surface presence of groundwater (phreatophytes). The GSP provides figures showing the locations of all potential GDEs identified by the NCCAG database within the Vina Subbasin. The GSP states that GDE’s dependence on groundwater was analyzed based on: land use changes; proximity to perennial surface water supplies; areas accessing supplemental water supplies; adjacency to irrigated agriculture; dependency on agricultural-dependent surface water; and non-survival of vegetation during drought years. Additionally, the potential GDE dataset was further reviewed against land use classifications to identify unlikely GDEs based on adjacency to agricultural operations. Based on this analysis, the GSP classified the potential GDEs as “Not likely a GDE” or “Likely a GDE” showing their locations on maps. Additionally, the maps also show the location of Valley Oak Dominated Areas which are classified as “Likely a GDE” because, per the GSP, this species can access groundwater over a wide range of depths.

Although recommended corrective actions are identified, the Plan adequately describes the historical and current groundwater conditions related to chronic lowering of groundwater level, change in storage, seawater intrusion, and land subsidence throughout the Plan area, and the information included in the Plan substantially complies with the requirements outlined in the GSP Regulations. However, more information is required to fully understand groundwater conditions related to degraded water quality and depletions of interconnected surface water as discussed above.

### 4.2.3 Water Budget

GSP Regulations require a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions, and the sustainable yield.

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130 Vina Subbasin GSP, Figure 6-1, p.259.
131 Vina Subbasin GSP, Figure 2-28, p. 146, Figure 2-29, p. 147.
132 Vina Subbasin GSP, Section 2.2.7.4, p. 150.
133 Vina Subbasin GSP, Appendix 2-A, pp. 283-284.
134 Vina Subbasin GSP, Section 2.2.7.4, p. 150, Appendix 2-A, pp. 283-284.
135 23 CCR §§ 354.18 (a), 354.18 (c) et seq.
136 23 CCR § 354.18 (b)(7).
The GSP utilizes the Butte Basin Groundwater Model, originally developed in 1992 and updated over the decades, to estimate the water budget for historical, current, and projected conditions.\textsuperscript{137} The GSP identifies water years 2000 to 2018 as the historical water budget and states data collected from 1971 to 2018 reflects the current water budget, with 2018 representing the most recent hydrology.\textsuperscript{138} The GSP uses a 50-year period from 1971 to 2018 with 2004-2005 repeated after 2018 to develop a projected water budget.\textsuperscript{139}

The water budgets are estimated for both the Land and Surface Water System and Groundwater System.\textsuperscript{140} The water budget information is provided in tabular and graphical formats for both systems.\textsuperscript{141} The water budget includes a detailed discussion and estimates of inflows and outflows to the groundwater system. The main components of inflows are subsurface inflows from adjacent basins and foothills, deep percolation of precipitation and agricultural return flow, and stream seepage.\textsuperscript{142} The main components of outflows are groundwater extraction, subsurface outflows to adjacent basins and foothills, stream gains from groundwater, and western boundary net outflows.\textsuperscript{143} Groundwater extraction is the main source of outflow which makes up about 65% of the total outflow from the Subbasin.\textsuperscript{144}

Between 2000 and 2018, groundwater storage declined by 19,600 acre-feet per year, and between 1971 and 2018, groundwater storage declined by 1,200 acre-feet per year.\textsuperscript{145} The GSP simulates three projected water budget scenarios: future conditions with no climate change, future conditions with 2030 climate change factor, and future conditions with 2070 climate change factor. The estimated change in storage for future conditions with no climate change, future conditions with 2030 climate change factor, and future conditions with 2070 climate change factor are a decline in storage of 1,900 acre-feet per year, 1,700 acre-feet per year and 2,700 acre-feet per year, respectively.\textsuperscript{146}

The GSP estimates the sustainable yield based on projected water levels under baseline conditions. Per the GSP, on average, groundwater levels will be 21 feet below measurable objective in 2042 if no groundwater management measures are implemented.\textsuperscript{147} This decline of 21 feet translates into 12,840 acre-feet per year of storage decline.\textsuperscript{148} While the GSP does not explicitly state this information, it appears that the GSP rounds this decline in storage to 10,000 acre-feet per year and deducts this from

\textsuperscript{137} Vina Subbasin GSP, Section 2.3, p. 151-178.
\textsuperscript{138} Vina Subbasin GSP, Table 2-6, p. 154.
\textsuperscript{139} Vina Subbasin GSP, Section 2.3.1, p. 152
\textsuperscript{140} Vina Subbasin GSP, Section 2.3, p. 151-178.
\textsuperscript{141} Vina Subbasin GSP, Figure 2-31 to 2-43, pp. 153-177, Table 2-6 to 2-9, pp. 154 to 166.
\textsuperscript{142} Vina Subbasin GSP, Table 2-8, p. 163.
\textsuperscript{143} Vina Subbasin GSP, Table 2-8, p. 163.
\textsuperscript{144} Vina Subbasin GSP, Table 2-8, p. 163.
\textsuperscript{145} Vina Subbasin GSP, Table 2-8, p. 163.
\textsuperscript{146} Vina Subbasin GSP, Table 2-8, p. 163.
\textsuperscript{147} Vina Subbasin GSP, Section 2.3.6, p. 178.
\textsuperscript{148} Vina Subbasin GSP, Table 2-10, p. 179.
historical pumping of 243,500 acre-feet per year to estimate sustainable yield. Thus, the GSP estimates a sustainable yield of 233,500 acre-feet per year which is expected to stop the projected decline in groundwater levels. Department staff encourage the GSAs to update the Plan during future periodic evaluations to clarify how the sustainable yield was calculated to ensure the inference by Department staff is correct.

Department staff conclude that the historical, current, and projected water budgets included in the Plan substantially comply with the requirements outlined in the GSP Regulations. The GSP provides the required historical, current, and future accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the Plan area and includes an estimate of the sustainable yield of the Plan area and projected future water demands.

4.2.4 Management Areas
The GSP Regulations provide the option for one or more management areas to be defined within a basin if the GSA has determined that the creation of the management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives, provided that undesirable results are defined consistently throughout the basin.

The GSP divides the Subbasin into three management areas: Vina North, Vina Chico, and Vina South. The GSP states that the management areas are created to develop sustainable management criteria, monitoring networks, and projects that best serve the needs of the uses and users of groundwater unique to the management area. The GSP further elaborates that the management areas are unique in terms of interest and vulnerability of stakeholders and groundwater uses, the nature of water demand such as agricultural, domestic and municipal sectors, the number and characteristics of wells supplying groundwater, and to some degree the hydrogeology and recharge sources.

The GSP states that the Vina North management area is dominated by irrigated agriculture dependent on wells with sparsely distributed rural residential domestic wells. The streams in the Vina North are ephemeral (Pine Creek, Rock Creek, and Mud Creek) except for the Sacramento River which flows along the western boundary.

The GSP states that the Vina Chico management area is predominantly an urban area with a small number of domestic wells and California Water Service providing groundwater supplies for residential and municipal use. There are a number of creeks

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149 Vina Subbasin GSP, Section 2.3.6, p. 179.
150 Vina Subbasin GSP, Section 2.3.6, p. 179.
151 23 CCR § 354.20.
152 Vina Subbasin GSP, Section 1.2.2, p. 64.
153 Vina Subbasin GSP, Section 1.2.2, p. 64.
154 Vina Subbasin GSP, Section 1.2.2.1, p. 64.
(Big Chico Creek, Little Chico Creek, and Butte Creek) that traverse the Vina Chico, but the GSP does not identify if the streams are ephemeral or perennial.  

In the Vina South management area, the GSP states that significant numbers of users typically depend on groundwater from relatively shallow domestic wells and the management area is dominated by irrigated agriculture dependent on groundwater and, to a lesser extent, surface water diversions primarily from Butte Creek. A number of perennial and ephemeral streams (Butte Creek, Little Dry Creek, and Dry Creek) traverse the Vina South management area.  

The GSP sufficiently describes the reasoning for dividing the Subbasin into management areas along with the characteristics and features of each management area. Department staff believe that the established management areas will likely help in Plan implementation as each management area appear to have unique challenges and opportunities.

4.3 SUSTAINABLE MANAGEMENT CRITERIA

GSP Regulations require each Plan to include a sustainability goal for the basin and to characterize and establish undesirable results, minimum thresholds, and measurable objectives for each applicable sustainability indicator, as appropriate. The GSP Regulations require each Plan to define conditions that constitute sustainable groundwater management for the basin including the process by which the GSA characterizes undesirable results and establishes minimum thresholds and measurable objectives for each applicable sustainability indicator.  

4.3.1 Sustainability Goal

GSP Regulations require that GSAs establish a sustainability goal for the basin. The sustainability goal should be based on information provided in the GSP’s basin setting and should include an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation.  

The sustainability goal for the Subbasin is “to ensure that groundwater is managed to provide a water supply of adequate quantity and quality to support rural areas and communities, the agricultural economic base of the region, and environmental uses now and in the future.” The GSP states that groundwater management is already occurring in the Subbasin which has resulted in enhanced monitoring. While the GSP states that the groundwater levels in the Subbasin may continue to decline during the implementation period, the GSP focuses on having stable groundwater levels for the long term and

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155 Vina Subbasin GSP, Section 1.2.2.2, pp. 64-65.  
156 Vina Subbasin GSP, Section 1.2.2.3, p. 65.  
157 23 CCR § 354.22 et seq.  
158 23 CCR § 354.24.  
159 Vina Subbasin GSP, Section 3.1, p. 183.  
160 Vina Subbasin GSP, Section 3.1, p. 183.
operating the Subbasin within its sustainable yield.\textsuperscript{161} The GSAs intend to achieve the Subbasin’s sustainability goal by implementing projects and management actions which are aimed to increase direct and in-lieu recharge, promote water conservation, and enhance monitoring.\textsuperscript{162} The GSAs have adopted an adaptive management strategy under which new projects may be proposed, and the projects proposed in this GSP may be further expanded and modified depending on the groundwater conditions in the Subbasin.\textsuperscript{163} The GSP has included demand management as one of the management actions and intends to implement it only if the proposed projects fail to achieve interim milestones and the Subbasin is projected to not achieve sustainability goals by 2042.\textsuperscript{164}

Department staff note the Subbasin’s sustainability goal substantially complies with the requirement of the GSP Regulations.

4.3.2 Sustainability Indicators

Sustainability indicators are defined as any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results.\textsuperscript{165} Sustainability indicators thus correspond with the six undesirable results – chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon, significant and unreasonable reduction of groundwater storage, significant and unreasonable seawater intrusion, significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies, land subsidence that substantially interferes with surface land uses, and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water\textsuperscript{166} – but refer to groundwater conditions that are not, in and of themselves, significant and unreasonable. Rather, sustainability indicators refer to the effects caused by changing groundwater conditions that are monitored, and for which criteria in the form of minimum thresholds are established by the agency to define when the effect becomes significant and unreasonable, producing an undesirable result.

GSP Regulations require that GSAs provide descriptions of undesirable results including defining what are significant and unreasonable potential effects to beneficial uses and users for each sustainability indicator.\textsuperscript{167} GSP Regulations also require GSPs provide the criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based

\begin{itemize}
\item \textsuperscript{161} Vina Subbasin GSP, Section 3.1, p. 183.
\item \textsuperscript{162} Vina Subbasin GSP, Section 3.1, p. 183, Table 5-1, pp. 231-232.
\item \textsuperscript{163} Vina Subbasin GSP, Section 5, pp. 228-251.
\item \textsuperscript{164} Vina Subbasin GSP, Section 5.3.7, pp. 250-251.
\item \textsuperscript{165} 23 CCR § 351(ah).
\item \textsuperscript{166} Water Code § 10721(x).
\item \textsuperscript{167} 23 CCR §§ 354.26 (a), 354.26 (b)(c).
\end{itemize}
on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.\textsuperscript{168}

GSP Regulations require that the description of minimum thresholds include the information and criteria relied upon to establish and justify the minimum threshold for each sustainability indicator.\textsuperscript{169} GSAs are required to describe how conditions at minimum thresholds may affect beneficial uses and users,\textsuperscript{170} and the relationship between the minimum thresholds for each sustainability indicator, including an explanation for how the GSA has determined conditions at each minimum threshold will avoid causing undesirable results for other sustainability indicators.\textsuperscript{171}

GSP Regulations require that GSPs include a description of the criteria used to select measurable objectives, including interim milestones, to achieve the sustainability goal within 20 years.\textsuperscript{172} GSP Regulations also require that the measurable objectives be established based on the same metrics and monitoring sites as those used to define minimum thresholds.\textsuperscript{173}

The following subsections thus consolidate three facets of sustainable management criteria: undesirable results, minimum thresholds, and measurable objectives. Information, as presented in the Plan, pertaining to the processes and criteria relied upon to define undesirable results applicable to the Subbasin, as quantified through the establishment of minimum thresholds, are addressed for each applicable sustainability indicator. A submitting agency is not required to establish criteria for undesirable results that the agency can demonstrate are not present and are not likely to occur in a basin.\textsuperscript{174}

\textbf{4.3.2.1 Chronic Lowering of Groundwater Levels}

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the chronic lowering of groundwater, the GSP Regulations require the minimum threshold for chronic lowering of groundwater levels to be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results that is supported by information about groundwater elevation conditions and potential effects on other sustainability indicators.\textsuperscript{175}

The GSP defines significant and unreasonable lowering of groundwater levels as “sustainably constructed domestic wells going dry during non-dry year conditions”.\textsuperscript{176} Sustainably constructed wells are defined in the GSP as “wells that have been installed following the relevant County Well standards within permeable aquifer material and the

\textsuperscript{168} 23 CCR § 354.26 (b)(2).
\textsuperscript{169} 23 CCR § 354.28 (b)(1).
\textsuperscript{170} 23 CCR § 354.28 (b)(4).
\textsuperscript{171} 23 CCR § 354.28 (b)(2).
\textsuperscript{172} 23 CCR § 354.30 (a).
\textsuperscript{173} 23 CCR § 354.30 (b).
\textsuperscript{174} 23 CCR § 354.26 (d).
\textsuperscript{175} 23 CCR § 354.28(c)(1) \textit{et seq}.
\textsuperscript{176} Vina Subbasin GSP, Section 3.3.2, p. 185.
wells have been appropriately maintained (e.g., well problems are not due to clogging of well screens or sitting of well).  

The GSP states that “[a]n undesirable result caused by the chronic lowering of groundwater levels is experienced if sustained groundwater levels are too low to provide a water supply of adequate quantity and quality to support rural areas and communities, and the agricultural economic base of the region, or if significant and unreasonable impacts to environmental uses of groundwater occur”. \(^{177}\) Department staff note that “adequate quantity and quality” and “significant and unreasonable impacts to environmental uses of groundwater” are not defined when qualifying undesirable results. The undesirable result in terms of quantified exceedance of minimum threshold is defined as “[t]wo [representative monitoring site] wells within a management area reach their [minimum threshold] for two consecutive years of non-dry year-types.” \(^{179}\) The GSP states that “[n]on-dry year types include wet, above normal, and below normal as defined by the Sacramento Valley Water Year Index”. \(^{180}\)

Department staff note that the GSP excludes dry and critical years in the definition of undesirable results, and these dry conditions are also excluded in the definition of significant and unreasonable lowering of groundwater levels. SGMA includes a provision which states, “overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.” \(^{109}\) As such, Department staff conclude the inclusion of language in the definition of an undesirable result and in the discussion of significant and unreasonable conditions that precludes undesirable results during dry years without discussing how extractions and recharge will be managed to offset these potential impacts in other periods is problematic. The GSAs should revise the definition of undesirable results to remove the non-dry year condition, or discuss how extractions and recharge will be managed to ensure that reductions in groundwater levels or storage during dry years are offset by increases in groundwater levels or storage during other periods (see Recommended Corrective Action 3a).

While establishing groundwater level minimum thresholds, the GSP focuses on the protection of sustainably constructed domestic wells because dewatering domestic wells is a concern in the Subbasin. Per the GSP, the minimum thresholds are aimed to protect the majority of domestic wells, including those not constructed sustainably. Domestic wells are generally shallower than other well types; therefore, the water level that is protective of domestic wells is considered protective of other wells too. \(^{181}\) The GSP states

\(^{177}\) Vina Subbasin GSP, Section 3.3.2, p. 186.  
\(^{178}\) Vina Subbasin GSP, Section 3.3.1, p. 185.  
\(^{179}\) Vina Subbasin GSP, Section 3.3.2, p. 185.  
\(^{180}\) Vina Subbasin GSP, Section 3.3.2, p. 185.  
\(^{181}\) Vina Subbasin GSP, Section 3.3.2, p. 186.
that the domestic well dataset was refined by removing wells installed before 1980 so that the wells that remained in the dataset are likely to be consistent with the current County well standards and currently serving domestic households.\textsuperscript{182} Maps showing the depths of domestic wells and other wells in the Subbasin are provided in the GSP.\textsuperscript{183}

To establish groundwater level minimum thresholds, the GSP divides management areas into "polygons that represent proximate areas to each [representative monitoring site] well".\textsuperscript{184} There is one representative monitoring site well per polygon.\textsuperscript{185} A unique minimum threshold is established at each representative monitoring site well to protect the sustainably constructed domestic wells, as well as to mitigate the impact on the majority of domestic wells. The GSP states that the Vina Chico management area was not divided into polygons because of its size and the same minimum threshold is applied to all representative monitoring site wells.\textsuperscript{186}

The minimum threshold groundwater levels are the levels “that would be protective of the majority of the domestic wells in the [representative monitoring site] zone”.\textsuperscript{187} The GSP recognizes that the representative monitoring site well is not fully representative of wells within the zone due to changes in ground surface and water surface elevations.\textsuperscript{188} The GSP clarifies that the wells with the bottom of well above the minimum thresholds are either shallow wells (less than 100 feet deep) or have a significantly different (higher) ground surface elevation than the representative well.\textsuperscript{189}

While the GSAs established minimum thresholds to protect the majority of the domestic wells and provide some information on which wells might be protected, the Plan does not explain what is meant by “the majority of the domestic wells.” Because the GSP did not say that all the sustainably constructed domestic wells will be protected, this indicates that some of the domestic wells may be impacted or go dry at the proposed minimum threshold. Department staff recommend the GSAs provide information on impacts to domestic wells during projected conditions where minimum thresholds are exceeded but undesirable results do not occur and quantify domestic wells that will be impacted. Furthermore, the Department staff recommend evaluating impacts of proposed minimum thresholds on other beneficial uses and users, such as public and small water systems and environmental uses and users, as the GSP does not evaluate those impacts (see \textbf{Recommended Corrective Action 3b}).

Further, Department staff note the GSA does not access how the proposed minimum thresholds for the chronic lowering of groundwater levels may impact other sustainability

\begin{itemize}
\item \textsuperscript{182} Vina Subbasin GSP, Section 3.3.2, p. 186.
\item \textsuperscript{183} Vina Subbasin GSP, Appendix 3-A, pp. 289-292.
\item \textsuperscript{184} Vina Subbasin GSP, Section 3.3.2, p. 186.
\item \textsuperscript{185} Vina Subbasin GSP, Appendix 3-B, pp. 294 and 304.
\item \textsuperscript{186} Vina Subbasin GSP, Section 3.3.2, p. 186.
\item \textsuperscript{187} Vina Subbasin GSP, Section 3.3.2, p. 187.
\item \textsuperscript{188} Vina Subbasin GSP, Section 3.3.2, p. 187.
\item \textsuperscript{189} Vina Subbasin GSP, Section 3.3.2, p. 187.
\end{itemize}
indicators (e.g., groundwater storage, depletion of interconnected surface water, etc.). Considering the GSA is choosing to manage the Subbasin below historic lows, understanding this relationship will be important during plan implementation. Department staff recommend the GSA provide a description of the relationship between established minimum thresholds for the chronic lowering of groundwater levels and how they avoid undesirable results for each of the other sustainability indicators (see Recommended Corrective Action 3c).

Department staff note the GSP includes a management action entitled “Domestic Well Mitigation” that aims to potentially provide resources to well owners impacted by groundwater management and lowering groundwater levels planned under the GSAs’ management of the Subbasin. Under this management action, the GSAs plan to collect data on domestic wells to determine which well owners potentially need assistance; secure financial resources to assist with the repair, replacement, and deepening of domestic wells; and provide emergency response to well owners including supplying bottled water and potable water for sanitation. Department staff are encouraged by the GSAs’ proposed management action to assist well owners who may be impacted by the proposed groundwater management of the Subbasin. Department staff recommend the GSAs utilize the Department’s Drinking Water Guidance as appropriate and provide updates to the Plan about the progress of this program during GSP implementation.

The measurable objective is defined as “the groundwater level based on the groundwater trend line of the [representative monitoring site] well for the dry periods (since 2000) of observed short-term climatic cycles extended to 2030”. In other words, measurable objectives reflect the groundwater level trend that will be observed in 2030 based on the linear projection of the groundwater level data for the dry periods since 2000. Groundwater level data shows cyclic fluctuations over a four-to seven-year cycle and, generally, the lowest groundwater levels of a given cycle were used for this projection. Since there is a continuous long-term decline in groundwater levels, the measurable objectives or the projected 2030 levels are the lowest levels observed since 2000 and generally lower than the groundwater levels observed in 2015. The GSP clarifies that the measurable objective water level is chosen as the 2030 water level because it will take time to stop the long-term decline through the implementation of water efficiency and supply augmentation projects.

The GSP states that interim milestones are based on linear interpolation of groundwater levels at each representative monitoring site. However, the majority of the interim milestone groundwater levels are the same as the measurable objectives and when the

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190 Vina Subbasin GSP, Section 3.3.3, p. 188.
191 Vina Subbasin GSP, Section 3.3.3, pp. 187-188.
192 Vina Subbasin GSP, Section 3.3.3, p. 188, Appendix 3-C, pp. 311-331.
193 Vina Subbasin GSP, Section 3.3.3, p. 188.
194 Vina Subbasin GSP, Section 3.3.3, p. 189.
interim milestones are different, they only differ by a few feet. The GSP also states that the observed groundwater levels may be higher than the established interim milestones because the interim milestones are projected based on the dry years in the cycle.

The GSP considers the beneficial uses and users of groundwater by analyzing minimum threshold impacts on domestic wells and establishing minimum thresholds that are protective of sustainably constructed wells. The measurable objectives set at 2030 groundwater levels are 10 to 84 feet higher than the minimum threshold levels. The GSP states that this range between minimum thresholds and measurable objectives provides operational flexibility for active management. Although groundwater levels will continue to decline for some time, the GSAs plan to stabilize groundwater levels by 2030 through the implementation of various projects and management actions. For more information on the proposed projects and management actions, please see Projects and Management Actions (Section 4.5). Department staff note that the Agencies’ approach, of allowing the groundwater level to further decline until 2030, is based on the anticipation that it will take a few years to implement the water conservation and supply augmentation projects and to reflect the benefit of these projects on groundwater levels.

Despite the identification of multiple recommended corrective actions, the GSP’s discussion of minimum thresholds and measurable objectives for the chronic lowering of groundwater levels seems to be comprehensive and includes adequate support, justification, and information to understand the GSAs’ process, analysis, and rationale. Although Department staff have requested the GSA further evaluate potential impacts to beneficial uses and users, the GSP includes a well mitigation program to assist any well owners who may be impacted during initial plan implementation which is a consideration of these users. While Department staff have also noted the GSA needs to evaluate the potential impacts to other sustainability indicators at the proposed minimum thresholds, this does not preclude plan approval at this time since the GSA’s planned management maintains current groundwater level trends until 2030 and will likely not cause undesirable results as defined in the Plan. Department staff expect the GSA to update the plan accordingly and potentially refine the groundwater level sustainable management criteria as more information becomes available to ensure the proposed management considers beneficial uses and users and does not cause undesirable results for other sustainability indicators.

4.3.2.2 Reduction of Groundwater Storage
In addition to components identified in 23 CCR §§ 354.28 (a-b), for the reduction of groundwater storage, the GSP Regulations require the minimum threshold for the reduction of groundwater storage to be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the

195 Vina Subbasin GSP, Table 3-1, p. 190.
196 Vina Subbasin GSP, Section 3.3.3, p. 189.
197 Vina Subbasin GSP, Table 3-1, p. 190, Section 3, p. 182, Section 3.3.2, p. 187.
sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.\textsuperscript{198}

The GSP states that the sustainable management criteria developed for groundwater levels are used for groundwater storage because groundwater levels and groundwater storage are closely related and measured changes in groundwater levels can serve as a proxy for change in groundwater storage.\textsuperscript{199} Because groundwater levels are used as a proxy, the minimum thresholds and measurable objectives for groundwater storage are the same as groundwater levels.\textsuperscript{200}

The GSP states that an undesirable result related to the reduction of groundwater storage is experienced “if sustained groundwater storage volumes are insufficient to support rural areas and communities, the agricultural economic base of the region, and environmental uses”.\textsuperscript{201} The GSP further states that minimum thresholds intended to prevent significant and unreasonable impacts on groundwater levels are assumed adequate to protect against significant and unreasonable reductions of groundwater storage.\textsuperscript{202} As per the GSP “[t]he aquifer system in the Vina Subbasin generally has sufficient groundwater storage capacity to take additional groundwater recharge during wet periods and remain saturated during dry periods, allowing for a range of active management reflecting the desired state for groundwater storage at the year 2042.”

The GSP’s discussion of minimum thresholds and measurable objectives for the reduction of groundwater storage seems to be comprehensive and includes adequate support, justification, and information to understand the GSAs’ process, analysis, and rationale. Department staff conclude that the GSP’s discussion and presentation of information covers the specific items listed in the GSP Regulations in an understandable format using appropriate data and assumptions. Staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

4.3.2.3 \textit{Seawater Intrusion}

In addition to components identified in 23 CCR §§ 354.28 (a-b), for seawater intrusion, the GSP Regulations require the minimum threshold for seawater intrusion to be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results.\textsuperscript{203}

The GSP does not consider seawater intrusion an applicable sustainability indicator in the Subbasin due to its distance from the Pacific Ocean.\textsuperscript{204} Therefore, the GSP does not
define undesirable results and establish sustainable management criteria for seawater intrusion. Department staff regard the GSAs’ rationale for not setting sustainable management criteria for seawater intrusion to be reasonable given the location of the Subbasin.

4.3.2.4 Degraded Water Quality
In addition to components identified in 23 CCR §§ 354.28 (a-b), for degraded water quality, the GSP Regulations require the minimum threshold for degraded water quality to be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.205

Per the GSP, undesirable results related to water quality due to groundwater pumping in the Subbasin have not occurred historically, are not currently occurring, and are not likely to occur in the future.206 While the GSP briefly discusses the presence of various water quality constituents of concern in the Subbasin, the only acknowledgment of groundwater quality conditions in the Subbasin to support the sustainable management criteria is for specific conductance, which is a measurement of salinity. The salinity appears to be relatively stable over the years and well below the regulatory limits as the GSP states, “observations of specific conductance at [representative monitoring sites] from 2008 through 2019 ranged between 148 and 364 [microsiemens per centimeter (μS/cm)] and demonstrated no trend.”207

To determine what is considered “significant and unreasonable” degraded water quality, the GSAs consulted with stakeholders in the Subbasin and determined that the following could be potential impacts: aesthetic concerns for drinking water; reduced crop yield and quality; and increased reliance on surface water for blending.208 Considering these potential impacts, degraded water quality would be significant and unreasonable, and therefore an undesirable result, “if groundwater quality degrades such that the specific conductance exceeds the upper limit of the Secondary Maximum Contaminant Level (SMCL) of 1,600 µS/cm based on the State Secondary Drinking Water Standards.”209 The GSP acknowledges that the State Secondary Drinking Water Standards are set on the basis of aesthetic concerns and water exceeding the SMCL is typically unacceptable for drinking water.

205 23 CCR § 354.28(c)(4).
206 Vina Subbasin GSP, Section 3.5.2, p. 192.
207 Vina Subbasin GSP, Section 3.5.2, p. 192.
208 Vina Subbasin GSP, Section 3.5.2, p. 192.
209 Vina Subbasin GSP, Section 3.5.2, p. 192.
The GSP states that an undesirable result related to degraded water quality is experienced if "groundwater pumping that degrades water quality and compromises the long-term viability of rural areas and communities, the agricultural economic base of the region, and environmental uses for suitable habitat". The GSP also defines undesirable result occurrence in terms of a minimum threshold exceedance, where an undesirable result "occurs in the Vina Subbasin when two [representative monitoring site] wells exceed their [minimum threshold] for two consecutive non-dry years."

Department staff note that the GSP excludes dry and critical years in the definition of undesirable results. Department staff conclude that including language in the definition of an undesirable result that precludes undesirable results during dry years without discussing how the degradation of groundwater quality will be managed in other periods may be problematic. The GSAs should revise the definition of undesirable results to remove the non-dry year condition or discuss how degradation during dry periods will be managed as necessary to ensure that adverse water quality conditions are offset during other periods (see Recommended Corrective Action 4).

The minimum thresholds and measurable objectives are established based on the SMCL of specific conductance (salinity). The minimum threshold and the measurable objective are established at 1,600 µS/cm and 900 µS/cm, respectively, which are the upper and the lower limits of the SMCL for specific conductance. The minimum threshold is defined as “the upper limit of the SMCL for specific conductance based on the State Secondary Drinking Water Standards”. The measurable objective is defined as “the recommended SMCL for specific conductance based on the State Secondary Drinking Water Standards”. As previously explained, the GSP states that an undesirable result is considered significant and unreasonable if groundwater quality degrades such that the specific conductance exceeds the upper limit of the SMCL of 1,600 µS/cm.

Despite the presence of various constituents of concern, the GSAs established sustainable management criteria only for salinity and do not intend to manage other constituents of concern because the groundwater quality management in the Subbasin is led and overseen by other entities under existing laws and regulations. Department staff note that the GSAs plan to coordinate with the applicable agencies implementing water quality management and regulatory programs to understand if the existing regulations are being met or if groundwater pumping in the Subbasin is adversely impacting the constituents managed or regulated under these programs. Department staff reiterate the need for the GSAs to provide detailed information on all water quality

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210 Vina Subbasin GSP, Section 3.5.1, p. 191.
211 Vina Subbasin GSP, Section 3.5.1, p. 191.
212 Vina Subbasin GSP, Section 3.5.2, p. 192.
213 Vina Subbasin GSP, Section 3.5.2, p. 192, Section 3.5.3, p. 193.
214 Vina Subbasin GSP, Section 3.5.2, p. 192
215 Vina Subbasin GSP, Section 3.5.2, p. 192
216 Vina Subbasin GSP, Section 3.5.1, p. 192.
constituents of concern and to discuss how existing groundwater quality conditions and/or remediation efforts may impact the GSAs’ ability to manage groundwater as requested in Recommended Corrective Actions 1a through 1d.

Despite the identification of a recommended corrective action, the GSP’s discussion of constituents of concern in the Subbasin and the degraded water quality sustainability indicator is comprehensive and includes adequate support, justification, and information to understand the GSAs’ process, analysis, and rationale. While Department staff have noted the GSA needs to remove the exemption that excludes dry and critical years from the definition of undesirable results, this flaw does not preclude plan approval at this time as water quality is closely regulated by many other agencies in the Subbasin. Staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

4.3.2.5 Land Subsidence

In addition to components identified in 23 CCR §§ 354.28 (a-b), the GSP Regulations require the minimum threshold for land subsidence to be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency’s rationale for establishing minimum thresholds in light of those effects and maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum thresholds and measurable objectives.

The GSP states a review of data collected from 2005 to 2019 at GPS monuments located within the Subbasin showed that changes in ground surface elevations were slight and remained at or above baseline levels, indicating that inelastic land subsidence has not occurred in the Subbasin. The GSP further states that the absence of inelastic subsidence is likely due to the presence of subsurface materials that are not susceptible to subsidence and relatively stable groundwater levels.

The GSP states that the sustainable management criteria developed for groundwater levels are used for land subsidence because land subsidence typically occurs concurrently or shortly after significant declines in groundwater levels; therefore, measured changes in groundwater levels can serve as a proxy for potential land subsidence. Since groundwater levels are used as a proxy for determining undesirable

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217 23 CCR § 354.28(c)(5).
218 23 CCR §§ 354.28(c)(5)(A-B).
219 Vina Subbasin GSP, Section 3.7.1, p. 195.
220 Vina Subbasin GSP, Section 3.7.1, p. 195.
221 Vina Subbasin GSP, Section 3.7.1, pp. 194-195
result associated with land subsidence, the minimum thresholds and measurable objectives for land subsidence are the same as groundwater levels.  

The GSP states that an undesirable result resulting from land subsidence is experienced if “groundwater pumping leads to changes in the ground surface elevation severe enough to disrupt critical infrastructure, development of projects that enhance the viability of rural areas, communities, and the agricultural economic base of the region.” The GSP identifies critical infrastructure that could be affected by subsidence as federal, state, and county roads and highways, irrigation district infrastructure, railroad infrastructure, and power transmission lines. The GSP states that undesirable results related to land subsidence in the Vina Subbasin have not occurred historically, are not currently occurring, and are not likely to occur in the future. Department staff note that while undesirable results related to land subsidence have not occurred in the past, there is a potential to occur undesirable results in the future given the GSAs’ proposed management strategy to lower groundwater levels below historic lows. Department staff recommend GSAs provide a clear, quantitative definition of when undesirable results for land subsidence may occur in the Subbasin, as required by the GSP regulations (see Recommended Corrective Action 5a).

While the GSP states that inelastic land subsidence due to groundwater pumping is unlikely to produce an undesirable result in the Subbasin, the groundwater levels will continue to decline before they will stabilize in 2030. Because the groundwater level is anticipated to decline in the near future and the future groundwater levels will be lower than historical lows, Department staff believe that it is important for GSAs to monitor the land subsidence using a method that can directly measure land elevation changes and provide quantitative data. Furthermore, Department staff conclude that the use of groundwater level as a proxy for land subsidence is inappropriate because of GSAs’ plan to allow continued lowering of groundwater level. Therefore, Department staff recommend the GSAs establish sustainable management criteria for land subsidence utilizing a monitoring network that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations (see Recommended Corrective Action 5b).

Despite the identification of a recommended corrective action, the GSP’s discussion of land subsidence is comprehensive and includes adequate support, justification, and information to understand the GSAs’ process, analysis, and rationale. While Department staff have asked the GSA to remove the use of groundwater levels as a proxy for land subsidence, this flaw does not preclude plan approval as the Subbasin does not appear to have any significant current or historical land subsidence. Department staff are aware

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222 Vina Subbasin GSP, Section 3.7.1, pp. 194-195, Section 3.7.2, p. 195.
223 Vina Subbasin GSP, Section 3.7.1, p. 194.
224 Vina Subbasin GSP, Section 3.7.1, p. 195.
225 Vina Subbasin GSP, Section 3.7.1, p. 195.
226 Vina Subbasin GSP, Section 3.3.3, pp. 187-188
of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

4.3.2.6 Depletions of Interconnected Surface Water

SGMA defines undesirable results for the depletions of interconnected surface water as those that have significant and unreasonable adverse impacts on beneficial uses of surface water and are caused by groundwater conditions occurring throughout the basin.\(^{227}\) The GSP Regulations require that a Plan identify the presence of interconnected surface water systems in the basin and estimate the quantity and timing of depletions of those systems.\(^{228}\) The GSP Regulations further require that minimum thresholds be set based on the rate or volume of surface water depletions caused by groundwater use, supported by information including the location, quantity, and timing of depletions, that adversely impact beneficial uses of the surface water and may lead to undesirable results.\(^{229}\)

The Plan acknowledges that most of the streams in the Subbasin are interconnected surface water bodies and identifies their location using Butte Basin Groundwater Model. Department staff are satisfied that the GSA(s) have adopted a reasonable approach of utilizing groundwater model to identify the location of interconnected surface waters in the Subbasin.

Although the GSP provides inconsistent information regarding stream gains and losses, it does provide rate and volume of surface water depletions. However, the GSP does not specify if the quantified rate or volume of surface water depletions due to groundwater pumping as required by the GSP Regulations.\(^{230}\) Instead, the GSP proposes to use groundwater levels as a proxy for depletions of interconnected surface water because the connectivity between the surface water and groundwater is not well measured or understood at this time.\(^{231}\) The GSP further elaborates that the groundwater model incorporates interaction of surface water and groundwater at a regional scale but there are significant data gaps that limit calibration of the groundwater response to the uppermost layer of the model.\(^{232}\) The GSP also states that an accelerated schedule has been developed to fill these data gaps, and the sustainable management criteria for depletions of interconnected surface water will be established in the future.\(^{233}\)

The GSAs have not provided a technical justification for the use of groundwater elevations as a proxy for quantifying the location, quantity, and timing of depletions of interconnected surface water due to groundwater extraction. As a result, the GSAs have not

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\(^{227}\) Water Code § 10721(x)(6).
\(^{228}\) 23 CCR § 354.16 (f).
\(^{229}\) 23 CCR § 354.28 (c)(6).
\(^{230}\) 23 CCR § 354.28 (c)(6).
\(^{231}\) Vina Subbasin GSP, Section 3.8.3, p. 200, Section 3.8.4, p. 200, Section 3.8.5, p. 200.
\(^{232}\) Vina Subbasin GSP, Section 3.8.4, p. 200.
\(^{233}\) Vina Subbasin GSP, Section 3.8.3, p. 200.
demonstrated by adequate evidence that groundwater elevation can serve as a sustainability indicator for the depletions of interconnected surface water.

The GSP defines undesirable result as “[a]voiding significant and unreasonable depletions of surface water flows caused by groundwater pumping that significantly impacts beneficial uses”. 234 The minimum thresholds and measurable objectives for depletions of interconnected surface water are the same as groundwater levels because groundwater levels are used as a proxy. 235

Department staff understand that quantifying depletions of surface water from groundwater extractions is a complex task that likely requires developing new, specialized tools, models, and methods to understand local hydrogeologic conditions, interactions, and responses. During the initial review of GSPs, Department staff have observed that most GSAs have struggled with this new requirement of SGMA. However, staff believe that most GSAs will more fully comply with regulatory requirements after several years of Plan implementation that includes projects and management actions to address the data gaps and other issues necessary to understand, quantify, and manage depletions of interconnected surface waters. Accordingly, Department staff believes that affording GSAs adequate time to refine their Plans to address interconnected surface waters is appropriate and remains consistent with SGMA’s timelines and local control preferences.

The Department will continue to support GSAs in this regard by providing, as appropriate, financial and technical assistance to GSAs, including the development of guidance describing appropriate methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water caused by groundwater extractions. Once the Department’s guidance related to depletions of interconnected surface water is publicly available, the GSAs, where applicable, should consider incorporating appropriate guidance approaches into their future periodic evaluations to the GSP (see Recommended Corrective Action 6a). GSAs should consider availing themselves of the Department’s financial or technical assistance, but in any event must continue to fill data gaps, collect additional monitoring data, and implement strategies to better understand and manage depletions of interconnected surface water caused by groundwater extractions and define segments of interconnectivity and timing within their jurisdictional area (see Recommended Corrective Action 6b). Furthermore, GSAs should coordinate with local, state, and federal resources agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion (see Recommended Corrective Action 6c).

4.4 MONITORING NETWORK
The GSP Regulations describe the monitoring network that must be developed for each sustainability indicator including monitoring objectives, monitoring protocols, and data

234 Vina Subbasin GSP, Section 3.8.3, p. 200.
235 Vina Subbasin GSP, Section 3.8.4, p. 200, Section 3.8.5, pp. 200-201.
reporting requirements. Collecting monitoring data of a sufficient quality and quantity is necessary for the successful implementation of a groundwater sustainability plan. The GSP Regulations require a monitoring network of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.\(^{236}\) Specifically, a monitoring network must be able to monitor impacts to beneficial uses and users,\(^{237}\) monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds,\(^{238}\) capture seasonal low and high conditions,\(^{239}\) include required information such as location and well construction and include maps and tables clearly showing the monitoring site type, location, and frequency.\(^{240}\) Department staff encourage GSAs to collect monitoring data as specified in the GSP, follow SGMA data and reporting standards,\(^{241}\) fill data gaps identified in the GSP prior to the first periodic evaluation,\(^{242}\) update monitoring network information as needed, follow monitoring best management practices,\(^{243}\) and submit all monitoring data to the Department’s Monitoring Network Module immediately after collection including any additional groundwater monitoring data that is collected within the Plan area that is used for groundwater management decisions. Department staff note that if GSAs do not fill their identified data gaps, the GSAs’ basin understanding may not represent the best available science for use to monitor basin conditions.

The GSAs have developed monitoring networks for chronic lowering of groundwater level and degraded water quality. The GSAs propose to use the groundwater level monitoring network as a proxy for the reduction of groundwater in storage, land subsidence, and depletions of interconnected surface water sustainability indicators. The GSAs do not establish a dedicated monitoring network for the seawater intrusion sustainability criterion because the GSAs have determined this sustainability indicator is not applicable to the Subbasin.

