Executive Summary

ES-1: INTRODUCTION (CHAPTER 1)

Background (Section 1.1)

Section 1 describes the 2014 Sustainable Groundwater Management Act (SGMA) and the purpose of the Groundwater Sustainability Plan (GSP). Section 1 also introduces the management structure of the agencies developing and implementing the GSP.

SGMA was established to provide local and regional agencies the authority to sustainably manage groundwater resources through the development and implementation of GSPs for high and medium priority subbasins (e.g., Butte Valley). In accordance with SGMA, this GSP was developed and will be implemented by the groundwater sustainability agency (GSA) representing the Butte Valley groundwater basin (Basin): the Siskiyou County Flood Control and Water Conservation District.

The California Department of Water Resources (DWR) and the State Water Resources Control Board (SWRCB) provide primary oversight for implementation of SGMA. DWR adopted regulations that specify the components and evaluation criteria for groundwater sustainability plans, alternatives to GSPs, and coordination agreements to implement such plans. To satisfy the requirements of SGMA, local agencies must do the following:

Locally controlled and governed GSAs must be formed for all high- and medium-priority groundwater basins in California.

- GSAs must develop and implement GSPs or Alternatives to GSPs that define a roadmap for how groundwater basins will reach long-term sustainability.
- The GSPs must consider six sustainability indicators defined as: groundwater level decline, groundwater storage reduction, seawater intrusion, water quality degradation, land subsidence, and surface-water depletion.
- GSAs must submit annual reports to DWR each April 1 following adoption of a GSP.
- Groundwater basins should reach sustainability within 20 years of implementing their GSPs.

This GSP was prepared to meet the regulatory requirements established by DWR. The completed GSP Elements Guide is organized according to the GSP Emergency Regulations sections of the California Code of Regulations and is provided in Appendix 1-D.

On January 18, 2024, the GSA received a letter from DWR with the determination that the Butte Valley GSP was determined to be incomplete. The letter documents DWR's review of the GSP, including outlining deficiencies and corrective actions. The GSA has~~s~~ the opportunity to implement these corrective actions in a 180-day period, ending on July 16, 2024. The~~is~~ determination letter from DWR is included as Appendix 3-D.

The two deficiencies were identified as:

Deficiency 1: The GSP does not include a reasonable assessment of overdraft conditions and reasonable means to mitigate overdraft.

Deficiency 2: The GSP does not establish sustainable management criteria for chronic lowering of groundwater levels in a manner substantially compliant with the GSP regulations.

To address deficiency 1 the Hydrologic Conceptual Model was expanded to better and more explicitly describe current hydrogeologic understanding of groundwater in the Basin and its relationship to the larger groundwater system of the Upper Klamath Basin that it is part of. This provides the context for understanding the key components of the water budget of the Basin and their drivers: groundwater inflow, recharge and pumping within the Basin, and groundwater outflow.

The GSP was revised to include details of ~~the~~ long-term water level dynamics across the Basin, which had been increasing or were stable prior to 1980 and have been in chronic decline over much of the period since 2000. An extensive analysis of groundwater storage changes since 1990 and the chronic lowering of groundwater storage since 2000 have been added to the GSP to quantify, based on water level measurements and estimates of specific yield, average annual groundwater storage declines for various periods and to compare them to estimated groundwater extraction in the Basin. Additional hydrologic information was provided corroborating numerical model estimates of potential recharge in the uplands that feed groundwater inflow to the Basin.

Clarification has been added to identify four creeks, Meiss Lake, and Butte Creek as interconnected surface waters that potentially recharge groundwater when and where flowing.

Additional– analysis also provides an improved explanation of groundwater outflows and their relationship to Basin water levels. Two analytical and a revised modeling analysis were employed in the revised GSP to derive and justify a sustainable yield of the Basin. The sustainable yield is estimated to be 65,000 acre-feet per year. The sustainable yield is 10% to 15% lower than groundwater extraction in the Basin over the most recent periods and is expected to stabilize water levels in the basin. The revised sustainable yield is a best available estimate of groundwater extraction that balances subsurface inflows and Basin recharge with Basin groundwater extraction and the minimum Basin subsurface outflows necessary to maintain groundwater levels in the Basin at a long-term dynamic steady-state such that water levels in the Basin meet the MO and do not violate the MT.