The GSP included 78 wells (59 sites) in the groundwater levels monitoring network, with 25 of the wells located in the Vina North management area, 14 in the Vina Chico management area, and 39 in the Vina South management area.\(^{244}\) Of the 78 wells, a total of 17 wells are identified as representative monitoring wells with six located in the Vina North management area, five located in the Vina Chico management area, and six located in the Vina South management area.\(^{245}\) The wells are drilled and screened at various depths to measure groundwater levels in the single principal aquifer. The

\(^{236}\) 23 CCR § 354.32.
\(^{237}\) 23 CCR § 354.34(b)(2).
\(^{238}\) 23 CCR § 354.34(b)(3).
\(^{239}\) 23 CCR § 354.34(c)(1)(B).
\(^{240}\) 23 CCR §§ 354.34(g-h).
\(^{241}\) 23 CCR § 352.4 et seq.
\(^{242}\) 23 CCR § 354.38(d).
\(^{244}\) Vina Subbasin GSP, Section 4.2, p. 204.
\(^{245}\) Vina Subbasin GSP, Table 3-1, p. 190.
densities of monitoring wells are 22 wells per 100 square miles in Vina North management area, 30 well per 100 square miles in Vina Chico management area, and 30 wells per 100 square miles in Vina South management area, which are above the range of 0.2 to 10 wells per 100 square miles recommended in the Department’s Best Management Practices. 246 Additionally, Department staff calculate the density of the proposed monitoring wells in the Subbasin to be approximately 27 wells per 100 square miles which is slightly less than the 31 wells per 100 square miles stated in the GSP, but still exceeding the range (0.2 – 10 wells per 100 square miles) recommended by the Department.247 The monitoring wells are unevenly distributed in the Subbasin; however, Department staff believe that the proposed monitoring network contains a reasonable density of monitoring wells in the principal aquifer to demonstrate groundwater occurrence, flow direction, and lateral hydraulic gradient within the aquifer.

The frequency of groundwater level monitoring varies between hourly, tri-annually, and quarterly to capture seasonal highs and lows.248 The GSP states water levels in the representative monitoring wells will be monitored at least bi-annually (spring and fall) for the purpose of SGMA compliance, and data will continue to be taken at wells now monitored at greater frequencies according to their existing monitoring schedules.249 While the GSAs are planning to monitor groundwater levels bi-annually at a minimum, the GSP does not provide specific months when the monitoring will take place. The GSP does not provide analysis to support the justification that the proposed frequency of measurements can accurately capture the seasonal highs and lows in the Subbasin. Therefore, Department staff recommend GSAs should specify which months depict the seasonal high and low and provide justification on specified months representing the seasonal high and low.

The GSP proposes to use the groundwater level monitoring network as a proxy for the groundwater storage monitoring network.250 Department staff concur with the GSAs’ approach of using groundwater level as a proxy to monitor changes in groundwater storage.

The GSP states that the seawater intrusion sustainability indicator is not applicable to this Subbasin; therefore, no monitoring network is proposed.251 Department staff agree with the GSAs’ assessment of seawater intrusion; therefore, the development of a monitoring network is not required.

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246 Vina Subbasin GSP, Section 4.2.1, p. 209.
247 Vina Subbasin GSP, Section 4.2.1, p. 209.
248 Vina Subbasin GSP, Section 4.2.1, p. 208.
249 Vina Subbasin GSP, Section 4.2.1, p. 208.
251 Vina Subbasin GSP, Section 2.2.3, p. 125, Section 4.9, p. 420.
The proposed water quality monitoring network consists of seven monitoring wells and eight representative monitoring wells. There is one monitoring well in each of the Vina North and Vina Chico management areas and five monitoring wells in the Vina South management area. There are three representative monitoring wells in the Vina North management area, one in the Vina Chico management area, and four in the Vina South management area. The GSAs plan to monitor pH and temperature, but plan only to track specific conductance or salinity at the representative monitoring sites. The GSP states that the month of August is near the peak season for groundwater demand, so therefore, the GSAs plan to collect groundwater quality samples once a year in August to understand the water quality when the demand is at its highest.

Department staff note a clerical error in Section 4.9.2, which states that the representative monitoring sites were selected independently from the wells discussed in Section 4.5, but this section relates to subsidence monitoring. Section 4.9.2 also refers to Figure 4-5 while discussing the location of water quality monitoring sites, but the figure shows the location of groundwater level monitoring sites. Department staff recommend updating the section and figure numbers to direct the reader to the appropriate section and figure.

The GSP discusses the Sacramento Valley GPS Subsidence Monitoring Network and the availability of InSAR data for the Subbasin; however, the GSP does not clearly discuss how and if these data will be utilized for subsidence monitoring. Furthermore, in the sustainable management criteria section, the GSP discusses using the groundwater level as a proxy for land subsidence, but the GSP does not indicate or discuss using the groundwater level monitoring network as a proxy for the land subsidence monitoring network. Because GSAs' intent to monitor and manage land subsidence in the Subbasin is not clearly described in the Plan, Department staff recommend the GSAs establish monitoring for land subsidence utilizing a method that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations (see Recommended Corrective Action 5b).

The GSP states that a total of 78 monitoring wells and seven stream gages are included in the Subbasin’s network for monitoring groundwater and streamflow interactions, which means all the groundwater level monitoring sites in the Subbasin are included in the depletions of interconnected surface water monitoring network. Therefore,
Department staff are unable to determine which monitoring wells will be utilized to evaluate depletions of interconnected surface water. Department staff are unable to determine if the proposed monitoring network is sufficient to evaluate conditions related to depletions of interconnected surface water because pertinent information about the monitoring network, such as specific details regarding monitoring sites, frequency of monitoring, and scientific justification for site selection are not provided. Department staff recommend the GSAs clarify the groundwater level monitoring sites that will be used for the evaluation of depletions of interconnected surface water and provide site-specific information (see Recommended Corrective Action 6d).

While one or more recommended corrective actions are identified, the description of the monitoring network included in the Plan substantially complies with the requirements outlined in the GSP Regulations. Overall, the Plan describes in sufficient detail a monitoring network that promotes the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the Plan area and evaluate changing conditions that occur through Plan implementation. The GSP provides a good explanation for the conclusion that the monitoring network is supported by the best available information and data and is designed to ensure adequate coverage of sustainability indicators. The Plan also describes existing data gaps and the steps that will be taken to fill data gaps and improve the monitoring network. Department staff consider the information presented in the Plan to satisfy the general requirements of the GSP Regulations regarding monitoring network.

4.5 PROJECTS AND MANAGEMENT ACTIONS

The GSP Regulations require a description of the projects and management actions the submitting Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin. Each Plan’s description of projects and management actions must include details such as: how projects and management actions in the GSP will achieve sustainability, the implementation process and expected benefits, and prioritization and criteria used to initiate projects and management actions.

The GSP includes a suite of projects and management actions which are developed to benefit the Vina Subbasin’s groundwater supply and quality for all beneficial users. Between 2000 and 2018, the decrease in storage or the overdraft in the Subbasin is about 20,000 acre-feet per year which is about 0.1 percent of the total freshwater storage. The GSP includes 15 projects which are designed to increase direct and in-lieu recharge, promote water conservation and enhance monitoring. Among the 15 projects, five are

262 23 CCR § 354.44 (a).
263 23 CCR § 354.44 (b) et seq.
264 Vina Subbasin GSP, Section 5.1, p. 228.
265 Vina Subbasin GSP, Section 2.3.6, p. 178.
categorized as Planned Projects, eight are identified as Potential Projects, and two are
described as Conceptual Projects as shown below.266

Planned Projects

1. Agricultural Irrigation Efficiency
2. Residential Conservation
3. Scoping for Flood Managed Aquifer Recharge/Surface Water Supply and
   Recharge
4. Community Water Education Initiative
5. Fuels Management for Watershed Health

Potential Projects

1. Paradise Irrigation District Intertie
2. Agricultural Surface Water Supplies
3. Streamflow Augmentation
4. Community Monitoring Program
5. Recycled Wastewater
6. Rangeland Management
7. Removal of Invasive Species
8. Surface Water Supply and Recharge

Conceptual Projects

1. Extend Orchard Replacement
2. Recharge from the Miocene Canal

As per the GSP, Planned Projects “are anticipated to move forward to help achieve the
region’s sustainability before 2042”, Potential Projects “are currently in the initial planning
stages and may move forward as feasibility and project requirements are determined”,
and Conceptual Projects “are in the early conceptual planning states and would require
significant additional work to move forward”.267 While the GSP tentatively identifies the
implementation timeline of most projects, it also states that “[a]ll projects, regardless of
status, remain subject to available funding, any required CEQA compliance, and any
required approvals”.268 The GSP further states that the projects included in the GSP may
be further expanded or modified, or additional projects may be added in the future, as the
GSAs work toward GSP implementation to achieve sustainability by 2042.269

The GSP states that the projects included were based on the public acceptance of the
project and the GSAs plan to continue conducting public outreach and will be responsible
for notification of the projects.270 The GSP provides the estimated cost for a few projects,

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266 Vina Subbasin GSP, Section 5.2.2.1, p. 229.
267 Vina Subbasin GSP, Section 5.2.2.1, p. 229.
268 Vina Subbasin GSP, Section 5.2.2.1, p. 229.
269 Vina Subbasin GSP, Section 5.2.2.1, p. 229.
270 Vina Subbasin GSP, Section 5.2.2.1, p. 228, Section 5.2.6, p.249.
but for most of the projects the cost is to be determined.\textsuperscript{271} The sources of funding for the projects are identified as grant funding from the Department or from other Federal and State Agencies.\textsuperscript{272}

Based on the implementation schedule provided, all the Planned Projects and Potential Projects will be completed by 2042. One of the Planned Projects is already underway, another one is ready for implementation, and the remaining Planned Projects are in the planning stage.\textsuperscript{273} Consistent with GSP Regulations, the project descriptions for projects contain information regarding a description of the measurable objective that is expected to benefit from the project, implementation trigger, a summary of the permitting and regulatory process required, expected benefits, and legal authority under which each project will be implemented.

The GSP includes seven management actions as shown below. The GSP states that these management actions are options that the GSAs may consider during GSP implementation.\textsuperscript{274} The GSP further states that the groundwater allocation to manage groundwater demand will be implemented in the event that the proposed projects fail to achieve interim milestones and the Subbasin is projected to not be able to achieve sustainability goals by 2042.\textsuperscript{275}

**Management Actions**

1. General Plan Updates  
2. Domestic Well Mitigation  
3. Well Permitting Ordinance  
4. Landscape Ordinance  
5. Prohibition of Groundwater Use for Ski (Recreational) Lakes  
6. Expansion of Water Purveyors’ Service Area  
7. Groundwater Allocation

The GSAs plan to collaborate with Butte County and the City of Chico so that important components of the GSP are addressed in their general plans.\textsuperscript{276} The GSP states that data on domestic wells will be collected, and financial resources will be secured, to provide emergency response to homeowners with dry domestic wells.\textsuperscript{277} The GSAs plan to work with Butte County to amend the County code which requires domestic wells to be screened below the groundwater levels measured during the 1989 to 1994 drought.\textsuperscript{278} The GSP states that this amendment will improve water supply reliability of future

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\textsuperscript{271} Vina Subbasin GSP, Table 5-1, pp. 231-232.  
\textsuperscript{272} Vina Subbasin GSP, Section 5-2, pp. 228-249.  
\textsuperscript{273} Vina Subbasin GSP, Table 5-1, pp. 231-232.  
\textsuperscript{274} Vina Subbasin GSP, Section 5.3, p. 249.  
\textsuperscript{275} Vina Subbasin GSP, Section 5.3.7, pp. 250-251.  
\textsuperscript{276} Vina Subbasin GSP, Section 5.3.1, p. 249.  
\textsuperscript{277} Vina Subbasin GSP, Section 5.3.2, pp. 249-250.  
\textsuperscript{278} Vina Subbasin GSP, Section 5.3.3, p. 250.
agricultural and domestic wells. A new ordinance will be enacted by Butte County and/or the City of Chico requiring new development to use drought-resistant plants for landscaping. The GSAs would encourage the expansion of water purveyor’s service area so that the areas that solely rely on groundwater will have an alternate source of water and would reduce groundwater extraction.

The GSP does not provide an implementation schedule for the management actions and states that the schedule is likely to vary depending on the groundwater conditions of the Subbasin. While some of the management actions are likely to help reduce groundwater demand, the GSP does not quantify the expected benefit or the expected groundwater supply reduction.

Although the GSP lacks specific details regarding the expected benefit from management actions, the GSP provides an estimate of an expected groundwater supply reduction from most projects. The groundwater supply reductions from Planned, Potential, and Conceptual projects are up to 4,000 acre-feet per year, 19,000 acre-feet per year, and 20,000 acre-feet per year, respectively. The combined supply reduction from all the projects for which the expected benefits are quantified is about 33,000 acre-feet per year which is much higher than the estimated overdraft of 20,000 acre-feet per year.

The GSAs have an adaptive management strategy for the Subbasin as the GSP states that Planned Projects are anticipated to move forward but the implementation of Potential Projects and Conceptual Projects will be based on long-term management or changing needs of the GSAs or Vina Subbasin. The implementation of the projects is also based on the availability of funding and any required regulatory compliance and approvals. According to the adaptive management strategy, new projects may be proposed, and the projects proposed in the GSP may be further expanded and modified or the management actions may be implemented. The GSP acknowledges that additional data collected during this period helps reduce uncertainty and future decision-making for the Agencies. Department staff agree that adaptive management should be implemented given that proposed projects and management actions have not been fully developed. Additionally, Department staff recommend that the adaptive management strategy continues to be utilized to update projects and management actions to adapt to future conditions in the Subbasin.

The Plan adequately describes proposed projects and management actions in a manner that is generally consistent and substantially complies with the GSP Regulations.

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279 Vina Subbasin GSP, Section 5.3.3, p. 250.
280 Vina Subbasin GSP, Section 5.3.4, p. 250.
281 Vina Subbasin GSP, Section 5.3.6, p. 250.
282 Vina Subbasin GSP, Section 5, p. 249.
283 Vina Subbasin GSP, Table 5-1, pp. 231-232.
284 Vina Subbasin GSP, Section 5, pp. 228-249.
285 Vina Subbasin GSP, Section 5.2.2.1, p. 229.
286 Vina Subbasin GSP, Section 5, pp. 228-251.
projects and management actions, which focus largely on refining the GSAs’ understanding of basin conditions and avoiding undesirable results, are directly related to the sustainable management criteria and present a generally feasible approach to achieving the sustainability goal of the Plan area.

As projects and management actions are implemented, the Department expects that progress be included in annual reports and any addition or removal of project and management actions be documented in periodic evaluations.

4.6 CONSIDERATION OF ADJACENT BASINS/SUBBASINS

SGMA requires the Department to “…evaluate whether a groundwater sustainability plan adversely affects the ability of an adjacent basin to implement their groundwater sustainability plan or impedes achievement of sustainability goals in an adjacent basin.”287 Furthermore, the GSP Regulations state that minimum thresholds defined in each GSP be designed to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.288

The GSP acknowledges that the water management decisions and actions in the Vina Subbasin can affect adjacent basins because groundwater basins in the Northern Sacramento Valley are hydrologically interconnected. Therefore, the GSAs in the Vina Subbasin have been collaborating with GSAs in the adjacent basins on SGMA implementation efforts. Although there are only four groundwater basins that are adjacent to the Vina Subbasin, GSAs for the Vina Subbasin have been coordinating with GSAs from 10 groundwater basins (Antelope, Bowman, Butte, Colusa, Corning, Los Molinos, Red Bluff, Sutter, Wyandotte Creek, and Yolo) since 2020.289 While the collaboration among the GSAs began in 2020, because of insufficient time during the GSP development phase the GSAs were not able to fully characterize or address inconsistencies among the 11 GSPs.290 Therefore, the GSAs have developed a framework for long-term coordination which will be followed during Plan implementation.291 The GSP also discusses its inter-basin coordination plan which involves identifying and acknowledging significant discrepancies, understanding why those differences exist, and evaluating to the extent they need to be reconciled.292

According to the inter-basin coordination plan, the GSAs will also evaluate sustainable management criteria among the GSPs to assess impacts and identify significant differences and possible impacts between subbasins that could potentially lead to undesirable results, joint monitoring, regional modeling, and other efforts to address data gaps at subbasin boundaries, compiling and comparing model outputs, and so on.293

287 Water Code § 10733(c).
288 23 CCR § 354.28(b)(3).
289 Vina Subbasin GSP, Appendix 6-A, p. 335.
290 Vina Subbasin GSP, Appendix 6-A, p. 335.
291 Vina Subbasin GSP, Appendix 6-A, p. 335.
292 Vina Subbasin GSP, Appendix 6-A, p. 337.
293 Vina Subbasin GSP, Appendix 6-A, p. 338.
Department staff concur with the GSAs’ plan to collaborate and coordinate with multiple groundwater basins to ensure that sustainability will be achieved at the regional level and the management of one basin will not adversely impact the management of other interconnected basins.

Based on information available at this time, Department staff have no information that would indicate that groundwater management in the Subbasin will adversely affect groundwater conditions in the adjacent Subbasins at this time. Department staff will continue to review periodic evaluations to the Plan to assess whether implementation of the Vina GSP is potentially impacting adjacent basins.

4.7 CONSIDERATION OF CLIMATE CHANGE AND FUTURE CONDITIONS

The GSP Regulations require a GSA to consider future conditions and project how future water use may change due to multiple factors including climate change.\(^\text{294}\)

Since the GSP was adopted and submitted, climate change conditions have advanced faster and more dramatically. It is anticipated that the hotter, drier conditions will result in a loss of 10% of California’s water supply. As California adapts to a hotter, drier climate, GSAs should be preparing for these changing conditions as they work to sustainably manage groundwater within their jurisdictional areas. Specifically, the Department encourages GSAs to:

1. Explore how their proposed groundwater level thresholds have been established in consideration of groundwater level conditions in the Subbasin based on current and future drought conditions.

2. Explore how groundwater level data from the existing monitoring network will be used to make progress towards sustainable management of the Subbasin given increasing aridification and effects of climate change, such as prolonged drought.

3. Take into consideration changes to surface water reliability and that impact on groundwater conditions.

4. Evaluate updated watershed studies that may modify assumed frequency and magnitude of recharge projects, if applicable.

5. Continually coordinate with the appropriate groundwater users, including but not limited to domestic well owners and state small water systems, and the appropriate overlying county jurisdictions developing drought plans and establishing local drought task forces\(^\text{295}\) to evaluate how their Plan’s groundwater management strategy aligns with drought planning, response, and mitigation efforts within the basin.

\(^{294}\) 23 CCR § 354.18.

\(^{295}\) Water Code § 10609.50.
5 STAFF RECOMMENDATION

Department staff recommend approval of the GSP with the recommended corrective actions listed below. The Vina Subbasin GSP conforms with Water Code Sections 10727.2 and 10727.4 of SGMA and substantially complies with the GSP Regulations. Implementation of the GSP will likely achieve the sustainability goal for the Vina Subbasin. The GSA(s) have identified several areas for improvement of their Plan and Department staff concur that those items are important and should be addressed as soon as possible. Department staff have also identified additional recommended corrective actions that should be considered by the GSA(s) for the first periodic evaluation of the GSP. Addressing these recommended corrective actions will be important to demonstrate that implementation of the Plan is likely to achieve the sustainability goal.

The recommended corrective actions include:

RECOMMENDED CORRECTIVE ACTION 1
Provide additional information on historical and current groundwater quality conditions in the Subbasin and refine the definition of sustainable management criteria including:

a. Provide additional information in the GSP outlining the location and extent of contamination plumes, identifying which constituents are being monitored under various programs, and thoroughly describing ongoing remediation efforts within the Subbasin.

b. Evaluate whether groundwater management actions, including production and/or replenishment under the jurisdiction of the GSAs, may influence the migration of contaminant plumes.

c. Investigate if groundwater quality issues are adversely impacting groundwater supply and beneficial uses and provide information if there are any mitigation programs in place and the effectiveness of such programs.

d. Coordinate with the lead agencies overseeing these remediation sites regularly and update the Plan stating how existing groundwater quality conditions and/or remediation efforts may impact the GSAs’ ability to manage groundwater.

RECOMMENDED CORRECTIVE ACTION 2
Review the model inputs/outputs and provide consistent information regarding stream loss and gains throughout the GSP. Clarify whether these values simply represent the overall interaction between the surface water and groundwater system or the quantity of depletion due to groundwater pumping.
**RECOMMENDED CORRECTIVE ACTION 3**

Provide sufficient information regarding criteria used to identify significant and unreasonable conditions, undesirable results, and the potential impacts to various beneficial uses and users of groundwater related to the chronic lowering of groundwater level minimum thresholds. The GSAs should address the following items:

- a. Revise the definition of undesirable results and language pertaining to significant and unreasonable lowering of groundwater level to remove the non-dry year condition or discuss how extractions and recharge will be managed as necessary to ensure that reductions in groundwater levels or storage during dry years are offset by increases in groundwater levels or storage during other years within the sustainable management criteria for the chronic lowering of groundwater levels.

- b. Provide information on impacts to domestic wells during projected conditions where minimum thresholds are exceeded but undesirable results do not occur and also quantify domestic wells that will be impacted by the proposed minimum threshold. Furthermore, the GSAs should evaluate the impacts of proposed minimum thresholds on other beneficial uses and users, such as public and small water systems and environmental users and users.

- c. Evaluate how the proposed minimum thresholds for the chronic lowering of groundwater levels may impact other sustainability indicators (e.g., groundwater storage, depletion of interconnected surface water, etc.).

**RECOMMENDED CORRECTIVE ACTION 4**

Revise the definition of undesirable results to remove the non-dry year condition or discuss how degradation during dry period will be managed as necessary to ensure that adverse water quality conditions are offset during other periods.

**RECOMMENDED CORRECTIVE ACTION 5**

Provide additional information on criteria used to identify undesirable results, and sustainable management criteria for land subsidence, including:

- a. Provide a clear, quantitative definition of when undesirable results for land subsidence may occur in the Subbasin, as required by the GSP regulations, to support the selection of land subsidence minimum thresholds that demonstrate avoidance of undesirable results.

- b. Establish sustainable management criteria for land subsidence for the Subbasin utilizing a monitoring network that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations.
RECOMMENDED CORRECTIVE ACTION 6

Department staff understand that estimating the location, quantity, and timing of stream depletion due to ongoing, Subbasin-wide pumping is a complex task and that developing suitable tools may take additional time; however, it is critical for the Department’s ongoing and future evaluations of whether GSP implementation is on track to achieve sustainable groundwater management. The Department plans to provide guidance on methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water and support for establishing specific sustainable management criteria in the near future. This guidance is intended to assist GSAs to sustainably manage depletions of interconnected surface water.

In addition, the GSAs should work to address the following items by the first periodic evaluation:

a. Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions.

b. Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing.

c. Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion within the GSAs’ jurisdictional area.

d. Clarify the groundwater level monitoring sites that will be used for the evaluation of depletions of interconnected surface water and provide site-specific information.
July 27, 2023

Christina Buck
Butte County Department of Water and Resource Conservation
308 Nelson Ave.
Oroville, CA 95965
cbuck@buttecounty.net

RE: Sacramento Valley Basin – Wyandotte Creek Subbasin - 2022 Groundwater Sustainability Plan

Dear Christina Buck,

The Department of Water Resources (Department) has evaluated the groundwater sustainability plan (GSP) submitted for the Sacramento Valley Basin – Wyandotte Creek Subbasin and has determined the GSP is approved. The approval is based on recommendations from the Staff Report, included as an exhibit to the attached Statement of Findings, which describes that the Wyandotte Creek Subbasin GSP satisfies the objectives of the Sustainable Groundwater Management Act (SGMA) and substantially complies with the GSP Regulations. The Staff Report also proposes recommended corrective actions that the Department believes will enhance the GSP and facilitate future evaluation by the Department. The Department strongly encourages the recommended corrective actions be given due consideration and suggests incorporating all resulting changes to the GSP in future updates.

Recognizing SGMA sets a long-term horizon for groundwater sustainability agencies (GSAs) to achieve their basin sustainability goals, monitoring progress is fundamental for successful implementation. GSAs are required to evaluate their GSPs at least every five years and whenever the Plan is amended, and to provide a written assessment to the Department. Accordingly, the Department will evaluate approved GSPs and issue an assessment at least every five years. The Department will initiate the first periodic review of the Wyandotte Creek Subbasin GSP no later than January 28, 2027.

Please contact Sustainable Groundwater Management staff by emailing sgmps@water.ca.gov if you have any questions related to the Department’s assessment or implementation of your GSP.
Thank You,

Steven Springhorn  
Supervising Engineering Geologist  
Sustainable Groundwater Management

Attachment:
1. Statement of Findings Regarding the Approval of the Sacramento Valley Basin – Wyandotte Creek Subbasin Groundwater Sustainability Plan
STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

STATEMENT OF FINDINGS REGARDING THE
APPROVAL OF THE
SACRAMENTO VALLEY – WYANDOTTE CREEK SUBBASIN GROUNDWATER
SUSTAINABILITY PLAN

The Department of Water Resources (Department) is required to evaluate whether a submitted groundwater sustainability plan (GSP or Plan) conforms to specific requirements of the Sustainable Groundwater Management Act (SGMA or Act), is likely to achieve the sustainability goal for the basin covered by the Plan, and whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) The Department is directed to issue an assessment of the Plan within two years of its submission. (Water Code § 10733.4.) This Statement of Findings explains the Department’s decision regarding the Plan submitted by the Wyandotte Creek Groundwater Sustainability Agency (GSA or Agency) for the Wyandotte Creek Subbasin (Basin No. 5-021.69).

Department management has discussed the Plan with staff and has reviewed the Department Staff Report, entitled Sustainable Groundwater Management Program Groundwater Sustainability Plan Assessment Staff Report, attached as Exhibit A, recommending approval of the GSP. Department management is satisfied that staff have conducted a thorough evaluation and assessment of the Plan and concurs with staff’s recommendation and all the recommended corrective actions. The Department therefore APPROVES the Plan and makes the following findings:

A. The Plan satisfies the required conditions as outlined in § 355.4(a) of the GSP Regulations (23 CCR § 350 et seq.):

1. The Plan was submitted within the statutory deadline of January 31, 2022. (Water Code § 10720.7(a); 23 CCR § 355.4(a)(1).)

2. The Plan was complete, meaning it generally appeared to include the information required by the Act and the GSP Regulations sufficient to warrant a thorough evaluation and issuance of an assessment by the Department. (23 CCR § 355.4(a)(2).)

3. The Plan, either on its own or in coordination with other Plans, covers the entire Wyandotte Creek Subbasin. (23 CCR § 355.4(a)(3).)

B. The general standards the Department applied in its evaluation and assessment of the Plan are: (1) “conformance” with the specified statutory requirements, (2) “substantial compliance” with the GSP Regulations, (3) whether the Plan is likely
to achieve the sustainability goal for the Subbasin within 20 years of the implementation of the Plan, and (4) whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) Application of these standards requires exercise of the Department’s expertise, judgment, and discretion when making its determination of whether a Plan should be deemed “approved,” “incomplete,” or “inadequate.”

The statutes and GSP Regulations require Plans to include and address a multitude and wide range of informational and technical components. The Department has observed a diverse array of approaches to addressing these technical and informational components being used by GSAs in different basins throughout the state. The Department does not apply a set formula or criterion that would require a particular outcome based on how a Plan addresses any one of SGMA’s numerous informational and technical components. The Department finds that affording flexibility and discretion to local GSAs is consistent with the standards identified above; the state policy that sustainable groundwater management is best achieved locally through the development, implementation, and updating of local plans and programs (Water Code § 113); and the Legislature’s express intent under SGMA that groundwater basins be managed through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner. (Water Code § 10720.1(h)) The Department’s final determination is made based on the entirety of the Plan’s contents on a case-by-case basis, considering and weighing factors relevant to the particular Plan and Subbasin under review.

C. In making these findings and Plan determination, the Department also recognized that: (1) the Department maintains continuing oversight and jurisdiction to ensure the Plan is adequately implemented; (2) the Legislature intended SGMA to be implemented over many years; (3) SGMA provides Plans 20 years of implementation to achieve the sustainability goal in a Subbasin (with the possibility that the Department may grant GSAs an additional five years upon request if the GSA has made satisfactory progress toward sustainability); and, (4) local agencies acting as GSAs are authorized, but not required, to address undesirable results that occurred prior to enactment of SGMA. (Water Code §§ 10721(r); 10727.2(b); 10733(a); 10733.8.)

D. The Plan conforms with Water Code §§ 10727.2 and 10727.4, substantially complies with 23 CCR § 355.4, and appears likely to achieve the sustainability goal for the Subbasin. It does not appear at this time that the Plan will adversely affect the ability of adjacent basins to implement their GSPs or impede achievement of sustainability goals.
1. The sustainable management criteria and sustainability goals, which focus on having stable groundwater levels for the long-term and operating the Subbasin within its sustainable yield, are sufficiently justified and explained. The Plan relies on credible information and science such as long-term groundwater level data, a reasonable understanding of aquifer properties, and an updated groundwater model to quantify the groundwater conditions that the Plan seeks to avoid and provides an objective way to determine whether the Subbasin is being managed sustainably in accordance with SGMA. (23 CCR § 355.4(b)(1).)

2. The Plan has identified reasonable measures and schedules to eliminate data gaps such as collecting data from active domestic wells to adjust minimum thresholds, installing additional wells and other monitoring sites to analyze the interaction of streams and groundwater pumping, and updating and refining the Butte Basin Groundwater Model. Refinement of the groundwater model is expected to eliminate the data gap related to the interconnected surface water, develop appropriate sustainable management criteria, and support evaluation of projects or GSP updates as appropriate and warranted. (23 CCR § 355.4(b)(2).)

3. The projects and management actions proposed are designed to maintain sufficient groundwater supply and quality to achieve the sustainability goal. The GSA plans to achieve the sustainability goal through water supply augmentation, increase water supply efficiency, stabilize the groundwater levels on a long-term average basis, and avoid undesirable results. The projects and management actions are reasonable and commensurate with the level of understanding of the Subbasin setting. The projects and management actions described in the Plan provide a feasible approach to achieving the Subbasin’s sustainability goal and should provide the GSA with greater versatility to adapt and respond to changing conditions and future challenges during GSP implementation. (23 CCR § 355.4(b)(3).)

4. The Plan provides a detailed explanation of how the varied interest of groundwater users and users in the Subbasin were considered in developing the sustainable management criteria and how those interests, including beneficial uses and users of groundwater including domestic well owners, would be impacted by the chosen minimum thresholds. Furthermore, the GSP includes a management action entitled “Domestic Well Mitigation” that aims to potentially provide resources to well owners impacted by groundwater management and lowering groundwater levels planned under the GSA’s management of the Subbasin. Under this management action, the GSA plans to collect data on domestic wells to determine which well owners potentially need assistance; secure financial
resources to assist with the repair, replacement, and deepening of domestic wells; and provide emergency response to well owners including supplying bottled water and potable water for sanitation. (23 CCR § 355.4(b)(4).)

5. The Plan’s projects and management actions appear feasible at this time and appear capable of preventing undesirable results and ensuring that the Subbasin is managed within its sustainable yield within 20 years. The Department will continue to monitor Plan implementation and reserves the right to change its determination if projects and management actions are not implemented or appear unlikely to prevent undesirable results or achieve sustainability within SGMA timeframes. (23 CCR § 355.4(b)(5).)

6. The Plan includes a reasonable assessment of overdraft conditions and includes reasonable means to mitigate overdraft, if present. (23 CCR § 355.4(b)(6).)

7. At this time, it does not appear that the Plan will adversely affect the ability of an adjacent basin to implement its GSP or impede achievement of sustainability goals in an adjacent basin. The Plan states that collaboration and coordination with 10 adjacent basins began in 2020 which will be continued during the Plan implementation period to ensure that undesirable results will be avoided and sustainability will be achieved at the regional level. (23 CCR § 355.4(b)(7).)

8. Because a single plan was submitted for the Subbasin, a coordination agreement was not required. (23 CCR § 355.4(b)(8).)

9. The GSA’s member agency, Butte County, has a groundwater management plan, established monitoring networks, and Basin Management Objectives for groundwater level, groundwater quality related to seawater intrusion, and land subsidence. The Butte County’s history of groundwater management and its participation in the Department’s groundwater elevation and subsidence monitoring programs provide a reasonable level of confidence that the GSA has the legal authority and financial resources necessary to implement the Plan. (23 CCR § 355.4(b)(9).)

10. Through review of the Plan and consideration of public comments, the Department determines that the GSA adequately responded to comments that raised credible technical or policy issues with the Plan, sufficient to warrant approval of the Plan at this time. The Department also notes that the recommended corrective actions included in the Staff Report are important to addressing certain technical or policy issues that were raised and, if not addressed before future, subsequent plan evaluations, may
preclude approval of the Plan in those future evaluations. (23 CCR § 355.4(b)(10).)

11. In addition to the grounds listed above, DWR also finds that:

**E. The Plan focuses on the protection of sustainably constructed domestic wells because dewatering domestic wells is a concern in the Subbasin.** Per the GSP, the minimum thresholds aim to protect most domestic wells, including those not constructed sustainably. Domestic wells are generally shallower than other well types; therefore, the minimum threshold water level that is protective of domestic users is considered protective of other beneficial users too. The GSA plans to implement a mitigation program for domestic well owners to assist with the repair, replacement, and deepening of wells; and provide emergency response to well owners including supplying bottled water and potable water for sanitation. The Plan’s compliance with the requirements of SGMA and substantial compliance with the GSP Regulations supports the state policy regarding the human right to water (Water Code § 106.3). The Department developed its GSP Regulations consistent with and intending to further the policy through implementation of SGMA and the Regulations, primarily by achieving sustainable groundwater management in a basin. By ensuring substantial compliance with the GSP Regulations, the Department has considered the state policy regarding the human right to water in its evaluation of the Plan. (23 CCR § 350.4(g).)

1. The GSA has an adaptive management approach in regard to managing groundwater; therefore, there will be continued monitoring, assessment of groundwater conditions, and evaluation of benefits obtained from projects and management actions. The GSA plans to implement the groundwater allocation to manage groundwater demand only in the event that the proposed projects fail to achieve interim milestones and the Subbasin is projected to not be able to achieve sustainability goals by 2042.

2. The Plan acknowledges and identifies interconnected surface waters within the Subbasin. The GSA proposes initial sustainable management criteria to manage this sustainability indicator and measures to improve understanding and management of interconnected surface water. The GSA acknowledges, and the Department agrees, many data gaps related to interconnected surface water exist. The GSA should continue filling data gaps, collecting additional monitoring data, and coordinating with resources agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping. Future updates to the Plan should aim to improve the initial sustainable management criteria as more information and improved methodology becomes available.
3. Projections of future basin extractions are likely to stay within current and historic ranges, at least until the next periodic evaluation by the GSA and the Department. Subbasin groundwater levels and other SGMA sustainability indicators are unlikely to substantially deteriorate while the GSA implements the Department’s recommended corrective actions. State intervention is not necessary at this time to ensure that local agencies manage groundwater in a sustainable manner. (Water Code § 10720.1(h).)

4. The California Environmental Quality Act (Public Resources Code § 21000 et seq.) does not apply to the Department’s evaluation and assessment of the Plan.

Accordingly, the GSP submitted by the Agency for the Wyandotte Creek Subbasin is hereby APPROVED. The recommended corrective actions identified in the Staff Report will assist the Department’s future review of the Plan’s implementation for consistency with SGMA and the Department therefore recommends the Agency address them by the time of the Department’s periodic review, which is set to begin on January 28, 2027, as required by Water Code § 10733.8. Failure to address the Department’s Recommended Corrective Actions before future, subsequent plan evaluations, may lead to a Plan being determined incomplete or inadequate.

Signed:

_____________________________
Karla Nemeth, Director
Date: July 27, 2023

Exhibit A: Groundwater Sustainability Plan Assessment Staff Report – Sacramento Valley – Wyandotte Creek Subbasin
State of California
Department of Water Resources
Sustainable Groundwater Management Program
Groundwater Sustainability Plan Assessment
Staff Report

Groundwater Basin Name: Sacramento Valley – Wyandotte Creek Subbasin (No. 5-021.69)
Submitting Agency: Wyandotte Creek Groundwater Sustainability Agency
Submittal Type: Initial GSP Submission
Submittal Date: January 28, 2022
Recommendation: Approved
Date: July 27, 2023

The Wyandotte Creek Groundwater Sustainability Agency (GSA or Agency) submitted the Wyandotte Creek Groundwater Subbasin Groundwater Sustainability Plan – December 2021 (GSP or Plan) for the Sacramento Valley – Wyandotte Creek Subbasin (Subbasin) to the Department of Water Resources (Department) for evaluation and assessment as required by the Sustainable Groundwater Management Act (SGMA)\(^1\) and GSP Regulations.\(^2\) The GSP covers the entire Subbasin for the implementation of SGMA.

After evaluation and assessment, Department staff conclude that the Plan includes the required components of a GSP, demonstrates a thorough understanding of the Subbasin based on what appears to be the best available science and information, sets well explained, supported, and reasonable sustainable management criteria to prevent undesirable results as defined in the Plan, and proposes a set of projects and management actions that will likely achieve the sustainability goal defined for the Subbasin.\(^3\) Department staff will continue to monitor and evaluate the Subbasin's progress toward achieving the sustainability goal through annual reporting and future periodic evaluations of the GSP and its implementation.

- Based on the current evaluation of the Plan, Department staff recommend the GSP be approved with the recommended corrective actions described herein.

This assessment includes five sections:

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\(^1\) Water Code § 10720 et seq.
\(^2\) 23 CCR § 350 et seq.
\(^3\) 23 CCR § 350 et seq.
1 **SUMMARY**

Department staff recommend approval of the Wyandotte Creek GSP. The GSA has identified areas for improvement of its Plan (e.g., improve characterization of the aquifer system, collect data from active domestic wells to adjust minimum thresholds, installing additional wells and other monitoring sites to analyze interaction of streams and groundwater pumping, update and refine the Butte Basin Groundwater model). Department staff concur that those items are important and recommend the GSA address them as soon as possible. Department staff have also identified additional recommended corrective actions within this assessment that the GSA should consider addressing by the first periodic evaluation of the Plan. The recommended corrective actions generally focus on the following:

1. Improving the understanding of water quality conditions in the Subbasin, coordinating with lead regulatory agencies, and updating the GSP with information about how ongoing regulatory programs operating in the Subbasin may impact groundwater management,

2. Evaluating the potential impacts to beneficial uses and users of groundwater from the proposed sustainable management criteria for chronic lowering of groundwater levels and revising the definition of undesirable results and language pertaining to significant and unreasonable lowering of groundwater level,

3. Establishing a monitoring network and sustainable management criteria for land subsidence, and

4. Continuing to fill data gaps, collecting additional monitoring data, coordinating with resource agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping, and potentially refine sustainable management criteria.
Addressing the recommended corrective actions identified in Section 5 of this assessment will be important to demonstrate, on an ongoing basis, that implementation of the Plan is likely to achieve the sustainability goal.

2 EVALUATION CRITERIA

The GSA submitted a single GSP to the Department to evaluate whether the Plan conforms to specified SGMA requirements and is likely to achieve the sustainability goal for the Wyandotte Creek Subbasin. To achieve the sustainability goal for the Subbasin, the GSP must demonstrate that implementation of the Plan will lead to sustainable groundwater management, which means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results. Undesirable results must be defined quantitatively by the GSAs. The Department is also required to evaluate whether the GSP will adversely affect the ability of an adjacent basin to implement its GSP or achieve its sustainability goal.

For the GSP to be evaluated by the Department, it must first be determined that the Plan was submitted by the statutory deadline, and that it is complete and covers the entire basin. If these conditions are satisfied, the Department evaluates the Plan to determine whether it complies with specific SGMA requirements and substantially complies with the GSP Regulations. Substantial compliance means that the supporting information is sufficiently detailed and the analyses sufficiently thorough and reasonable, in the judgment of the Department, to evaluate the Plan, and the Department determines that any discrepancy would not materially affect the ability of the Agency to achieve the sustainability goal for the basin, or the ability of the Department to evaluate the likelihood of the Plan to attain that goal.

When evaluating whether the Plan is likely to achieve the sustainability goal for the Subbasin, Department staff reviewed the information provided and relied upon in the GSP for sufficiency, credibility, and consistency with scientific and engineering professional standards of practice. The Department’s review considers whether there is a reasonable relationship between the information provided and the assumptions and conclusions made by the GSA, including whether the interests of the beneficial uses and users of groundwater in the basin have been considered; whether sustainable management
criteria and projects and management actions described in the Plan are commensurate with the level of understanding of the basin setting; and whether those projects and management actions are feasible and likely to prevent undesirable results.\textsuperscript{14}

The Department also considers whether the GSA has the legal authority and financial resources necessary to implement the Plan.\textsuperscript{15}

To the extent overdraft is present in a basin, the Department evaluates whether the Plan provides a reasonable assessment of the overdraft and includes reasonable means to mitigate the overdraft.\textsuperscript{16} The Department also considers whether the Plan provides reasonable measures and schedules to eliminate identified data gaps.\textsuperscript{17} Lastly, the Department’s review considers the comments submitted on the Plan and evaluates whether the GSA adequately responded to the comments that raise credible technical or policy issues with the Plan.\textsuperscript{18}

The Department is required to evaluate the Plan within two years of its submittal date and issue a written assessment of the Plan.\textsuperscript{19} The assessment is required to include a determination of the Plan’s status.\textsuperscript{20} The GSP Regulations define the three options for determining the status of a Plan: Approved,\textsuperscript{21} Incomplete,\textsuperscript{22} or Inadequate.\textsuperscript{23}

Even when review indicates that the GSP satisfies the requirements of SGMA and is in substantial compliance with the GSP Regulations, the Department may recommend corrective actions.\textsuperscript{24} Recommended corrective actions are intended to facilitate progress in achieving the sustainability goal within the basin and the Department’s future evaluations, and to allow the Department to better evaluate whether the Plan adversely affects adjacent basins. While the issues addressed by the recommended corrective actions do not, at this time, preclude approval of the Plan, the Department recommends that the issues be addressed to ensure the Plan’s implementation continues to be consistent with SGMA and the Department is able to assess progress in achieving the sustainability goal within the basin.\textsuperscript{25} Unless otherwise noted, the Department proposes that recommended corrective actions be addressed by the submission date for the first periodic assessment.\textsuperscript{26}

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{14} 23 CCR §§ 355.4(b)(1), (3), (4), and (5).
\item \textsuperscript{15} 23 CCR § 355.4(b)(9).
\item \textsuperscript{16} 23 CCR § 355.4(b)(6).
\item \textsuperscript{17} 23 CCR § 355.4(b)(2).
\item \textsuperscript{18} 23 CCR § 355.4(b)(10).
\item \textsuperscript{19} Water Code § 10733.4(d); 23 CCR § 355.2(e).
\item \textsuperscript{20} Water Code § 10733.4(d); 23 CCR § 355.2(e).
\item \textsuperscript{21} 23 CCR § 355.2(e)(1).
\item \textsuperscript{22} 23 CCR § 355.2(e)(2).
\item \textsuperscript{23} 23 CCR § 355.2(e)(3).
\item \textsuperscript{24} Water Code § 10733.4(d).
\item \textsuperscript{25} Water Code § 10733.8.
\item \textsuperscript{26} 23 CCR § 356.4 et seq.
\end{enumerate}
\end{footnotesize}
The staff assessment of the GSP involves the review of information presented by the GSA, including models and assumptions, and an evaluation of that information based on scientific reasonableness, including standard or accepted professional and scientific methods and practices. The assessment does not require Department staff to recalculate or reevaluate technical information provided in the Plan or to perform its own geologic or engineering analysis of that information. The staff recommendation to approve a Plan does not signify that Department staff, were they to exercise the professional judgment required to develop a GSP for the basin, would make the same assumptions and interpretations as those contained in the Plan, but simply that Department staff have determined that the assumptions and interpretations relied upon by the submitting GSA are supported by adequate, credible evidence, and are scientifically reasonable.

Lastly, the Department’s review and approval of the Plan is a continual process. Both SGMA and the GSP Regulations provide the Department with the ongoing authority and duty to review the implementation of the Plan.27 Also, GSAs have an ongoing duty to provide reports to the Department, periodically reassess their plans, and, when necessary, update or amend their plans.28 The passage of time or new information may make what is reasonable and feasible at the time of this review to not be so in the future. The emphasis of the Department’s periodic reviews will be to assess the progress toward achieving the sustainability goal for the basin and whether Plan implementation adversely affects the ability of adjacent basins to achieve their sustainability goals.

3 Required Conditions

A GSP, to be evaluated by the Department, must be submitted within the applicable statutory deadline. The GSP must also be complete and must, either on its own or in coordination with other GSPs, cover the entire basin.

3.1 Submission Deadline

SGMA required basins categorized as high- or medium-priority and not subject to critical conditions of overdraft to submit a GSP no later than January 31, 2022.29


3.2 Completeness

GSP Regulations specify that the Department shall evaluate a GSP if that GSP is complete and includes the information required by SGMA and the GSP Regulations.30

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27 Water Code § 10733.8; 23 CCR § 355.6.
28 Water Code §§ 10728 et seq., 10728.2.
29 Water Code § 10720.7(a)(2).
30 23 CCR § 355.4(a)(2).
The GSA submitted an adopted GSP for the entire Subbasin. After an initial, preliminary review, Department staff found the GSP to be complete and appearing to include the required information, sufficient to warrant a thorough evaluation by the Department. The Department posted the GSP to its website on February 27, 2022.

3.3 Basin Coverage
A GSP, either on its own or in coordination with other GSPs, must cover the entire basin. A GSP that is intended to cover the entire basin may be presumed to do so if the basin is fully contained within the jurisdictional boundaries of the submitting GSAs.

The GSP intends to manage the entire Wyandotte Creek Subbasin and the jurisdictional boundary of the submitting GSA fully contains the Subbasin.

4 Plan Evaluation

As stated in Section 355.4 of the GSP Regulations, a basin “shall be sustainably managed within 20 years of the applicable statutory deadline consistent with the objectives of the Act.” The Department’s assessment is based on a number of related factors including whether the elements of a GSP were developed in the manner required by the GSP Regulations, whether the GSP was developed using appropriate data and methodologies and whether its conclusions are scientifically reasonable, and whether the GSP, through the implementation of clearly defined and technically feasible projects and management actions, is likely to achieve a tenable sustainability goal for the basin. The Department staff’s evaluation of the likelihood of the Plan to attain the sustainability goal for the Subbasin is provided below.

4.1 Administrative Information
The GSP Regulations require each Plan to include administrative information identifying the submitting Agency, its decision-making process, and its legal authority; a description of the Plan area and identification of beneficial uses and users in the Plan area; and a description of the ability of the submitting Agency to develop and implement a Plan for that area.

31 The Department undertakes a preliminary completeness review of a submitted Plan under section 355.4(a) of the GSP Regulations to determine whether the elements of a Plan required by SGMA and the GSP Regulations have been provided, which is different from a determination, upon review, that a Plan is “incomplete” for purposes of section 355.2(e)(2) of the GSP Regulations.
33 Water Code § 10727(b); 23 CCR § 355.4(a)(3).
34 Wyandotte Creek Subbasin GSP, Executive Summary, p. 21.
35 23 CCR § 354.6 et seq.
36 23 CCR § 354.8 et seq.
37 23 CCR § 354.6(e).
A single GSP covering the entire Wyandotte Creek Subbasin was prepared and submitted to the Department by the Wyandotte Creek GSA, which is the only GSA in the Subbasin. The GSA was formed by the County of Butte, City of Oroville and Thermalito Water and Sewer District (TWSD) using a Joint Powers Agreement. A GSA Board serves as the policy-making role for SGMA implementation, which is composed of five seats with equal and full voting rights. The five seats are filled by five board members who are representatives of the County of Butte, City of Oroville, TWSD, agricultural groundwater users, and domestic well users. The GSP states that the GSA possesses the ability to exercise powers granted by the Joint Powers Agreement, SGMA, and the common powers of its members.

The Subbasin is located within Butte County which also includes the City of Oroville, state and federal lands, and portions of the Berry Creek Off-Reservation Trust Land, Mooretown Off-Reservation Trust Land and Mooretown Rancheria. The Subbasin is part of the larger Sacramento Valley Groundwater Basin and is surrounded by the Vina Subbasin to the northwest; Butte Subbasin to the west; North Yuba and Sutter Subbasins to the south; and by the Sierra Nevada geomorphic province to the east, as shown in Figure 1. All the adjacent groundwater basins are medium and high-priority basins with most of their GSPs under review by the Department.

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38 Wyandotte Creek Subbasin GSP, Section 1.1.4, p. 39.
39 Wyandotte Creek Subbasin GSP, Section 1.1.4, p. 41.
40 Wyandotte Creek Subbasin GSP, Section 1.1.4, p. 41.
41 Wyandotte Creek Subbasin GSP, Section 1.2.1, p. 45.
42 Wyandotte Creek Subbasin GSP, Executive Summary and Section 1.2.1, pp. 21 and 45.
The GSP states that land use is dominated by agriculture with other land use types in the Subbasin being industrial, urban, and undeveloped.\textsuperscript{43} The GSP also provides a map showing three land use types: agricultural areas, developed areas, and other land use;\textsuperscript{44} however, the GSP does not appear to provide the quantitative information regarding the total area for each land use type. The GSP states that both agricultural and urban land uses rely on a combination of surface water and groundwater.\textsuperscript{45}

The GSP provides a list of beneficial uses and users of groundwater in the Subbasin which includes agricultural, domestic, municipal, environmental, and others.\textsuperscript{46} The GSP states that more than 4,000 domestic wells are recorded per the Department’s Online System for Well Completion Reports database as being located within the Wyandotte Creek Subbasin; however, the GSP adds that the data within this database cannot be guaranteed to always be accurate or precise.\textsuperscript{47}

\textsuperscript{43} Wyandotte Creek Subbasin GSP, Section 1.2.1, p. 45.
\textsuperscript{44} Wyandotte Creek Subbasin GSP, Figure 1-7, p. 51.
\textsuperscript{45} Wyandotte Creek Subbasin GSP, Section 1.2.1, p. 45.
\textsuperscript{46} Wyandotte Creek Subbasin GSP, Section 1.8.3, pp. 73-74.
\textsuperscript{47} Wyandotte Creek Subbasin GSP, Section 1.4.4, p. 70.
The County of Butte has been monitoring groundwater in the County since 2000 under Butte County Code regarding groundwater conservation and protection.\textsuperscript{48} In 2004, the Butte County Code required the establishment of monitoring networks and Basin Management Objectives for groundwater elevation, groundwater quality related to saline intrusion, and land subsidence.\textsuperscript{49} The Basin Management Objectives program transitioned to SGMA implementation through a revision to the Butte County Code in 2019.\textsuperscript{50}

The GSP describes the existing monitoring programs and data sources that were considered during the GSP development. These programs and data sources are the California Statewide Groundwater Elevation Monitoring, Water Data Library, Online System for Well Completion Reports, Butte County Department of Water and Resource Conservation, Sacramento Valley Water Quality Coalition, and the Geotracker/Groundwater Ambient Monitoring and Assessment.\textsuperscript{51} In addition to the monitoring programs, the County of Butte has a Groundwater Management Plan that covers the entire County except for the areas covered by the Urban Water Management Plans,\textsuperscript{52} the Butte General Plan 2030, and the City of Oroville General Plan which aims to maintain and enhance water quality, ensure an abundant and sustainable water supply to support all uses, effectively manage groundwater resources, promote water conservation, protect water quality, improve stream bank stability and protect riparian resources.\textsuperscript{53} Given the history of groundwater monitoring and management in the Subbasin by the GSA member agencies, the County of Butte and the City of Oroville, and the transition of ongoing programs to SGMA implementation, Department staff believe that the GSA has the ability to implement the GSP in the Subbasin.

The GSP’s discussion and presentation of administrative information covers the specific items listed in the GSP Regulations in an understandable format using appropriate detail. Department staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the quality, data, and discussion of this subject in the GSP. The administrative information included in the Plan substantially complies with the requirements outlined in the GSP Regulations.

4.2 BASIN SETTING
GSP Regulations require information about the physical setting and characteristics of the basin and current conditions of the basin, including a hydrogeologic conceptual model; a description of historical and current groundwater conditions; and a water budget

\textsuperscript{48} Wyandotte Creek Subbasin GSP, Section 1.4.1, pp. 68-69.
\textsuperscript{49} Wyandotte Creek Subbasin GSP, Section 1.4.1, p. 69.
\textsuperscript{50} Wyandotte Creek Subbasin GSP, Section 1.4.1, p. 69.
\textsuperscript{51} Wyandotte Creek Subbasin GSP, Sections 1.4.2-1.7, pp. 69-72.
\textsuperscript{52} Wyandotte Creek Subbasin GSP, Section 1.3.1, p. 60.
\textsuperscript{53} Wyandotte Creek Subbasin GSP, Sections 1.3.5-1.3.5.2, pp. 62-66.
accounting for total annual volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions.  

4.2.1 Hydrogeologic Conceptual Model

The hydrogeologic conceptual model is a non-numerical model of the physical setting, characteristics, and processes that govern groundwater occurrence within a basin, and represents a local agency’s understanding of the geology and hydrology of the basin that support the geologic assumptions used in developing mathematical models, such as those that allow for quantification of the water budget. The GSP Regulations require a descriptive hydrogeologic conceptual model that includes a written description of geologic conditions, supported by cross sections and maps, and includes a description of basin boundaries and the bottom of the basin, principal aquifers and aquitards, and data gaps.

The Subbasin is bounded on the west by the Feather River and Thermalito Afterbay, on the south by the Butte-Yuba County line, and on the north and east by the edge of the alluvium. “Groundwater flows from the north and from foothill recharge areas in the east toward the subbasin’s southeastern corner.” The GSP describes the regional structure of the Sacramento Valley as a groundwater basin which consists of an “asymmetrical trough tilting to the southwest with a steeply dipping western limb and a gently dipping eastern limb.” Younger marine and continentally derived sediments and volcanic rock overlie older granitic and metamorphic rock formations; sediments thin near the eastern margin of the Subbasin, exposing older metamorphic and granitic rocks underlying and bounding the Sacramento Valley sediments. In the Oroville area, bedrock depths are irregular, ranging from 283 feet below ground surface (bgs) in the west to depths greater than 1,000 feet bgs in the east.

The GSP describes the bottom of the Subbasin using the North Yuba Subbasin description from the Department’s 2003 Bulletin 118 report (at the time, the North Yuba Subbasin included what is now the Wyandotte Creek Subbasin). The report describes the aquifer system to be comprised of “continental deposits of Quaternary to Late Tertiary (Pliocene) age. The cumulative thickness of these deposits increases from a few hundred feet near the Sierra Nevada foothills on the east to over 1,000 feet along the western

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54 23 CCR § 354.12.
56 23 CCR §§ 354.14 (a), 354.14 (c).
57 23 CCR §§ 354.14 (b)(2-3).
58 23 CCR § 354.14 (b)(4) et seq.
59 23 CCR § 354.14 (b)(5).
60 Wyandotte Creek Subbasin GSP, Section 2.1.1.1, p. 78.
61 Wyandotte Creek Subbasin GSP, Executive Summary, p. 24.
62 Wyandotte Creek Subbasin GSP, Section 2.1.3, p. 87.
63 Wyandotte Creek Subbasin GSP, Section 2.1.3, p. 87.
margin of the basin." According to the GSP, the base of the Laguna Formation is generally accepted as the base of fresh water. However, the GSP also mentions the base of the Mehrten Formation as the base of freshwater for portions of the Subbasin. The GSP explains that the stratigraphy of the Subbasin is complicated by discontinuous formation exposures and inset relationships with older formations, primarily owing to the sedimentologic behavior of the Feather River system. The base of fresh groundwater fluctuates by local changes in the subsurface geology and geologic formational structure. Because of the variable depths and geologic formations for defining the base of fresh groundwater, the GSP recognizes the inconclusiveness of the data and the need for additional data to improve characterization of the aquifer system.

The GSP describes a single principal aquifer in the Subbasin comprised predominantly of sedimentary deposits of three water bearing aquifers: Ione, Mehrten, and Laguna Formations. The Ione Formation consists of discontinuous exposures of variably cemented, fine to coarse sandstone, siltstone, lignite, and claystone; primarily deltaic deposits. The Mehrten Formation consists of a series of volcanic debris flows with pebble and cobble-gravel facies suggesting the debris flows may have chocked ancestral stream/river systems. The Laguna Formation within the Subbasin boundary is described as ancestral Feather River deposits. The water produced from the principal aquifer is primarily used to meet irrigation, domestic and municipal water demand. No known structural properties that significantly restrict groundwater flow within the subbasin. Department staff note the GSP describes the principal aquifer without mentioning aquitards, but the east-west cross section shows a thin aquitard layer at the surface. Department staff encourages the GSA to clarify the presence or absence of aquitards in the Plan.

The GSP provides a north-south cross section showing lithology, well locations, regional water table elevation, and geologic interpretation of discontinuous aquifer zones. The GSP also includes an east-west cross section with no supporting well log data, no identification of geologic formations, and no major stratigraphic or structural features. Department staff find that the discussion and presentation of the east-west cross section

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64 Wyandotte Creek Subbasin GSP, Section 2.1.1.2, p. 78.
65 Wyandotte Creek Subbasin GSP, Section 2.1.1.2, p. 78.
66 Wyandotte Creek Subbasin GSP, Section 2.1.3, p. 87.
67 Wyandotte Creek Subbasin GSP, Section 2.1.1.2, p 79.
68 Wyandotte Creek Subbasin GSP, Section 2.1.7, p. 93.
69 Wyandotte Creek Subbasin GSP, Section 2.1.5.1, p. 89.
70 Wyandotte Creek Subbasin GSP, Section 2.1.5.2, p. 89.
71 Wyandotte Creek Subbasin GSP, Section 2.1.5.3, pp. 89-90.
72 Wyandotte Creek Subbasin GSP, Section 2.1.7, p. 93.
73 Wyandotte Creek Subbasin GSP, Section 2.1.7, p. 93.
74 Wyandotte Creek Subbasin GSP, Section 2.1.7, p. 93.
75 Wyandotte Creek Subbasin GSP, Section 2.1.7, p. 93.
76 Wyandotte Creek Subbasin GSP, Figure 2-8C, p. 93.
77 Wyandotte Creek Subbasin GSP, Section 2.1.6, Figures 2-8A and 2-8B, pp. 90-92.
78 Wyandotte Creek Subbasin GSP, Section 2.1.6, Figures 2-8A and 2-8C, pp. 90-91 and 93.
does not cover the information required by the GSP Regulations. Department staff recommend revising the east-west cross section that will demonstrate relevant well logs and geologic descriptions.

The GSP identifies data gaps relevant to the development and understanding of the hydrogeologic conceptual model of the Subbasin. The GSP notes the lack of groundwater monitoring data, the need for water quality data to understand recharge areas, better characterization of surface water-groundwater relationships, and using aerial electromagnetic (also known as AEM) survey data to improve understanding of lithology and aquifer connectivity. The GSP mentions that data gaps can result from insufficient quantity or quality of the monitoring information and is planning to report any updates on data gaps in the annual report and the periodic evaluation of the Plan.

Despite requesting clarification on the presence of aquitards and revision of the east-west cross section, the information provided in the GSP that comprises the hydrogeologic conceptual model substantially complies with the requirements outlined in the GSP Regulations. In general, the Plan’s descriptions of the regional geologic setting, the Subbasin’s physical characteristics, the identification of the principal aquifer, and hydrogeologic conceptual model appear to utilize the best available science. Department staff are aware of no significant inconsistencies or contrary technical information to that presented in the Plan.

### 4.2.2 Groundwater Conditions

The GSP Regulations require a written description of historical and current groundwater conditions for each of the applicable sustainability indicators and groundwater dependent ecosystems that includes the following: groundwater elevation contour maps and hydrographs, a graph depicting change in groundwater storage, maps and cross-sections of the seawater intrusion front, maps of groundwater contamination sites and plumes, maps depicting total subsidence, identification of interconnected surface water systems and an estimate of the quantity and timing of depletions of those systems, and identification of groundwater dependent ecosystems.

According to the Plan, groundwater elevations have been relatively stable in the Subbasin. The GSP provides four groundwater elevation contour figures showing the

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78 23 CCR § 354.14 (c).
79 Wyandotte Creek Subbasin GSP, Section 4.10, p. 193.
80 Wyandotte Creek Subbasin GSP, Section 2.1.8, p. 95.
81 Wyandotte Creek Subbasin GSP, Section 4.10, p. 193.
82 23 CCR §§ 354.16 (a)-(2).
83 23 CCR § 354.16 (b).
84 23 CCR § 354.16 (c).
85 23 CCR § 354.16 (d).
86 23 CCR § 354.16 (e).
87 23 CCR § 354.16 (f).
88 23 CCR § 354.16 (g).
89 Wyandotte Creek Subbasin GSP, Executive Summary, p. 24.
spring and fall 2015 and 2019 groundwater elevations.90 The GSP states that the Thermalito Afterbay and Feather River influence the stability of groundwater elevations in the north "between the spring and fall observation periods, while elevations in the south tend to be lower in the fall than the spring, a pattern typical of valley floor locations distant from major sources of recharge."91 The four contour maps display higher groundwater elevations in the north indicating a general gradient that causes water to flow from north and from foothill recharge areas in the east toward the Subbasin’s southeastern corner.92

In addition to the groundwater elevation contour maps, the GSP provides nine hydrographs of selected monitoring wells which depict long-term groundwater elevation trends in the Subbasin 93 and nine additional hydrographs for wells identified as representative monitoring sites for chronic lowering of groundwater levels in Appendix 3-C, 94 which also show long-term groundwater level data. The period of record for hydrographs provided in the GSP vary, some begin as early as the 1940s, but generally begin in the 2000s and extend through 2018. Based on the review of the information provided, it appears to Department staff that most hydrographs show stable groundwater levels in the Subbasin; however, some wells in the north (within the Oroville Management Area) show slight groundwater level decline after 2012. The GSP does not indicate how much groundwater levels have declined, but Department staff estimated the decline to be up to 10 feet.

The GSP describes the groundwater storage as declining over the summer when groundwater demand is high and replenishing through precipitation and natural recharge by the following spring.95 The GSP provides a graph depicting the annual and cumulative change in storage between seasonal high groundwater conditions from 2000 to 2018, including annual groundwater pumping and water year type data. 96 The graph demonstrates groundwater storage increasing in wet years, decreasing in dry and critical years, and either increasing or decreasing in above normal and below normal years. The GSP states that a decline in groundwater storage was observed between the period of 2007 to 2016 and is attributed to the dry conditions experienced in the Subbasin.97 A cumulative decline in groundwater storage is estimated to be -60,000 acre-feet.98 The annual groundwater storage during the same period is reported as -3,700 acre-feet per

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90 Wyandotte Creek Subbasin GSP, Section 2.2.2.1 and Figures 2-9-2-12, pp. 96-100.
91 Wyandotte Creek Subbasin GSP, Executive Summary and Section 2.2.2.1, pp. 24 and 96.
92 Wyandotte Creek Subbasin GSP, Section 2.2.2.1, p. 96.
93 Wyandotte Creek Subbasin GSP, Section 2.2.2.2 and Figures 2-13 to 2-14, pp. 101-103.
94 Wyandotte Creek Subbasin GSP Appendices, Appendix 3-C, pp. 215-226.
95 Wyandotte Creek Subbasin GSP, Section 2.2.2.4, p. 104.
96 Wyandotte Creek Subbasin GSP, Section 2.2.2.4 and Figure 2-15, pp. 104-105.
97 Wyandotte Creek Subbasin GSP, Section 2.2.2.4, p. 105.
98 Wyandotte Creek Subbasin GSP, Figure 2-15, p. 105.
year (AFY).\textsuperscript{99} Per the GSP, this annual change in storage is about 0.14 percent of the total groundwater stored, which is estimated to be 2.1 million acre-feet.\textsuperscript{100}

The GSP states that the Wyandotte Creek Subbasin is located far from the Delta and Pacific Ocean; therefore, seawater intrusion is not an applicable sustainability indicator.\textsuperscript{101} Department staff concur with this conclusion as the nearest coastline is about 100 miles away from the Subbasin.

The GSP describes the groundwater quality in the principal aquifer as generally good\textsuperscript{102} with some impacted areas by anthropogenic sources.\textsuperscript{103} The GSP elaborates by presenting total dissolved solid (TDS) concentrations that demonstrate good water quality in the Subbasin. TDS is reported to range from 149 to 655 milligrams per liter (mg/L), with a median concentration of 277 mg/L,\textsuperscript{104} which Department staff note is below the upper secondary maximum contaminant levels set for the State Secondary Drinking Water Standards.\textsuperscript{105} The anthropogenic sources (or Active Contamination Remediation Sites) are in the northern region of the Subbasin as shown on Figure 2-16.\textsuperscript{106} The GSP categorizes the Active Contamination Remediation Sites as: Other Sites with Corrective Action, Sites Needing Evaluation, Federal Superfund-Listed Sites, and Leaking LUST Cleanup Sites,\textsuperscript{107} but the GSP does not identify which Active Contamination Remediation Site(s) pertain to what category. The GSP mentions that one site (formerly a manufactured gas plant) is confirmed to be impacting groundwater. The potential contaminants of concern derived from the manufactured gas plant include arsenic, cyanide, lead, polynuclear aromatic hydrocarbons, and total petroleum hydrocarbons.\textsuperscript{108}

The GSP also identifies saline to brackish groundwater in the northern portion\textsuperscript{109} and chemicals of emerging concern, such as perfluorooctanesulfonic acid (PFOS) and per- and polyfluoroalkyl substances (PFAS), to potentially affect groundwater conditions.\textsuperscript{110} Department staff note that a map showing the extent and location of the contaminant plumes within the Subbasin is not provided.

The GSP states that the groundwater quality in the Subbasin is currently monitored by Butte County, Sacramento Valley Water Quality Coalition, California Rice Commission, State Drinking Water Program, California Department of Toxic Substances Control, and the United States Environmental Protection Agency’s National Priorities List. Per the GSP, water quality data collected by Sacramento Valley Water Quality Coalition for

\textsuperscript{99} Wyandotte Creek Subbasin GSP, Section 2.3.4.1, p. 140.
\textsuperscript{100} Wyandotte Creek Subbasin GSP, Executive Summary, p. 24.
\textsuperscript{101} Wyandotte Creek Subbasin GSP, Executive Summary and Section 2.2.3, pp. 24 and 105.
\textsuperscript{102} Wyandotte Creek Subbasin GSP, Section 2.1.7.4, p. 94.
\textsuperscript{103} Wyandotte Creek Subbasin GSP, Executive Summary, p. 24.
\textsuperscript{104} Wyandotte Creek Subbasin GSP, Section 2.1.7.4, p. 94.
\textsuperscript{105} https://regulations.justia.com/states/california/title-22/division-4/chapter-15/article-16/section-64449/
\textsuperscript{106} Wyandotte Creek Subbasin GSP, Tables ES-4 and Figure 2-16, pp. 26 and 107.
\textsuperscript{107} Wyandotte Creek Subbasin GSP, Section 2.2.4.2, p. 106.
\textsuperscript{108} Wyandotte Creek Subbasin GSP, Section 2.2.4.2, p. 108.
\textsuperscript{109} Wyandotte Creek Subbasin GSP, Section 2.1.7.4, p. 94.
\textsuperscript{110} Wyandotte Creek Subbasin GSP, Section 2.2.4.1, p. 106.
compliance with the Central Valley Regional Board’s Irrigated Lands Regulatory Program is an important set of data because irrigated agriculture is the predominant land use in the Wyandotte Creek Subbasin.\textsuperscript{111} The GSP states that PFOS and PFAS will not be monitored by the GSA for SGMA implementation but the GSA will be attentive to the effect the presence of these contaminants may have on groundwater management.\textsuperscript{112}

The GSP’s description of groundwater quality conditions in the Subbasin includes relevant topics such as water quality constituents of concern, and some discussion of the factors that have caused water quality degradation; however, Department staff conclude that the Plan is also lacking important details related to groundwater quality. Department staff recommend the GSA provide additional information in the GSP outlining the location and extent of contamination plumes, identifying which constituents are being monitored under various regulatory programs, and thoroughly describing ongoing remediation efforts within the Subbasin (see \textit{Recommended Corrective Action 1a}). Further, the GSA should evaluate whether groundwater management activities, including groundwater production under the jurisdiction of the GSA, may influence the migration of contaminant plumes (see \textit{Recommended Corrective Action 1b}). As the GSP acknowledges that the aquifer used for drinking water supply is potentially affected by the contaminants,\textsuperscript{113} the GSA should also evaluate how existing groundwater quality issues and existing contamination plumes present in the Subbasin may be impacting beneficial uses and users of groundwater (see \textit{Recommended Corrective Action 1c}). Lastly, Department staff recommend the GSA coordinate with the lead agencies overseeing these remediation sites regularly and update the Plan to explain how existing groundwater quality conditions and/or remediation efforts may impact the GSA’s ability to manage groundwater (see \textit{Recommended Corrective Action 1d}).

The GSP states that no inelastic land subsidence has been recorded in the Subbasin\textsuperscript{114} because of stable groundwater levels and subsurface materials that are not prone to compaction.\textsuperscript{115} The GSP includes two maps showing the stations and displacement values from the Sacramento Valley Global Positioning System (GPS) study of 2008 to 2017,\textsuperscript{116} and the Department’s Interferometric Synthetic Aperture Radar (InSAR) displacement data coverage between 2015 and 2019.\textsuperscript{117} Land subsidence observations from the GPS Subsidence Monitoring stations show a total cumulative displacement range of 0.038 to -0.015 feet between 2008 to 2017 and the InSAR data shows a total cumulative displacement range of 0.25 to -0.25 feet between 2015-2019.\textsuperscript{118} The GSP

\begin{footnotesize}
\textsuperscript{111} Wyandotte Creek Subbasin GSP, Section 2.2.4.1, p. 106.
\textsuperscript{112} Wyandotte Creek Subbasin GSP, Section 2.2.4.1, p. 106.
\textsuperscript{113} Wyandotte Creek Subbasin GSP, Section 2.2.4.1, p. 106.
\textsuperscript{114} Wyandotte Creek Subbasin GSP, Section 2.2.5.1, p. 108.
\textsuperscript{115} Wyandotte Creek Subbasin GSP, Section 4.5.1, p. 180.
\textsuperscript{116} Wyandotte Creek Subbasin GSP, Figure 2-17A, p. 111.
\textsuperscript{117} Wyandotte Creek Subbasin GSP, Figure 2-17B, p. 112.
\textsuperscript{118} Wyandotte Creek Subbasin GSP, Table 2-2, p. 110.
\end{footnotesize}
states that “inelastic land subsidence due to groundwater withdrawal is unlikely to result in an Undesirable Result.”

The GSP estimates the quantity and timing of depletions of interconnected surface water using the Butte Basin Groundwater Model (BBGM) for the primary streams in the Subbasin (i.e., Feather River, North Honcut Creek, and South Honcut Creek). The GSP explains that a total of seven stream segments were defined for the primary streams. The BBGM was utilized to evaluate the stream segments and to classify them as being primarily gaining (gaining more than 80% of the time), losing (losing more than 80% of the time), or mixed over the historical period from 2000 to 2018. Based on the BBGM results, the Feather River appears to be gaining, North Honcut Creek as losing, and the South Honcut Creek as mixed. Additionally, the GSP states that, based on the results and on consideration of the spring depth to groundwater below the estimated streambed depth along each primary stream, it is likely that all streams traversing or bounding the Subbasin are connected to the groundwater system. The water budget summary table for the groundwater system shows that the average annual inflow from the surface water system was 4,100 acre-feet and the outflow to the surface water system was 36,300 acre-feet. This shows there was an annual net stream accretion of 32,200 acre-feet.

The GSP states that the BBGM incorporates the interaction of surface water and groundwater at a regional scale, but concedes that significant data gaps limit calibration of the groundwater response to the uppermost layer of the model. Department staff note that the GSA plans to complete the first model update by 2027 and the second model update by 2032. Department staff encourage the GSA to refine the model prior to the next periodic evaluation of the Plan and provide information on the interaction of surface water and groundwater at a reasonable scale, thereby eliminating the data gap related to groundwater response to the uppermost layer of the model.

The GSP utilized the Natural Communities Commonly Associated with the Groundwater (NCCAG) dataset to identify groundwater dependent ecosystems (GDEs). Per the GSP, the NCCAG dataset defines two habitat classes: wetland features commonly associated with the surface expression of groundwater under natural, unmodified conditions; and vegetation types commonly associated with the sub-surface presence of groundwater (i.e., phreatophytes). The GSP provides a figure showing the locations of all potential

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119 Wyandotte Creek Subbasin GSP, Section 2.2.5.2, p. 110.
120 Wyandotte Creek Subbasin GSP, Section 2.2.6.2, p. 118.
121 Wyandotte Creek Subbasin GSP, Section 2.2.6.1, p. 114.
122 Wyandotte Creek Subbasin GSP, Section 2.2.6.1 and Figure 2-20, pp. 114 and 116.
123 Wyandotte Creek Subbasin GSP, Section 2.2.6.1, p. 114.
124 Wyandotte Creek Subbasin GSP, Table 2-6, pp. 136-137.
125 Wyandotte Creek Subbasin GSP, Section 3.8.4, p. 170.
126 Wyandotte Creek Subbasin GSP, Figure 6-1, p.227.
127 Wyandotte Creek Subbasin GSP, Section 2.2.7.1, pp. 118-119.
GDEs identified by the NCCAG database within the Wyandotte Creek Subbasin. The GSP states that GDE’s dependence on groundwater was analyzed based on land use changes, proximity to perennial surface water supplies, areas accessing supplemental water supplies, adjacency to irrigated agriculture, dependency on agricultural-dependent surface water, and non-survival of vegetation during drought years. Additionally, the potential GDE dataset was further reviewed against land use classifications to identify unlikely GDEs based on adjacency to agricultural operations. Based on this analysis, the GSP classified the potential GDEs as “Not likely a GDE” or “Likely a GDE” showing their locations on a map. Additionally, the maps also show location of Valley Oak Dominated Areas which are classified as “Likely a GDE” because “this species can access groundwater over a wide range of depths.”

Although recommended corrective actions are identified, the Plan sufficiently describes the historical and current groundwater conditions related to chronic lowering of groundwater levels, change in storage, seawater intrusion, and land subsidence throughout the Plan area, and the information included in the Plan substantially complies with the requirements outlined in the GSP Regulations. However, more information is required to fully understand groundwater conditions related to degraded water quality and depletions of interconnected surface water, as discussed above.

4.2.3 Water Budget
GSP Regulations require a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical; current; and projected water budget conditions, and the sustainable yield.

The GSP utilizes the BBGM, originally developed in 1992 and updated over the decades, to estimate the water budget for historical, current, and projected conditions. The GSP identifies water years 2000 to 2018 as the historical water budget and states data collected from 1971 to 2018 reflects the current water budget, with 2018 representing the most recent hydrology. The GSP uses a 50-year period from 1971 to 2018 with 2004 and 2005 repeated after 2018 to develop a projected water budget. The water budgets are estimated for both the Land and Surface Water System and Groundwater System.
and are provided in tabular and graphical formats.\textsuperscript{139} The water budget includes a detailed discussion and estimates of inflows and outflows for each system. Specifically for the groundwater system, the main components of inflows are deep percolation, subsurface inflows from adjacent basins and foothills, and stream seepage. The main components of outflows are groundwater pumping, subsurface outflows to adjacent basins, and stream accretions.\textsuperscript{140}

For the groundwater system, the historical water budget reports a decline in groundwater storage of 3,700 AFY and the current water budget reports an increase of 100 AFY. The GSP simulates three projected water budget scenarios: future conditions with no climate change, future conditions with 2030 climate change factor, and future conditions with 2070 climate change factor. The estimated change in storage for the three projected water budget scenarios are a decline in storage of 300 AFY, 0 AFY, and 400 AFY, respectively.\textsuperscript{141}

The GSP estimates the sustainable yield based on projected water levels under baseline conditions. Per the GSP, on average, groundwater levels will be five feet below the measurable objectives in 2042 if no groundwater management measures are implemented.\textsuperscript{142} The decline of five feet translates into 793 AFY of storage decline.\textsuperscript{143} While the GSP does not explicitly state this information, it appears that the GSP rounds this decline in storage to 1,000 AFY and deducts this from historical pumping of 47,100 AFY to estimate sustainable yield.\textsuperscript{144} Thus, the GSP estimates a sustainable yield of 46,100 AFY which is expected to stop the projected decline in groundwater levels.\textsuperscript{145} Department staff encourage the GSA to update the Plan during future periodic evaluations to clarify how the sustainable yield was calculated to ensure the inference by Department staff is correct.

Department staff conclude that the historical, current, and projected water budgets included in the Plan substantially comply with the requirements outlined in the GSP Regulations. The GSP provides the required historical, current, and future accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the Plan area and includes an estimate of the sustainable yield of the Plan area and projected future water demands.

\subsection*{4.2.4 Management Areas}

The GSP Regulations provide the option for one or more management areas to be defined within a basin if the GSA has determined that the creation of the management areas will

\begin{itemize}
\item \textsuperscript{139} Wyandotte Creek Subbasin GSP, Tables 2-5 to 2-6 and Figures 2-26 to 2-35, pp. 135-139, 142-143, and 145-150.
\item \textsuperscript{140} Wyandotte Creek Subbasin GSP, Section 2.3.4, p. 134.
\item \textsuperscript{141} Wyandotte Creek Subbasin GSP, Table 2-6, p. 137.
\item \textsuperscript{142} Wyandotte Creek Subbasin GSP, Section 2.3.6, p. 153.
\item \textsuperscript{143} Wyandotte Creek Subbasin GSP, Table 2-9, p. 153.
\item \textsuperscript{144} Wyandotte Creek Subbasin GSP, Section 2.3.6, p. 153.
\item \textsuperscript{145} Wyandotte Creek Subbasin GSP, Section 2.3.6, p. 153.
\end{itemize}
facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives, provided that undesirable results are defined consistently throughout the basin.\textsuperscript{146}

The GSP divides the Subbasin into two management areas: Wyandotte Creek Oroville and Wyandotte Creek South. The GSP states that the management areas are created to develop sustainable management criteria, monitoring networks, and projects that best serve the need of the uses and users of groundwater unique to the management area.\textsuperscript{147}

The GSP further elaborates that the management areas are unique in terms of interest and vulnerability of stakeholders and groundwater uses, the nature of water demand such as agricultural, domestic, and municipal, the number and characteristics of wells supplying groundwater, and to some degree the hydrogeology and recharge sources.\textsuperscript{148}

The GSP states that the Wyandotte Creek Oroville management area encompasses the municipal and adjacent area to the City of Oroville and is predominantly an urban area with California Water Service providing groundwater supplies for residential and municipal use.\textsuperscript{149} The Feather River enters the Subbasin in the northeast and crosses the management area through the central portion.\textsuperscript{150}

The Wyandotte Creek South management area encompasses the area south of the City of Oroville\textsuperscript{151} and is described to be “dominated by irrigated agriculture dependent on groundwater and surface water diversions from the Feather River.”\textsuperscript{152} The Feather River enters the management area in the northeast and flows along the western boundary. Both perennial and ephemeral streams traverse the management area including Honcut Creek and Wyandotte Creek.\textsuperscript{153}

The GSP sufficiently describes the reasoning for dividing the Subbasin into management areas along with the characteristics and features of each management area. Department staff believe that the established management area will likely help in Plan implementation as each management area appear to have unique challenges and opportunities.

### 4.3 Sustainable Management Criteria

GSP Regulations require each Plan to include a sustainability goal for the basin and to characterize and establish undesirable results, minimum thresholds, and measurable objectives for each applicable sustainability indicator, as appropriate. The GSP Regulations require each Plan to define conditions that constitute sustainable groundwater management for the basin including the process by which the GSA

\textsuperscript{146} 23 CCR § 354.20.
\textsuperscript{147} Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 60.
\textsuperscript{148} Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 60.
\textsuperscript{149} Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 54.
\textsuperscript{150} Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 54.
\textsuperscript{151} Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 54.
\textsuperscript{152} Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 60.
\textsuperscript{153} Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 60.
characterizes undesirable results and establishes minimum thresholds and measurable objectives for each applicable sustainability indicator.\(^{154}\)

### 4.3.1 Sustainability Goal

GSP Regulations require that GSAs establish a sustainability goal for the basin. The sustainability goal should be based on information provided in the GSP’s basin setting and should include an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation.\(^{155}\)

The sustainability goal for the Subbasin is “to ensure that groundwater is managed to provide a water supply of adequate quantity and quality to support beneficial users of groundwater including but not limited to rural areas and other communities, the agricultural economic base of the region, and environmental resource uses in the Subbasin now and in the future.”\(^{156}\) The GSP states that groundwater management is already occurring in Butte County which has resulted in enhanced monitoring.\(^{157}\) While the GSP states that the groundwater levels in the Subbasin may continue to decline during the implementation period, the GSP focuses on having stable groundwater levels for the long term and operating the Subbasin within its sustainable yield.\(^{158}\) The GSA intends to achieve the Subbasin’s sustainability goal by implementing projects and management actions which are aimed to augment water supply and increase water efficiency, stabilize groundwater levels on a long-term average basis, and avoid undesirable results to ensure the Subbasin is operating within its sustainable yield.\(^{159}\) The GSA has adopted an adaptive management strategy under which new projects may be proposed, and the projects proposed in this GSP may be further expanded and modified depending on the groundwater conditions of the Subbasin.\(^{160}\)

Department staff note the Subbasin’s sustainability goal substantially complies with the GSP Regulations.

### 4.3.2 Sustainability Indicators

Sustainability indicators are defined as any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results.\(^{161}\) Sustainability indicators thus correspond with the six undesirable results – chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon, significant and unreasonable reduction of groundwater storage, significant and unreasonable seawater intrusion, significant and unreasonable degraded water quality, including the

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\(^{154}\) 23 CCR § 354.22 et seq.

\(^{155}\) 23 CCR § 354.24.