To address the mitigation portion of this deficiency, the GSA added four projects and management actions to Chapter 4 thate mitigate the effects of declining groundwater levels in the Basin and stop chronic lowering of water levels: a) City of Dorris Well Deepening and Pipeline Replacement Project (already in progress), b) Well Inventory and Well Mitigation Program, c) Preliminary Groundwater Allocation Program and, d) Groundwater Demand Management. The projects are scheduled for implementation within the current five-year period. These PMAs are added to avoid further groundwater level declines beginning in 2025 and ensure the Basin fully operates within its sustainable yield by the beginning of the 2027-2032 implementation period. (Groundwater Demand Managment Program and Groundwater Allocation Program) and simultaneously address negative impacts to beneficial uses and users due to groundwater level declines (City of Dorris project, Well Mitigation Program).

To address the second deficiency, an updated Well Failure Analysis (Appendix 3-C), was created and used to evaluate wells that may be dewatered under undesirable results. , Tthe sustainable management criteria for the chronic lowering of groundwater levelss sustainability indicator were revised. The quantitative undesirable result definition was modified to consider this updated Well Failure analysis and the impact to domestic, municipal, and agricultural well users under undesirable result conditions. Minimum thresholds were raised by 15 ft, and the updated Well Failure Analysis was used to evaluate depletion of supply, and dewatering of wells at these levels. Discussion of these thresholds, and consideration for beneficial uses and users, is included in the revised discussion of the chronic lowering of the water level sustainability indicator in Chapter 3.

A sustainable management criterion for interconnected surface water (ISW) and groundwater-dependent ecosystems (GDEs) was added to the plan. The GDE impact discussion was updated with the monitoring of GDEs and ISWs added since GSP submittal, and the planned work and timelines to further understand and evaluate ISWs and GDEs in the Basin. Minimum thresholds were raised, and the updated Well Failure Analysis was used to evaluate depletion of supply, and dewatering of wells at these levels. Discussion of these thresholds, and consideration for beneficial uses and users, is included in the revised discussion of the chronic lowering of groundwater levels sustainability indicator in Chapter 3, and the updated

A completely updated Well Failure Analysis (Appendix 3-C) was performed and used to evaluate wells that may be dewatered under undesirable results. The Well Failure Analysis in Appendix 3-C was updated to reflect the correct number of known wells in the Basin and additional methods were employed to corroborate the estimates of wells at risk for well failure. The updated well infrastructure discussion, maps of wells, methods description, and number and location of wells that may be negatively affected when minimum thresholds are reached can be found in Appendix 3-C. A well mitigation program is detailed as part of the "Well Inventory and Well Mitigation Program" PMA, included in Chapter 4.

Specific updates to chapters are discussed in the corresponding sections below.

Purpose of the Groundwater Sustainability Plan

The Butte Valley GSP outlines a 20-year plan to direct sustainable groundwater management activities that considers the needs of all users in the Basin and ensures a viable groundwater resource for beneficial use by agricultural, residential, industrial, municipal and ecological users. The initial GSP is a starting point towards achievement of the sustainability goal for the Basin. Although available information and monitoring data have been evaluated throughout the GSP to set sustainable management criteria and define projects and management actions, there are gaps in knowledge and additional monitoring requirements. Information gained in the first five years of plan implementation, and through the planned monitoring network expansions, will be used to further refine the strategy outlined in this draft of the GSP. The GSA will work towards implementation of the GSP to meet all provisions of the SGMA using available local, state, and federal resources. It is anticipated that coordination with other agencies that conduct monitoring and/or management activities will occur throughout GSP implementation to fund and conduct this important work. Fees or other means may be required to support progress towards compliance with SGMA.

ES-2: PLAN AREA AND BASIN SETTING (CHAPTER 2)

Chapter 2 provides an overview of the Basin area. This includes descriptions of plan area, relevant agencies and programs, groundwater conditions, water quality, interconnected surface waters (ISWs), and groundwater dependent ecosystems (GDEs). These details inform the hydrogeologic conceptual model and water budget developed for the Basin which will be used to frame the discussion for sustainable management criteria (SMCs; Chapter 3) and projects and management actions (PMAs; Chapter 4).

Description of Plan Area (Section 2.1)

Summary of Jurisdictional Areas and Other Features (Section 2.1.1)

The Basin is a medium priority basin located in Northern California. The Basin is surrounded by several mountain ranges: the Cascade Mountains in the north, south and west, the Mahogany Mountain ridge in the east and Sheep Mountain and Red Rock Valley in the southeast. The major water features in the basin are Meiss Lake and several streams including Butte Creek. The primary communities in Butte Valley are the City of Dorris (population 962) and the smaller communities of Macdoel (population 155) and Mount Hebron (population 81) (DWR 2016b). All three of these populations are classified as severely disadvantaged communities (SDACs), based on annual median household income. The most significant land use in the Basin is for agriculture, accounting for ~~38.7~~35% of the land in the Basin according to the 2010 County land use survey (DWR 2010) with primary crops of alfalfa, grain and hay, pasture, and strawberry.