\(^{156}\) Wyandotte Creek Subbasin GSP, Section 3.1, p. 157.

\(^{157}\) Wyandotte Creek Subbasin GSP, Section 3.1, p. 157.

\(^{158}\) Wyandotte Creek Subbasin GSP, Section 3.1, p. 157.

\(^{159}\) Wyandotte Creek Subbasin GSP, Section 3.1, p. 157.

\(^{160}\) Wyandotte Creek Subbasin GSP, Section 5.5, p. 218.

\(^{161}\) 23 CCR § 351(ah).
migration of contaminant plumes that impair water supplies, land subsidence that substantially interferes with surface land uses, and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water\textsuperscript{162} – but refer to groundwater conditions that are not, in and of themselves, significant and unreasonable. Rather, sustainability indicators refer to the effects caused by changing groundwater conditions that are monitored, and for which criteria in the form of minimum thresholds are established by the agency to define when the effect becomes significant and unreasonable, producing an undesirable result.

GSP Regulations require that GSAs provide descriptions of undesirable results including defining what are significant and unreasonable potential effects to beneficial uses and users for each sustainability indicator.\textsuperscript{163} GSP Regulations also require GSPs provide the criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.\textsuperscript{164}

GSP Regulations require that the description of minimum thresholds include the information and criteria relied upon to establish and justify the minimum threshold for each sustainability indicator.\textsuperscript{165} GSAs are required to describe how conditions at minimum thresholds may affect beneficial uses and users,\textsuperscript{166} and the relationship between the minimum thresholds for each sustainability indicator, including an explanation for how the GSA has determined conditions at each minimum threshold will avoid causing undesirable results for other sustainability indicators.\textsuperscript{167}

GSP Regulations require that GSPs include a description of the criteria used to select measurable objectives, including interim milestones, to achieve the sustainability goal within 20 years.\textsuperscript{168} GSP Regulations also require that the measurable objectives be established based on the same metrics and monitoring sites as those used to define minimum thresholds.\textsuperscript{169}

The following subsections thus consolidate three facets of sustainable management criteria: undesirable results, minimum thresholds, and measurable objectives. Information, as presented in the Plan, pertaining to the processes and criteria relied upon to define undesirable results applicable to the Subbasin, as quantified through the establishment of minimum thresholds, are addressed for each applicable sustainability

\begin{footnotesize}{\begin{enumerate}[162 Water Code § 10721(x). \item 163 23 CCR §§ 354.26 (a), 354.26 (b)(c). \item 164 23 CCR § 354.26 (b)(2). \item 165 23 CCR § 354.28 (b)(1). \item 166 23 CCR § 354.28 (b)(4). \item 167 23 CCR § 354.28 (b)(2). \item 168 23 CCR § 354.30 (a). \item 169 23 CCR § 354.30 (b). \end{enumerate}}\end{footnotesize}
indicator. A submitting agency is not required to establish criteria for undesirable results that the agency can demonstrate are not present and are not likely to occur in a basin.170

4.3.2.1 Chronic Lowering of Groundwater Levels
In addition to components identified in 23 CCR §§ 354.28 (a-b), for the chronic lowering of groundwater, the GSP Regulations require the minimum threshold for chronic lowering of groundwater levels to be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results that is supported by information about groundwater elevation conditions and potential effects on other sustainability indicators.171

The GSP defines significant and unreasonable lowering of groundwater levels as “sustainably constructed domestic wells going dry during non-dry year conditions.”172 However, the GSP did not provide the definition of “sustainably constructed domestic wells.”

The GSP states that “[a]n undesirable result caused by the chronic lowering of groundwater levels is experienced if sustained groundwater levels are too low to provide a water supply of adequate quantity and quality to achieve the Sustainability Goal.”173 The undesirable result in terms of quantified exceedance of minimum threshold is defined as “[t]wo [representative monitoring site] wells within a management area reach their [minimum threshold] for two consecutive non-dry year-types.”174 The GSP states that non-dry year types include wet, above normal, and below normal as defined by the Sacramento Valley Water Year Index.175 Department staff note that the GSP excludes dry and critical water year types in the definition of undesirable results. SGMA includes a provision which states “overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.”176 Therefore, Department staff conclude the inclusion of language in the definition of an undesirable result and in the discussion of significant and unreasonable conditions that precludes undesirable results during dry years without discussing how extractions and recharge will be managed to offset these potential impacts in other periods is problematic. The GSA should revise the definition of undesirable results to remove the non-dry year condition or discuss how extractions and recharge will be managed as necessary to ensure that reductions in groundwater levels or storage

170 23 CCR § 354.26 (d).
171 23 CCR § 354.28(c)(1) et seq.
172 Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 159.
173 Wyandotte Creek Subbasin GSP, Section 3.3.1, p. 159.
174 Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 159.
175 Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 159.
176 Water Code § 10721(x)(1).
during dry years are offset by increases in groundwater levels or storage during other periods (see Recommended Corrective Action 2a).

While establishing groundwater level minimum thresholds, the GSP focuses on the protection of sustainably constructed domestic wells because of dewatering domestic wells is a concern in the Subbasin. However, the GSP did not provide a definition of “sustainably constructed domestic wells.” Domestic wells are generally shallower than other well types; therefore, the water level that is protective of domestic wells is considered protective of other wells too. The GSP states that the domestic well dataset was refined by removing wells installed before 1980 so that the wells that remained in the dataset are likely to be consistent with the current County well standards and currently serving domestic households. The Department staff recommend evaluating impacts of proposed minimum thresholds on other beneficial uses and users, such as public and small water systems and environmental uses and users, as the GSP does not evaluate those impacts (see Recommended Corrective Action 2b).

Further, Department staff note the GSA does not assess how the proposed minimum thresholds for the chronic lowering of groundwater levels may impact other sustainability indicators (e.g., groundwater storage, depletion of interconnected surface water, etc.). Considering the GSA is choosing to manage the Subbasin below historic lows, understanding this relationship will be important during Plan implementation. Department staff recommend the GSA provide a description of the relationship between established minimum thresholds for the chronic lowering of groundwater levels and how they avoid undesirable results for each of the other sustainability indicators (see Recommended Corrective Action 2c).

To establish groundwater level minimum thresholds, the GSP identifies three representative monitoring sites in the Wyandotte Creek Oroville management area and six representative monitoring sites in the Wyandotte Creek South management area. A unique minimum threshold is established at each representative monitoring site well to protect the sustainably constructed domestic wells, as well as to mitigate the impact on the majority of domestic wells.

The minimum threshold was established using the refined domestic well dataset, and further refining the dataset by removing 15 percent of the shallowest wells based on the elevation of the bottom of the wells within a three-mile radius of each representative monitoring site. The GSP explains that a percentile statistical analysis was conducted based on the calculation of domestic well depths (translated to elevation). Box and whisker plots were used to calculate the minimum threshold using this method.

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177 Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 159.
178 Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 160.
179 Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 160.
180 Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 160.
181 Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 160.
GSP explains that the minimum threshold will protect 85 percent of all domestic wells within a three-mile radius of the representative monitoring site. Department staff note that Appendix 3-B shows the upper quartile of the box and whisker plot to be the minimum threshold value.

Department staff note the GSP includes a management action referenced as “Domestic Well Mitigation” that aims to potentially provide resources to well owners impacted by groundwater management and lowering groundwater levels planned under the GSA’s management of the Subbasin. Under this management action, the GSA plans to collect data on domestic wells to determine which well owners potentially need assistance; secure financial resources to assist with the repair, replacement, and deepening of domestic wells; and provide emergency response to well owners including supplying bottled water and potable water for sanitation. Department staff are encouraged by the GSA’s proposed management action to assist well owners who may be impacted by the proposed groundwater management of the Subbasin. Department staff recommend the GSA utilizes the Department’s Drinking Water Guidance as appropriate and provide updates to the Plan about the progress of this program during GSP implementation.

The measurable objective is defined as the “groundwater level based on the groundwater trend line for the dry periods (over the period of record) of observed short-term climatic cycles extended to 2030.” In other words, measurable objectives are the groundwater level trend that will be observed in 2030 based on the linear projection of the groundwater level data for the dry periods since 2000. The groundwater level data shows cyclic fluctuations over a four- to seven-year cycle and generally, the lowest groundwater levels of a given cycle were used for this projection unless they appeared to be outliers. Since groundwater levels have been relatively stable in the Subbasin, the projected 2030 levels are near the lowest historical levels. The GSP clarifies that the measurable objective water level is chosen as the 2030 water level because it will take time to stop the long-term decline through the implementation of projects and management actions.

The GSP states that interim milestones are based on linear interpolation of groundwater levels at each representative monitoring site between 2022 and 2042. However, the majority of the interim milestones are the same as the measurable objective and when the interim milestones are different, they only differ by a few feet. The GSP also states

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182 Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 161.
184 Wyandotte Creek Subbasin GSP, Section 3.3.3, p. 162.
185 Wyandotte Creek Subbasin GSP, Section 3.3.3, p. 162.
186 Wyandotte Creek Subbasin GSP, Executive Summary, p. 24.
188 Wyandotte Creek Subbasin GSP, Section 3.3.3, p. 161.
189 Wyandotte Creek Subbasin GSP, Section 3.3.3, p. 162.
190 Wyandotte Creek Subbasin GSP, Table 3-1, p. 163.
that observed groundwater levels may be higher than the established interim milestones because the projection is based on the dry years in the cycle.\textsuperscript{191}

The GSP considers the beneficial uses and users of groundwater by analyzing minimum threshold impacts on domestic wells and establishing minimum thresholds that are protective of sustainably constructed wells. The measurable objectives set at 2030 groundwater levels are 12 to 48 feet higher than the minimum threshold levels.\textsuperscript{192} The GSP states that this range between minimum thresholds and measurable objectives provides operational flexibility for active management.\textsuperscript{193} Although groundwater levels will continue to decline for some time, the GSA plans to stabilize groundwater levels by 2030 through the implementation of various projects and management actions. For more information on the proposed projects and management actions, please see Projects and Management Actions (Section 4.5). Department staff note that the GSA’s approach of allowing the groundwater level to further decline until 2030 is based on the anticipation that it will take a few years to implement the projects and to reflect the benefit of these projects on groundwater levels.

Despite the identification of multiple recommended corrective actions, the GSP’s discussion of minimum thresholds and measurable objectives for the chronic lowering of groundwater levels seems to be comprehensive and includes adequate support, justification, and information to understand the GSA’s process, analysis, and rationale. Although Department staff have requested the GSA further evaluate potential impacts to beneficial uses and users, the GSP includes a well mitigation program to assist any well owners who may be impacted during initial plan implementation which is a consideration of these users. While Department staff have also noted the GSA needs to evaluate the potential impacts to other sustainability indicators at the proposed minimum thresholds, this does not preclude plan approval at this time since the GSA’s planned management maintains current groundwater level trends until 2030 and will likely not cause undesirable results as defined in the Plan. Department staff expect the GSA to update the plan accordingly and potentially refine the groundwater level sustainable management criteria as more information becomes available to ensure the proposed management considers beneficial uses and users and does not cause undesirable results for other sustainability indicators.

4.3.2.2 Reduction of Groundwater Storage

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the reduction of groundwater storage, the GSP Regulations require the minimum threshold for the reduction of groundwater storage to be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the

\textsuperscript{191} Wyandotte Creek Subbasin GSP, Section 3.3.3, p. 162.
\textsuperscript{192} Wyandotte Creek Subbasin GSP, Table 3-1, p. 163.
\textsuperscript{193} Wyandotte Creek Subbasin GSP, Section 3.2.3, p. 158.
sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.194

The GSP states that the sustainable management criteria developed for chronic lowering of groundwater levels are used for reduction of groundwater storage because groundwater levels and groundwater storage are closely related and measured changes in groundwater levels can serve as a proxy for change in groundwater storage.195 Because groundwater levels are used as a proxy, the minimum thresholds and measurable objectives for groundwater storage are the same as groundwater levels.196

The GSP states that an undesirable result related to the reduction of groundwater storage is experienced if “sustained groundwater storage volumes are insufficient to achieve the Sustainability Goal.”197 The GSP further states that minimum thresholds intended to prevent significant and unreasonable negative impacts on groundwater levels are assumed adequate to protect against significant and unreasonable reductions of groundwater storage.198 Per the GSP, “[t]he aquifer system in the Wyandotte Creek Subbasin generally has sufficient groundwater storage capacity to take additional groundwater recharge during wet periods and remain saturated during dry periods, allowing for a range of active management reflecting the desired state for groundwater storage at the year 2042.”199

The GSP’s discussion of minimum thresholds and measurable objectives for the reduction of groundwater storage seems to be comprehensive and includes adequate support, justification, and information to understand the GSA’s process, analysis, and rationale. Department staff find that the GSP’s discussion and presentation of information covers the specific items listed in the GSP Regulations in an understandable format using appropriate data and assumptions. Staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

4.3.2.3 Seawater Intrusion
In addition to components identified in 23 CCR §§ 354.28 (a-b), for seawater intrusion, the GSP Regulations require the minimum threshold for seawater intrusion to be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results.200

194 23 CCR § 354.28(c)(2).
195 Wyandotte Creek Subbasin GSP, Section 3.4.1, p. 163.
196 Wyandotte Creek Subbasin GSP, Sections 3.4.2 and 3.4.3, pp. 163-164.
197 Wyandotte Creek Subbasin GSP, Section 3.4.1, p. 163.
198 Wyandotte Creek Subbasin GSP, Section 3.4.2, p. 164.
199 Wyandotte Creek Subbasin GSP, Section 3.4.3, p. 164.
200 23 CCR § 354.28(c)(3).
The GSP does not consider seawater intrusion an applicable sustainability indicator in the Subbasin due to its distance from the Pacific Ocean. Therefore, the GSP does not define undesirable results and establish sustainable management criteria for seawater intrusion. Department staff concur with the rationale for not setting sustainable management criteria for seawater intrusion.

4.3.2.4 Degraded Water Quality

In addition to components identified in 23 CCR §§ 354.28 (a-b), for degraded water quality, the GSP Regulations require the minimum threshold for degraded water quality to be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.

The GSP states that undesirable results related to water quality as a result of groundwater pumping have not occurred historically, are not currently occurring, and are not likely to occur in the future in the Subbasin. While the GSP briefly discusses the presence of various water quality constituents of concern in the Subbasin, the only acknowledgement of groundwater quality conditions to support the sustainable management criteria established for degradation of water quality is for specific conductance, which is a measurement of salinity. The salinity appears to be relatively stable over the years and well below the regulatory limits as the GSP states, “[o]bservations of specific conductance at [representative monitoring sites] from 2001 through 2019 ranged between 346 and 390 [microsiemens per centimeter (µS/cm)] and demonstrated no trend.”

To determine what is considered “significant and unreasonable” degraded water quality, the GSA consulted with stakeholders in the Subbasin and determined that the following could be potential impacts: aesthetic concerns for drinking water; reduced crop yield and quality; and increased reliance on surface water for blending. Considering these potential impacts, degraded water quality would be significant and unreasonable and, therefore, an undesirable result “if groundwater quality degrades such that the specific conductance exceeds the upper Secondary [Maximum Contaminant Level (MCL)] of 1,600 µS/cm.” The GSP acknowledges that there is no public health goal or primary MCL goal associated with specific conductance.

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201 Wyandotte Creek Subbasin GSP, Section 3.6, p. 167.
202 23 CCR § 354.28(c)(4).
203 Wyandotte Creek Subbasin GSP, Section 3.5.2, p. 165.
204 Wyandotte Creek Subbasin GSP, Section 3.5.2, p. 165.
205 Wyandotte Creek Subbasin GSP, Section 3.5.2, p. 165.
206 Wyandotte Creek Subbasin GSP, Section 3.5.2, p. 165.
The GSP states that an undesirable result is experienced if “groundwater pumping compromises the Subbasin’s ability to achieve its Sustainability Goal.”\(^{207}\) The GSP also defines undesirable result occurrence in terms of a minimum threshold exceedance when “two [representative monitoring site] wells over the entire Wyandotte Creek Subbasin exceed their [minimum threshold] for two consecutive non-dry years.”\(^{208}\)

Department staff note that the GSP excludes dry and critical years in the definition of undesirable results. Department staff conclude that including language in the definition of an undesirable result that precludes undesirable results during dry years without discussing how the degradation of groundwater quality will be managed in other periods may be problematic. The GSA should revise the definition of undesirable results to remove the non-dry year condition or discuss how degradation during dry periods will be managed as necessary to ensure that adverse water quality conditions are offset during other periods (see Recommended Corrective Action 3).

The minimum thresholds and measurable objectives are established based on the Secondary MCL (SMCL) of specific conductance (salinity).\(^{209}\) The minimum threshold is defined as “the upper [SMCL] for specific conductance based on the State Secondary Drinking Water Standards” which is 1,600 µS/cm\(^{210}\) and the measurable objective is defined as “the recommended [SMCL] for specific conductance based on the State Secondary Drinking Water Standards” which is 900 µS/cm.\(^{211}\)

Despite the presence of various constituents of concern, the GSA established sustainable management criteria only for salinity and does not intend to manage other constituents of concern because the groundwater quality in the Subbasin is led and overseen by other entities under existing laws and regulations. Department staff note that the GSA plans to coordinate with the applicable agencies implementing water quality management and regulatory programs to understand if the existing regulations are being met or if groundwater pumping in the Subbasin is adversely impacting the constituents managed or regulated under these programs.\(^{212}\) Department staff reiterate the need for the GSA to provide detailed information on all water quality constituents of concern and to discuss how existing groundwater quality conditions and/or remediation efforts may impact the GSA’s ability to manage groundwater as requested in Recommended Corrective Action 1a through 1d.

Despite the identification of a recommended corrective action, the GSP’s discussion of constituents of concern in the Subbasin and the degraded water quality sustainability indicator is comprehensive and includes adequate support, justification, and information to understand the GSA’s process, analysis, and rationale. While Department staff have

\(^{207}\) Wyandotte Creek Subbasin GSP, Section 3.5.1, p. 164.
\(^{208}\) Wyandotte Creek Subbasin GSP, Section 3.5.1, p. 164.
\(^{209}\) Wyandotte Creek Subbasin GSP, Sections 3.5.2 and 3.5.3, pp. 165-166.
\(^{210}\) Wyandotte Creek Subbasin GSP, Section 3.5.2, p. 165.
\(^{211}\) Wyandotte Creek Subbasin GSP, Section 3.5.3, p. 166.
\(^{212}\) Wyandotte Creek Subbasin GSP, Section 3.5.1, p. 164.
noted the GSA needs to remove the exemption that excludes dry and critical years from the definition of undesirable results, this flaw does not preclude plan approval at this time as water quality is closely regulated by many other agencies in the Subbasin. Staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

4.3.2.5 Land Subsidence
In addition to components identified in 23 CCR §§ 354.28 (a-b), the GSP Regulations require the minimum threshold for land subsidence to be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects and maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum thresholds and measurable objectives.

The GSP defines the sustainable management criteria for land subsidence the same as those established for chronic lowering of groundwater levels. The GSP states that measured changes in groundwater levels can serve as a proxy for potential land subsidence because land subsidence typically occurs concurrently or shortly after significant declines in groundwater levels.

The GSP states that an undesirable result resulting from land subsidence is experienced if "groundwater pumping leads to changes in the ground surface elevation severe enough to disrupt critical infrastructure or development of projects in a manner that is inconsistent with the Sustainability Goal." The GSP identifies critical infrastructure that could be affected by subsidence as state and county highways, power transmission lines, and water conveyance and distribution facilities. The GSP states that undesirable results related to land subsidence in the Subbasin have not occurred historically, are not currently occurring, and are not likely to occur in the future. Department staff note that while undesirable results related to land subsidence have not occurred in the past, there is a potential for undesirable results to occur in the future given the GSA's proposed management strategy to lower groundwater levels below historic lows. Department staff recommend to the GSA to provide a clear, quantitative definition of when undesirable

213 23 CCR § 354.28(c)(5).
214 23 CCR §§ 354.28(c)(5)(A-B).
215 Wyandotte Creek Subbasin GSP, Section 3.7.1, p. 167.
216 Wyandotte Creek Subbasin GSP, Section 3.7.1, p. 167.
217 Wyandotte Creek Subbasin GSP, Section 2.2.5.1, p. 108.
218 Wyandotte Creek Subbasin GSP, Section 3.7.1, p. 167.
results for land subsidence may occur in the Subbasin, as required by the GSP regulations (see Recommended Corrective Action 4a).

While the GSP states that inelastic land subsidence due to groundwater pumping is unlikely to produce an undesirable result in the Subbasin,\(^{219}\) the groundwater levels will continue to decline before they will stabilize in 2030.\(^{220}\) Because the groundwater level is anticipated to decline and the future groundwater levels will be lower than historical lows for some representative monitoring sites,\(^{221}\) Department staff believe that it is critical for the GSA to monitor for land subsidence using a method that can directly measure land elevation changes and provide quantitative data. Furthermore, Department staff conclude that the use of groundwater level as a proxy for land subsidence is inappropriate because of the GSA’s plan to allow continued lowering of groundwater levels. Therefore, Department staff recommend the GSA establish a monitoring network for land subsidence that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations, and establish sustainable management criteria for land subsidence (see Recommended Corrective Action 4b).

Despite the identification of a recommended corrective action, the GSP’s discussion of land subsidence is comprehensive and includes adequate support, justification, and information to understand the GSA’s process, analysis, and rationale. While Department staff have asked the GSA to remove the use of groundwater levels as a proxy for land subsidence, this flaw does not preclude plan approval as the Subbasin does not appear to have any significant current or historical land subsidence. Department staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

4.3.2.6 Depletions of Interconnected Surface Water

SGMA defines undesirable results for the depletion of interconnected surface water as those that have significant and unreasonable adverse impacts on beneficial uses of surface water and are caused by groundwater conditions occurring throughout the basin.\(^{222}\) The GSP Regulations require that a Plan identify the presence of interconnected surface water systems in the basin and estimate the quantity and timing of depletions of those systems.\(^{223}\) The GSP Regulations further require that minimum thresholds be set based on the rate or volume of surface water depletions caused by groundwater use, supported by information including the location, quantity, and timing of depletions, that

\(^{219}\) Wyandotte Creek Subbasin GSP, Section 2.2.5.2, p. 110.
\(^{220}\) Wyandotte Creek Subbasin GSP, Section 3.3.3, pp. 161-162.
\(^{221}\) Wyandotte Creek Subbasin GSP Appendices, Appendix 3-C, pp. 216-226.
\(^{222}\) Water Code § 10721(x)(6).
\(^{223}\) 23 CCR § 354.16 (f).
adversely impact beneficial uses of the surface water and may lead to undesirable results.\textsuperscript{224}

The Plan acknowledges the presence of interconnected surface water in the Subbasin and provides some data of stream gains and losses;\textsuperscript{225} however, the GSP plans to use groundwater levels as a proxy for depletion of interconnected surface water because the connectivity between the surface water and groundwater is not well measured or understood at this time.\textsuperscript{226} The GSP further elaborates that the BBGM incorporates interaction of surface water and groundwater at a regional scale but “there are significant data gaps that limit calibration of the groundwater response to the uppermost layer of the model.”\textsuperscript{227} The GSP states that the groundwater level sustainable management criteria will be used as a proxy in the interim as more data is collected.\textsuperscript{228} The GSP mentions that an accelerated schedule has been developed to fill these data gaps, and the sustainable management criteria for depletion of interconnected surface water will be established in the future.\textsuperscript{229}

The GSP defines an undesirable result as “depletion of surface water flows caused by groundwater pumping significantly and unreasonably impacts beneficial uses of surface water.”\textsuperscript{230} The minimum thresholds and measurable objectives for depletion of interconnected surface water are the same as chronic lowering of groundwater levels because groundwater levels are used as a proxy.\textsuperscript{231}

Department staff understand that quantifying depletions of surface water from groundwater extractions is a complex task that likely requires developing new, specialized tools, models, and methods to understand local hydrogeologic conditions, interactions, and responses. During the initial review of GSPs, Department staff have observed that most GSAs have struggled with this new requirement of SGMA. However, staff believe that most GSAs will more fully comply with regulatory requirements after several years of Plan implementation that includes projects and management actions to address the data gaps and other issues necessary to understand, quantify, and manage depletions of interconnected surface waters. Accordingly, Department staff believes that affording GSAs adequate time to refine their Plans to address interconnected surface waters is appropriate and remains consistent with SGMA’s timelines and local control preferences.

The Department will continue to support GSAs in this regard by providing, as appropriate, financial and technical assistance to GSAs, including the development of guidance describing appropriate methods and approaches to evaluate the rate, timing, and volume

\textsuperscript{224} 23 CCR § 354.28 (c)(6).
\textsuperscript{225} Wyandotte Creek Subbasin GSP, Section 2.2.6.1, Figure 2-20, and Table 2-3, pp. 114, 116, and 118.
\textsuperscript{226} Wyandotte Creek Subbasin GSP, Section 3.8.3, p. 170.
\textsuperscript{227} Wyandotte Creek Subbasin GSP, Section 3.8.4, p. 170.
\textsuperscript{228} Wyandotte Creek Subbasin GSP, Section 3.8.4, pp. 170-171.
\textsuperscript{229} Wyandotte Creek Subbasin GSP, Section 3.8.3, p. 170.
\textsuperscript{230} Wyandotte Creek Subbasin GSP, Section 3.8.3, p. 170.
\textsuperscript{231} Wyandotte Creek Subbasin GSP, Sections 3.8.4 and 3.8.5, pp. 170-171.
of depletions of interconnected surface water caused by groundwater extractions. Once the Department’s guidance related to depletions of interconnected surface water is publicly available, the GSA, where applicable, should consider incorporating appropriate guidance approaches into their future periodic evaluation to the GSP (see Recommended Corrective Action 5a). GSAs should consider availing themselves of the Department’s financial or technical assistance, but in any event must continue to fill data gaps, collect additional monitoring data, and implement strategies to better understand and manage depletions of interconnected surface water caused by groundwater extractions and define segments of interconnectivity and timing within their jurisdictional area (see Recommended Corrective Action 5b). Furthermore, GSAs should coordinate with local, state, and federal resources agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion (see Recommended Corrective Action 5c).

### 4.4 Monitoring Network

The GSP Regulations describe the monitoring network that must be developed for each sustainability indicator including monitoring objectives, monitoring protocols, and data reporting requirements. Collecting monitoring data of a sufficient quality and quantity is necessary for the successful implementation of a groundwater sustainability plan. The GSP Regulations require a monitoring network of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.\(^{232}\) Specifically, a monitoring network must be able to monitor impacts to beneficial uses and users,\(^{233}\) monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds,\(^{234}\) capture seasonal low and high conditions,\(^{235}\) include required information such as location and well construction and include maps and tables clearly showing the monitoring site type, location, and frequency.\(^{236}\) Department staff encourage GSAs to collect monitoring data as specified in the GSP, follow SGMA data and reporting standards,\(^{237}\) fill data gaps identified in the GSP prior to the first periodic evaluation,\(^{238}\) update monitoring network information as needed, follow monitoring best management practices,\(^{239}\) and submit all monitoring data to the Department’s Monitoring Network Module immediately after collection including any additional groundwater monitoring data that is collected within the Plan area that is used for groundwater management decisions. Department staff note that if GSAs do not fill their identified data

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\(^{232}\) 23 CCR § 354.32.

\(^{233}\) 23 CCR § 354.34(b)(2).

\(^{234}\) 23 CCR § 354.34(b)(3).

\(^{235}\) 23 CCR § 354.34(c)(1)(B).

\(^{236}\) 23 CCR §§ 354.34(g-h).

\(^{237}\) 23 CCR § 352.4 et seq.

\(^{238}\) 23 CCR § 354.38(d).

gaps, the GSA’s basin understanding may not represent the best available science for use to monitor basin conditions.

The GSA has developed monitoring networks for chronic lowering of groundwater level and degraded water quality. The GSA proposes to use the groundwater level monitoring network as a proxy for the reduction of groundwater in storage, land subsidence, and depletions of interconnected surface water sustainability indicators. The GSA has not established a dedicated monitoring network for the seawater intrusion sustainability indicator because the GSA has determined this indicator is not applicable to the Subbasin.

The GSP includes 13 wells in the groundwater level monitoring network, with five of the wells located in the Wyandotte Creek Oroville management area and eight wells in the Wyandotte Creek South management area. Of the 13 wells, a total of nine wells are identified as representative monitoring wells with three located in the Wyandotte Creek Oroville management area and six in the Wyandotte Creek South management area. The wells are drilled and screened at various depths to measure groundwater levels in the single principal aquifer. The densities of monitoring wells are 5 wells per 29 square miles (equivalent to 17 wells per 100 square miles) in Wyandotte Creek Oroville management area and 8 wells per 64 square miles (equivalent to 12.5 wells per 100 square miles) in Wyandotte Creek South management area, which are above the range of 0.2 to 10 wells per 100 square miles recommended in the Department’s Best Management Practices.

The frequency of groundwater level monitoring for wells in the existing network is quarterly, while the representative monitoring wells will be monitored at least biannually (spring and fall) for the purpose of SGMA compliance. While the GSA is planning to monitor groundwater levels bi-annually at a minimum, the GSP does not provide specific months when the monitoring will take place. The GSP does not provide analysis to support the justification that the proposed frequency of measurements can accurately capture the seasonal highs and lows in the Subbasin. Therefore, Department staff recommend the GSA to specify which months depict the seasonal high and low and provide justification on specified months representing the seasonal high and low.

The GSP proposes to use the groundwater level monitoring network as a proxy for the groundwater storage monitoring network. Department staff concur with the GSA’s approach of using groundwater level as a proxy to monitor change in groundwater storage.

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240 Wyandotte Creek Subbasin GSP, Section 4.2, p. 174.
241 Wyandotte Creek Subbasin GSP, Table 4-5, p. 188.
242 Wyandotte Creek Subbasin GSP, Section 4.2, p. 174.
243 Wyandotte Creek Subbasin GSP, Section 4.2.1, p. 177.
244 Wyandotte Creek Subbasin GSP, Section 4.2.1, p. 176.
245 Wyandotte Creek Subbasin GSP, Section 4.3.1, p. 177.
The GSP states that the seawater intrusion sustainability indicator is not applicable to this Subbasin; therefore, no monitoring network is proposed.\textsuperscript{246} Department staff agree with the GSA’s assessment of seawater intrusion; therefore, the development of a monitoring network is not required.

The GSP includes two wells in the water quality monitoring network, both in the Wyandotte Creek Oroville management area.\textsuperscript{247} The density of monitoring wells is reported as 2.1 wells per 100 square miles.\textsuperscript{248} The GSA plans to monitor pH and temperature but plans to only track specific conductance or salinity at the representative monitoring sites.\textsuperscript{249} The GSP states that the month of July is near the peak season for groundwater demand, and therefore, the GSA plans to collect groundwater quality samples once a year in July to understand the water quality when the demand is at its highest.\textsuperscript{250}

For the land subsidence monitoring network, the GSP discusses the Sacramento Valley GPS Subsidence Monitoring Network and the availability of InSAR data for the Subbasin;\textsuperscript{251} however, the GSP does not clearly discuss how and if these data will be utilized for land subsidence monitoring. Furthermore, in the sustainable management criteria section, the GSP discusses using the groundwater level as a proxy for land subsidence, but the GSP does not indicate or discuss using the groundwater level monitoring network as a proxy for the land subsidence monitoring network. Because GSA’s intent to monitor and manage land subsidence in the Subbasin is unclear, Department staff recommend the GSA establish monitoring for land subsidence utilizing a method that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations (see \textit{Recommended Corrective Action 4b}).

The GSP states that a total of 13 monitoring wells and three stream gages are included in the Subbasin’s network for monitoring groundwater and streamflow interactions,\textsuperscript{252} which means all the groundwater level monitoring sites in the Subbasin are included in the depletions of interconnected surface water monitoring network. Therefore, Department staff are unclear regarding which monitoring wells will be utilized to evaluate depletions of interconnected surface water. Department staff are unable to determine if the proposed monitoring network is sufficient to evaluate conditions related to depletions of interconnected surface water because pertinent information about the monitoring network such as specific details regarding monitoring sites, frequency of monitoring, and scientific justification for site selection are not provided. Department staff recommend the

\begin{itemize}
\item \textsuperscript{246} Wyandotte Creek Subbasin GSP, Section 4.1, p. 173.
\item \textsuperscript{247} Wyandotte Creek Subbasin GSP, Section 4.4.1 and Table 4-3, p. 178.
\item \textsuperscript{248} Wyandotte Creek Subbasin GSP, Section 4.4.2, p. 178.
\item \textsuperscript{249} Wyandotte Creek Subbasin GSP, Section 4.4.1, p. 177.
\item \textsuperscript{250} Wyandotte Creek Subbasin GSP, Section 4.4.2, p. 178.
\item \textsuperscript{251} Wyandotte Creek Subbasin GSP, Section 4.5.1, p. 180.
\item \textsuperscript{252} Wyandotte Creek Subbasin GSP, Section 4.6.1, p. 182.
\end{itemize}
GSA clarify the groundwater level monitoring sites that will be used for the evaluation of depletions of interconnected surface water and provide site-specific information (see Recommended Corrective Action 5d).

While recommended corrective actions are identified, the description of the monitoring network included in the Plan substantially complies with the requirements outlined in the GSP Regulations. Overall, the Plan describes in sufficient detail a monitoring network that promotes the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the Plan area and evaluate changing conditions that occur through Plan implementation. The GSP provides a good explanation for the conclusion that the monitoring network is supported by the best available information and data and is designed to ensure adequate coverage of sustainability indicators. The Plan also describes existing data gaps and the steps that will be taken to fill data gaps and improve the monitoring network. Department staff consider the information presented in the Plan to satisfy the general requirements of the GSP Regulations regarding monitoring network.

4.5 PROJECTS AND MANAGEMENT ACTIONS

The GSP Regulations require a description of the projects and management actions the submitting Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin. Each Plan’s description of projects and management actions must include details such as: how projects and management actions in the GSP will achieve sustainability, the implementation process and expected benefits, and prioritization and criteria used to initiate projects and management actions.

The GSP identifies 15 projects which are intended to achieve the Subbasin’s sustainability goal. The projects, if implemented, are reported to provide benefit to groundwater levels, which will in turn benefit groundwater storage, groundwater quality, interconnected surface water, and the land subsidence sustainability indicators, as well as addressing data gaps. The 15 projects are designed to increase direct and in-lieu recharge and promote water conservation to reduce groundwater demand. The projects are categorized into “planned”, “potential”, or “conceptual” projects, where planned projects are expected to move forward and be completed by 2042, potential projects are in planning stages and are dependent on funding sources, and conceptual projects are in conceptual planning stages and will require significant work to move forward.

There are eight planned projects to reduce groundwater demand through water conservation, improving irrigation efficiency, increasing capacity of a water treatment...
plant, and monitoring water loss from fire hydrants due to unpermitted use, as well as increase recharge.\textsuperscript{257} There are five potential projects to also reduce groundwater demand through intra-basin water transfer and water conservation.\textsuperscript{258} Lastly, there are two conceptual projects for direct recharge and water conservation.\textsuperscript{259} 

Based on the implementation schedule provided, most projects will be initiated by 2025 and be completed by 2042. Eight projects were implemented in 2022 or 2023, four will be ready for implementation by 2025, and three projects do not have a timetable provided.\textsuperscript{260} 

The GSP provides an estimate of an expected groundwater supply reduction from some planned and potential projects. The planned and potential projects have an expected groundwater supply reduction of up to 12,700 AFY and 8,000 AFY, respectively. The combined supply reduction is 20,700 AFY which is much higher than the estimated overdraft of 1,000 AFY.\textsuperscript{261} 

Consistent with GSP Regulations, the project descriptions contain information regarding a description of the measurable objective that is expected to benefit from the project, an implementation trigger, a summary of the permitting and regulatory process required, expected benefits, and legal authority under which each project will be implemented.

The GSA has an adaptive management strategy for the Subbasin if projects are not progressing or achieving their targets. The GSA will evaluate the need for additional projects or modify the current projects and begin implementation of management actions.\textsuperscript{262} 

The GSP includes five management actions that the GSA may consider during GSP implementation.\textsuperscript{263} The management actions can be implemented to reduce groundwater demand which “can include increased data collection, education and outreach, regulatory policies, incentive programs, and enforcement actions.”\textsuperscript{264} The GSA plans to coordinate with Butte County and the City of Oroville so that important components of the GSP are addressed in their general plans,\textsuperscript{265} collect domestic well data to provide emergency response to homeowners with dry domestic wells,\textsuperscript{266} coordinate with Butte County to amend the County Code which requires domestic wells to be screened below the groundwater levels measured during the 1989 to 1994 drought,\textsuperscript{267} coordinate with Butte County and the City of Oroville to update the landscape ordinance to encourage new

\textsuperscript{257} Wyandotte Creek Subbasin GSP, Section 5.2.4, pp. 201-208.  
\textsuperscript{258} Wyandotte Creek Subbasin GSP, Sections 5.2.5.1 to 5.2.5.5, pp. 209-213.  
\textsuperscript{259} Wyandotte Creek Subbasin GSP, Sections 5.2.6.1 to 5.2.6.2, pp. 214-215.  
\textsuperscript{260} Wyandotte Creek Subbasin GSP, Tables 5-1 to 5-2, Sections 5.2.4.1 to 5.2.6.2 and Figure 6-1, pp. 197-199, 201-215, and 227.  
\textsuperscript{261} Wyandotte Creek Subbasin GSP, Executive Summary and Section 2.3.6, pp. 32 and 153.  
\textsuperscript{262} Wyandotte Creek Subbasin GSP, Sections 5.5, p. 218.  
\textsuperscript{263} Wyandotte Creek Subbasin GSP, Section 5.3, pp. 216-217.  
\textsuperscript{264} Wyandotte Creek Subbasin GSP, Section 5.3, p. 216.  
\textsuperscript{265} Wyandotte Creek Subbasin GSP, Section 5.3.1, p. 216.  
\textsuperscript{266} Wyandotte Creek Subbasin GSP, Section 5.3.2, p. 216.  
\textsuperscript{267} Wyandotte Creek Subbasin GSP, Section 5.3.3, p. 217.
developments to use drought-resistant plants,\(^\text{268}\) and water purveyors to expand their service area to provide drinking water to residential areas that are currently using private domestic wells.\(^\text{269}\)

The GSP does not provide an implementation schedule for the management actions and states that the schedule is likely to vary depending on the groundwater conditions of the Subbasin.\(^\text{270}\) While some of the management actions are likely to help reduce groundwater demand, the GSP does not quantify the expected benefit.

Department staff encourage the implementation of adaptive management given that proposed projects and management actions have not been fully developed. Department staff recommend that the adaptive management strategy continues to be utilized to update projects and management actions to adapt to future conditions in the Subbasin.

The Plan adequately describes proposed projects and management actions in a manner that is generally consistent and substantially complies with the GSP Regulations. The projects and management actions, which focus largely on refining the GSA’s understanding of basin conditions and avoiding undesirable results, are directly related to the sustainable management criteria and present a generally feasible approach to achieving the sustainability goal of the Plan area.

As projects and management actions are implemented, the Department expects that progress be included in annual reports and any addition or removal of project and management actions be documented in periodic evaluations.

4.6 CONSIDERATION OF ADJACENT BASINS/SUBBASINS

SGMA requires the Department to “…evaluate whether a groundwater sustainability plan adversely affects the ability of an adjacent basin to implement their groundwater sustainability plan or impedes achievement of sustainability goals in an adjacent basin.”\(^\text{271}\) Furthermore, the GSP Regulations state that minimum thresholds defined in each GSP be designed to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.\(^\text{272}\)

The GSP acknowledges that the water management decisions and actions in the Wyandotte Creek Subbasin can affect adjacent basins because groundwater basins in the Northern Sacramento Valley are hydrologically interconnected.\(^\text{273}\) Therefore, the GSA has been collaborating with the other GSAs from the adjacent basins on SGMA implementation efforts. Although there are only four groundwater basins adjacent to the Wyandotte Creek Subbasin, the GSA has been coordinating with GSAs from 10

\(^\text{268}\) Wyandotte Creek Subbasin GSP, Section 5.3.4, p. 217.
\(^\text{269}\) Wyandotte Creek Subbasin GSP, Section 5.3.5, p. 217.
\(^\text{270}\) Wyandotte Creek Subbasin GSP, Section 5.3, p. 216.
\(^\text{271}\) Water Code § 10733(c).
\(^\text{272}\) 23 CCR § 354.28(b)(3).
\(^\text{273}\) Wyandotte Creek Subbasin GSP Appendices, Appendix 6-A, p. 229.
groundwater basins (Antelope, Bowman, Butte, Colusa, Corning, Los Molinos, Red Bluff, Sutter, Vina, and Yolo), since 2020. While the collaboration among the GSAs began in 2020 because of insufficient time during the GSP development phase, GSAs were not able to fully characterize or address inconsistencies among the 11 GSPs. Therefore, the GSAs have developed a framework for long-term coordination which will be followed through during Plan implementation. The GSP also discusses its inter-basin coordination plan which involves identifying and acknowledging significant discrepancies, understanding why those differences exist, and evaluating to the extent they need to be reconciled. According to the inter-basin coordination plan, the GSAs will also evaluate sustainable management criteria among the GSPs to assess impacts and identify significant differences and possible impacts between subbasins that could potentially lead to undesirable results, joint monitoring, regional modeling, and other efforts to address data gaps at subbasin boundaries, compiling and comparing model outputs, and so on. Department staff concur with the GSA’s plan to collaborate and coordinate with multiple groundwater basins to ensure that sustainability will be achieved at the regional level and the management of one basin will not adversely impact the management of other interconnected basins.

Based on information available at this time, Department staff have no reason to believe that groundwater management in the Subbasin will adversely affect groundwater conditions in the adjacent Subbasins at this time. Department staff will continue to review periodic evaluations to the Plan to assess whether implementation of the Wyandotte Creek GSP is potentially impacting adjacent basins.

### 4.7 CONSIDERATION OF CLIMATE CHANGE AND FUTURE CONDITIONS

The GSP Regulations require a GSA to consider future conditions and project how future water use may change due to multiple factors including climate change.

Since the GSP was adopted and submitted, climate change conditions have advanced faster and more dramatically. It is anticipated that the hotter, drier conditions will result in a loss of 10% of California’s water supply. As California adapts to a hotter, drier climate, GSAs should be preparing for these changing conditions as they work to sustainably manage groundwater within their jurisdictional areas. Specifically, the Department encourages GSAs to:

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274 Wyandotte Creek Subbasin GSP Appendices, Appendix 6-A, p. 230.
275 Wyandotte Creek Subbasin GSP Appendices, Appendix 6-A, p. 230.
276 Wyandotte Creek Subbasin GSP Appendices, Appendix 6-A, p. 230.
277 Wyandotte Creek Subbasin GSP Appendices, Appendix 6-A, p. 232.
278 Wyandotte Creek Subbasin GSP Appendices, Appendix 6-A, p. 233.
279 23 CCR § 354.18.
1. Explore how their proposed groundwater level thresholds have been established in consideration of groundwater level conditions in the Subbasin based on current and future drought conditions.

2. Explore how groundwater level data from the existing monitoring network will be used to make progress towards sustainable management of the Subbasin given increasing aridification and effects of climate change, such as prolonged drought.

3. Take into consideration changes to surface water reliability and that impact on groundwater conditions.

4. Evaluate updated watershed studies that may modify assumed frequency and magnitude of recharge projects, if applicable.

5. Continually coordinate with the appropriate groundwater users, including but not limited to domestic well owners and state small water systems, and the appropriate overlying county jurisdictions developing drought plans and establishing local drought task forces to evaluate how their Plan’s groundwater management strategy aligns with drought planning, response, and mitigation efforts within the basin.

5 STAFF RECOMMENDATION

Department staff recommend approval of the GSP with the recommended corrective actions listed below. The Wyandotte Creek Subbasin GSP conforms with Water Code Sections 10727.2 and 10727.4 of SGMA and substantially complies with the GSP Regulations. Implementation of the GSP will likely achieve the sustainability goal for the Wyandotte Creek Subbasin. The GSA has identified several areas for improvement of their Plan and Department staff concur that those items are important and should be addressed as soon as possible. Department staff have also identified additional recommended corrective actions that should be considered by the GSA for the first periodic evaluation of its GSP. Addressing these recommended corrective actions will be important to demonstrate that implementation of the Plan is likely to achieve the sustainability goal.

The recommended corrective actions include:

RECOMMENDED CORRECTIVE ACTION 1

Provide additional information on historical and current groundwater quality conditions in the Subbasin and refine the definition of sustainable management criteria including:

a. Provide additional information in the GSP outlining the location and extent of contamination plumes, identifying which constituents are being monitored.

280 Water Code § 10609.50.
under various programs, and thoroughly describing ongoing remediation efforts within the Subbasin.

b. Evaluate whether groundwater management actions, including production and/or replenishment under the jurisdiction of the GSA, may influence the migration of contaminant plumes.

c. Investigate if groundwater quality issues are adversely impacting groundwater supply and beneficial uses and provide information if there are any mitigation programs in place and the effectiveness of such programs.

d. Coordinate with the lead agencies overseeing these remediation sites regularly and update the Plan stating how existing groundwater quality conditions and/or remediation efforts may impact the GSA’s ability to manage groundwater.

**RECOMMENDED CORRECTIVE ACTION 2**

Provide sufficient information regarding criteria used to identify significant and unreasonable conditions, undesirable results, and the potential impacts to various beneficial uses and users of groundwater related to the chronic lowering of groundwater level minimum thresholds. The GSA should address the following items:

a. Revise the definition of undesirable results and language pertaining to significant and unreasonable lowering of groundwater level to remove the non-dry year condition or discuss how extractions and recharge will be managed as necessary to ensure that reductions in groundwater levels or storage during dry years are offset by increases in groundwater levels or storage during other years within the sustainable management criteria for the chronic lowering of groundwater levels.

b. Provide information on impacts to domestic wells during projected conditions where minimum thresholds are exceeded but undesirable results do not occur and quantify domestic wells that will be impacted by the proposed minimum threshold. Furthermore, the GSA should evaluate the impacts of proposed minimum thresholds on other beneficial uses and users, such as public and small water systems and environmental users and users as the GSP does not evaluate those impacts.

c. Provide a description of the relationship between established minimum thresholds for the chronic lowering of groundwater levels and how they avoid undesirable results for each of the other sustainability indicators.

**RECOMMENDED CORRECTIVE ACTION 3**

Revise the definition of undesirable results to remove the non-dry year condition or discuss how degradation during dry period will be managed as necessary to ensure that adverse water quality conditions are offset during other periods.
RECOMMENDED CORRECTIVE ACTION 4

Provide additional information on criteria used to identify undesirable results, and sustainable management criteria for land subsidence, including:

a. Provide a clear, quantitative definition of when undesirable results for land subsidence may occur in the Subbasin, as required by the GSP Regulations, to support the selection of land subsidence minimum thresholds that demonstrate avoidance of undesirable results.

b. Establish sustainable management criteria for land subsidence for the Subbasin utilizing a monitoring network that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations.

RECOMMENDED CORRECTIVE ACTION 5

Department staff understand that estimating the location, quantity, and timing of stream depletion due to ongoing, Subbasin-wide pumping is a complex task and that developing suitable tools may take additional time; however, it is critical for the Department’s ongoing and future evaluations of whether GSP implementation is on track to achieve sustainable groundwater management. The Department plans to provide guidance on methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water and support for establishing specific sustainable management criteria in the near future. This guidance is intended to assist GSAs to sustainably manage depletions of interconnected surface water.

In addition, the GSA should work to address the following items by the first periodic evaluation:

a. Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions.

b. Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing.

c. Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion within the GSA’s jurisdictional area.

d. Clarify the groundwater level monitoring sites that will be used for the evaluation of depletions of interconnected surface water and provide site-specific information.

e. 
COMMUNICATIONS RECEIVED AND REFERRED
BUTTE COUNTY WATER COMMISSION
MEETING OF AUGUST 2, 2023

Copies of all communications are available at the
Butte County Department of Water and Resource Conservation
308 Nelson Avenue
Oroville, CA 95965

1. *Memo from Butte County Local Agency Formation Commission (LAFCO), re: LAFCO FILE 21-06 – Tuscan Water District Formation – Protest Proceeding Results, Call for Election and Impartial Analysis, June 1, 2023

2. *Publication from NCWA, Water Briefings: State Budget, June 2023, 2023

3. *Article from California WaterBlog, Water Wasted to the Sea?, June 4, 2023

4. *Article from NewsBreak, Colorado River deal forever changes the price of water in the West, June 6, 2023

5. *Email from Tovey Giezentanner to Butte County Water Commission, re: Water Commission Agenda Packet for June 7, 2023, June 6, 2023

6. *California Water Plan eNews, Wednesday’s Update, June 7, 2023

7. *Article from NCWA, Norcal Water Insight – Bringing the Sacramento Valley to Life: Investing in Multiple Benefits through Floodplain Reactivation & Nature-Based Solutions, June 7, 2023

8. *Article from Chico Enterprise-Record, Groundwater agency hosts info workshop, June 15, 2023

9. *Email from Christina Buck to Butte County Water Commission, re: Letter to DWR Regarding Recharge Opportunities and Needs, July 6, 2023

10. *Memo from California Rice, re: Rice Land Use and SGMA Implementation, July 6, 2023

11. *Article from Chico Enterprise Record, Groundwater regulations are moving forward, July 12, 2023

12. *Article from Action News Now, A new proposed Butte County Water District: groundwater a key concern, July 17, 2023

13. *Article from Action News Now, Butte County water showdown may go to special election, July 18, 2023


15. *Article from Chico Enterprise-Record, Group protests water district, July 19, 2023
16. *California Water Plan eNews, Wednesday’s Update, July 26, 2023

17. *Article from NCWA, Measuring and Monitoring Are Essential to Groundwater Sustainability, July 26, 2023

18. *Article from Chico Enterprise-Record, Board calls Tuscan Water District Election, July 27, 2023
MEMORANDUM
LOCAL AGENCY FORMATION COMMISSION

TO: Local Agency Formation Commission

FROM: Stephen Lucas, Executive Officer

SUBJECT: LAFCo File 21-06 - Tuscan Water District Formation – Protest Proceeding Results, Call for Election and Impartial Analysis

DATE: May 24, 2023 for the meeting of June 1, 2023

Summary

The Commission approved the formation of a California Water District to be called the Tuscan Water District (TWD) at its March 2, 2023 public hearing by adopting Resolution No. 18 2022/23 (Attachment A) subject to protest proceedings and a landowner voter election as discussed below. Conditions referenced below are found in Resolution No. 18 2022/23, Section 4 – Further Procedural Actions.

Protest Proceeding

4.E. This formation requires a protest proceeding to be conducted and the Commission directs the Executive Officer to set the proposal for a protest hearing and give public notice of said hearing pursuant to Butte LAFCo Policy, California Government Code section 57002, and other applicable provisions of CKH.

The Executive Officer, pursuant to Commission policy, conducted a 21 day publicly noticed protest proceeding beginning April 7, 2023 and concluding on May 5, 2023. Official Public Notice was published in the Chico Enterprise Record on April 7, 2023 (Attachment B) as there was greater than 1,000 notices to be mailed to landowners. In addition to, but not statutorily required, individual landowner protest forms with cover letter were mailed to each landowner. Results of the Protest Proceedings (Attachment C) determined that there was insufficient landowner protest (greater than 50%) to terminate the proposal and therefore the Commission is obligated to request an election be conducted.

Call for Election

4.E. The Commission with this resolution again requests that the Butte County Board of Supervisors direct the County Elections Official to conduct the necessary election, setting the matter for consideration of the landowner voters of the affected territory on a date consistent with election law and the Cortese-Knox-Hertzberg Act, particularly G.C. 57130. Pursuant to Water Code Sections 34422 and 35003 each landowner voter shall have one vote for each dollar's worth of land owned by the landowner. The last equalized regular (Govt. Code § 57100(g)) County assessment roll will be used to establish land values and landowner title and, pursuant to the "land" definition at Water Code section 34014, land value shall not include land improvements. As used herein, "landowner" refers to a person who is a holder of title to land within the District or its legal representative as provided in Water Code Section 19, 34026, 34027, 34030 and 35004.

While the above terms and conditions adopted in Resolution No. 18 2022/23 remain valid and provide the necessary direction to proceed with the election, the Executive Officer, as a measure of
additional clarity for the Commission, BOS and the public, determined to adopt a separate draft Resolution No. 26 2022/23 (Attachment D) confirming the results of the protest proceedings for the TWD formation and requesting the Butte County Board of Supervisors direct the County Elections Official to conduct the election. The draft resolution, with approving Resolution 18 2022/23 incorporated by reference, specifically addresses the election requirements stipulated by state law (GC 57000) and the Commission’s actions. The Draft Resolution provides the following same ballot questions which were previously adopted in Resolution No. 18 2022/23.

4.F. The formation election ballot questions to be placed before the voters are as follows:

1. Shall the Butte Local Agency Formation Commission order dated March 2, 2023 ordering the formation of Tuscan Water District as a California Water District in western Butte County be approved, subject to the terms and conditions specified in the order which will require a subsequent, post-formation landowner approval of a special assessment or other lawful revenue measure generating equivalent revenue, to fund the initial administrative/organizational activities or the district shall be dissolved, all as more particularly described and set forth in Resolution No. 18 2022/23?"

2. If the Tuscan Water District is formed, it will be governed by a nine (9)-member board of directors. Vote for up to nine at-large directors from the list below:
   [final list of candidate names and occupational designation (if any) to be inserted here]

This resolution calling for an election will be provided to the Board of Supervisors along with the adopting Resolution No. 18 2022/23, the proposed district boundary map and legal description.

Impartial Analysis

4.G. Pursuant to §57144 and §56898 of the Government Code, the Executive Officer will prepare for the Commission’s review a revised Impartial Analysis of the proposed District formation; after the Commission has approved or modified the Impartial Analysis, it shall direct the Executive Officer to submit it to the election’s official no later than the last day for submission of ballot arguments.

Included in this report is a draft Impartial Analysis (Attachment E) that will be provided to the County Elections Official to be included with the ballot pamphlet.

Action Requested:

1. Receive and acknowledge the outcome of Protest Proceedings conducted by the Executive Officer.

2. Consider and approve draft Resolution No. 26 2022/23 (Attachment C) formally requesting the BOS to direct the County Elections Official to conduct the mailed ballot election and direct staff to deliver said resolution to the County Chief Administrative Officer.

3. Consider and approve the Draft Impartial Analysis (Attachment D) and direct staff to provide the Impartial Analysis to the County Elections Official at the appropriate time.

Attachment:
   A. Adopting Resolution No. 18 2022/23
   B. Protest Proceeding Published Notice
   C. Results of Protest Proceeding
   D. Draft Election Call Resolution No. 26 2022/23
   E. Draft TWD Formation Impartial Analysis
Resolution No. 18 2022/23

AMENDED RESOLUTION OF THE LOCAL AGENCY FORMATION COMMISSION
OF THE COUNTY OF BUTTE MAKING DETERMINATIONS
AND APPROVING THE FORMATION OF THE TUSCAN WATER DISTRICT –
LAFCO FILE NO. 21-06

RESOLVED, by the Local Agency Formation Commission of the County of Butte, State of California, that:

WHEREAS, a Petition of Application signed by 57-percent of the landowners in the proposed Water District was filed with the Commission to initiate the change of organization; and

WHEREAS, application has been made to this Commission pursuant to the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000 (Government Code Sections 56000 et seq.) for consideration of a proposal for the formation of the Tuscan Water District as shown in Exhibit "A" attached hereto and made a part hereof; and

WHEREAS, an application to form the Tuscan Water District, a California Water District as defined in the California Water Code, Section 34000 et seq., has been filed with the Executive Officer of the Local Agency Formation Commission of Butte County, California by petition, and said application complied with all the requirements of law and the Commission; and

WHEREAS, the Executive Officer has given the notices required by law and forwarded copies of his report to officers, persons and public agencies prescribed by law; and

WHEREAS, the Executive Officer, pursuant to Government Code Section 56658, set December 2, 2021, as the initial hearing date and gave the required notice of public hearing; and the matter was continued to the meeting of January 6, 2022, and continued again to February 3, 2022, in the City of Oroville City Council Chambers; and

WHEREAS, the Executive Officer, pursuant to Government Code Section 56665, has reviewed this proposal and prepared a report including his recommendations thereon, and has furnished a copy of this report to each person entitled to a copy; and

WHEREAS, this Commission has considered the application materials, studies, attachments, and other documentation at the December 2, 2021, January 6, 2022, and February 3, 2022, public hearings which is incorporated by reference herein; and

WHEREAS, on December 2, 2021, January 6, 2022, and February 3, 2022, this Commission heard and received, all oral and written protests, objections and evidence, which were made, presented, or filed, and all persons present were given the opportunity to hear and be heard in respect to any matter concerning this proposal; and

WHEREAS, this Commission considered the factors determined by the Commission to be relevant to this proposal, including, but not limited to, factors specified in Government Code Sections 56301, 56668; and 56886.5(a); and the California Water Code Section 34000; and

WHEREAS the Commission adopted Resolution No. 11 2021/22 on February 3, 2022, approving the formation of the Tuscan Water District (TWD) and ordering the formation subject to protest proceeding and election; and
WHEREAS, protest proceedings were duly held and protests were not received representing a majority protest, so the Executive Officer, pursuant to the Resolution requested that the Board of Supervisors of Butte County (BOS) call an election with regard to the formation, election of a board of directors, and adoption of a parcel charge to fund the operation of the district; and

WHEREAS the BOS by minute order on April 7, 2022, directed the Elections Officer to proceed with a mailed ballot election as requested; and

WHEREAS, the Elections Department prepared a ballot form and proceeded to conduct the mailed ballot election; and

WHEREAS, On September 16, 2022, James McCabe sent a letter to the Butte County Clerk Recorder objecting to the election proceeding. He pointed out that the Elections Office had failed to send the Notice of Election required by Government Code § 57130. And that the proposed ballot measure for a parcel charge to fund the operation of the district was contrary to the requirements of Prop 218. AquAlliance raised similar objections in a letter dated September 19, 2022; and

WHEREAS, On September 27, 2022, the County Elections Official posted a News Release stating that “due to concerns that were raised regarding whether adequate notice of the election was provided, the Elections Official has determined that the official canvass will not be conducted as scheduled, and no results will be certified at this time. A new election will instead be re-noticed and scheduled for a future date;” and

WHEREAS, LAFCO was requested by the County to submit a new request to the BOS calling for a new election;

WHEREAS, On December 7, 2022, Mr. McCabe sent a further letter to the Butte County Administrative Officer outlining his concerns with the TWD election process, the proposed parcel charge, and originating LAFCO Resolution No. 11 2021/22 adopted February 3, 2022; and

WHEREAS, On January 3, 2023, Butte County Counsel provided a letter to LAFCO stating that “On behalf of the Clerk of the Board of Supervisors and the Clerk-Recorder/Registrar of Voters Office, the Butte County Counsel’s Office is requesting that the Butte LAFCO Commission review Mr. McCabe’s letter and adopt, if appropriate, a revised TWD Formation resolution to submit to the County that addresses the issues he has raised.”; and

WHEREAS, The Commission has determined that it is appropriate and necessary to adopt a new Resolution No. 18 2022/23, amending and restating Resolution No. 11 2021/22 to address the concerns raised; and

WHEREAS, after a duly noticed public hearing and consideration of any further testimony received.

NOW THEREFORE, the Local Agency Formation Commission of the County of Butte DOES HEREBY RESOLVE, DETERMINE AND ORDER, to adopt Resolution No. 18 2022/23, amending and restating Resolution No. 11 2021/22 to read as follows:

Section 1. Environmental Findings:

A. Based upon its review of the entire record, including the Staff Report, any public comments or testimony presented to the Commission, and the facts outlined herein, the Commission finds that the formation of the Tuscan Water District is not subject to CEQA for the following reasons:

i. The formation of the Tuscan Water District is not a “project” under CEQA
LAFCo approval of a change of organization (such as a special district formation) is a project under CEQA when the action has a potential for resulting in either a direct or reasonably foreseeable indirect physical change in the environment. (CEQA Guidelines §§ 15060(c) & 15378.) For example, a local government change of organization approval is a CEQA project when it constitutes an essential and conclusive step that foreseeably will culminate in some action that may affect the environment (e.g., approval of annexation of territory to a city for the planned development of that territory). But, when the LAFCo approval leaves open the issue of whether, what, where, or when any actual physical change affecting the environment would ultimately take place, the approval is not a project.

The formation of a water district under these facts and at this time is not a CEQA project because the Groundwater Sustainability Plan (GSP) has not yet received approval by the Department of Water Resources (DWR) (under review) and the Groundwater Sustainability Agencies (GSAs) must then consider how to best implement the GSP, assuming the project and management actions (PMAs) will evolve throughout this stage and the preferred or planned GSP actions and projects to be implemented have not yet been fully vetted beyond cursory identification. Therefore, under the current circumstances, approval of district formation will not result in any reasonably foreseeable change to the environment.

ii. The formation of the Tuscan Water District is exempt from CEQA

Even if formation of the Tuscan Water District was a "project" under CEQA, there are six CEQA exemptions that apply to LAFCo's action:

- **Common sense exemption.** CEQA does not apply "where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment." (CEQA Guidelines § 15061(b)(3).) At the time of the water district formation, there will not be any identifiable environmental changes that are reasonably foreseeable because GSP implementation actions will be evaluated, determined, and implemented at a much later stage in the SGMA/GSP process.

- **Organizational activity exemption.** Similarly, CEQA defines "project" to exclude "organizational or administrative activities of governments that will not result in direct or indirect physical changes in the environment." (CEQA Guidelines § 15378(b)(5).) At this stage and as part of the planning work toward implementing groundwater regulation, LAFCo's organizational action to create a new water district is exempt because that action at this time will not result in any physical change in the environment.

- **Section 15320 Exemption.** Section 15320 exempts from CEQA review requirements "changes in the organization or reorganization of local governmental agencies where the changes do not change the geographical area in which previously existing powers are exercised." In this case the newly formed TWD will only have the authority to exercise powers already exercisable by the County Water Authority and the *** Sustainable Groundwater Management Agency (SGA) within the territory of the proposed District. Therefore the formation of the district is merely a reorganization of who exercises existing authority within the territory of the proposed district and is within the scope of the 15320 exemption.

- **Funding mechanism creation exemption.** A principal objective for water district formation is to create a local agency with the authority to generate local revenue through fees or assessments and fund GSP implementation projects. The creation of a government funding mechanism is not a project. (CEQA Guidelines § 15378(b)(4).)
Natural resource protection exemption. LAFCo is a government agency authorized by state law to regulate local government changes of organization. LAFCo approval of water district formation is an action to facilitate GSP implementation, which is an action to maintain and restore the groundwater, a natural resource and a matter involving environmental protection. The regulatory process involves procedures for protection of the environment because LAFCo will create a new water district (a local government agency subject to CEQA) that must evaluate its projects under CEQA before approving GSP implementation actions. The Proposal therefore is exempt under CEQA Guidelines sections 15307 and 15308.

Planning study exemption. "Feasibility or planning studies for possible future actions which the agency, board, or commission has not approved, adopted, or funded does not require the preparation of an EIR or negative declaration." (CEQA Guidelines § 15262.) Water district formation is exempt under this provision because it is a GSP planning-related action that will facilitate future GSP implementation actions that LAFCo, GSA, and the water district have not yet approved, adopted, or funded.

SGMA exemption. SGMA contains a special CEQA exemption: "[CEQA] does not apply to the preparation and adoption of plans pursuant to this chapter. Nothing in this part shall be interpreted as exempting from [CEQA] a project that would implement actions taken pursuant to a plan adopted pursuant to this chapter." (Water Code § 10728.6.) This exemption distinguishes between GSP preparation and adoption (exempt) and later GSP implementing projects (not exempt). Petitioners are pursuing water district formation concurrent with GSA preparation of the Vina GSP in order for the district to exist and be able to start GSP implementation after the Vina GSP is adopted. Water district formation therefore is an organizational activity that is part of GSP preparation and adoption. At this time, the SGMA/GSP process is in the planning (exempt) phase and water district formation at this stage similarly should be considered exempt. Conversely, if LAFCo were to treat district formation as a CEQA project and undertake detailed environmental review of potential Vina GSP implementation actions, then the environmental analysis would need to evaluate the potential actions to later implement the Vina GSP, which would be inconsistent with the SGMA exemption for GSP adoption.

iii. Environmental Review is Premature

Choosing the precise time for CEQA compliance involves a balancing of competing factors. EIRs and negative declarations should be prepared as early as feasible in the planning process to enable environmental considerations to influence project program and design and yet late enough to provide meaningful information for environmental assessment. (CEQA Guidelines § 15004(b).)

Since the preferred or planned GSP actions and projects to be implemented have not yet been determined, it would be difficult to identify and formulate a project for thorough and meaningful environmental assessment at this time. Consequently, detailed CEQA environmental review of the district formation at this time would be premature because (a) the analysis would occur too early in the GSP planning and development process to allow meaningful analysis of potential environmental impacts, (b) the final GSP will propose several different projects and options such that analysis of potential environmental impacts would be wholly speculative, and (c) the potential future environment-changing projects and actions are so varied and uncertain at this time that preparation of an initial study or EIR at this planning stage would be so speculative as to be meaningless.

Detailed CEQA review therefore should wait until GSP implementation project plans have matured into firm and specific proposals. Tuscan Water District will be a local government
agency with its own CEQA responsibilities and obligations, and it will review proposed GSP implementation actions under CEQA as and when it identifies appropriate GSP-implementing actions or projects. As a means to ensure later CEQA compliance by TWD, this resolution includes and imposes Condition 18 to require CEQA evaluation.

The Executive Officer is authorized and directed to prepare and file a CEQA Notice of Exemption consistent with this determination.

Section 2. General Findings, Terms and Conditions:

A. The Commission has considered the factors determined by the Commission to be relevant to this proposal, including, but not limited to, Sphere of Influence and General Plan consistency, and other factors specified in Government Code Sections 56301, 56668; and 56886.5(a); and the California Water Code Section 34000 and as described and discussed in the staff reports dated November 23, 2021 for the meeting of December 2, 2021 (Part A) and January 27, 2022, for the meeting of February 3, 2022 (Part B), and the Legal Counsel Memorandum of February 23, 2023 for the meeting of March 2, 2023.

B. Based on the evidence, analysis, and conclusions set forth in this resolution and the Executive Officer's reports and Legal Counsel Memorandum, the Commission finds that the formation of this District serves to further the purposes of the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000 including, but not limited to, the following: efficiently providing government services and facilitating the orderly formation and development of local agencies based upon local conditions and circumstances.

C. The Commission adopts the determinations regarding consistency with LAFCO law and Commission Policies contained in the staff report for this proposal and incorporates them by reference herein.

D. The Commission recognizes its core responsibility to preserve and protect agricultural lands (GC 56100, 56301) and finds that this proposal conforms with, and will not alter, modify or amend any current land uses or County land use designations in the Butte County General Plan. Furthermore, the Commission finds that the Tuscan Water District (TWD) formation will assist and support the continued and consistent availability of irrigation water to agricultural lands that will encourage their continued productivity and economic viability resulting in far less pressure to convert marginal agricultural lands to urban development proposals. As agricultural land protection is at the core of LAFCo's role, the formation of the TWD will do no harm to current land use patterns and help maintain agricultural as a valued economic driver in Butte County.

E. The subject territory includes approximately 97,625 acres and 3,138 parcels of mostly private and very limited public property as described and identified in the adopted map shown as Exhibit A to this resolution and is assigned the following distinctive short form designation: 21-06 - Formation of the Tuscan Water District.

F. Pursuant to Government Code Section 56426.5(b), the Commission is adopting an interim coterminous Sphere of Influence for the District. The Commission will, within one year of the effective date of the TWD formation, determine the long-term sphere of influence for the TWD. The Commission's conditions of approval require the TWD, within 6 months of the recording of the Certificate of Completion for the formation of the Tuscan Water District, to submit an application to LAFCo to conduct a municipal service review (MSR) and determine the sphere of influence for the new district to LAFCo and that all fees and costs associated with the application shall be borne by the applicant (TWD), including an initial deposit in an amount deemed appropriate by the Executive Officer.
G. Pursuant to Government Code Section 56886.5, the Commission determines, based upon the public record, the responses from alternative service providers lacking interest in assuming the role proposed by the TWD, the services currently provided to the affected territory by the County of Butte and other local agencies, the County's clear intent to not actively pursue water supply and irrigation projects, and its declared support for the formation application, that existing allied agencies are in support of the TWD formation and cannot feasibly provide the needed service or services in a more efficient and accountable manner than is proposed and that a new local agency is deemed necessary.

H. The proposed TWD would have a landowner voter Board of Directors that would be focused on making decisions about the groundwater resources in the unincorporated service area of the Vina Groundwater Basin.

I. The proposed TWD offers the opportunity for landowners to manage the groundwater resource. The GSP shows that the Vina Groundwater Basin is in decline and is in need of a more focused management effort. It is in the best interests of all users of the Basin to better manage the groundwater resources.

J. The landowners proposing the TWD are willing to fund and form the District to sustainably manage the groundwater resources. This brings more resources to the management of the Basin. The County would not be responsible for the entire Basin. The District would assist in complying with SGMA. The TWD could bring in an estimated $425,000 to perhaps $1,000,000 annually to help implement the Vina GSP and comply with SGMA. This is money that the County would not have to spend on SGMA compliance activities and areas that will not have to be managed by the County.

K. The TWD would establish a local public agency of voluntary landowners that would sustainably manage the groundwater resource under its area. The District would work within the State Law with other agencies to provide for the reasonable use of water, pursue supply solutions, and to raise funds for planning and projects that comply with the GSP's.

L. The affected territory will not be taxed for existing general bonded indebtedness of any agency whose boundaries are changed as required by Govt. Code § 57100(h).

M. The Commission determines that an election on district formation will be held within the territory of the district ordered to be formed in accordance with applicable provisions of the CKH, California Water District Law, and Uniform District Election Law as required by Govt. Code § 57118(a).

Section 3. Conditions adopted by LAFCO:

Administrative Conditions

A. All LAFCo, Butte County and State of California fees must be paid in full prior to filing the Certificate of Completion.

B. The map and legal description shall comply with the Department of Public Works and State Board of Equalization requirements.

C. The legal description and map, if rejected by the State Board of Equalization or amended by action of the Commission, will be revised at the expense of the applicant.

D. The following conditions are applied by the Commission consistent with its authority granted by
Government Code Sections 56301, 56668; and 56886.5(a); and the California Water Code Section 34000:

General Conditions

1. That the name of the California Water District shall be the Tuscan Water District.

2. That formation of the 97,625-acre Tuscan Water District shall be contingent upon:

   a. A successful landowner vote. The vote required for confirmation shall be an affirmative vote of a majority of the votes cast in the election, with each landowner having one vote for each dollar's worth of land to which the landowner holds title. Pursuant to W.C. 34422, title and worth of land shall be determined from the last equalized County Assessment Roll and, pursuant to the "land" definition at Water Code section 34014, land value shall not include land improvements. As used herein, "landowner" refers to a person who is a holder of title to land within the proposed District boundary or its legal representative as provided in Water Code Sections 19, 34026, 34027, 34030 and 35004. LAFCO will provide the Elections office with a list of properties and assessment roll information based on the boundaries of the District, but actual determinations as to the eligibility of owners to act as voters will be made by the Elections Officer.

   b. Selection of an initial nine (9) members of the Board of Directors based on the nine candidates who receive the most votes with each landowner having one vote for each dollar's worth of land to which the landowner holds title.

   c. The formation election ballot questions are as set forth in Procedural Actions 4.F. below.

3. Prior to filing the Certificate of Completion, a revised legal description and boundary map(s) shall be submitted to reflect the service area of the Tuscan Water District as adopted by the Commission.

4. The effective date of the Tuscan Water District formation will be determined by the certification of the election results by the Board of Supervisors and the filing of the certificate of completion by the LAFCO Executive Officer with the County Clerk-Recorder's office.

5. The new District is not expected to receive any revenue from the proceeds of taxes for the first full fiscal year of operation. Therefore, the Commission determines provisionally under Government Code section 56811(a) that the District will not be subject to any appropriations limit. After it is formed, the Tuscan Water District shall determine the permanent appropriations limit (if any) as soon as feasibly possible consistent with Government Code §§ 56811(a) & 57120. The planned special assessment revenue is not considered "proceeds of taxes" that would be subject to an appropriations limit.

Boundaries

6. a. Pursuant to G.C. 56426.5.(b), the Commission hereby adopts an interim Sphere of Influence for the District that is coterminous with the proposed District boundaries. As a special condition of that Sphere, the sphere shall be reduced to a zero sphere and the District dissolved if the District does not successfully enact a revenue measure for the District in accordance with Condition 12 below within one year from the date of recording the Certificate of Completion as provided in Section 57077.1(c)(1) without protest or election. The Executive Officer may extend this one-year deadline based on good cause demonstrated by the District.
b. Within 6 months of the recording of the Certificate of Completion for the formation of the Tuscan Water District, the Board of Directors of the Tuscan Water District shall submit an application to LAFCo to conduct a municipal service review (MSR) and determine the long-term sphere of influence for the new district to LAFCo and that all fees and costs associated with the application shall be borne by the applicant (TWD), including an initial deposit in an amount deemed appropriate by the Executive Officer. The failure to execute this condition will result in the Commission applying a zero sphere of influence and initiating corrective actions up to and including, dissolution of the District.

Governance – Board of Directors

7. The initial Board of Directors of the Tuscan Water District shall be composed of nine (9) members as provided for in the California Water Code section 34700.

8. The initial TWD board of directors will be elected at large based on a one vote for each dollar of assessed land value formula pursuant to Water Code sections 34400-34403, 34700, 34422-34424, 35003-35125, and the Uniform District Election Law. Candidates for the TWD board of directors must be qualified pursuant to Water Code section 34700. Candidates may self-nominate themselves but must demonstrate to the Elections Official their qualification to be a member of the board when doing so. If candidates are nominated by other individuals or entities, the candidate’s qualification to be a member of the board must be stated in the nomination submitted to the Elections Official. If it has not been demonstrated to the satisfaction of the Elections Official that a candidate is qualified to be a member of the board, that candidate’s name will not appear on the ballot.

9. The TWD board of directors shall within six (6) months from the date of the recording of the Certificate of Completion, adopt a resolution requesting the Board of Supervisors to establish electoral divisions based on equal size (acres) and the boundaries thereof in accordance with Water Code sections 35025 and 35026. The number of divisions shall be equal to the number of directors. (WC35025) The failure to execute this condition will result in the Commission initiating corrective actions up to and including, dissolution of the District.

10. The BOS shall at the time of calling the formation election for the proposed district, prescribe the procedure for the nomination of candidates for the initial board of directors of the district in accordance with Water Code section 34403 and other applicable provisions of the Water Code and Elections Code. The BOS shall make use of the nomination process and qualifications specified in Condition 8 above.-

Governance – Future Voting

11. Conversion to Registered Voters. In accordance with Water Code sections 35040-35041., the Board of Directors of the Tuscan Water District shall, between January 1 and March 30 of each year, inspect the assessable area within the district. At such time as at least 50 percent of the assessable area within the district is devoted to and developed for residential, industrial, or nonagricultural commercial use, or any combination thereof, such fact shall be certified to the board of directors by the secretary of the district. Any time after such certification, the registered voters residing within the district may petition for a change in the voting procedure from a landowner-voting district to a resident-voting district pursuant to Water Code section 35042 et seq.

Governance – Finance

12. The formation of the TWD shall be contingent upon a successful vote on the formation as
determined pursuant to Water Code Section 34500. The continuing operation of the District shall require that the TWD enact a special assessment or other revenue measure generating sufficient annual revenue for the ongoing operation of the District in an amount not less than $445,600/year on all land within the District receiving a special benefit or property-related service. If the revenue measure is not successfully enacted by the District within one year of the recording of the certificate of completion, pursuant to G.C. 56886(o) the Water District shall be dissolved in accordance with the procedure set forth in G.C. 57077.1(c)(1). As an integral part of the formation conditions, the District Board shall be deemed to have initiated such dissolution in the event it fails to meet the one-year deadline. The Commission may extend this deadline for good cause upon request by the Water District.

Intergovernmental Coordination – SGMA and Water

13. The Tuscan Water District, shall within one (1) year from the date of the recording of the Certificate of Completion, enter into a memorandum of understanding (MOU) with the Vina Basin and Butte Basin Groundwater Sustainability Agencies establishing the formal, government to government working relationship between the Tuscan Water District and the GSA’s to include acknowledging the roles of each agency in the SGMA environment, methods for communication, cooperation and collaboration, establishing points of contact and any other matter that leads to cooperation in the implementation of the GSP for the basin. The MOU should identify the Tuscan Water District as a GSA partner, pursuant to the sustainable Groundwater Management Act, Water Code section 10720 et. seq. The MOU shall be provided to the LAFCo Executive Officer upon completion. The failure of the District to successfully enter into a MOU with the GSA’s within one year of the Certificate of Completion being recorded, the Tuscan Water District shall be dissolved by LAFCo at the request of the TWD Board of Directors. If an agreement cannot be reached with the GSA’s, the TWD can request LAFCo to mediate a resolution and/or extend this deadline for an additional period to be determined by LAFCo or modify the condition.

14. Per the MOU required in Condition No. 13, all activities, actions, projects, and proposals initiated by the Tuscan Water District within its jurisdictional boundaries related to the direct or indirect management of groundwater resources, including groundwater recharge options, shall be submitted to the appropriate GSA for review and cannot be implemented or initiated until and unless, the affected GSA Board determines in writing that the proposed activities, actions and proposals are consistent with the applicable GSP. Requests not deemed consistent with the GSA’s GSP are prohibited.

15. Tuscan Water District shall submit any proposals, plans or projects regarding any extraction, use, or transfer of groundwater as defined in Butte County Chapter 33 (Groundwater Conservation), to the Butte County Department of Water and Resource Conservation for review and such proposals cannot be implemented or initiated until and unless, the Butte County Board of Supervisors or the Director of Butte County Department of Water and Resource Conservation determines in writing that the proposed activities, actions and proposals are consistent with the Butte County Code Chapter 33 (Groundwater Conservation). Requests not deemed consistent with the Butte County Chapter 33 are prohibited. The Tuscan Water District shall adhere to all the laws of the County of Butte.

16. The Tuscan Water District shall not have the power to acquire, plan, construct, maintain, improve, operate, and keep in repair the necessary works for any drainage or reclamation works within the jurisdictional boundaries or sphere of influence of the Rock Creek Reclamation District without the written consent of the Rock Creek Reclamation District Board of Directors.
General Powers and Functions

17. That pursuant to the applicable Water Code Sections the Tuscan Water District is authorized to exercise all powers and authorities subject to the following restrictions in a-e below:

a. The Tuscan Water District shall not have the powers to export, transfer, or move water underlying the Tuscan Water District (including groundwater pumped into an above ground storage facility) outside the Vina or Butte Subbasins. For purposes of this Condition "groundwater" shall have the meaning set forth in Water Code Section 10721(g) as follows: "Groundwater" means water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water but does not include water that flows in known and definite channels unless included pursuant to Section 10722.5.

b. The Tuscan Water District shall not have the power to acquire, plan, construct, maintain, improve, operate, and keep in repair the necessary works for the production, storage, transmission, distribution and sale of water for domestic, industrial, and municipal purposes (WC35401). These powers under the California Water Code shall be deemed inactive or latent. The District may request that LAFCO activate these powers in the future.

c. The Tuscan Water District shall not have the power to acquire, construct, operate, and furnish facilities and services, within or without the district, for the collection, treatment, and disposal of sewage, waste, and storm water nor contract with any persons, firms, public or private corporations or public agencies or other users concerning facilities and services for said purposes. (WC35500) The District may request that LAFCO activate these powers in the future. These powers under the California Water Code shall be deemed inactive or latent.

d. Any and all proposals or projects proposed by the Tuscan Water District (including groundwater recharge projects for the benefit of District landowners) shall be submitted to the appropriate GSA or agency under Condition Nos. 13, 14 and 15 to determine if the proposal or project is consistent with the affected GSP in sustaining the Vina groundwater basin.

e. If the District approves and implements a project involving the delivery and/or importation of surface water into the District, then the District shall not thereafter transfer that surface water for use outside the District boundaries.

Future Projects and CEQA

18. As a means to ensure that later District actions comply with CEQA and are consistent with the GSP, the District shall comply with the requirements in this condition. Prior to approving any GSP implementation activity that may result in a direct or reasonably foreseeable indirect physical change in the environment, the District shall undertake these steps:

(a) The District shall prepare a project description and submit it to the Vina Groundwater Sustainability Agency (GSA). The GSA shall undertake a GSP consistency determination by reviewing the project description and determining whether the project is consistent with the GSP. The GSA shall determine that the project is consistent with the GSP if the project is (1) a type of project or action or within the scope of a project or action identified in the GSP or a planned or potential project or management action, or (2) consistent and compatible with the goals, objectives, purposes, and policies in the GSP. GSA staff and officers shall not use or exercise any personal or subjective judgment in deciding whether the project should be carried out. The GSA GSP consistency determination is intended to be a ministerial review, with the GSA determining only whether the project is consistent or not. This condition is not intended to confer on the GSA the discretionary authority to determine whether to approve a District project or to modify or condition a project. A principal purpose of the GSP determination review is to
confirm that the proposed project will be consistent with the GSP before the District undertakes the effort, time, and expense to perform CEQA review of the project.

(b) If the GSA determines that the proposed project is consistent with the GSP, the District shall prepare an appropriate CEQA document for the project (e.g., notice of exemption, initial study and negative declaration, environmental impact report), adopt the CEQA document, make appropriate findings, and approve the project in accordance with the procedural and substantive requirements of CEQA. The District shall include the GSA on its distribution list for CEQA-related notices and draft documents. If during the CEQA process the District materially changes the project description, then the District shall consult with the GSA to confirm that the proposed project as modified remains consistent with the GSP.