Water Resources Monitoring and Management Programs (Section 2.1.2)

Section 2.1.2 documents monitoring and management of surface water and groundwater resources in the Basin and their relation to GSP implementation. These include federal, state, and local agencies and their associated activities in Butte Valley.

Land Use Elements or Topic Categories of Applicable General Plans (Section 2.1.3)

Applicable land use and community plans in the Basin are outlined in Section 2.1.3, including the County of Siskiyou General Plan and City of Dorris General Plan.

Additional GSP Elements (Section 2.1.4)

Well policies, groundwater use regulations and the role of land use planning agencies and federal regulatory agencies in GSP implementation are outlined in Section 2.1.4.

Basin Setting (Section 2.2)

Section 2.2 includes descriptions of geologic formations and structures, aquifers, and properties of geology related to groundwater, among other related characteristics of the Basin.

Hydrogeologic Conceptual Model (Section 2.2.1)

The hydrogeologic conceptual model encompasses the Basin setting including its geographical location, climate, geology, soils, land use and water management history, and hydrology (Sections 2.2.1.1 through 2.2.1.9).

Current and Historical Groundwater Conditions (Section 2.2.2)

General Groundwater Flow Conditions of Butte Valley- Overview (Section 2.2.2.1)

This section was added as part of the July 2024 revision to address the deficiencies and corrective actions identified by DWR. Discussion in this section includes the Butte Valley groundwater Basin's position and interactions in the larger groundwater flow system and interactions with neighboring subbasins within this groundwater flow system. Additions were made to provide additional context on the Basin's hydrogeological setting within the broader Upper Klamath Basin and to provide greater detail on groundwater recharge and discharge dynamics within the Basin.

Development of Groundwater Resources (2.2.2.2)

Groundwater as a source of irrigation was vital for the Basin's settlement and development. Lack of major surface water was a major impediment to agricultural development until the first irrigation well was drilled by BVID, in 1929. Major expansion of irrigated agriculture and groundwater development occurred mostly during the 1950s to 1970s.

Groundwater Elevation (2.2.2.3~~1~~)

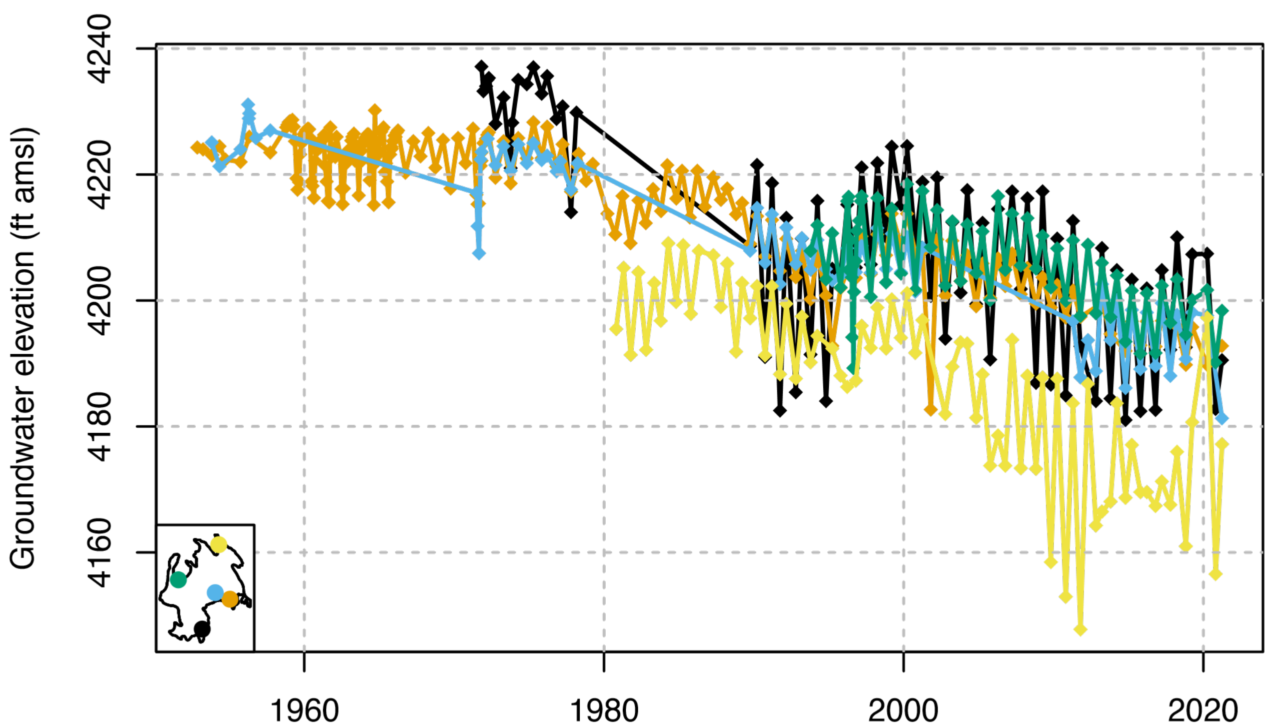
Groundwater levels in the Basin fluctuate on a short-term scale with a seasonal high in the spring and seasonal low in the fall, and over the long term based on precipitation levels and changes in the amount of total groundwater extraction. Groundwater recharge in the Basin depends on precipitation, which has been in decline since the 1980s. Groundwater levels have decreased around 30 feet from the spring of 1979 to the spring of 2015; the decline in groundwater levels in five wells is shown in Figure 1. This section was updated in July 2024 to include discussion of groundwater levels where long-term (about 70-year) records are available, through early 2024. Specific wells are used to illustrate groundwater level trends observed in wells in different areas of the Basin. Water levels were stable or increased in the 1950s – 1970s following drought conditions- in the late 1940s. Chronic lowering of water levels is observed across the basin since 2000 and, in some wells, since 1980.