(c) The District may proceed with and implement the project if the GSA has determined that it is consistent with the GSP, and the District has complied with CEQA.

Section 4. Further Procedural Actions

A. The recitals set forth hereinafore are true, correct, and valid.

B. The Executive Officer is hereby authorized and directed to mail certified copies of this Resolution in the manner and as provided in Section 56882 of the Government Code.

C. The Formation of the Tuscan Water District is hereby approved subject to the terms and conditions of this Amended Resolution.

D. This formation requires a protest proceeding to be conducted and the Commission directs the Executive Officer to set the proposal for a protest hearing and give public notice of said hearing pursuant to Butte LAFCo Policy, California Government Code section 57002, and other applicable provisions of CKH.

E. The Commission with this resolution again requests that the Butte County Board of Supervisors direct the County Elections Official to conduct the necessary election, setting the matter for consideration of the landowner voters of the affected territory on a date consistent with election law and the Cortese-Knox-Hertzberg Act, particularly G.C. 57130. Pursuant to Water Code Sections 34422 and 35003 each landowner voter shall have one vote for each dollar’s worth of land owned by the landowner. The last equalized regular (Govt. Code § 57100(g)) County assessment roll will be used to establish land values and landowner title and, pursuant to the “land” definition at Water Code section 34014, land value shall not include land improvements. As used herein, “landowner” refers to a person who is a holder of title to land within the District or its legal representative as provided in Water Code Section 19, 34026, 34027, 34030 and 35004.

F. The formation election ballot questions to be placed before the voters are as follows:

1. Shall the Butte Local Agency Formation Commission order dated March 2, 2023 ordering the formation of Tuscan Water District as a California Water District in western Butte County be approved, subject to the terms and conditions specified in the order which will require a subsequent, post-formation landowner approval of a special assessment or other lawful revenue measure generating equivalent revenue, to fund the initial administrative/organizational activities or the district shall be dissolved, all as more particularly described and set forth in Resolution No. 18 2022/23?

2. If the Tuscan Water District is formed, it will be governed by a nine (9)-member board of directors. Vote for up to nine at-large directors from the list below:
[final list of candidate names and occupational designation (if any) to be inserted here]

G. Pursuant to §57144 and §56898 of the Government Code, the Executive Officer will prepare for the Commission's review a revised Impartial Analysis of the proposed District formation; after the Commission has approved or modified the Impartial Analysis, it shall direct the Executive Officer to submit it to the election's official no later than the last day for submission of ballot arguments.

PASSED AND ADOPTED by the Local Agency Formation Commission of the County of Butte, on the 2nd day of March 2023, by the following vote:

AYES: Bolin, Johnson, Betts, McGreehan, Bradley
NOES: Ritter
ABSENT:
RECUSED/ Connelly
ABSTAIN:

[Signature]
Clerk of the Commission

Bill Connelly, Chair
Butte Local Agency Formation Commission
NOTICE OF PROTEST HEARING
(Published in the Chico ER on April 7, 2023)

NOTICE IS HEREBY GIVEN that on Friday, May 5, 2023, from 9:00 a.m. to 10:00 a.m., at the office of the Butte Local Agency Formation Commission (LAFCo), located at 1453 Downer Street, Suite C, Oroville, CA, the Butte LAFCO Executive Officer will hold a public hearing for the single and only purpose of receiving written protests from any owner of land and/or registered voter within the area proposed for the formation of the Tuscan Water District as identified as "Butte LAFCO File No. 21-06 – Formation of the Tuscan Water District". The territory proposed for formation, as approved by the LAFCo, consists of 3,138 parcels totaling approximately 97,625 acres in size, and is generally bounded by the Tehama County line on the north, SR99 and Chico city limits on the east, Ord Ferry Road/ Western Canal Water District/Grainland Road on the south and the Sacramento River on the west.

This landowner district formation was initiated by a landowner petition submitted by the proponents who desired to provide representation for primarily agricultural users/landowners who wish to partner with other County agencies to address groundwater sustainability issues within the Vina Subbasin.

The proposed terms and conditions for this landowner district formation are set forth in Butte LAFCO Resolution No. 18 2022/23, adopted by the Commission on March 2, 2023, which is available for review in the LAFCO office at the address listed above and on our website at www.buttelafco.org.

All protests must be in writing, in the form required by California Government Code Section 57051, signed and dated, and addressed to Stephen Lucas, Executive Officer, Butte Local Agency Formation Commission, 1453 Downer Street, Suite C, Oroville, CA 95965-4950, and be received any time prior to the conclusion of the hearing at the date and time set forth above. The original completed protest forms may be submitted via US Mail or at the protest hearing. For further information or to obtain a copy of the LAFCO Resolution or protest forms, call (530) 538-7784, or visit the Butte LAFCO website at www.buttelafco.org.

PLEASE NOTE THAT THIS HEARING IS PURELY FOR THE PURPOSE OF RECEIVING WRITTEN PROTESTS, NOT TESTIMONY CONCERNING THE DISTRICT FORMATION.

BUTTE LOCAL AGENCY FORMATION COMMISSION
RESULTS OF PROTEST PROCEEDINGS

LAFCo File: 21-06 – Tuscan Water District Formation
Protest Hearing held on May 5, 2023

<table>
<thead>
<tr>
<th>Landowner Protests</th>
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<th></th>
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<tr>
<td>Total Number of Landowners/Parcels:</td>
<td>3,116</td>
<td>Total Assessed Land Value (ALV):</td>
<td>$632,592,704</td>
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<td>Landowner Protests Received</td>
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<td></td>
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<td>Landowner Protests Determined Valid</td>
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<td>Total Valid ALV</td>
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<td>Percentage of Valid ALV</td>
<td>4.8%</td>
</tr>
</tbody>
</table>

Determination of Protests

The Executive Officer pursuant to GC §56708 and §56710, has caused the names of the landowner signers of protests and associated land values and acres, to be compared with the most recent assessment roll maintained by the Butte County Assessor.

Pursuant to GC §57052 the Executive Officer has determined the value of written protests and finds that pursuant to GC §57075, insufficient protests (less than 50% of ALV) have been received to terminate the formation proceedings, therefore, pursuant to the Water Code and the Commission Resolution No. 18 2022/23 approving the formation, the Commission will formally request the Board of Supervisors to direct the County Elections Official to conduct an election.

May 18, 2023 By:  

Steve Lucas

Stephen Lucas, Executive Officer
RESOLUTION NO. 26 2022/23

RESOLUTION OF THE BUTTE LOCAL AGENCY FORMATION COMMISSION
CONFIRMING RESULTS OF THE PROTEST PROCEEDINGS FOR
21-06 – TUSCAN WATER DISTRICT FORMATION AND
REQUESTING THE BUTTE COUNTY BOARD OF SUPERVISORS DIRECT THE COUNTY
ELECTIONS OFFICIAL TO CONDUCT THE NECESSARY ELECTION

WHEREAS, a Petition of Application signed by 57-percent of the landowners in the proposed Water District was filed with the Commission to initiate the change of organization; and

WHEREAS, pursuant to Part 4 of Division 3 of Title 5 of the Government Code of the State of California, commencing with Section 56000 (GC§5100(a); an application to form the Tuscan Water District "District" (GC§57100(b)(d)), a California Water District as defined in the California Water Code, Section 34000 et seq., has been filed with the Executive Officer of the Local Agency Formation Commission of Butte County, California by petition and said application complied with all the requirements of law and the Commission; and

WHEREAS, the Local Agency Formation Commission (LAFCO) has adopted Resolution No. 18 2022/23 on March 2, 2023 making determinations and approving the Tuscan Water District Formation as described in Exhibit "A" attached hereto and by this reference incorporated herein; and which describes the boundaries of the proposed district (GC§57100(c), and states the conditions (GC§57100(e) applied by the Commission;

WHEREAS, the District would establish a local public agency of voluntary landowners that would sustainably manage the groundwater resource under its area. The District would work within the State Law with other agencies to provide for the reasonable use of water, pursue supply solutions, and to raise funds for planning and projects that comply with the GSP's (GC§57100(f); and

WHEREAS, protest proceedings for the change of organization or reorganization were conducted pursuant to Chapter 1, commencing with Section 57000, of Part 4 of Division 3 of Title 5 of the Government Code; and the protest hearing was held on May 5, 2023, notice of which was given in the manner required by law.

NOW, THEREFORE, BE IT RESOLVED BY THE BUTTE LOCAL AGENCY FORMATION COMMISSION AS FOLLOWS (Pursuant to 57100, 57115, 57118, 57125):

A. The Commission hereby finds and determines that the value of written protests against this annexation which were filed and not withdrawn by landowner voters within the formation area was less than 50% of the assessed land value within the territory and therefore the Commission directs the formation to be subject to the confirmation of the landowner voters located within the affected territory.

B. The regular County assessment roll is to be utilized by the County Elections Official (GC§57100(g).

C. The election will be conducted by mailed ballots within the affected territory (GC§57115(a), (GC§57118(a) of the proposed formation as described in Resolution 18 2022/23 incorporated herein as Exhibit A.

D. The formation is subject to the terms and conditions identified in LAFCo Resolution No. 18 2022/23 making determinations and approving the Tuscan Water District Formation as
described in Exhibit “A” attached hereto and by this reference incorporated herein; and which describes the conditions (GC§57115(c)) approved by the Commission;

E. The vote required for confirmation shall be an affirmative vote of a majority of the votes cast in the election, with each landowner having one vote for each dollar's worth of land to which the landowner holds title. Pursuant to W.C. 34422, title and worth of land shall be determined from the last equalized County Assessment Roll and, pursuant to the “land” definition at Water Code section 34014, land value shall not include land improvements. As used herein, “landowner” refers to a person who is a holder of title to land within the proposed District boundary or its legal representative as provided in Water Code Sections 19, 34026, 34027, 34030 and 35004. LAFCo will provide the Elections office with a list of properties and assessment roll information based on the boundaries of the District, but actual determinations as to the eligibility of owners to act as voters will be made by the Elections Officer. (GC§57115(d))

F. The affected territory will not be taxed for existing general bonded indebtedness of any agency whose boundaries are changed as required by GC§57100(h).

G. The District is not expected to receive any revenue from the proceeds of taxes for the first full fiscal year of operation. Therefore, the Commission determines provisionally under Government Code section 56811(a) that the District will not be subject to any appropriations limit. After it is formed, the Tuscan Water District shall determine the permanent appropriations limit (if any) as soon as feasibly possible consistent with Government Code §§ 56811(a) & 57120. The planned special assessment revenue is not considered “proceeds of taxes” that would be subject to an appropriations limit. (GC§57120)

H. The ballot questions for the election shall read as follows (GC§57115(b)):

1. Shall the Butte Local Agency Formation Commission order dated March 2, 2023 ordering the formation of Tuscan Water District as a California Water District in western Butte County be approved, subject to the terms and conditions specified in the order which will require a subsequent, post-formation landowner approval of a special assessment or other lawful revenue measure generating equivalent revenue, to fund the initial administrative/organizational activities or the district shall be dissolved, all as more particularly described and set forth in Resolution No. 18 2022/23?

2. If the Tuscan Water District is formed, it will be governed by a nine (9)-member board of directors. Vote for up to nine at-large directors from the list below:
   [final list of candidate names and occupational designation (if any) to be inserted here]

   PASSED AND ADOPTED by this Local Agency Formation Commission of the County of Butte, on the 1st day of June 2023, by the following vote:

   AYES:
   NOES:
   ABSENT:
   ABSTAINS:

   ____________________________  ____________________________
   Clerk of the Commission       BILL CONNELLY, Chair
                                Butte Local Agency Formation Commission

Exhibits: A. Resolution No. 18 2022/23
BUTTE LOCAL AGENCY FORMATION COMMISSION
IMPARTIAL ANALYSIS OF THE PROPOSED
FORMATION OF THE TUSCAN WATER DISTRICT

A “yes” vote on the formation will confirm the decision of the Butte Local Agency Formation Commission to form an independent special district to be called the Tuscan Water District (District). A “no” vote on the formation indicates opposition to the formation proposal. Landowner voters may also select nine (9) persons to be the new board of directors. Landowner votes are counted based on a one dollar of assessed land value equals one vote formula.

The District is established pursuant to Division 13 of the California Water Code as a California Water District, is approximately 99,152 acres in size, and contains 3,136 individual parcels primarily used for agricultural production.

The District is generally bound by Tehama County to the north, State Route 99 and the City of Chico jurisdictional boundary to the east, Grainland Road to the south, and the Sacramento River on the west, in the unincorporated area of Butte County.

The District will represent landowners for the purpose of working with the County of Butte, Butte County Water Commission, Vina, Butte, and Rock Creek Reclamation District Groundwater Sustainability Agencies (GSA’s) and other state and local agencies to implement Groundwater Sustainability Plans (GSP) for the Vina and Butte sub-basins.

The District is authorized to exercise all powers of a California Water District except, shall not have the power to transfer water underlying the District outside the Vina or Butte Subbasins; provide water for domestic purposes; or provide sewage treatment or stormwater drainage services.

Following formation, the Board of Directors will be elected by divisions established by the Butte County Board of Supervisors.

District operations will be funded through a landowner voter approved revenue measure that would raise a minimum of $445,600 annually. The District may establish and collect fees for specified projects and in accordance with applicable law.

The District is required to enter into an agreement with the Vina and Rock Creek GSA’s within one year to establish their role in stabilizing the Vina groundwater basin. If an agreement cannot be reached, the District shall be dissolved.

All District projects related to the direct or indirect management of groundwater resources, cannot be initiated until and unless, the GSA Board reviews and determines that the projects are consistent with the applicable GSP.

Any District proposal for the use or transfer of groundwater shall be reviewed by the Butte County Department of Water and Resource Conservation and approved by the Butte County Board of Supervisors.

The District shall annually review the assessable land within the district. If at least 50 percent of the District land is devoted to and developed for residential, industrial, or nonagricultural commercial use, the registered voters within the district may petition for a change in the voting procedure from a landowner-voting district to a resident-voting district.

The district formation order is subject to the terms and conditions approved by the Butte Local Agency Formation Commission and identified in LAFCO Resolution No. 18 2022-23.
The above statement is an impartial analysis of the Tuscan Water District Formation. If you desire a copy of the ballot measure, please call the elections official's office at (1-800-894-7761) and a copy will be mailed at no cost to you.

S/Stephen Lucas, Executive Officer, Butte Local Agency Formation Commission
On June 27, Governor Newsom signed SB 101 (Skinner), the Budget Act of 2023, into law. The $310.8 billion budget agreement, reached by the Governor Newsom, Senate President pro Tempore Atkins and Assemblymember Rendon, and approved by both houses of the Legislature, closes a $32 billion budget deficit.

Budget highlights:

- $38 billion set aside for state reserves
- No reversion of committed Healthy Rivers and Landscapes (Voluntary Agreements) funding
- $31.5 million for the Updating Water Rights Data for California (UPWARD) modernization project
- Still retains $51.4 billion in climate projects our of $54.3 billion that was initially proposed in the 2021-22 state budgets.

Budget cuts:

- $2.9 billion (5%) reduction from climate change programs including $964 million from climate resilience funding.

Government's Infrastructure Package

On May 19, Governor Newsom unveiled his new proposals to “Build California’s Clean Future, Faster.” The proposals facilitate and streamline project approval and completion to maximize California’s share of federal infrastructure dollars and expedite the implementation of projects that meet the state’s ambitious economic, climate, and social goals.

Along with his proposal, Governor Newsom signed an executive order and introduced a series of legislative infrastructure budget proposals. Most pieces of his legislative proposals made it into the final budget and speeds up construction processes, expedites court review for legal challenges, streamlines permitting for projects, addresses cumbersome CEQA processes across the board and maximizes federal dollars for climate projects that cut pollution.

The final budget agreement includes support for the associated budget trailer and the following policy bills:

- AB 122 – Joshua Tree (Committee on Budget)
  - Requires DWR, upon appropriation by the Legislature, to develop and administer the Dam Safety and Climate Resilience Local Assistance Program to provide state funding for repairs, rehabilitation, enhancements, and other dam safety projects at existing state jurisdictional dams and associated facilities that were in service prior to January 1, 2023, subject to prescribed criteria.
  - Includes most of the Governor’s proposed Drought and Flood Streamlining trailer bill language, which seeks to codify recent executive orders, including Executive Order N-4-23, which suspended regulations and restrictions on permitting and use to enable water users to divert flood stage water for the purpose of boosting groundwater recharge. The language also expands the State Water

*Please note that the electronic version of this document contains various links, where you can click on either the link or the documents shown to see more detailed information.*
Board's enforcement authority by allowing them to issue a cease-and-desist order to any regulation violation, as opposed to just emergency regulation violations as it stands currently.

- **AB 124 – Green Bank and Energy (Committee on Budget)**
- **AB 126 – Clean transportation (Reyes)**
- **SB 145 – Caltrans Advanced Mitigation and I-15 Wildlife Crossings (Newman)**
- **SB 146 – Progressive Design Build, Job Order Contracting, NEPA Assignment (Gonzalez and Friedman)**

- Would authorize the Department of Water Resources and the Department of Transportation to use the progressive design-build procurement process for the construction of up to 8 public works projects per department for a project that is estimated to exceed $25,000,000 in total price, and prescribes that process.

- Would specify that the above provisions do not apply to procurement by the Department of Water Resources for the design or construction of through-Delta conveyance facilities of the Sacramento-San Joaquin Delta or seawater desalination projects.

- **SB 147 – Fully Protected Species (Ashby)**

- Would, until December 31, 2033, authorize the Department of Fish and Wildlife to issue a permit under CESA that would authorize the take of a fully protected species resulting from impacts attributable to the implementation of specified projects if certain conditions are satisfied, including, among others, the conditions required for the issuance of an incidental take permit.

- Would also remove the American peregrine falcon, brown pelican, and thicktail chub as fully protected species.

- If passed, would take effect immediately.

- **SB 149 – Expedited Judicial Review, Administrative Record Reform (Caballero and Becker)**

- Would authorize, under CEA, a public agency to deny the request of the plaintiff or petitioner to prepare the record of proceedings, as provided, in which case the bill would require the public agency or the real party in interest to bear the costs of preparation and certification of the record of proceedings and would prohibit the recovery of those costs from the plaintiff or petitioner.

- Would also require the court to schedule a case management conference within 30 days of the filing of an action to review the scope, timing, and cost of the record of proceedings.

- **SB 150 – Equity (Durazo, Smallwood Cuevas, Gonzalez, Cortese, and L. Rivas)**
Water Wasted to the Sea?

Posted on June 4, 2023 by Andrew Rypel

By James E. Cloern, Jane Kay, Wim Kimmerer, Jeffrey Mount, Peter B. Moyle and Anke Müller-Solger

This essay is a condensed version of one that appeared in the journal San Francisco Estuary and Watershed Science (Vol. 15, Issue 2, Article 1), in July 2017. The complete article with references and author's contact information can be found at:

https://escholarship.org/uc/item/2d1og5yp
If we farmed the Central Valley or managed water supplies for San Francisco, San Jose, or Los Angeles, we might think that freshwater flowing from the Sacramento and San Joaquin Rivers through the Delta to San Francisco Bay is “wasted” because it ends up in the Pacific Ocean as an unused resource. However, different perspectives emerge as we follow the downstream movement of river water through the Delta and into San Francisco Bay.

If we were Delta farmers or administered Contra Costa County’s water supply, we would value how high flows reduce salt intrusion (Jassby et al. 1995) and protect water quality for drinking, growing crops, and meeting other customer needs.

If we were responsible for protecting at-risk species, we would value river water that flows through the Delta to the Bay and ocean because it stimulates migration and spawning of native Chinook salmon, Delta Smelt, Longfin Smelt, and Sacramento Splittail, while also reducing the potential for colonization and spread of non-native fishes (Brown et al. 2016). River flow reduces toxic selenium concentrations in clams eaten by sturgeon, splittail, and diving ducks (Stewart et al. 2013), and it delivers plankton and detritus to fuel production in downstream food webs (Sobczak et al. 2002).

If we managed a Bay Area storm water district or sewage treatment plant, we would value water that flows from the Delta into the Bay because it dilutes and flushes such urban pollutants as metals, microplastics, and nutrients (McCulloch et al. 1970).

If we directed restoration projects around the Bay, we would value water that flows from the Delta into the Bay because it brings sediment required to sustain marshes that otherwise would be lost to subsidence and sea level rise (Stralberg et al. 2011; Schoellhamer et al. 2016). Sediment supplies from rivers also sustain mudflats (Jaffe et al. 2007) used as habitat and probed for food by more than a million willets, sandpipers, dunlins, and other shorebirds during spring migration (Stenzel et al. 2002).

If we fished the Pacific for a living, we would value river flow into the Bay because it carries cues used by adult salmon to find their home streams and spawn (Dittman and Quinn 1996), it brings young salmon to the sea where they grow and mature, and it creates bottom currents that carry young English Sole, California Halibut, and
Dungeness crabs into the Bay (Raimonet and Cloern 2016) where they feed and grow before returning to the ocean.

If we liked to romp along the shore or served on the California Coastal Commission, we would value rivers that flow to the sea because they supply the sand that keeps California’s beaches from eroding (Barnard et al. 2017).

Finally, if we were among those who want to conserve California’s landscape and biological diversity, we would value river water that flows to the sea because it creates one of the nation’s iconic estuaries, and sustains plant and animal communities found only where seawater and freshwater mix (Cloern et al. 2016).

Is the fresh river water that naturally flows through the Delta to San Francisco Bay and on to the Pacific Ocean “wasted?” No. The seaward flow of fresh water is essential to farmers, fishers, conservationists, seashore lovers, and government agencies that manage drinking water supplies, restore wetlands, protect coastlines, and clean up sewage and storm pollution. Wasted water to some is essential water to others.
Travis Hiett of USGS measures high flows on the Cosumnes River, December 31, 2022, from the bridge at Michigan Bar. Flows were estimated at 63,700 cfs. USGS Photo by Sue Brockner.

Further Reading


https://doi.org/10.1242/jeb.199.1.83

https://doi.org/10.1016/j.ecss.2007.02.017

https://doi.org/10.2307/1942069


https://doi.org/10.1073/pnas.122614399


About Andrew Rypel
Andrew L. Rypel is a Professor and the Peter B. Moyle and California Trout Chair of coldwater fish ecology at the University of California, Davis. He is a faculty member in the Department of Wildlife, Fish & Conservation Biology and Director of the Center for Watershed Sciences.
View all posts by Andrew Rypel →

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6 Responses to Water Wasted to the Sea?

Tony Buffington says:
June 4, 2023 at 7:02 am

Thank you for this important reminder to “first seek to understand”!

Loading...

Reply
linda says:
June 4, 2023 at 10:28 am

Thank you very much for your excellent compilation of the myriad ways in which this so-called “wasted water” contributes to our environment/society.

I’ve heard the phrase for soooo many years.

Loading...

Reply

Francisco José Torres Medina says:
June 4, 2023 at 9:29 pm

Excellent publication. I would want to support this outlook with the following article published some years ago: chrome-extension://efaidnbmnnibpapnjfloahfjiddkfdce/ajpicajpefndmkaj/http://dgifuchile.cl/rene/PUBS/Rivers_megadrought_phytoplankton_Masotti_etal201

Loading...

Reply

Nick K says:
June 5, 2023 at 8:01 am

The folks that always say that don’t care about any of these issues unfortunately. They certainly should, but they really don’t.

Loading...

Reply

Thomas Schwertscharf says:
June 5, 2023 at 9:26 am
Saying it is wasted to the ocean makes about as much sense as saying dams are what are protecting salmon fisheries.

Loading...

Reply

**kccorby@hotmail.com** says:

June 5, 2023 at 11:02 am

One man's trash is another man's treasure.

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Reply
Colorado River deal forever changes the price of water in the West

Guest Commentary written by Grayson Zulauf
June 6, 2023

Stay up-to-date with free briefings on topics that matter to all Californians. Subscribe to CalMatters today for nonprofit news in your inbox.

Guest Commentary written by

Grayson Zulauf

Grayson Zulauf is the CEO of Resonant Link. He holds a PhD in electrical engineering from Stanford University and is a Forbes 30 Under 30 honoree for energy.
For the first time in this drought-stricken century, a new price for water in the West has been set – and it’s 25 times higher than what farmers have paid for the last 75 years.

Arizona, Nevada and California recently agreed to reduce their water consumption from the Colorado River by 13% through 2026. The federal government will pay their irrigation districts, Native American tribes and cities $521 for each acre-foot of water they don’t use.

This agreement is the start of the end of agriculture as we know it in the West, but not just agriculture. For every drop of water used, industries – from farms and ranches to data centers and power plants to ski resorts and golf courses – must determine whether it pays more to use the water, or to avoid using it.

And the price of using it will only increase.

Some businesses will become more water-efficient. Some will move. Some will close.

What was the price of water, anyways? It depends on both the source and the use. If water comes from a river or lake, it’s zero. If water comes from an aquifer in the ground, it’s the cost of pumping the water up. And despite the enormous infrastructure required, water delivered from reservoirs behind large dams (as promised by the federal Bureau of Reclamation) has historically cost farmers no more than $20 per acre-foot, which is enough to cover a full acre one foot deep.

This water costs much more to deliver, with the difference subsidized by federal taxpayers. For example, in the Imperial Water District, the destination for 80% of all Colorado River water delivered to California, water for irrigation
costs farmers that $20 per acre-foot even though the water is stored (in Lake Mead, behind Hoover Dam) and transported (through the All-American Canal) by mega-projects paid for by federal taxpayers.

In the Westlands Water District of central California, taxpayers subsidize farms at $2,200 per acre. For California farmers who receive water from the Central Valley Project, taxpayers contribute $416 million annually.

With the price signal of water now reset to $521 per acre-foot, the math for water users will change, starting with agriculture. Food generates more than $50 billion annually across the lower Colorado River basin states, and the industry rests on the foundation of $20 water promised by the Bureau of Reclamation.

With this new agreement, every use of water must exceed the value of not using it.

Take the most-grown crop in the Colorado River basin: alfalfa. This grass is exported worldwide and fed to livestock, mostly cows. Alfalfa sells for $230 per ton in California. With 3 acre-feet of water, an acre of alfalfa will yields around 6 tons of product. So, at $20 per acre-foot of water, a farmer would spend $60 in water for $1,380 of alfalfa, leaving plenty of money for labor and equipment and profit. At $521 per acre-foot of water, the farmer pays $3,126 for water alone for that same $1,380 in alfalfa, losing over $1,700 per acre.

By contrast, the farmer could make $3,126 from the federal government for growing nothing and avoiding the water consumption altogether.

The math for most other crops is not much better.
Although the agreement only runs through 2026, water price signals are here to stay. And the price of water — or the value of avoided water use — will only increase. Because of global warming, the flows of the Colorado River will drop by half by 2100, making the current cuts almost seem painless.

Carbon credits set the price for carbon dioxide emissions, with the avoided emission of one ton of carbon dioxide fetching a firm, trusted price. Over the last decade, as this price has started to come into focus, carbon-intensive industries have reexamined their businesses, analyzing if their products or services would remain profitable if they paid the market price for emissions.

The price of a water credit is now set, with the avoided consumption of one acre-foot of water worth $521. Over the next decade, similarly, water-intensive industries will reexamine the water liability of their businesses. For every use of water, they will have to consider what will happen if the price of water doubles, triples or more. For every drop of water used, they will have to weigh whether it is worth using it at all.

The water reckoning is here, and the West will never be the same.

Subscribe to the Free CalMatters Newsletter
Good Morning Water Commissioners,

Commissioner Giezentanner asked that we forward this on to the Commission as he will not be in attendance at tomorrow’s meeting.

Thank you,
Autum

Hi Kamie and Christina, and Commission:

My apologies for missing this month’s BC Water Commission meeting.

I’m traveling with my daughter as a parent chaperone on her 8th grade DC/NYC trip, so won’t be in town to attend tomorrow’s meeting.

A couple of quick comments:

- Thank you Christina, Kelly, Kamie and fellow ad hoc members for everyone’s work on preparing the letter to DWR from the BOS (Item 5). I support the letter as revised and believe this is an important step forward on the issue of recharge in Butte County. We met twice as an ad hoc and there was a lot of discussion and work put into drafting and revising this letter. I appreciated being included on the ad hoc and am really sorry to miss this meeting and discussion.

- Re: Spring groundwater levels - I’m hopeful we see real improvements here given how much rain we got this past season.

- I’m disappointed to miss Sean Early’s presentation on the Voluntary Agreements. Thank you, Sean, for your work here locally on this issue and for providing your update to our group. I’ll be sure to watch the video later.

- Finally, thank you Kamie for providing the update on the status of TWD. I think you may be using the recent LAFCO staff report as the basis of your update, which did a nice job in summarizing the current status.
Again, my apologies for missing this meeting. I look forward to watching the video and listening to the discussion.

Respectfully,
Tovey
Watershed Management RMS workshop set for June 22
On Thursday, June 22, the California Water Plan team will host a virtual workshop to get public input on the draft Watershed Management Resource Management Strategy (RMS) for California Water Plan Update 2023. The workshop will give Tribes, local agencies, non-governmental organizations, and the public an opportunity to review and provide comment on the content in the draft RMS. An agenda and draft for review will be sent to those who complete the registration form.

Looking for ways to store water from a wet winter
With California coming out of a wet winter, there are questions about what can be done to save some of the water for drier times. The uses, limits, and policies concerning water storage in the state will be discussed during a webinar on Friday, June 9. This is part of the Sacramento State Water Seminar Series. Registration is required to attend.

New technology being used to map California aquifers
A new underground mapping technology is revealing the best spots for storing wet-weather water in California’s Central Valley. A new article from Western Water explores how DWR is using helicopters and giant magnets to create 3-D maps of California’s vast aquifer networks. The flooded Tulare Lake Basin is one of the places where the maps are being used. Based on the information, some of the flows are being directed into areas determined to have the more porous underground for swiftly absorbing runoff.

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**Water Use Efficiency Data portal open for annual reports**

DWR’s Water Use Efficiency Data portal is open for annual water shortage assessment reports. All urban water suppliers are required to submit their annual reports by Saturday, July 1. Information and resources are available on DWR’s Annual Water and Demand Assessment webpage.

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**San Ramon to host Water Conservation Showcase**

The 20th anniversary Water Conservation Showcase will be held Thursday, June 15, in San Ramon. The event attracts hundreds of water industry officials to address the most pressing water issues and challenges facing California. Virtual options are available for those who are not able to attend in person.

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**Webinar will offer overview of forest carbon markets**

The Sierra Nevada Alliance will provide an overview of forest carbon markets during a seminar on Thursday, June 15. The markets are one way to provide funding for various management practices that take up additional carbon on the forested landscape. The webinar will include principles governing the way carbon projects are implemented and how the credits are sold and traded on the carbon market.

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**$83 million in funding approved by Wildlife Conservation Board**

The Wildlife Conservation Board has approved more than $83 million in funding to be spread among 28 projects that will improve fish and wildlife habitats throughout California. In some cases, the projects will also provide improved public access and educational opportunities. The funding comes from a variety of sources including the Habitat Conservation Fund and voter-approved bond measures to help preserve California’s natural resources.
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This email was sent to bcwater@buttecounty.net from the California Natural Resources Agency utilizing govDelivery. California Natural Resources Agency, 715 P Street, California, CA 95814
Bringing the Sacramento Valley to Life: Investing in Multiple Benefits through Floodplain Reactivation and Nature-Based Solutions

By David Guy

There are unique opportunities in the Sacramento Valley to reactivate floodplains, mimicking historical natural processes to improve habitat for fish, birds and other wildlife, enhance flood protection and groundwater recharge, and increase California's resilience to climate change by better preparing the state for future droughts and floods. These nature-based solutions are a new way forward in the Sacramento Valley and are highlighted in the work of
leading researchers from the University of California-Davis and proven in the field through collaborative partnerships between scientists, conservation groups, water resources managers, local governments and local landowners. Our history has shown that floodplains are vital in the health and wellness of people, fish and wildlife.

An amazing working group is advancing these efforts through the Floodplain Forward Coalition, which has a new booklet that shares the innovative work that is underway in the Sacramento Valley to create vibrant landscapes and healthy California river systems for generations to come. We encourage you to look at the digital version of the booklet by clicking here.

To help visualize the important work underway, we also encourage you to watch the four films described on page 21 of the booklet or that you can see at Floodplains Reconnected.

We truly appreciate the broad support for this amazing coalition and the collaborative approach to water management and habitat creation through floodplain reactivation in the Sacramento Valley.

Details on the specific projects are seen in the Portfolio for Floodplain Reactivation and Priority Projects and by viewing Floodplains Reimagined. If
you would like additional information or copies of this booklet, please let us know at info@norcalwater.org and we will send it to you.
Groundwater agency hosts info workshop

BY MICHAEL WEBER
MWEBER@CHICOER.COM

CHICO >> Residents in Chico, Durham and areas of Butte County may soon see a new fee on their tax bill next year that will go towards funding the area’s groundwater regulation agency.

Formed in 2019, the Vina Groundwater Sustainability Agency is a jurisdiction with regulatory power over groundwater in an area of about 185,000 acres encompassing Chico, Durham surrounding parts of Butte County.

A workshop on Wednesday by the agency discussed a flat fee of $3.09 per acre per year proposed to cover long-term agency costs including administration at 48% of a projected 5-year budget, state regulation compliance at 35% and legal defense at 19%.

The agency has been operating with staff and one-time funding from Chico, Butte County and the Durham Irrigation District, but is now seeking to propose a fee, through Proposition 218, to support the agency long-term in carrying out state mandates from the Sustainable Groundwater Management Act passed in 2014.

Kamie Loeser said state requirements include annual reporting, keeping the plan updated every five years, collecting data for models, coordination with other agencies and others.

Opposition voiced at hearing

The fee is scheduled to be placed on the assessor’s tax roll on Aug. 10 and a public hearing and majority protest is scheduled for 5:30 p.m. July 26 at the Chico City Council Chambers located on 421 Main St.

Several residents at the workshop were opposed to the fee because of concerns against more regulation, against the fee structure and concerns about the public process.

Because the fee is proposed as a flat rate per acre, residents with many acres who don’t use groundwater opposed the fees.

Calculated fees can be found at any residence in the agency’s jurisdiction and is available at www.vinagsa.org.

Residents have a right to protest the adoption of the fee by writing a protest and delivering it in person at the public hearing or mailing it to Vina GSA, PO Box 7211, Chico, CA 95927 by July 26.
Good morning,

We would like to let you know that the Board of Supervisors considered and approved a letter at their June 27th board meeting regarding groundwater recharge opportunities and local agency needs in Butte County to be sent to Paul Gosselin, Deputy Director of the Sustainable Groundwater Management Office at the Department of Water Resources.

Best,
Christina

Christina R. Buck, Ph.D.
Assistant Director

Dept. of Water and Resource Conservation
Butte County
308 Nelson Avenue
Oroville, CA 95965-3302
Off: 530.552.3593
Cell: 530.864.6057
cbuck@buttecounty.net
Subject: Consideration of a Letter to the Department of Water Resources (DWR) Regarding Local Recharge Opportunities

Department: Water and Resource Conservation

Contact: Christina Buck Phone: 552-3593

Meeting Date Requested: June 27, 2022

Regular Agenda ☒ Consent Agenda ☐

Department Summary: (Information provided in this section will be included on the agenda. Attach explanatory memorandum and other background as necessary).

At the Butte County Water Commission (Commission) meeting on April 9, 2023, the Department of Water and Resource Conservation provided an update on the status of Governor Newsom's March 10th Executive Order (EO), N-4-23, which makes it easier for agencies to divert floodwater to recharge groundwater. The EO temporarily lifts regulations and sets specific conditions under which floodwaters can be diverted without permits to boost groundwater recharge and mitigate flooding. In addition to the staff update, the Commission received multiple comments from the public urging the Commission to encourage action be taken this year on groundwater recharge efforts. The Commission engaged staff and ultimately decided to form an Ad-Hoc Committee (Ad-Hoc) to further discuss the recharge issue generally and to determine what, if anything, could be done locally this year under EO N-4-23 to capture floodwater to recharge groundwater. Ad-Hoc members and staff concluded that locally there would not be recharge opportunities under the EO since it was highly unlikely that conditions would arise over the next several months to cause an “imminent risk of flooding.” As a result, the Ad-Hoc redirected their efforts to draft a letter for to be sent to DWR that would address the EO and its limitations locally, identify potential action steps by the County to enhance natural recharge, and identify the local needs to advance recharge efforts. The Ad-Hoc revised and refined a drafted letter and on June 7, 2023 the Commission discussed the letter and amended it by adding one additional bullet point. The Commission unanimously recommended the letter be considered for approval by the Board of Supervisors. The Department recommends the Board approve the letter to DWR and authorize the Chair to sign.

Fiscal Impact:

None

Personnel Impact:

None

Action Requested:

Approve letter and authorize the Chair to sign.

Administrative Office Review: Danielle Nuzum, Deputy Chief Administrative Officer

Revised: December 2019
MEMORANDUM

DATE: June 12, 2023

TO: Butte County Board of Supervisors

FROM: Christina Buck, Assistant Director

RE: Local Recharge Opportunities and Consideration of a Letter to the Department of Water Resources

Background

At the Butte County Water Commission (Commission) meeting on April 9, 2023, the Department of Water and Resource Conservation (Department) provided an update on the status of Governor Newsom’s March 10th Executive Order (EO), N-4-23, which makes it easier for agencies to divert floodwater to recharge groundwater. The EO temporarily lifts regulations and sets specific conditions under which flood waters can be diverted without permits to boost groundwater recharge and mitigate flooding (more details below). In addition to the staff update, the Commission received multiple comments from the public urging the Commission to encourage action be taken this year on groundwater recharge efforts. The Commission then engaged in a robust discussion with staff about EO N-4-23 and ultimately decided to form an Ad-Hoc Committee (Ad-Hoc). The purpose of the Ad-Hoc was to further discuss recharge opportunities and to determine what, if anything, could be done locally this year under EO N-4-23 to capture floodwater to recharge groundwater.

Flood Water Recharge Executive Orders

The Governor released two EOs in the spring to streamline the use of floodwater to aid in recharge. There is state and local motivation for action during this wet year given the record snowpack and flooding conditions that continue in the San Joaquin and Tulare Basins coupled with the most severe impacts of unsustainable groundwater use in these areas (severe declines in groundwater levels, increased subsidence, dry wells etc.). EO N-4-23 and, subsequently, N-7-23 authorize diversion of flood flows under the following conditions in the Tulare Lake and San Joaquin Valley Basins until August 31, 2023:

- Imminent risk of flooding is known and noticed by an appropriate local agency (diversions must stop when there is no longer a flood risk)
- Use of existing diversion infrastructure or temporary pumps with simple screens to minimize impacts to fish/other species.
- Water rights permits are suspended
- CEQA and CDFW 1600 compliance is suspended.

In addition, the EOs specify the following compliance requirements for diversions to take place:

1. No new permanent infrastructure or permanent construction
2. Cannot divert water onto:
   a. Dairy land areas
   b. Agriculture fields where pesticides or fertilizer application occurred in the past 30 days
   c. Rangeland/grazing lands, natural habitats
   d. Areas that could cause damage to critical levees/infrastructure, and wastewater or drinking water systems/wells
   e. Areas that would exacerbate flood threats, or health and safety concerns
3. Reporting is required to the Groundwater Sustainability Agencies (GSAs) and State Water Board.

Reports of diversions under the EO are posted online (https://www.waterboards.ca.gov/waterrights/water_issues/programs/groundwater-recharge/).

As of mid-June, over 90,000 acre-feet have been diverted.

The Department of Water Resources (DWR) is facilitating use of temporary flood diversion equipment to support local agencies conveying high flows from rivers that drain towards the Tulare Lake Basin. Temporary pumps and siphons can be mission tasked through the local counties’ Office of Emergency Services (OES) to California OES to DWR. Experience this year has helped the state develop tools and a process to assist local agencies in managing floodwaters while helping some of it get into the ground.

**Current County Policy Related to Recharge**

At the Board of Supervisor meeting on May 9, 2023, staff presented the Groundwater Status Report for the three groundwater subbasins within Butte County. Conclusions and recommendations in the presentation highlighted the downward trend in groundwater levels observed in the Vina Subbasin since around the year 2000 and pointed out that actions are needed to stabilize conditions using a four pronged approach that includes: 1. Demand reduction and water conservation activities, 2. Increasing use of surface water supplies, 3. Land use management, and 4. Increasing recharge. The Vina Groundwater Sustainability Agency (GSA) and Rock Creek Reclamation District GSA are working towards the goal of sustainably managing groundwater through pursuit of local funding and grant funds for Projects and Management Actions and to address data gaps identified in the Groundwater Sustainability Plan (GSP). The County, as a member agency of the Vina GSA (and Wyandotte Creek GSA), has provided leadership and staff support for these efforts.
Increasing natural recharge through flood and water management actions is one of the approaches that can be taken to bolster groundwater conditions and help maintain or achieve drought resilient groundwater supplies in Butte County subbasins. Current Butte County policy supports actions along these lines as shown through the excerpts below from the Butte County State Legislative Platform (January 2023) and 2040 General Plan Water Resource Element.