Estimate of Groundwater Storage and Groundwater Storage Changes (2.2.2.42)

Groundwater storage and specific yield are difficult to estimate due to the interconnectivity of all confined and unconfined units, and critical data gaps in the main water bearing and recharge unit, the High Cascade Volcanics. For the unconfined units, Lake Deposits, pyroclastic rocks, and Butte Valley Basalt, the weighted average specific yield is calculated to be 9.5% and total groundwater storage capacity is 2,560,000 acre-feet. . The High Cascade Volcanics has unknown depth and extent, and a total estimate of storage is based on the Butte Valley Integrated Hydrologic Model (BVIHM; see Section 2.2.3). This section was updated in July 2024 to include a description of the revised method to calculate groundwater storage changes, which uses groundwater elevation change at each well appliedand extrapolated to a Thiessen polygon (Voronoi polygon). This is a change from the method used in previous annual reports (WY2021 and 2022), which used Thin Plate Spline interpolation and looked at year-over-year fall water level changes to evaluate annual change in storage. Comparison of the results of both methods are provided. The estimated average decline in groundwater storage in the 80,000 acre Basin, between spring 2000 and spring 2024, was 6,300 acre-feet per year.

Groundwater Quality (Section 2.2.2.43)

Based on an evaluation of Basin groundwater quality using available monitoring data (see Appendix 2-B), a list of constituents of interest was generated for the Basin. This list includes



Measurement date

Figure 1: Groundwater elevation measurements over time in five wells, one located in each hydrogeologic zone.

1,2 Dibromoethane, arsenic, benzene, boron, nitrate, and specific conductivity. The known contaminated sites in the Basin include a PCE plume near Dorris, Calzona Tankways, and a former petroleum fueling facility.

Seawater Intrusion (Section 2.2.2.5~~4)~~)

The Basin is located well over 100 miles east of the Pacific Ocean with lowest observed water levels thousands of feet above mean sea level. Seawater intrusion is therefore not an issue of concern.

Land Subsidence Conditions (Section 2.2.2.6~~5~~)

Land subsidence is lowering of the ground surface elevation and is not known to be currently or historically significant in the Basin. The maximum observed subsidence is approximately 0.15 ft (46 millimeters [mm]) between June 2015 to September 2019 in an area west of the City of Dorris. The change in land elevation was likely the result of localized land leveling. Land subsidence will continue to be periodically re-evaluated.

Identification of Interconnected Surface Water Systems (Section 2.2.2.7~~6~~)

ISWs are defined as surface water which is connected to groundwater through a continuous saturated zone. SGMA mandates an assessment of the location, timing, and magnitude of ISW depletions, and to demonstrate that projected ISW depletions will not lead to significant and undesirable results for beneficial uses and users of groundwater.