**2023 State Legislative Platform**

- **Support actions that promote natural groundwater recharge, protection of area of origin water rights, existing water right priorities, and local control over water management.**

**2023 Federal Legislative Platform**

- **Support funding for projects and programs that naturally recharge our groundwater basins.**

**2040 General Plan: Water Resources Element**

**W-A3.1** Continue to seek funding for and participate in efforts to conduct comprehensive, countywide mapping of water resources and groundwater recharge areas

**W-A3.3** Seek funds and develop programs that improve the scientific understanding of regional aquifer systems and potential factors related to the sustainability of the county’s water resources

**W-P6.2** The use of permeable surfaces and rainwater catchment/retention systems shall be allowed and encouraged to enhance groundwater recharge

**W-P6.5** Storm water channels should be managed in a way that produces co-benefits, such as supporting recharge, improving water quality, providing recreation areas, and reducing flood risk.

In addition, the Department’s Strategic Plan (approved by the Board on May 24, 2022) identifies related goals and actions to promote and advance recharge within the County through work of the Department:

**Goal 1: Support Solutions to Ensure the Sustainability of Local Water Supplies**

- **Collaborate with Butte County Departments (i.e., Public Works and Development Services/Planning Division) and local entities on multi-benefit water resources projects, such as drainage/flood studies, for potential opportunities for managed aquifer recharge consistent with the applicable Groundwater Sustainability Plan (GSP).**

**Goal 3: Protect and Manage Groundwater Resources**

- **Participate in efforts to conduct comprehensive, countywide mapping of water resources and groundwater recharge areas. (M) (General Plan W-A3.1) (SGMA)**
- **Consult with other local agencies to explore opportunities to promote recharge within the County.**
Water Commission Ad-Hoc Committee

As stated, the Water Commission formed an Ad-Hoc to further explore opportunities for local recharge in light of the EO. The Ad-Hoc subsequently met with staff on April 24, 2023 and discussed specific and more general local recharge opportunities in Butte County. For example, ideas included: 1. Flooding idled agricultural lands with nearby streamflow during high flow events or with existing water rights when available, 2. Designing instream detention, such as retaining water in Lindo Channel longer, 3. Stormwater retention to give rainfall and runoff an opportunity to slow down and seep into the ground, or 4. Filling canals, ditches, and stock watering ponds during rainfall events. After much discussion, Commission members and staff concluded that locally there would not be recharge opportunities under the EO since it was highly unlikely that conditions would arise over the next several months to cause an “imminent risk of flooding.” As a result, the committee redirected their efforts and decided to draft a letter to be sent from the Board to DWR that would address the EO and its limitations here, identify potential action steps by Butte County to enhance recharge, and identify the local needs to advance recharge efforts. A draft letter was circulated to committee members and the Ad-Hoc met a second time on May 15, 2023 to refine and revise the letter.

On June 7, 2023 the Water Commission discussed the draft letter and amended it by adding one additional bullet point. The Commission unanimously recommended the letter be considered for approval by the Board.

Action Requested

Approve the letter and authorize the Chair to sign.
June 27, 2023

Mr. Paul Gosselin
Deputy Director, Sustainable Groundwater Management Office
Department of Water Resources

Re: Butte County – Groundwater Recharge Opportunities & Local Agency Needs

Dear Mr. Gosselin:

In response to Governor Newsom’s Executive Order (EO) N-4-23 (and subsequent EO N-7-23), the Butte County Water Commission engaged in a robust discussion about the EO and the opportunities that may arise in Butte County in the coming months to utilize provisions of the EO. While the EO is a commendable step forward by the state to recognize the importance of recharge while reducing flood risks, unfortunately, the Commission identified several aspects of the EO that either create significant challenges or prevent the implementation of additional recharge under the EO within Butte County.

These include:
- A lack of “imminent flood risk” likely to occur through June 1, 2023 (per specified date in EO);
- Management activities in orchards and for rice planting require lands to dry out by this time in the season, so landowners are less open to voluntary inundation of fields; and
- The exclusion of native grasslands and rangeland along the east side of the valley as potential inundation areas due to the EO requirement that lands must have been in active irrigated agricultural cultivation within the last three years.

Although we do not anticipate that local action can be taken this year under EO N-4-23 (or EO N-7-23) to capture floodwater to recharge groundwater, we would like to take this opportunity to share our vision for the role of enhancing recharge to achieve groundwater sustainability within Butte County, as well as our financial needs to advance these efforts.

Statewide, we have experienced a remarkable shift from the past few years with the arrival of 31 atmospheric river storms this winter, in contrast to the preceding driest three-year period in the state’s recorded history. As the Public Policy Institute of California points out, while it may be tempting to think the drought is now over, the recent shift in conditions highlights just how much we need to prepare for wetter wet and drier dry years. Butte County recognizes the need to address declining groundwater levels, particularly in the Vina Subbasin, and is engaged
with Groundwater Sustainability Agencies (GSAs) to pursue solutions using a five-pronged approach:

1. Reducing groundwater demand through increased conservation activities;
2. Increasing groundwater recharge during wet periods;
3. Increasing use of available surface water supplies when economical;
4. Land use management to manage water demands, and;
5. Inter-basin coordination

Through this letter we wish to communicate our approach and intent to pursue enhanced natural recharge and our technical and financial needs to make it possible. By “enhancing natural recharge” we mean increasing the extent to which recharge occurs via natural processes by extending the amount of time and/or expanding the area over which water has an opportunity to seep into the ground.

Butte County intends to take the following steps through activities of the Department of Water and Resource Conservation (Department):

**Create a Butte County Groundwater Recharge Action Plan**
The Department will develop a groundwater recharge action plan by January 1, 2024, that provides actionable recommendations that result in the ability to achieve additional groundwater recharge during wet periods, regardless of whether the year is wet or dry. The plan will identify the target amount of recharge that can be achieved by December 31, 2030. This effort will consist of compiling information and data from existing studies to outline the near-term opportunities for actionable recharge that benefit Butte County groundwater conditions.

**Prepare to Implement a Pilot Project during Wet Periods of Water Year 2024**
The Department will utilize the Butte County Technical Advisory Committee, Water Commission, and coordination with landowners to identify diversion points and locations on working agricultural lands where flood water could be routed to enhance natural recharge during wet periods in Water Year 2024. Opportunities for enhancing natural recharge may include:

- Retention of rainfall on agricultural land,
- Diversion of flows during imminent risk of flooding onto agricultural lands,
- Operations of flows within local flood channels (ex. Lindo Channel)

**Learn from Neighboring Subbasins and Others throughout the State**
Other groundwater managers throughout the state and the Sacramento Valley are diverting flood flows, conducting pilot projects for recharge, and designing and expanding recharge projects. Butte County will continue to learn from the experience of others to reduce costs and maximize benefits of local efforts.
In order to pursue these short-term and longer-term recharge goals, technical assistance and funding from the State will be required. Although not a critically over-drafted subbasin, it is important that declining groundwater levels be stabilized in the Vina Subbasin and throughout the Sacramento Valley as quickly as possible. Assistance and funding from the State to support local efforts, as outlined below will help jump start this progress.

**Continue and Expand Technical Assistance to Local Agencies**

DWR through its Sustainable Groundwater Management and Flood-Managed Aquifer Recharge programs is providing valuable technical assistance and guidance to GSAs and other local agencies seeking to enhance recharge this year. We appreciate these efforts and encourage the State to expand these programs in the following ways:

- Provide specialized equipment in Water Year 2024:
  - Provide equipment for localized geophysical investigations (i.e. towed transient electromagnetic system a.k.a tTEM) to help identify prime recharge areas.
  - Provide specialized equipment to divert flows during wet periods or when imminent risk of flooding is occurring, such as temporary pumps and siphons being provided in the Tulare Lake Basin for the Temporary Flood Diversion and Groundwater Recharge Support Program.

- Provide technical assistance:
  - Provide technical assistance to move projects from concept to completed preliminary design so that the County or GSAs can pursue grant dollars for specific projects.
  - Provide technical assistance to develop localized applications of available modeling tools (such as Eco-FIP used by the Flood-MAR program)
  - Provide technical assistance to monitor and analyze the effects of recharge efforts

To supplement grant funding, technical assistance activities will advance local efforts to enhance recharge and address flooding concerns.

**Provide Groundwater Recharge Capacity Building Grants**

As a key strategy in the Governor’s California’s Water Supply Strategy, Adapting to a Hotter, Drier Future, the State has outlined a vision for increasing recharge by 500,000 acre-feet annually to help address impacts of declining groundwater levels and impacts to domestic well owners. The Governor and Legislature have committed more than $8.6 billion in the last two budget cycles to build water resilience across the State. However, there is limited capacity at the local level to take advantage of state technical assistance and even grant opportunities. It takes time and resources to apply for competitive grants and to utilize technical assistance resources. Even in light of grant awards announced through the SGM Grant Program, funding through capacity building grants is needed to provide GSAs, or other local agencies implementing GSPs, the ability to fully utilize the programs and resources the State is offering. Non-competitive
funding made available to agencies with a spending plan outlining activities to enhance recharge would go a long way to moving more water into aquifers throughout California, not just in critically over-drafted subbasins.

Ensuring a sustainable aquifer system and drought resilient groundwater supplies in Butte County will require action and coordination by GSAs and the County over the implementation period of the GSPs. Local agencies are up to the task of protecting and managing local and regional water supplies that are crucial for our rural communities, environment, and agricultural industry. Recognizing the warmer, drier climate that is likely to dominate our future, we encourage the State to continue to make additional funds and technical assistance available to non-critically over-drafted subbasins. The enhancement of groundwater recharge within Butte County subbasins will greatly help in providing not only essential water supply resilience, but it will also address drought impacts that have affected groundwater dependent households, communities, and ecosystems over recent decades.

Sincerely,

Tod Kimmelshue
Chair, Butte County Board of Supervisors
water supply resilience, but it will also address drought impacts that have affected groundwater dependent households, communities, and ecosystems over recent decades.

Sincerely,

[Signature]

Tod Kimmelshue
Chair, Butte County Board of Supervisors
Autum, will you please include this and the attached report in Water Commission Correspondence?

From: Craig Riddle <CRiddle@calrice.org>
Sent: Thursday, July 6, 2023 3:21 PM
To: Buck, Christina <CBuck@buttecounty.net>
Subject: Rice SGMA report

Hi Christina,
With the abundant water this winter and spring groundwater recharge on agricultural lands is hot topic. We thought it was good timing to refresh our 2018 memo regarding the generally poor suitability of rice lands for groundwater recharge. Attached is an updated report with more recent data and information. I was hoping you could share it with the Butte County GSA (Wyandotte Creek, Butte, Vina) technical group as needed for GSP implementation.

I would be happy to discuss or even do a short presentation at a stakeholder meeting if requested.

Thanks,

Craig Riddle, PG
Industry Affairs Manager
1231 I Street, Suite 205
Sacramento, CA 95814

PH: 916-387-2264
CELL: 916-812-3468
FAX: 916-387-2265
Purpose of Document

This document provides a link between the California Rice Commission, rice land use, and the Sustainable Groundwater Management Act (SGMA) implementation to facilitate collaboration on planning and implementing projects and management actions to reach groundwater sustainability in the Sacramento Valley. This document works to deliver the following:

- Identifies the important scientific information available from rice industry research, Irrigated Lands Regulatory Program (ILRP), and CV-SALTS program reports.
- Provides a summary of groundwater sustainability plans (GSPs) in the rice growing areas of the Sacramento Valley.
- Fosters a deeper understanding for rice growers, water managers, and industry stakeholders to move toward overall sustainability in the valley for all the combined regulatory programs.
- Demonstrates that Rice can be a partner in SGMA implementation.

Summary

The California Rice Commission (CRC) is an integral farming stakeholder in the Sacramento Valley and is willing to partner with GSAs. Although rice growers use mostly surface water for irrigation, they can collaborate with groundwater managers to enable conjunctive use approaches to integrated water management in the valley.

This document provides a link between the data collected and analyzed for the Rice Waste Discharge Requirements (WDR) Order R5-2014-0032-03 adopted in April 2021 under the Central Valley Regional Water Quality Control Board's (Water Board's) ILRP (CVRWQCB 2021) and demonstrates how the data could be useful under the SGMA requirements for GSP implementation.

1) CRC's 2018 Rice Recharge Technical Memorandum (CRC 2018) provided relevant information for use by GSAs in rice-growing counties as they were developing their GSPs.

2) Rice research is continuously evolving and has provided valuable scientific and technical information to inform the ILRP and CV-SALTS; the latest technical report released by CRC (Nitrate Initial Assessment; CRC 2022) is a comprehensive analysis of groundwater quality under rice and further supports initial findings.

3) This document builds upon CRC's 2018 Technical Memorandum and updates the latest rice science and data, while incorporating information from applicable GSPs to tell the rice story as it fits into SGMA implementation.

Many GSPs propose enhanced groundwater recharge as a strategy to increase water supplies and raise/stabilize groundwater levels. Given that rice is a ponded crop, there is sometimes a misconception that rice fields are good areas for groundwater recharge. Although there are multiple benefits to rice ponding such as providing key environmental habitat for birds, snakes and salmon, deep percolation and groundwater recharge is a lesser, incidental effect of ponding water on rice fields. Therefore, rice-growing lands are generally not good candidates for groundwater recharge projects designed to increase water supplies.

Groundwater recharge under rice fields does occur, but it is limited and very slow. Direct groundwater recharge on agricultural lands may be more efficient in other crops grown on more permeable soils.

Prepared by

- Lisa Porta, P.E./Montgomery & Associates
- Jenny Krenz-Ruark/Jacobs
- Craig Riddle, P.G./California Rice Commission

Date: June 22, 2023
Rice Land Use and SGMA Implementation

Key Groundwater Characteristics Beneath Rice Lands

1) Rice land soils are generally less permeable than other soils, which leads to less groundwater recharge than other soils. Rice culture requires soils with limited permeability to maintain flooded (ponded) conditions on the surface. Soils underneath rice in the Sacramento Valley typically consist of poorly drained, fine-textured clays or contain a horizon that limits downward flow of water (for example, duripan or hardpan), with some exceptions.

2) Potential impacts from rice agriculture on groundwater quality relative to nitrate is very low because of soil denitrification processes. Low permeability soils combined with saturated conditions contribute to a redox and transport environment that favors the conversion of nitrate to nitrite and volatile gases (via denitrification), and that can only very slowly transport nitrogen present in any form to groundwater. Limited water movement, the absence of nitrate in soil pore water, and low to very low nitrate concentrations in shallow groundwater together suggest that applied nitrogen does not pose a significant risk to groundwater in rice cropping systems.

3) Potential impacts from rice agriculture on the salinity of local groundwater is also low because of the annual application of high-quality irrigation surface water. High-quality irrigation surface water combined with maintenance of a standing irrigation flood and likely seasonal surface water connectivity prevent the accumulation of salinity in the root zone.

4) Rice is a dominant crop in the Sacramento Valley, with a long history of successful farming and robust data collection and scientific studies. Although rice fields are not very suitable for direct recharge to groundwater, they provide “in-lieu” recharge through the use of surface water instead of groundwater, do not negatively affect groundwater quality, and provide habitat for key environmental species.

5) Water managers and rice growers can work together to implement groundwater sustainability projects and collect data for GSP implementation and reporting purposes.
Overview of SGMA Implementation in Rice-growing Areas of the Sacramento Valley

Since the passage of SGMA in 2014, local agencies have come together to form groundwater sustainability agencies (GSAs). These GSAs have worked to fulfill the requirements of SGMA, especially in high- and medium-priority basins, through development of GSPs. The goal of the GSPs is to evaluate sustainability indicators, prevent undesirable results, and mitigate overdraft in these basins to achieve long-term groundwater sustainability.

As part of the ILRP requirements, the CRC collects and analyzes water quality data and develops reports describing the outcomes. This information has proven to be useful for GSP planning and implementation under SGMA requirements. The CRC collects and analyzes water quality data for WDR Order R5-2014-0032-03 under the Central Valley Regional Water Quality Control Board's ILRP (CVRWQCB 2021). These data are analyzed and compiled annually, providing a targeted source of information in the Sacramento Valley.

- The 2018 Rice Groundwater Quality and Relative Recharge Technical Memorandum (TM; CRC 2018) provided relevant information for use by GSAs in rice-growing counties as they were developing their GSPs.
- Rice research is continuously evolving and has provided valuable scientific and technical information to inform the ILRP and CV-SALTS.
- The latest technical report released by CRC (Nitrate Initial Assessment; CRC 2022) is a comprehensive analysis of groundwater quality under rice and further supports initial findings.
- This document builds upon the 2018 TM and adds the latest and greatest rice science and data, while incorporating information from applicable GSPs to tell the rice story as it fits into SGMA implementation.

The CRC is an integral farming stakeholder in the Sacramento Valley and willing to partner with GSAs. Although rice growers use mostly surface water for irrigation, they can collaborate with groundwater managers to enable conjunctive use approaches to integrated water management in the valley.

Key SGMA Tenets

- Local control, stakeholder-driven regulatory program overseen by DWR.
- Revolves around six sustainability indicators that could lead to undesirable results if not managed sustainably.
- GSPs are large policy documents backed by comprehensive scientific analysis with most recent available data, and culminating in specific projects and management actions to reach groundwater sustainability over the planning and implementation horizon.
Status of SGMA Implementation in the Sacramento Valley

The Sacramento Valley includes several GSAs (Figure 1) that have prepared and adopted GSPs submitted to California Department of Water Resources (DWR) by the January 30, 2022 deadline. The GSAs have submitted 18 GSPs covering all high- and medium-priority subbasins within the Sacramento Valley. Figure 2 shows the extent of rice lands compared to the subbasins’ SGMA prioritization. Two GSPs in Yuba County were submitted to DWR in January 2020 and have already been approved. DWR is currently reviewing the remaining 2022 submitted GSPs and has to provide their determination within 2 years of GSP submittal, or by January 2024. In the meantime, GSAs and member agencies are actively implementing their GSPs by collecting data, submitting annual reports to DWR every year by April 1, filling data gaps, and planning for the development and implementation of projects and management actions to reach sustainability within 20 years, or by 2042.

Figure 1. Sacramento Valley and Redding Area Groundwater Sustainability Agencies
Figure 2. S6MA Susceptibility Prioritization in Rice-growing Areas

The S6PS relies on a detailed analysis of large historical and current datasets from multiple sources (including...
Figure 3. Six SGMA Sustainability Indicators

Five GSPs submitted for the Colusa, Butte, Sutter, North and South Yuba, and North American Subbasins represent approximately 90 percent of rice growing in the Sacramento Valley. These GSPs established important information and analysis regarding the physical setting of rice fields (as noted in their Hydrogeological Conceptual Models or HCMs), water quantity and quality conditions, and opportunities for projects and management actions.

Much of the information summarized in this document comes from the Rice-Specific Nitrate Initial Assessment (CRC 2022), which is a comprehensive technical report that was approved by the Water Board for the ILRP to incorporate CV-SALTs requirements, and from other relevant scientific studies and literature, as well as from a review of submitted GSPs within the main rice-growing groundwater basins.

Rice Physical Setting and Summary of GSPs Relative to Rice-growing Basins

Rice is primarily grown in eight Sacramento Valley counties (Butte, Colusa, Glenn, Placer, Sacramento, Sutter, Yolo, and Yuba) (Figure 2). Rice lands overlie nine of the current DWR Bulletin 118 Sacramento Valley groundwater subbasins, including the Butte, Colusa, North American, North Yuba, South Yuba, Sutter, Vina, Wyandotte Creek, and Yolo Subbasins (DWR 2018).

Rice farmlands in the Sacramento Valley cover approximately 525,000 acres. This represents the acreage suitable for rice given no restrictions on water or other inputs. The acreage of land annually farmed in rice is influenced by factors such as market conditions, weather, water availability, and potential drought water banking activities; however, the majority of rice lands are farmed in rice year after year. Conversion of rice farmlands into other long-term crops, such as orchards, has decreased the amount of rice grown from the historical high acreage of the early 1980s. Recent drought conditions led to extremely limited surface water supplies and widespread falling, resulting in a rice planted acreage low of approximately 245,000 acres in 2022. The rice planted acreage is expected to rebound in 2023, with early estimates of planted acreage closer to the typical 500,000 acres.

Rice Farming Overview and Water Use

Some management methods and techniques used in rice are unique to rice, but others are common with other crops. One of the main features unique to rice is the use of flooding during the growing season. Besides providing a water supply for the growing rice, flooding helps suppress weeds, helps to establish an optimum plant population, and helps prevent the loss of nutrients.

Key events in the rice-farming cycle are field preparation, planting, fertilizer and pesticide (mainly herbicide) application, irrigation flooding, field drainage, harvest, winter flood-up, and winter drainage. Figure 4 illustrates the typical timeline for these key events.
The majority of California rice fields are seeded by airplane directly into standing water. The seed is soaked 24 to 40 hours prior to seeding to start the germination process. Fields are flooded prior to planting, typically with surface water (groundwater is used occasionally); the pre-germinated seed then drops through the water to the soil surface, and establishes in that spot. The water is kept on the field throughout the growing season (April through September), with a slow trickle of water continually moving through the field to prevent stagnation. During required water holds for pesticide application/hold times, water is held completely on the field. Outside of hold times, field tailwater trickles out of the field into a drain, to be utilized by the next rice field. Rice fields are completely drained a few weeks prior to harvest to allow for surface drying to facilitate harvesting.

After harvest, about one-third to one-half of the fields are again flooded in the winter (from October through February). This land management regime results in flooded conditions during 5 to 10 months of the year, making rice fields prime and highly valued habitat for migratory waterfowl.

The University of California Agriculture and Natural Resources (UC-ANR) Rice Production Manual (UC-ANR 2023) gives an estimate of seasonal water use for rice fields in California. Seasonal water delivery varies a great deal depending on soil type, management, and seasonal length (Table 1). The average delivered water use is approximately 5 to 5.5 acre-feet per acre (af/acre), but varies from about 4 to 8 af/acre or more depending on soil properties and water management (UC-ANR 2023).

Table 1. Approximate Seasonal Water Use by use Component for Rice in California

<table>
<thead>
<tr>
<th>Seasonal Water Use</th>
<th>Acre feet per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evapotranspiration (Et)</td>
<td>2.75 - 3.25</td>
</tr>
<tr>
<td>Percolation/seepage</td>
<td>0.2 - 1.0</td>
</tr>
<tr>
<td>Drainage</td>
<td>0 - 2.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2.95 - 6.25</strong></td>
</tr>
</tbody>
</table>

Note: The data in this table do not account for leaks in levees and outlets.

Source: UC-ANR 2023
The techniques used in modern rice farming have been developed over decades of experience and modernization within the industry. This was noted in Northern California Water Association (NCWA) and Western Canal Water District (WCWD) Feather River Regional Agricultural Water Management Plan 2020 Update (NCWA and WCWD 2021):

“Over the more than 100 years that rice has been grown in the valley, all aspects of its production have steadily improved, including plant breeding, cultivation and weed-control techniques, harvesting, and water management. In particular, precision land leveling is now widely used to achieve nearly dead-level grading within rice checks, which allows farmers to manage rice ponds more precisely and eliminate water applied to compensate for uneven land surfaces. Techniques for on-farm water recycling have also been developed and are used where water use cannot be accomplished more efficiently at the district level.”

**Basin Setting**

Rice is preferentially farmed on lands with low vertical hydraulic conductivity, as low rates of downward water (and thus solute) movement through the soil allows for maintenance of standing water and avoids rapid seepage and deep percolation of applied water. This lengthens residence time within the upper soil horizons during which uptake, transformation, and immobilization of applied fertilizers, herbicides, and pesticides can occur.

**Rice Conceptual Site Model**

A conceptual site model (CSM) was developed as part of the Rice-Specific Groundwater Assessment Report (GAR; CRC 2013). The CSM is a framework for analyzing data related to subsurface hydrology and pollutant transport, and helps describe the connections of rice fields to the broader environment. The CSM for Sacramento Valley Rice Fields is shown on Figure 5.

![Figure 5. Conceptual Site Model for Sacramento Valley Rice Fields](image)

*Source: CRC 2013*
The CSM for Sacramento Valley Rice Fields includes the following main features:

- Physical-chemical conditions and dynamics pertaining to flooded fields and root zones
- Sources of water and pollutants
- Sinks for water and pollutants
- Potential transformations and pathways for the migration of water and pollutants

These main features of the rice-specific CSM are described as follows:

- **Root Zone Conditions and Dynamics** – Root zone conditions and dynamics relevant to rice farming include soils with low vertical hydraulic conductivity, a saturated root zone, and low soil oxidation-reduction (redox) conditions.
- **Sources** – Sources of water and pollutants include applied materials, irrigation water, natural geology (that contribute dissolved minerals to groundwater), surface water, and precipitation.
- **Sinks** – Potential sinks for water and pollutants include plants, soils, shallow and deep groundwater, surface water, and the atmosphere.
- **Pathways and Transformations** – Potential pathways and transformations of water and pollutants in a rice field include plant uptake, decomposition, chemical adsorption to soils, seepage from surface water, discharge to surface water, evapotranspiration, lateral movement, and vertical movement.
- **Application of the CSM** – The rice-specific CSM provides a framework that can help answer questions concerning the potential for groundwater recharge and contamination to occur as a result of rice farming. The CSM, in conjunction with available data, can be used to determine source condition for rice fields in the Sacramento Valley.

### Soil Properties in Rice-growing Areas

Rice is grown primarily on farmlands with soils favorable to the maintenance of standing water: specifically, poorly drained soils with a high clay content, or those with a duripan or other hardpan restrictive layers in the subsoil.

Soils are classified by the U.S. Department of Agriculture-Natural Resources Conservation Service (NRCS) into groups based on physical and chemical attributes. Physical soil properties that contribute to the unique landscape of the Sacramento Valley, as well as soil suitability for rice farming, are summarized as follows:

- **Soil Drainage** – The NRCS classifies soils into natural drainage classes (Figure 6). The majority of rice lands overlie soils classified as poorly drained (55 percent), somewhat poorly drained (25 percent), and moderately well drained (17 percent), with smaller acreages overlying lands classified as well drained (13 percent). The naturally occurring poor drainage under the majority of the rice acreage yields soils that are uniquely suited for farming flooded rice.
- **Soil Hydraulic Conductivity** – The NRCS classifies soils into hydraulic conductivity classes based on textures of the described horizons (Figure 7). As such, hydraulic conductivity tracks with texture in the Sacramento Valley, with the fine-textured basin floor soils having low hydraulic conductivity, and acreages in the North Yuba, South Yuba, and North American groundwater subbasins classified as having moderately low hydraulic conductivity. Soils with higher hydraulic conductivity typically contain a restrictive horizon that reduces water movement.
- **Soil Depth to Restrictive Layer** – Figure 8 shows the NRCS depth to restrictive layers for the rice-growing area. The main restrictive layer type in the Sacramento Valley is a duripan or hardpan. Restrictive layers are common in the rice-growing areas outside of the basin floor, as they facilitate flooding by restricting the downward flow of water. This feature makes these areas less suitable for other types of crops but well-suited to growing rice.
Figure 6. NRCS Soil Drainage Classes, along with the 2019 Rice Extent
Source: CRC 2022

Figure 7. NRCS Hydraulic Conductivity Classes, along with the 2019 Rice Extent
Source: CRC 2022

Figure 8. NRCS Depth to Restrictive Layer, along with the 2019 Rice Extent
Source: CRC 2022
Rice Field Soils and Recharge Potential

Groundwater recharge beneath rice fields varies based on the soil properties discussed previously, shallow geologic features, and the water management of the specific field. The water applied to rice fields may percolate slowly past the root zone, or it may flow laterally back to drainage ditches or other surface water bodies. The *Rice Production Manual* (UC-ANR 2023) defines (vertical) percolation and (lateral) seepage as follows:

- **Percolation** is controlled by soil texture and impervious subsoils. Most rice soils have clay and/or a hardpan in the subsoil, so water does not percolate rapidly compared to deep loamy or sandy soils. In general, percolation losses throughout a growing season in California clay soils are less than 4 inches per growing season. If deep percolation is excessive in an area, rice may be a poor crop choice.

- **Seepage** is the lateral movement of water out of the field, usually through levees. Seepage occurs in all soils, but is more of a problem in coarse textured soils, which have a high hydraulic conductivity. Seepage rates are also determined by the height of water on the other side of the levee. Seepage is lower (or even reversed) when there is a water supply canal or other flooded rice field on the other side of the levee. Studies have shown that seasonal water losses due to seepage are less than 2 inches per growing season.

GSP Information on Rice Soils and Recharge

This section presents content from several Sacramento Valley GSPs, in which the Basin Setting sections include a detailed review of geographic information, physical characteristics of soil and geology, and water occurrence, all of which is summarized in the HCM. The quoted material that follows briefly summarizes and presents some of the key HCM information relative to rice fields in the applicable Sacramento Valley GSPs.

The Butte Subbasin GSP (Butte County Department of Water and Resource Conservation 2022) notes the following:

"The area along portions of the Sacramento River and the Feather River is underlain by lighter textured soils consisting of loamy sands and sandy loams with higher infiltration rates. These areas correspond to irrigated lands dominated by orchards. In contrast, soils with a restrictive layer and low water holding capacity are well suited for growing rice. This land use dominates the central portion of the Subbasin."

"Although flooded rice fields predominantly exist on soils with low infiltration rates and a shallow restrictive layer, cumulatively over large acreage (and due to variable infiltration rates across rice fields), small infiltration rates still lead to notable recharge of applied water. For example, Feather River water diverted from the Thermalito Afterbay and applied to fields for irrigation provide some recharge to shallow zones of the aquifer system from infiltration in canals or flooded fields."

Further, "water from a domestic well (< 100 feet deep) sampled for the Butte County Stable Isotope Recharge Study (Brown and Caldwell 2017) showed characteristics of irrigation water from the Feather River. This well is likely screened in the alluvium overlying aquifer materials of the Tuscan Formation (Brown and Caldwell 2017), drawing from the shallow groundwater contained in the alluvium. These results aligned with extensive shallow groundwater data from rice fields from a USGS [U.S. Geological Survey] study drawing similar results (USGS Dawson 2001)."

The Yuba Subbasins GSP (Yuba Water Agency 2019) mentions:

"Of particular importance to groundwater flow in the Yuba Subbasins is the presence of significant near-surface clays. These clays create ideal conditions for rice cultivation, restricting the vertical movement of water in the shallow subsurface."
Further, “Crops grown in the Yuba Subbasins are largely driven by the unique conditions required for rice cultivation, including flat land and restrictive layers in the subsurface to facilitate ponding of water.”

The Colusa Subbasin GSP (Colusa Groundwater Authority and Glenn Groundwater Authority 2021) notes:

“Comparison of the depth to groundwater contours to land use shows that many areas with shallow depths to groundwater correspond to the areas of rice cultivation and wildlife refuges. Ponded agricultural fields tend to be in areas that contain a high percentage of silts and clays, which restrict, yet do not negate the vertical flow of water into or out of the groundwater system. A portion of the groundwater would therefore discharge into the ponded water and a portion would discharge into unlined irrigation canals, drains, or ephemeral stream channels.”

The Sutter Subbasin GSP (Sutter Subbasin Groundwater Management Coordination Committee 2021) includes this description:

“The most prominent agricultural land use in the Sutter Subbasin is rice production, followed by fruit and nut orchards and a variety of other crops. Rice production is characterized by flooding of relatively impermeable soils.

“Rice is mainly grown on soils favorable to the maintenance of standing water: specifically, clay soils with low vertical hydraulic conductivity. Soil features, such as fine-texture or cemented layers with low vertical hydraulic conductivity, are common over broad areas in the Subbasin and are considered advantageous for flooded rice culture. Although deep ripping of restrictive layers can make these soils more suitable for non-flooded crops, it would also reduce suitability for rice planting.

“Sacramento Valley rice farmers use mainly surface water for irrigation. The quality of this water is generally high having been derived from melting snow that enters rivers through managed reservoir discharge. Salinity is removed from the land by runoff and percolating water, mostly fairly early in the reclamation process, so there is little residual salinity in established rice fields.”

The information presented in the GSPs to describe the physical setting of rice growing and its potential for recharge to shallow groundwater is generally consistent with the previous reports and analysis developed by CRC, and the current state of the science in rice fields, as summarized in the next section.

Recent Sacramento Valley Rice Recharge Studies at the Field Level

Several studies over the last decade have looked at the vertical and lateral movement of water beneath California rice fields. The conclusion is that very little water is percolating beneath the majority of rice fields because of heavy soil textures; development of clay layers, duripans, and other hardpans in coarser soils; and development of plow pans. These features allow for little water movement into deeper profiles.

The development of a plow pan and influence on percolation of water below the root zone was studied by Liang at al. (2014). A plow pan is a compacted soil layer that develops after years of shallow tillage and equipment traffic, especially in moist soils, causing formation of a compacted soil layer. Soil characteristics were compared to field hydraulic conductivity, with results showing that the hydraulic conductivity just below the root zone ranged from 0.0028 to 0.029 inch per day (inch/d) (except for one site), "which is classified as practically impermeable" (Liang et al. 2014). One site had a hydraulic conductivity of 0.68 inch/d, which is considered very low permeability. It was concluded that under current rice management practices, nitrate leaching under rice fields poses little risk to groundwater quality in the Sacramento Valley.
Linquist et al. (2015) developed water balances for rice systems at select fields in the Sacramento Valley. Percolation and (lateral) seepage were estimated by subtracting crop evapotranspiration values and tailwater drainage from the amount of water applied to the field. Based on these calculations, the team estimated that the relative amount of percolation losses versus lateral seepage were only 14 percent of the total estimated infiltration losses. These values indicate that most of the infiltration losses occur because of lateral seepage, and that vertical percolation under rice root zones is limited.

LaHue and Linquist (2021) further investigated the contribution of percolation to water balances in Sacramento Valley rice systems. Eight Sacramento Valley rice fields with a variety of soil characteristics were used in their investigation, and direct measurements of percolation were recorded at each throughout the flooded growing season. A season-wide mean percolation rate was determined for each site, with the researchers noting that little temporal variability in percolation rates was observed at most sites (LaHue and Linquist 2021). Measured percolation rates ranged from 0.002 to 0.60 millimeters per day, which corresponds to 0.04 to 69.5 millimeters per season, based on 115 flooded days. These rates are considered “low to very low,” supporting the prior work indicating that vertical percolation under the rice root zone is limited.

**Overall Recharge Evaluation in the Sacramento Valley with Respect to Rice Lands**

Given the need to protect groundwater resources and enhance recharge where possible to maintain adequate groundwater levels, opportunities for groundwater recharge have been evaluated in several counties of the Sacramento Valley that include rice-growing areas and the most recent ones are summarized in this section for context.

**Regional Recharge Studies**

Butte County agencies have developed and documented several recharge studies to (1) better understand recharge to the Tuscan Aquifer and (2) evaluate potential areas for enhanced recharge to improve groundwater levels and overall management.

For example, the 2018 report Evaluation of Restoration and Recharge Within the Butte County Groundwater Basins (GEI Consultants et al. 2018) determined that:

"Much of the irrigated acreage in Butte County is devoted to rice production because of the suitability of local soils, climate, and water supply to this crop. While the practice of flooding rice fields generates deep percolation, the volume of percolation is constrained by the low infiltration rates of soils that can be ponded, a necessary characteristic for rice production. Flooding of rice fields is expected to continue to be a stable source of direct recharge that is unlikely to be greatly affected by changes in cropping or cultural practices. However, the potential for expanded use of rice ground for direct recharge is limited because of the low infiltration rates that make these lands suitable for rice cultivation in the first place. Therefore, the greatest opportunity for increased recharge on rice lands may lie through in-lieu recharge to reduce reliance on groundwater for rice irrigation."

Following this study, the Butte Subbasin GSP mentioned that:

"Crop areas suitable for multi-benefit recharge were evaluated based on 2018 Land IQ spatial land use data, filtering land areas by crop type to exclude permanent crops, rice, crops with growing seasons unsuited to the flooding window, and non-agricultural areas. In total, approximately 1,000 acres in the Butte Subbasin are eligible for multi-benefit recharge according to these criteria."
In other words, when looking at basin-scale recharge opportunities, rice lands are not the best opportunity to invest in specific direct recharge projects. Instead, other, high-percolation soils should be targeted for recharge benefits. Rice land use promotes conjunctive use and in-lieu recharge through the use of high-quality surface water for irrigation.

In addition, the Feather River Regional Agricultural Water Management Plan 2020 Update (NCWA and WCWD 2021) further summarized the rice-growing conditions relative to soils, water management, and infiltration potential, as follows:

"Rice ... is one of the only crops suited to the heavy clay soils that dominate much of the region and is consequently the primary crop grown today.

"The surface soils in the region consist of alluvial deposits from historic flooding of the Sacramento and Feather Rivers. The soils tend to be heavier, clays and clay loams, in areas of rice production. There are also areas of coarser, loamy soils found along the west side the Feather River in areas of orchard production."

"Groundwater level monitoring data and field observations suggest that the shallow groundwater system and regional aquifer are coupled within portions of the region at certain times. As a result, an unsaturated aquifer zone may not be present to receive recharge in all areas at all times. Depth to water in wells is typically less than ten feet in primary rice-growing areas, and drains often flow even when irrigation is not occurring. These conditions likely result from limited groundwater pumping in these areas along with sustained use of surface water for irrigation over past decades. As a result, it is likely that a substantial portion of the water percolating into the soil from ponded fields and seeping from canals is unable to flow downward but rather flows horizontally to where it is intercepted by non-ponded vegetation or by drains, providing base flow. Thus, these flows represent potential recharge that is essentially "rejected" by the groundwater system. Shallow groundwater interception is shown conceptually in Figure 3.11."

Figure 9. Shallow Groundwater Interception Conceptual Diagram. Figure 3.11 of the Feather River Regional Agricultural Water Management Plan 2020 Update (NCWA and WCWD 2021)

This figure further illustrates that rice flooding recharge to groundwater is not prevalent and supports the rice CSM shown at the beginning of this document.

In conclusion of this Feather River analysis,

"In areas where an unsaturated zone is present, water infiltrating into the soil in ponded fields may encounter impermeable layers caused by plow pan or natural soil features and thus flow laterally to adjacent lands or provide base flow for drains. Additional information is needed to distinguish shallow groundwater interception in areas where the shallow and regional groundwater systems are coupled from areas with perched shallow groundwater."
In addition, because the groundwater table is typically within 5 to 10 feet of the ground surface in areas that are in rice production, it restricts the potential for downward movement of vertical flow to groundwater because very little groundwater storage potential is available under rice fields.

As a result, rice fields are not a primary source of recharge in Butte County.

Soil Agricultural Groundwater Banking Index

The Soil Agricultural Groundwater Banking Index (SAGBI) developed by the California Soil Resource Lab at the University of California at Davis is a suitability index for groundwater recharge/banking on agricultural lands in California. The SAGBI is a web-based application that uses NRCS digital soil survey data to determine suitability ratings, which are based on five soil physical factors, including deep percolation, root zone residence time, chemical limitations, topographic limitations, and surface condition. This makes the SAGBI helpful for investigating the potential for recharge underneath large areas such as the Sacramento Valley.

The majority of current rice lands are rated as poor to very poor for groundwater banking suitability by the SAGBI (Figure 10). Most of the Yuba County areas and small areas of Glenn County rice fields are rated as moderately poor suitability, and areas along the Sacramento and Feather rivers trend up to moderately good and good suitability. These areas of sandy floodplains are not considered to be ideal locations for groundwater banking “because of the potential for applied water to flow, by subsurface transport, to rivers and streams” (O’Gee et al. 2015). This demonstrates that Sacramento Valley rice fields are not significant sources of recharge to groundwater.

Rice Fields are not Well-Suited for Groundwater Recharge Projects

There are several reasons why rice flooding is not a good source of recharge to groundwater:

• Recharge under rice fields is challenging to measure and quantify because of the complex soil composition and the potential for more lateral seepage than deep percolation. However, basic soil science and rice agricultural practices that have been used for generations show that water ponds well in the Sacramento Valley with minimal seepage loss during the growing season, indicating that recharge is low due to the fine soils that restrict vertical flow.

• Flows that percolate past the root zone often seep laterally back to drains and cannot recharge the water table.

• The water table under rice fields is shallow, not allowing for much recharge to add to storage.

• Direct recharge is thus limited; however, in-lieu recharge occurs through surface water use for irrigation.

• The science of rice recharge is complex and still developing; several GSPs have mentioned the estimation of recharge under rice fields is very uncertain and considered largely a data gap that implementation studies will seek to fill. In addition, new models by the DWR and others (such as CV-SWAT) are consistently improving and water budgets will be refined as new data and tools are developed. However, given the typical soil properties underlying rice fields, recharge under rice is more limited than recharge under other crops.
Figure 10. SAGBI Results Under Sacramento Valley Rice Lands
Groundwater Quality Below Rice Fields

Groundwater quality is one of the SGMA sustainability indicators relevant to rice, as it is being tracked through the ILRP. GSPs are responsible for evaluating and managing water quality degradation caused by groundwater pumping or GSA projects. Generally, groundwater quality should be protective of all beneficial uses and should be maintained or improved relative to the enactment of SGMA in 2014. GSAs in the Sacramento Valley commonly track nitrate and salinity concentrations in routinely monitored public supply wells, because these are the constituents most commonly found in the region near or above concentrations that would prevent some beneficial uses of water. The addition of rice monitoring data to their networks should provide a regularly monitored data point showing that shallow groundwater near rice has low nitrate and salinity and is suitable for all beneficial uses.