The Basin is a hydrologically closed basin. No surface water leaves the Basin and the Basin has no major drainage. Surface waters in Butte Valley are limited to Meiss Lake (hydrologically a terminal lake) and five creeks: Butte, Prather, Ikes, Harris, and Musgrave. Many of these waterbodies go dry in the summer and fall. Groundwater elevations near the creeks have been identified as data gaps. Interpolated (i.e., estimated) groundwater levels near the creeks are generally more than 30 feet below these creeks, suggesting losing stream conditions. Lack of streamflow data are also known data gaps. Additional information is required to determine in more detail the interconnections between the surface water bodies in Butte Valley with groundwater and the magnitude and direction of flow exchange. For the purposes of this plan, these surface waters are considered interconnected to groundwater.

Identification of Groundwater Dependent Ecosystems (Section 2.2.2.8~~7~~)

SGMA refers to GDEs as “ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface.”

The habitat ranges of freshwater species in the Basin with special designations (i.e., endangered, threatened, species of special concern, or on a watch list) were mapped. Riparian vegetation is prioritized for management in the Basin: managing for riparian vegetation addresses the needs of other special-status species in the Basin. These prioritized species are considered throughout the GSP, particularly in setting the sustainability indicators defined in Chapter 3 and identifying projects and management actions identified in Chapter 4. Vegetative GDE identification and classification was conducted through:

- The mapping of potential GDEs.
- Assigning rooting depths based on predominant assumed vegetation type.
- ESstablishing representations of depth to groundwater.
- Identifying potential areas where depth to groundwater, rooting depth, and presence of potential GDES confirm likely groundwater-dependence.

Potential mapped GDEs were grouped into two categories: potential GDE (where the grid-based analysis showed that the area is likely to be connected to groundwater) or potentially not a GDE (where the grid-based analysis showed that the area is disconnected from groundwater). Based on this analysis, around 10% of the mapped potential GDE area is likely connected to groundwater and assumed to be a GDE (shown in Figure 2, below). The current list of potential GDEs is considered tentative, a data gap, and dependent on collection of additional groundwater level data. An update was made to this section in July 2024, the addition of Figure 2.32, which shows rain, stream gage, and groundwater level monitoring added to fill data gaps in areas near potential GDEs and ISWs.

Water Budget (Section 2.2.3)

This section was updated in July 2024 to present the model BVIHM area and the Basin area to clarify and replace erroneous data in the original GSP. The model is currently under further refinement and calibration and will continue to be updated throughout GSP implementation. The historical water budget for the Basin was estimated for the period October 1989 through September 2018, using the Butte Valley Integrated Hydrologic Model (BVIHM). This 29-year model period includes water years ranging from very dry (e.g., 2014) to very wet (e.g., 1999). On an interannual scale, it includes a multi-year wet period in the late 1990s and a multi-year dry period in the late 2000s and mid-2010s.

The water budget is presented as flows into and out of two subsystems of the integrated watershed: the soil zone (land/soil model subsystem) and the groundwater subsystem. The water budget for the entire watershed is also included in this section.

In the historical water budget, Basin inflows include precipitation on the valley floor (to land) and subsurface inflow or mountain front recharge from the surrounding quaternary volcanics underlying the upper watershed (to groundwater). Precipitation input is variable with a median of 86 39 thousand acre-feet (TAF) per year. With a median ofAt 15785 TAF per year, median subsurface inflows to the Basin are estimated be four times more than twice as larger than Basin as precipitation. Basin outflows consist of evapotranspiration (from land) and subsurface outflow (from groundwater) with median values of 6610871 TAF and 16920 TAF per year, respectively. Fluxes between the two subsystems include recharge (from land to groundwater) and groundwater pumping for applied water (from groundwater to land). Median recharge to groundwater is ~~54 35~~26 TAF per year, ~~2231~~40 TAF lower than the median groundwater pumping value. This difference between pumping and recharge is made up for though lateral inflows into the Basin.

While soil zone storage shows minimal interannual change, aquifer storage varies, with a long-term trend indicating 5.2 TAF per year simulated ~~some g~~groundwater depletion, on average, between 1990 and 2018.~~.~~

Fifty-year future projected water budgets were developed using historical hydroclimate data (for water years 1991 to 2011) and four climate change scenarios were applied to explore potential effects of global warming on the Butte Valley watershed.

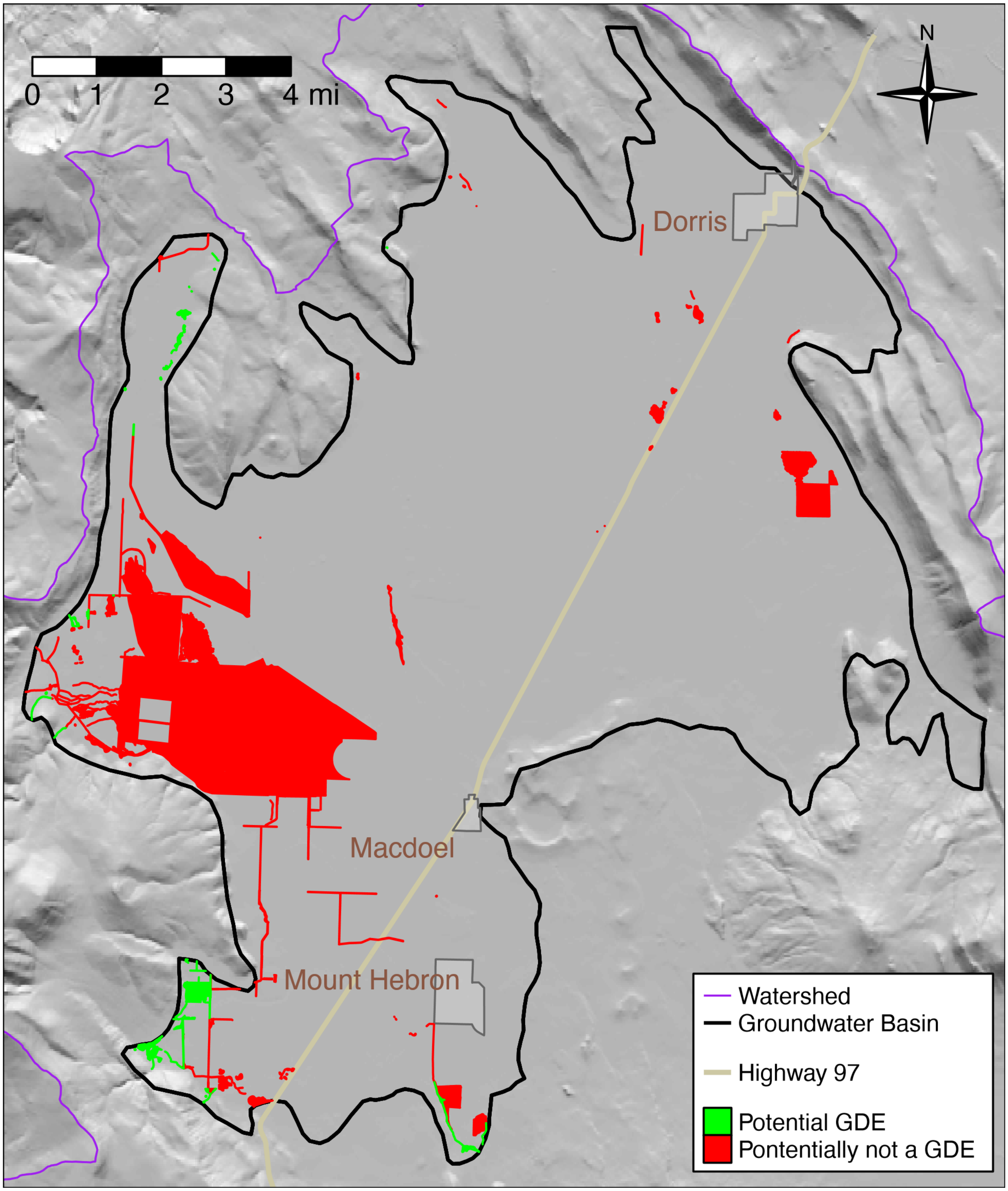


Figure 2: Categorized GDEs (including ISWs) for the Basin.

Future Water Budget (Section 2.2.4)

The future projected water budget uses the observed weather parameters from water years 1991 to 2011 to create a hypothetical future period in which climate conditions are the same as this "base case" period from 1991 to 2011. Climate-influenced variables are modified to create four climate change scenarios: a near-future, far-future, far-future with Wet with Moderate Warming, far-future with Dry with Extreme monitoring climates. BVIHM was run for the base case and all four of the climate change projected scenarios are run for 2022 to 2071. (These estimates have not been updated in the July 2024 revision).