The Rice Nitrogen Cycle

Rice agriculture's primary characteristics relevant to groundwater quality in the Sacramento Valley include low potential sources of nitrate, salinity and other primary pollutants, the high quality of underlying groundwater, and consistent land management practices over decades of farming.

The rice nitrogen cycle provides an understanding of the fate of nitrogen below rice fields. Figure 11 illustrates nitrogen transformation in flooded soils, and reviews the role of the oxidized layer (upper inch or so) and the underlying reduced layer on nitrogen fate.
Transformations of particular interest and the conditions that favor them are as follows:

- At higher redox potentials (in aerated soils), ammonium is readily transformed to nitrate. Thus, in well-aerated soils, the half-life of ammonium may be relatively brief, and ammonium concentrations correspondingly low, even if the predominate form of applied nitrogen is organic nitrogen or inorganic ammonium.

- At intermediate redox potentials (in wet soil), conditions favor the rapid conversion of nitrate (i.e., not taken up by plants) to nitrogen and nitrous oxide gases. Denitrification can significantly reduce soil pore water concentrations of nitrate.

- Under prolonged saturation, prevailing anaerobic conditions and resulting low redox potentials prevent nitrification of ammonium, so that available soil nitrogen is almost exclusively present as ammonium (such as in rice fields). Unlike nitrate, positively charged ammonium is held on soil exchange sites, and is thus less mobile.

- Mobility of nitrogen is therefore minimized by rice field physical conditions and management during most of the year, as long as rice fields are flooded.

Figure 11. Nitrogen Transformations in Flooded Soils
Source: CRC 2013, modified in 2022

Recent Groundwater Quality Reports and Results

Several reports developed in the last 30 years and recent monitoring events have collected and evaluated nitrate and salinity results under rice fields in the Sacramento Valley. Pertinent reports are introduced briefly in this section, along with a review of groundwater results and conclusions.
Nitrate data for public supply wells were downloaded from the State Water Board Groundwater Ambient Monitoring and Assessment Program (GAMA) database and also evaluated for the Initial Assessment. Nitrate concentrations in public supply wells installed near rice-growing areas are generally less than 5 milligrams per liter (mg/L). Public supply wells with elevated nitrate concentrations (above 7.5 mg/L) that are detected near rice are typically at the margins of the rice-growing areas, close to more densely populated areas or other crop types, and are likely due to other sources such as septic systems and chemical fertilizer applied to other crops (CRC 2022).

USGS-assessed trend evaluation data for the same wells were also downloaded as part of the Initial Assessment. The public supply wells with increasing trends are nearly all found outside of rice-growing areas, and the wells within rice-growing areas that have increasing trends typically have low nitrate concentrations of less than 5 mg/L. Increasing nitrate trends in wells near the margins of rice fields are likely related to other nitrate sources, such as septic systems and chemical fertilizer applied to other crops (CRC 2022).

Rice Land Use Relative to SGMA Sustainability Indicators

Rice land use is an important part of the economic and ecological makeup of the Sacramento Valley. Rice land use provides important habitat for migratory birds and food for fish in some project areas. SGMA relies on the six sustainability indicators to assess whether undesirable results occur and whether progress to achieve groundwater sustainability is demonstrated through the establishment of policy goals or sustainable management criteria.

Each of these indicators is considered to become an "undesirable result" if the following occurs:

- Chronic lowering of groundwater levels, indicating a significant and unreasonable depletion of supply
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable seawater intrusion (not applicable in the Sacramento Valley)
- Significant and unreasonable degraded water quality

Visit the Story Map here: https://tinyurl.com/NitrateInitialAssessment

"The California Rice Commission NCP Initial Assessment for Rice in the Sacramento Valley, dated May 2022, fulfills the requirements for the NCP Individual Permitting Approach and is approved." (California Water Boards 2022)
- Significant and unreasonable land subsidence
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

Table 2 shows the relationship of rice land use relative to the five SGMA sustainability indicators applicable to the Sacramento Valley.

**Table 2. Rice Land Use Relative to the Five SGMA Sustainability Indicators Applicable to the Sacramento Valley**

<table>
<thead>
<tr>
<th>Sustainability Indicator</th>
<th>Effect of Rice on Sustainability Indicator</th>
<th>Data Gaps</th>
<th>Current Undesirable Result Status within Rice Lands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater Levels</td>
<td>No effect to positive effect; rice lands primarily use surface water for irrigation and therefore do not affect water levels from pumping; they may contribute a small amount of recharge through their ponded fields. Also, because rice fields can be fallowed during times of surface water shortage, they do not exacerbate water level declines during drought.</td>
<td>Installation of shallow monitoring wells, in proximity to deeper monitoring wells, would help characterize the shallow subsurface and help improve the understanding of recharge from rice cultivation, including whether that recharge reaches the water supply aquifer or moves horizontally toward creeks and drains (Yuba Subbasins).</td>
<td>No undesirable result present</td>
</tr>
<tr>
<td>Groundwater Storage</td>
<td>Same as groundwater levels.</td>
<td></td>
<td>No undesirable result present</td>
</tr>
<tr>
<td>Water Quality</td>
<td>Long-term ILRP monitoring has shown very good quality shallow groundwater beneath rice fields.</td>
<td>The ILRP shallow groundwater monitoring network gives a clear understanding of water quality beneath rice fields; Yuba Subbasins GSP will fill some data gaps in rice lands.</td>
<td>No undesirable result present</td>
</tr>
<tr>
<td>Land Subsidence</td>
<td>Rice agriculture has no effect on land subsidence as long as surface water remains the primary source of irrigation.</td>
<td></td>
<td>No undesirable result present in most basins; some subsidence present in the Colusa Subbasin</td>
</tr>
<tr>
<td>Interconnected Surface Water</td>
<td>Rice is a beneficial user of surface water, less of groundwater, and therefore pumping in rice areas is generally low. Therefore, rice irrigated with surface water does not cause depletion of surface water from lowering groundwater levels. Lateral flow from rice fields has the potential to benefit interconnected surface water through irrigation return flows to streams. The interconnected surface water indicator is not well understood and largely a data gap in early stages of GSP implementation.</td>
<td>The addition of new flow gauges on creeks or drains conveying surface flows out of the subbasins can assist in refining water budgets for the surface water system to allow for improved estimation of the fate of applied irrigation water and of surface water outflows (Yuba Subbasins).</td>
<td>No undesirable result present</td>
</tr>
</tbody>
</table>
Collaboration Opportunities for SGMA Implementation

Per the GSP regulations (California Code of Regulations Title 23, Division 2, Chapter 1.5, Subchapter 2, Article 1, Section 356.4), GSAs are required to perform periodic evaluations of their GSPs, at a minimum every 5 years. Sacramento Valley GSAs will need to submit their evaluations for their respective GSPs in either 2025 (Yuba subbasins) or 2027. The purpose of these evaluations is to assess progress on SGMA implementation and the potential need to revise any aspects of the GSP, such as policy decisions or the development and implementation of projects and management actions, or additional monitoring.

Summary of Key Rice-related Projects in Submitted GSPs

In the 2020/2022 GSPs, the Sacramento Valley GSAs have identified initial projects and management actions to implement programs to help maintain or reach groundwater sustainability within the required 20-year timeframe.

Some of these projects include groundwater recharge programs, such as the ones recommended by DWR, related to flood-managed aquifer recharge (Flood-MAR; DWR 2023) or agricultural managed aquifer recharge (Ag-MAR) that consist in diverted flood flows onto working lands such as dormant agricultural fields to benefit groundwater recharge while protecting vulnerable areas from flooding. Flood-MAR and Ag-MAR projects are commonly framed as “multi-benefit” recharge projects because they recharge groundwater, provide flood control, and provide habitat for migratory birds and fish. Rice is specifically identified in some GSPs as proposed areas that could be used for groundwater recharge projects.

Such proposed projects in the GSPs are shown in Tables 3 and 4, followed by a discussion about potential drawbacks and considerations to using rice lands for groundwater recharge.

**Table 3. Sutter Subbasin Groundwater Sustainability Plan**

<table>
<thead>
<tr>
<th>Project</th>
<th>Action Type</th>
<th>Proponent</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice Field Infiltration Study to Promote Flood-MAR Recharge Projects</td>
<td>Direct Recharge</td>
<td>Multi-agency/GSA</td>
<td>Conduct an infiltration study to promote Flood-MAR projects and determine the feasibility and amount of infiltration a Flood-MAR project in rice could provide.</td>
</tr>
</tbody>
</table>

Source: Sutter Subbasin Groundwater Management Coordination Committee 2021

This Sutter Subbasin project would "determine the feasibility and estimate the amount of infiltration a Flood-MAR project could provide from a rice field to increase direct recharge in the Subbasin" (Sutter Subbasin Groundwater Management Coordination Committee 2021). Given the information presented in the preceding sections, such a project may be helpful for better estimating the overall recharge to groundwater from rice field flooding, however, it may not be a suitable Flood-MAR project due to the low infiltration potential known in rice fields. The previously mentioned LaHue and Linquist (2021) field study included a site within the Sutter Subbasin. Although the specific site chosen had a coarser-than-typical soil texture than much of the Sutter rice fields, the site generated some of the lowest recorded percolation rates in the study. This demonstrates the importance of reviewing several soil factors when determining locations for recharge projects, and further reemphasizes the low potential for groundwater recharge from ponded water in rice fields.
### Table 4. Colusa Subbasin Groundwater Sustainability Plan

<table>
<thead>
<tr>
<th>Project</th>
<th>Type</th>
<th>Proponent</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenn-Colusa Irrigation District (GCID) Strategic Winter Water Use for Groundwater Recharge and Multiple Benefits</td>
<td>Direct and In-lieu Groundwater Recharge</td>
<td>GCID</td>
<td>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.</td>
</tr>
<tr>
<td>Reclamation District (RD) 108 “Boards In” Program</td>
<td>Direct Groundwater Recharge</td>
<td>RD108</td>
<td>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.</td>
</tr>
</tbody>
</table>

Source: Colusa Groundwater Authority and Glenn Groundwater Authority 2021

These two Colusa Subbasin projects may overestimate the potential for groundwater recharge from rice fields, given the data and information provided in the GSP Basin Setting sections that were summarized earlier in this document. Some incidental recharge may occur on rice fields, but not enough to make up for groundwater level declines in some areas. Rather, rice agriculture will be helpful in providing in-lieu recharge through the practice of using surface water instead of groundwater for irrigation, thus not negatively affecting groundwater levels during the rice-growing season. Rice fields could be temporary ponding/storage areas for excess winter surface water before releasing it to recharge other areas downstream that are better suited for recharge.

### Example Projects and Programs for Collaboration with Rice Stakeholders

Generally, there are a number of multi-benefit projects and programs related to data collection, field studies, and better understanding of recharge and water budgets related to rice fields that can be developed in collaboration between GSAs, applicable water management entities, and the CRC and member growers, such as the following:

- Water level and water quality monitoring; access to USGS and CRC rice wells
  - CRC complies with ILRP water quality monitoring and reporting to the Central Valley Water Quality Control Board
- CV-SWAT tool enhancements to add rice module, and evaluate recharge under rice fields
  - As a member of the Central Valley Salinity Coalition, CRC is providing data and information to enhance this model
- Partner with UC Davis ANR on collaborative rice water use and water quality projects
  - CRC has a long history of collaborative scientific study development and funding
- Restoration/beneficial use for adjacent wetlands/habitat
  - Rice growers have numerous opportunities to partner with environmental groups (Audubon, The Nature Conservancy) and in partnership with CDFW to adapt fields to provide habitat opportunities
- Shallow water quality monitoring network coordination to fill data gaps
  - CRC has actively worked with Yuba County Water Agency on identifying new well locations for water level and water quality monitoring
- Rice fields fallowing and selling water to tree crops in drought conditions to offset their groundwater pumping needs (in-lieu groundwater recharge)
• Rice fields infiltration study (potential enhancements to the 2021 LaHue and Linquist study, as needed), in coordination with UC Davis Cooperative Extension rice program, and as deemed necessary. Most research is done at the field level, but this does not take into account the broader diversity of rice field conditions throughout the valley.

• Flood water capture and release to preferable recharge areas / canals that are more connected to groundwater, downstream

• GSP groundwater modeling tools and valley-wide modeling tools enhancements in collaboration with GSAs and DWR

• Filling data gaps related to monitoring data, deep percolation information, and better modeling representation of rice fields water use and recharge processes, as mentioned in the Yuba Subbasins GSP (below), to enhance region-wide water budget estimates
  
  "A unique data gap in the Yuba Subbasins is related to the fate of deep percolation and volumes of surface water outflows. Rice cultivation is a dominant land use in the area, partially due to low permeability soils that allow water to pond at the surface. As rice requires flooding for most of the growing season, a portion of applied irrigation water (and precipitation) infiltrates into the ground, with the remainder going to crop evapotranspiration or surface runoff. A portion of this infiltrated water continues to percolate to the production aquifer, with the remainder of the water being intercepted by other shallow clay hardpan layers and moving laterally to rivers, creeks, or drains. Quantifying these values is difficult with existing information." – Yuba Subbasins Water Management Plan: A Groundwater Sustainability Plan (Yuba Water Agency 2019)

  When computing water budgets, the deep percolation (or recharge) term is often estimated as a “closing” term in the basin-wide or district-wide water balance, given that all other water balance terms are generally known or more easily estimated.

  Given these uncertainties, future data collection needs to be focused on refining our understanding of recharge processes and improved model calibration in rice areas.

• A Butte County Stable Isotope Recharge study (Brown and Caldwell 2017) provided some recommended field studies for additional insights on the source and fate of water recharged to groundwater. These could provide field research collaboration opportunity to identify recharge sources and rates through a stable isotope study in valley floor wells, such as:
  
  Recharge rate. Most well locations and depths should be sampled and analyzed for presence of tritium to help distinguish whether recharge to individual aquifer zones is occurring over periods shorter than about 60 years, or whether recharge is occurring over longer timeframes.

  Coordination on Stable Isotope Recharge Study recommendations on evaluating recharge rates and water source (as mentioned in Butte Subbasin GSP)

Groundwater sustainability in the Sacramento Valley will require a collaborative approach between growers and water managers to pool financial, technical, and leadership resources. Figure 13 illustrates an approach that CRC could support.
Figure 13. Collaborative Approach to Groundwater Sustainability

Summary and Conclusions

In summary, this document provides the following understanding and findings of groundwater characteristics under rice fields in the Sacramento Valley:

1) Rice land soils are generally less permeable than other soils, which leads to less groundwater recharge than other soils. Direct groundwater recharge on agricultural lands may be more efficient in other crops grown in more permeable soils.

2) Potential impact from rice agriculture on groundwater quality relative to nitrate is very low because of soil denitrification processes.

3) Potential impact from rice agriculture on the salinity of local groundwater is also low because of annual application of high-quality irrigation surface water.

4) Groundwater recharge under rice fields does occur, but it is limited and very slow. Although rice fields are not very suitable for direct recharge to groundwater, they provide “in-lieu” recharge through the use of surface water instead of groundwater.

5) Rice field flooding, while not a major source of recharge, provides incidental benefits such as key environmental habitat, temporary storage of flood waters for release into drainage canals and recharge downstream in more permeable areas, and water quality benefits.

Further, this document demonstrates the many ways in which water managers and CRC can collaborate on integrated water management and groundwater sustainability efforts under both the ILRP and SGMA. Synergies and collaboration will be important to efficiently and effectively manage water and land use in the Sacramento Valley.
References


Groundwater regulations are moving forward

Proposed taxes to fund sustainability agencies in county for groundwater

BY MICHAEL WEBER
MWEBER@CHICOER.COM

OROVILLE >> In an effort to fulfill California law regulating local groundwater, local groundwater sustainability agencies in Butte County are proposing new taxes starting 2024 to fund long term operations in carrying out mandates not funded by the state.

In 2014, California passed the Sustainable Groundwater Management Act which laid out regulation requirements and mapped out jurisdictional boundaries of groundwater subbasins to be managed throughout the state.
So far, groundwater sustainability agencies in Butte County have paid for their operations using initial grants from the Department of Water Resources; and in-kind staff and monetary contributions from their governing members.

However, initial funding has run dry, resulting in some agencies proposing new fees by way of property tax to fund long-term administration and implementation of groundwater regulations.

Not all agencies in Butte County are seeking a tax, but the two largest — the Vina and Wyandotte Creek groundwater sustainability agencies — are proposing taxes that will affect residents in Chico, Durham, Oroville, Palermo and unincorporated areas of Butte County.

If requirements are not met by local agencies, the State Water Resources Control Board may intervene and charge higher fees, say agency representatives.

**Jurisdiction breakdown**

The taxes get complicated. Depending on where one lives in Butte County, they belong to one of 14 — yes, 14 — groundwater sustainability agencies each with their own funding source.

The 14 agencies account for three subbasins unique to Butte County: the Butte subbasin is regulated by 11 agencies, the Vina subbasin is regulated by two agencies and the Wyandotte Creek subbasin is managed by one agency.


Together, the three subbasins encompass the entirety of Butte County and some areas of other counties, and each has their own “groundwater sustainability plan” required by the act.

Aside from proposed taxes, lawsuits have been filed against the Vina subbasin Groundwater Sustainability Plan and the Butte subbasin Groundwater Sustainability Plan.

It should be noted these agencies only regulate groundwater. Surface waters, like in rivers and reservoirs, have been regulated since the 1914 Water Commission act signed 100 years before the law was passed.

**SGMA requirements**

Groundwater sustainability agencies must create a plan to keep aquifer levels sustainable, avoiding chronic depletion.

Groundwater sustainability agencies have power to meter groundwater pumping and to create projects that help subbasin health and long term sustainability, said Kamie Loeser, director of water and resource conservation for Butte County.

Groundwater sustainability plans must aim to avoid what SGMA defines as “undesirable effects” which include:
- Significant and unreasonable depletion of groundwater supply.
- Significant and unreasonable reduction in overall groundwater storage.
- Degraded water quality from contaminants.
- Land subsidence that interferes with surface land uses.
- Depictions of interconnected surface water.

A sixth requirement must address significant and unreasonable seawater intrusion, but this won’t apply to Butte County subbasins because they don’t connect to seawater.

While agencies have the power to meter wells, Loeser said currently proposed groundwater sustainability plans in the county will not be doing so.

“The GSA has a lot of regulatory power. It’s allowed not only to impose fees; it could meter people. We are not proposing that,” Loeser said. “I would say that the (Vina) GSA is focused more on helping implementing projects that would help us reach sustainability because the Vina subbasin is in decline. It has an average decline of about 2 feet in storage a year.”

While current proposed sustainability plans in Butte County don’t include metering as a means of regulating, changes to the plans in the future may do so.

“There’s no way for us to go to one well and say, ‘you’re pumping too much and you’re causing drawdown’. ... If there was some kind of enforcement, meters would have to be put on and that’s not what we’re proposing,” Loeser said.

Instead, Loeser said her agency’s solution is a four-pronged approach to regulating: bringing surface water into the basin, implementing recharge projects, conserving demand and managing land use.

All that is to say, if agencies don’t do their jobs of reporting and complying to SGMA, the State Water Resources Control Board will intervene in control of subbasin management, say agency representatives.

Loeser said the state would impose a wellhead fee of $100 for de minimis well, $300 for irrigation wells and usage fee of $40 per acre foot pumped.

Loeser said the state would also be in charge of implementing groundwater recharge projects.

**Vina Subbasin**

The Vina Subbasin is regulated by the Vina groundwater sustainability agency and the Rock Creek Reclamation District groundwater sustainability agency.

The Vina agency is proposing a tax with a maximum rate of $3.09 per acre per year.

Rock Creek Reclamation District residents, while located inside the Vina subbasin, will not be included in the tax proposed by the Vina Groundwater Sustainability Agency. Loeser said
the district will contribute its share of the Vinag groundwater sustainability plan separately.

Agency and proposed fee information is available at https://www.vinagsa.org.

**Wyandotte Creek Subbasin**

The Wyandotte Creek Subbasin is regulated solely by the Wyandotte Creek groundwater sustainability agency.

The agency’s proposed fee structure has three tiers of cost: non-irrigated land which encompasses 29,075 acres of the jurisdiction, surface water irrigated land at 10,088 acres and groundwater irrigated land at 11,917 acres.

For the next five years, users on non-irrigated land can expect to pay $1.16 to $1.38 per acre, users on surface water irrigated land would pay $7.39 to $8.98 per acre, and users on groundwater irrigated land would pay $11.40 to $13.86.

Agency and proposed fee information is available at https://www.wyandottecreekgsa.com.

**Butte Subbasin**

The Butte Subbasin is regulated by 11 groundwater sustainability agencies in a co-op agreement comprised of board members from each of the following agencies:

- Butte GSA
- Glenn GSA
- Biggs GSA
- Gridley GSA
- Biggs-West Gridley Water District GSA
- Butte Water District GSA
- Colusa Groundwater Authority GSA
- Richvale Irrigation District GSA
- Western Canal Water District GSA
- Reclamation District 1004 GSA
- Reclamation District 2106 GSA

The agencies are working to create a funding structure that currently does not rely on taxing residents.

**Protesting fees**

Residents who think the proposed taxes should not be enacted have the right to protest its adoption.
written protests must include the landowner name, assessor’s parcel number, statement of protest and the landowner’s signature.

Residents in the Vina Groundwater Sustainability Agency service area may mail their protests to Vina GSA, PO Box 7211, Chico, CA 95927 and must be received by 9 a.m. July 26; or submit in person 5:30 p.m. July 26 at the Chico City Council Chambers at 421 Main St.

Residency in the Wyandotte Creek Groundwater Sustainability Agency service area may mail their protests to Wyandotte Creek Subbasin GSA, PO Box 745, Oroville, CA 95965; or submit in person at 2 p.m. July 27, 2023 at the Oroville City Council Chambers at 1735 Montgomery St.
DURHAM, Calif. - The group Groundwater for Butte is a new committee going against the Butte County District in moving forward with water sustainability issues.

Groundwater for Butte is concerned about water overdraft, drawing more water from wells than is flowing into the aquifer. The proposed landowner-based Tuscan Water District could be a better idea.

State-regulated groundwater must have groundwater sustainability agencies to prevent water overdrafts.

This is because we're using more groundwater than is naturally recharging yearly throughout the state.
Groundwater for Butte says this is taking away public control of groundwater and that they don't have any plans to pay for it.

Action News Now spoke with the director of Groundwater of Butte, Jeffrey Obser, who says they leave many homeowners with no say over it.

"I want to stay in my home I don't want to face the death of my home because of the well going dry, and it could mean that for any or all of my neighbors," said Obser.

Putting the public groundwater in the hands of the Tuscan Water District, the committee fears local farms and families will have their land taken by corporations.

However, the project manager for Tuscan Water District, Tovey Giezentanner, said there needs to be a plan rather than waiting.

"If we do nothing, we're going to get 15 from 20 years from now and not have projects in place to bring in more water, and we're just not going to have any plan, and we will be stuck. That's not good for us, for the groundwater ecosystem, or for anybody."

Butte County Supervisors plan to approve the Tuscan Water District in the fall.

Those opposed to the district proposal are meeting to do a fake ballot question that the worried people want to know.

Obser said he wants the Tuscan Water District to let people know that their plan is in the people's best interest.

The Groundwater For Butte plans a news conference at the Durham community park Tuesday morning at 10:30 a.m. to voice their concerns.

The Butte County Board of Supervisors plans to make the decision in either late November or early December.
Learn more about your privacy options
A group of Butte County landowners is pushing back on plans to form a water district for the area north of Chico.

**BUTTE COUNTY, Calif.** - A group of Butte County landowners is pushing back on plans to form a water district for the area north of Chico.
More than a dozen people showed up protesting the Tuscan Water District, worrying local water will be sold down south, it would accelerate drying wells and tree die-off, and that a majority of people in the Vina Subbasin area will not have a fair vote on their how their groundwater is being used.

Some Butte County farmers and homeowners with wells on their properties are concerned that their water isn't being protected.

"I think we need to mind where our water is going. The corporate interest is now who we are," Francine Grubbs said. "Our water could be sold off really easily to the out-of-state mega farms who are just wanting to grow commodity crops at any price."

The Butte Local Agency Formation Commission approved the Tuscan Water District unanimously last year and will sell the water to commercial farmers out of our area, leaving our county's wells to run dry.

"People make decisions without understanding what farming is all about, where the food comes from, and the concerns that I have are a water source," farm owner Jay Knight said.

"I want to see a future where we all work together, and everybody is heard, and we find a solution to this together that both preserve the groundwater and keeps it from being swindled out from us by some very thirsty interests that are not people, they're machines. Corporations drink in money and spit out PR," said the director of Groundwater of Butte, Jeffery Obser.

But support for the Tuscan Water District and local farmer here in Durham, Ed McLaughlin, says everything said at the podium needs to be clarified and misinformation.

"The reality is the county asked a group of farmers to form a district because they didn't have the resources to do it, so we've spent money and done it, and you know, working to form it and protect our groundwater, one condition we're going to have is
Learn more about your privacy options
DWR director to present at Urban Water Institute Conference

DWR Director Karla Nemeth will be among the presenters at this year’s Urban Water Institute Conference. She will be part of a panel discussing the water lessons that have been learned in California over the last 30 years, including the things that we can and cannot control. The Urban Water Institute provides non-partisan information to the water resource industry, with emphasis on elements that affect consumers and the general economy. The conference runs Aug. 23–25, in San Diego.

Wraps taken off of new DWR Land Use Gallery

DWR has unveiled a new Land Use Gallery. It is a collection of ArcGIS Web apps to provide information on land use survey inventories, land use data downloads in GIS format, and statewide crop mapping dashboards for certain water years. The gallery was developed by DWR’s Land and Water Use Program.

Workbook being offered for this month’s drought workshops

The California Water Commission has issued a workbook for use at three online workshops this month. The workshops will focus on preparing for a drought during non-
drought years. The workshops will be offered, in English and Spanish, on July 19, July 25, and July 27.

Call for public comment on draft seawater desalination report
As part of California’s all-of-the-above strategy to address an anticipated 10 percent reduction in its water supply by 2040, the State Water Resources Control Board, in coordination with multiple State agencies has released for public comment a draft report on expediting permitting for seawater desalination projects. The Water Board is hosting an informational webinar on the draft report on the draft report this Friday, July 21, from 11 a.m. to 12 p.m., and accepting public comments until 12 p.m. on Friday, July 28.

September dates chosen for FMA Annual Conference
This year’s Floodplain Management Association (FMA) Annual Conference will run Sept. 5–8, in Los Angeles. The conference provides panel discussions, workshops, and field trips that cover the latest strategies, tools, and technologies in floodplain and flood risk management. Discounted registration fees are available through Sunday, Aug. 6

Stanford to host this year's California Water Data Summit
Stanford University has been chosen as the site for this year's California Water Data Summit. The event will run Sept. 7 and 8. The agenda is still in development, and the event is designed to encourage collaboration and provide opportunities to engage with new ideas and approaches to water data.

The Internet of Water: Automating Land and Water Data Integration for Future Planning and Informed Decision-Making
The Internet of Water Coalition is hosting a webinar by the American Planning Association Water and Planning Network scheduled for July 21, at 1 p.m. Eastern Time. Click here to register.

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Group protests water district

BY MICHAEL WEBER
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DURHAM >> A proposed special district in Butte County that would carry out groundwater recharge projects, known as the Tuscan Water District, has met controversy in its formation process.

Political group Groundwater for Butte began a public campaign Tuesday in a ballot-ripping protest at Durham Community Park held in opposition to the district’s formation for many reasons, one being a lack of public information and input on the matter.

The district has gone through Butte County’s agency formation process, and it is said county supervisors are set to vote as soon as Tuesday on whether or not to place the district’s formation on an official election ballot.

According to its website, the formation of the Tuscan Water District attempts to fill a water-management void in the area of the Vina subbasin and a portion of the Butte subbasin. It would purvey land for use of groundwater recharge projects in the Vina subbasin and parts of the Butte subbasin. Groundwater sustainability plans for the two subbasins are currently under litigation.

Opponents against the district’s formation say education on the formation process has been little to none, and the election ballot process is unfair.

Opponents also took issue with the science of proposed recharge projects in the Vina groundwater sustainability plan that would intentionally drain the basin in order to make room for surface water recharge.

Jeffrey Obser, an organizer with Groundwater for Butte, said the group started in 2022 after an initial election to form the Tuscan Water District failed to be placed on an official voter ballot.

Obser said the election process was flawed; 540 landowners voted in favor of its formation yet more than 5,000 had no input, he reasoned.

In addition, the vote would have been weighted one vote per one acre of land which would, in turn, disproportionately give landowners with large parcels with a stronger vote.

Obser said the process would allow “mega farms” that own a lot of land to have more say than any resident.
Amlono farmer Jay Knight said he is against the district’s formation because of a failure to inform the public on the matter.

“I’m personally disgusted with the Board of Supervisors. They have failed to come to the public. There is a gaping hole in the information that’s available to the general public,” Knight said. They’re elected to represent us and explain the abrupt decision making process we are now facing.

Opponents of the district’s formation also questioned why Butte County hasn’t used its 27,500 acre-foot water allocation stored at Lake Oroville to recharge groundwater.

Knight said he believes landowners won’t have control because of the large farms who would have more say to push their interests.

“I ask the supervisors to vote no,” he said. “Remember this; whiskey’s for drinking and water’s for fighting.”

Another opponent, Susan Schrader, said she is worried her well will go dry because proposed recharged projects would operate below her well.

Schrader also said that intentional dropping of the water table could cause urban forests to die, and that surface water holders could possibly sell “surface water in storage” bypassing laws that prevent the selling of underground water.

Ed McLaughlin, a farmer and former Butte County supervisor attended as a proponent of the district formation. He said the county asked farmers to show leadership by forming a water district to pursue supply, recharge and conservation projects to help fix overdraft and prevent negative outcomes like subsidence and dry wells.”
Four initial steps for owners to take after a well runs dry
A new flyer from DWR provides the four initial steps for well owners to take if they think their well has gone dry. The first step provides website information for contacting a certified well professional. The flyer information is part of the Be Well Prepared program that provides information and resources to help deal with impacts of climate-driven weather extremes on groundwater supplies and drinking water wells. The flyer is available in Spanish and Hmong.

Central Valley GSAs receive almost $17 million in grants
Almost $17 million in State funding has been awarded to three Central Valley groundwater sustainability agencies (GSAs). The funding will help with the transition to sustainable groundwater use and to protect drinking water supplies for vulnerable communities. The grants are being awarded through the LandFlex Program.

Flood-MAR success story to be told at Lunch-MAR webinar
A flood-managed aquifer recharge (Flood-MAR) success story out of Madera County will be featured during the next Lunch-MAR webinar on Wednesday, Aug. 2. Following the
March 10 release of Governor Newsom’s executive order on groundwater recharge, Madera County was able to implement recharge projects almost immediately. During the webinar, Stephanie Anagnoston, the county’s director of water and natural resources, will cover some of the lessons learned during the experience.

Direct potable reuse regulations hearing set for Sept. 7
A public hearing on proposed direct potable reuse regulations will be hosted by the State Water Resources Control Board on Thursday, Sept. 7, in Sacramento. Direct potable reuse is the planned introduction of recycled water either directly into a public water system or into a raw water supply immediately upstream of a water treatment plant. Public comments on the proposed regulations must be submitted by noon on Friday, Sept. 8.

Report offers strategies to improve water security
A new report from the Engineering Research Visioning Alliance outlines the ways engineering research can help address the issue of water security. The report discusses tools, technologies, and management approaches that can bring change to the way water resource sustainability challenges are being met. A webinar on the findings of the report will be held Tuesday, Aug. 15.

Estuarine monitoring workshop to be held in Tiburon
A one-day workshop on estuarine monitoring will be held Tuesday, Aug. 29, in Tiburon. The workshop is part of an effort to create improved long-term coastal wetland monitoring statewide. The registration deadline is Tuesday, Aug. 8. The event is being organized by UC Davis and the Southern California Coastal Water Research Project.

Registration opens for October’s California Economic Summit
Registration is open for the annual California Economic Summit. This year it will be Oct. 11–13, in Indian Wells. The summit will include tours, presentations, and sessions covering elements of the economic agenda known as the Roadmap to Shared Prosperity. Discount registration rates are available through Thursday, Aug. 10.

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Measuring and Monitoring Are Essential to Groundwater Sustainability

By Kelly Petersen, Butte County Water Resources Scientist

Each spring groundwater levels are measured throughout the Sacramento Valley, including here in Butte County. As Watching Groundwater Level Recover in the Sacramento Valley noted earlier this year, water resources managers, Groundwater Sustainability Agencies (GSAs) and landowners throughout the Sacramento Valley are watching groundwater levels and quality to see how the aquifer systems will recover on the heels of some very dry years where there has been little surface water in certain parts of the Valley. We are seeing some encouraging trends on aquifer recovery in Butte County with the
wet year and we will continue to monitor and collect important information to ensure the sustainable management of our groundwater resources.

In Butte County, groundwater levels have been measured by either Department of Water Resources (DWR) or County staff during the spring, summer and fall seasons since the mid-1990s, providing Butte County one of the most extensive data sets and groundwater models in California.

Each monitoring well tells its own story since wells vary in depth, well type and use (irrigation, domestic, dedicated monitoring wells and municipal and industrial), location and surrounding conditions. However, spring levels overall, give a big picture view of basin conditions and how they change throughout the County over time.

Monitoring approximately 140 wells throughout the County provides trends in water levels and provides a better understanding of not only how water levels change within a year, but also many years within a specific well. This also allows us to determine the rate of change for each well and understand how many feet per year (on average) water levels are rising or falling over a set amount of time. This can give us insights as to areas that may need to be evaluated further and monitored more closely, and/or areas that could be good candidates for targeted projects and management actions that improve groundwater levels and storage.
This work, and the resulting data, helps track how groundwater levels fluctuate at each of the wells in response to weather conditions and water use.

We spend significant time working to understanding the data—but the big question is, “how have groundwater levels responded after the wet spring of 2023 in comparison to the dry spring of 2022,” which was the third year of a three-year drought. Across the board, all the wells in the groundwater subbasins that the County monitors (Vina, Butte, and Wyandotte Creek) have shown increased groundwater levels when compared to spring 2022 numbers. This was expected, especially given the dry conditions in 2022 and the wet conditions of 2023.

The map below shows the wells that are monitored as part of Sustainable Groundwater Management Act (SGMA) compliance in the three subbasins. Each circle’s color indicates the degree of Groundwater Elevation (GWE) change from spring of 2022 to 2023 for that well, based on the information in the legend. In the Vina and Wyandotte Creek Subbasins, groundwater levels rose on average about three feet between the 2022 and 2023 spring seasons. In the Butte Subbasin groundwater levels rose on average about four and one-half feet between those two seasons.
This rise in groundwater levels from 2022 to 2023 is primarily due to the influx of precipitation we have had since mid-November 2022; not just here on the valley floor, but also in the high-elevation mountains that feed the rivers, creeks, and streams in our watersheds. These surface waters have had above average flows contributing to a full Lake Oroville and more ‘hang time’ in our area as the snow continues to melt, keeping these waterways fuller for a longer
duration. Surface waters have continued to add volume into our aquifers, raising groundwater levels. These excellent 2023 surface water conditions have also resulted in full allocations for those who have water rights to divert and use water from the rivers, creeks and streams, which in turn reduces the need to use groundwater to meet the existing water demands.

Changes in precipitation from year to year confirm that we continue to experience great extremes in California hydrology from historically dry to historically wet conditions within just a few years. These big swings in the surface water system lead to moderate annual changes in the groundwater system in Butte County. Managing both surface and groundwater resources with the reality of these extremes will continue to be our challenge and opportunity.

Our subbasins, particularly the Vina Subbasin, would need at least a few prime hydrological condition years to fully bounce back to the point where inputs into the aquifer balance the extractions we have observed over the last 20 years. The good news is that with the groundwater sustainability plans we know the scale of the work that needs to be done. The GSAs are annually tracking these conditions on a much finer scale to determine how well they are doing at managing groundwater sustainably. The GSAs also summarize the monitoring results in an easy-to-read-and-digestible Annual Report that shows water level comparisons from year to year. Groundwater extraction and storage volumes are shown graphically, in an attempt to make the complex datasets easier to visualize. The Annual Reports are valuable to the GSAs and the County for planning and project development purposes. Using the information reported in each subbasin, the Butte County Department of Water & Resource Conservation then synthesizes the information and provides a county-wide groundwater status report to the Board of Supervisors. This County report continues to provide decision-makers and stakeholders with a broader perspective on the status of this shared resource. It is designed to be a quick read of the highlights from all three groundwater subbasins, trends over time, things to track over the next year, and a description of current efforts underway.
to continue to improve the County’s groundwater resilience.

We encourage you to look at this information on groundwater levels and hydrological conditions on our website at: [Groundwater Levels | Butte County, CA](www.buttecounty.net/1189/Groundwater-Leve...)

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Residents all the chambers for the Board of Supervisors meeting Tuesday in Chico.

Board calls Tuscar Water District election

Butte County
BY EVAN TUCHINSKY
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OROVILLE >> The Butte County Board of Supervisors set a Dec. 5 election for forming the Tuscan Water District and supported public use of veterans halls Tuesday before a chambers full of concerned citizens.

The capacity crowd grew to standing-room-only in the first hour of the 9 a.m. meeting, most in anticipation of the hall discussion. A dozen veterans came in uniform or wearing regalia. Two-thirds of the audience exited after the item wrapped at 12:30 p.m.

The agenda also included an appeal of the Planning Commission’s denial of 22-acre, 108-lot subdivision by Oroville Airport; the board moved the project forward after a lengthy hearing. The 4-1 vote had Doug Teeter, who represents the Paradise ridge area, in dissent.

Supervisors also reappointed former Chico Mayor Randall Stone to the Assessment Appeals Board, though on a split vote; Peter Durfee, whose district covers part of Chico, and Teeter dissented. Dave Johnson was reappointed unanimously. They also unanimously endorsed the three-year plan for the Mental Health Services Act funding.

Among items on the consent agenda, supervisors gave final approval to the Butte County Sheriff’s Office’s military-equipment use policy and presented a resolution recognizing the community service of Ger Vang, who worked as a coordinator for the Community Action Agency.

**Veterans halls**

The board took input on operations of the four veterans memorial halls in the county: Chico, Durham, Gridley and Paradise. General Services Director Michael Hodson explained how a policy adopted in 2020, which would have “ceased use by the general public and the county with the exception of holding elections,” has been implemented differently at different facilities — some allowing for-profit, nonprofit and private groups to utilize the spaces, with varying fee schedules.

Hodson cast the decision facing the board as “binary”: Limit the use to veterans and their groups or open the halls to general use “in a way that’s consistent and fair.”
Teeter and Bill Connelly, representing the Oroville area, broached liability issues. Hodson said the bigger issue for the county is wear and tear and associated maintenance expense.

Fifteen attendees, plus three who emailed comments, spoke to the issue. Service organizations urged continued access to the community — a position also supported by veterans, including Ron Lassonde and Lawrence St. Germain from Paradise, Brianna Farrara of Chico and Gridley Mayor Mike Farr.

Chico veteran Bob Mulholland cautioned about opening the halls so wide as to allow white supremacists and provocateurs. Former supervisor Ed McLaughlin said, “I’m a firm believer in local control” and a panel from each hall could come up with the best plan for each community.

Hodson noted the county could set a broad policy and let each hall refine it for its use. Teeter supported veterans committees supervising each hall as “masters of their own destiny”; Durfee said, “I don’t want government involved in the hall rental business” — and Connelly said, “Veterans are adults; let them work it out.” Tami Ritter, who represents Chico, recommended rental fees factoring maintenance needs and requiring insurance coverage.

Referencing a “hierarchy” of uses, Hodson took supervisors’ direction and will return with a policy manual, which Teeter and Connelly will help develop.

**Tuscan Water District**

Scheduling the Tuscan Water District election was a formality. Chair Tod Kimmelshue noted that the Butte Local Agency Formation Commission called for the election; as confirmed by County Counsel Brad Stephens, the county’s role at this juncture was setting the date.

Nonetheless, 10 speakers (along with six submitted comments) addressed the issue — including specifics of the water district proposal. Emily Alma of Chico articulated a list of concerns with what she called “a very dangerous project,” ranging from hydrology to legal implications. Loree Monroe expressed concern about voting by acre; Julian Zener spoke to the role the agency would play in groundwater management.

District proponent Rich McGowan referred citizens to the 100-page application — in particular, 18 conditions Butte LAFCo set for approval. Tovey Giezentanner, a proponent who serves on the county water commission, honed in on restrictions from exporting groundwater out of the county.

Ritter, acknowledging the limited scope of the item, said the motion sends something to the county elections office “with more questions than answers” and voted against the action. It passed over her objection, 4-1.