Sustainable Yield (Section 2.2.5)

This section was revised in July 2024 to add relevant information on the conceptual basis for estimating sustainable yield and improve understanding of how subsurface outflow from the basin is a critical factor in average groundwater levels within the Basin. The sustainable yield was estimated to be 65 TAF/ yr using a combination of basic analytical models and modeling analyses. The sustainable yield is 10% - 15% below recent groundwater pumping requiring implementation of PMAs that reduce future groundwater pumping to the sustainable yield. Efforts to achieve sustainable yield in the Basin will begin immediately to ensure that the Basin is fully operating under its sustainable yield by 2027.

ES-3: SUSTAINABLE MANAGEMENT CRITERIA (CHAPTER 3)

Chapter 3 builds on the information presented in the previous chapters and details the key sustainability criteria developed for the GSP and associated monitoring networks.

Chapter 3 was revised in July 2024 to address the deficiencies and corrective actions identified by DWR. The primary changes include:

i. Both text and maps in Section 3.3 were updated in July 2024 to show the current monitoring network and record the progress in the work to fill data gaps since GSP submittal.
ii. Section 3.3.2 was amended to include a summary of the updated method to calculate groundwater storage change.
iii. The groundwater level sustainable management criteria were revised. ~~ed, s~~Specifically, a quantitative definition of the ~~the~~ undesirable result was added (Section 3.4.1.1) and the ~~definition of~~ minimum thresholds were revised to demonstrably avoid undesirable results (Section 3.4.1.2). The GSA has committed to mitigating up to 20% of domestic wells. The revised Minimum Threshold ensures that the likely number of wells at risk of falling dry, if water levels across the Basin were at the minimum threshold, about 12% of domestic wells (28 wells) can be mitigated by the GSA. Minimum thresholds for groundwater levels were raised by at least 15 feet to what was ~~originally~~the original GSP called the "soft-landing trigger". In wells shallower than the original "soft-landing trigger,

, with wellsthe minimum threshold for which the minimum threshold (MT), the MT is set at least 5 ft above the total well depth.

iv. A sustainability management criterion for interconnected surface water and groundwater dependent ecosystem was added to chapter 3 to more clearly define the GSA's efforts to protect environmental uses and users of groundwater and interconnected surface water. Significant monitoring and assessment of GDEs is ongoing to further evaluate potential undesirable results at the minimum threshold.

v. A revised well failure analysis was performed (Appendix 3C), ensuring consistent use of DWR OSWCR well log data, adding additional methodology to reduce estimation uncertainty, and clarifying the presentation of results. Maps are included, showing the number of expected well outages between 2015 and 2023, by section, based on the presented methodology (up to 6% of domestic wells, i.e., up to 14 domestic wells), and showing the expected number of well outages, by section, if water levels decline further to the minimum threshold (an additional 6% or 14 domestic wells). In total, a decline of water levels from 2015 to the minimum thresholds is estimated to put 28 domestic wells, 10 agricultural wells, and no public supply wells at risk of falling dry.

Sustainability Goal and Sustainability Indicators (Section 3.1)

The Sustainability Goal of the Basin is to maintain groundwater resources in ways that best support the continued and long-term health of the people, the environment, and the economy in Shasta Butte Valley for generations to come.

The GSP details six sustainability indicators with a goal of preventing undesirable results to any one of the following sustainability indicators:

1. Chronic Lowering of Groundwater Levels
2. Reduction of Groundwater Storage
3. Degraded Water Quality
4. Depletions of Interconnected Surface Water
5. Seawater Intrusion
6. Land Subsidence

Table 3 defines undesirable results for each sustainability indicator. Quantifiable minimum thresholds (MT), measurable objectives (MO), and interim milestones were also developed as checkpoints that evaluate success in maintaining the sustainability goal and are quantified in Chapter 3 of the GSP. Monitoring wells throughout the basin will be used to assess conditions relevant to each sustainability indicator. Monitoring wells were selected based on well location, monitoring history, well information, and well access.

Table 3: Shasta Butte Valley GSP Sustainability Indicator undesirable results defined

Sustainability Indicator	Undesirable Result Defined

Chronic Lowering of Groundwater Levels	The fall low water level observation ~~in any of the~~in 25% (4/13 wells) representative monitoring sites in the Basin fall~~s~~ below the respective minimum threshold for 2 consecutive years.
Reduction of Groundwater Storage	Same as "Chronic Lowering of Groundwater Levels."
Degraded Water Quality	More than 25% of groundwater quality wells exceed the respective maximum threshold for concentration and/or concentrations in over 25% of groundwater quality wells increase by more than 15% per year, on average over ten years.
Depletions of Interconnected Surface Water	SMCs not developed for this sustainability indicator due to lack of information on interconnectedness of surface water and groundwater in the Basin. Depending on funding and the filling of data gaps, SMCs may be set in a future GSP update.

Table 3: ~~Shasta~~ Butte Valley GSP Sustainability Indicator undesirable results defined *(continued)*

Sustainability Indicator	**Undesirable Result Defined**
Seawater Intrusion	Not applicable for the Basin.
Land Subsidence	Groundwater pumping induced subsidence is greater than the minimum threshold of 0.1 ft (0.03 m) in any single year.

Appendix 3-C was revised in July 2024 to address the deficiencies and corrective actions identified by DWR. Changes have been made to both the hydrographs and the well failure analysis sections. The primary change to hydrographs is the update on the SMCs for each RMP. The well failure analysis has been updated and reorganized with primary changes as below:

- Audited well records in OSWCR regarding the best information available for well locations, well construction information, and planned use.
- Replaced the result of fall 2017 in the original well failure analysis with the analysis of fall 2023 to reflect the most recent fall conditions. And added the analysis of well outages risk at minimum threshold across the basin to validate the feasibility of well mitigation at MT
- Clarified and expanded the approaches for well outage risk analysis (direct comparison and wet depth trend analysis) with more in-depth discussion and details.

ES-4: PROJECTS AND MANAGEMENT ACTIONS TO ACHIEVE SUSTAINABILITY (CHAPTER 4)

Chapter 4 describes past, current, and future projects management actions (PMAs) used to achieve the Butte Valley sustainability goal.

Chapter 4 was revised in July 2024 to address the deficiencies and corrective actions identified by DWR. The primary changes include addition of three PMAs: a well inventory and mitigation program, a preliminary groundwater allocation program, and a groundwater demand management PMA. Additionally, updates were made to include current work with the addition of the City of Dorris Well Deepening and Pipeline Replacement PMA.

To achieve the sustainability goals for Butte Valley by 2042, and to avoid undesirable results over the remainder of a 50-year planning horizon, as required by SGMA regulations, multiple PMAs have been identified and considered in this GSP.

PMAs are categorized into three different tiers, as follows:

Tier I: Existing PMAs that are currently being implemented and are anticipated to continue to be implemented.

Projects or management actions in the Tier I category include:

- Abandonment of Sam's Neck Flood Control Facility
- City of Dorris Water Conservation
- Well Drilling Permits and County of Siskiyou Groundwater Use Restrictions
- Kegg Meadow Enhancement and Butte Creek Channel Restoration
- Permit required for groundwater extraction for use outside the basin from which it was extracted (Siskiyou County Code of Ordinances)
- Upland Management
- Watermaster Butte Creek Flow Management

Tier II: PMAs ~~planned for near-term initiation~~with initiation and implementation from ~~(~~2022 ~~to~~ through 2027~~)~~ by individual member agencies.

Tier II PMAs include:

- Well Inventory and Mitigation Program
- Preliminary Groundwater Allocation Program
- Groundwater Demand Management
- City of Dorris Well Deepening and Pipeline Replacement
- High Priority PMAs - Data Gaps and Data Collection
  - Butte Valley Integrated Hydrologic Model (BVIHM) Update (High Priority)
  - Drought Year Analysis (High Priority)
  - Expand Monitoring Networks (High Priority)
  - General Data Gaps (High Priority)
  - Groundwater Dependent Ecosystem Data Gaps (High Priority)
  - Interconnected Surface Water Data Gaps (High Priority)
- Avoiding ~~Significant~~ Increase of Total Net Groundwater Use ~~from the Basin~~Above Sustainable Yield

- Management of Groundwater Use and Recharge
- Conservation Easements
- Dorris Water Meter Installation Project
- Irrigation Efficiency Improvements
- Public Outreach
- Voluntary Managed Land Repurposing (not including Conservation Easements)

~~Well Inventory Program~~

- ~~Well Replacement~~

Tier III: Additional PMAs that may be implemented in the future, as necessary (initiation and/or implementation 2027 to 2042).

Tier III PMAs, identified as potential future options, include:

- Alternative, Lower ET Crops
- Butte Creek Diversion Relocation
- Butte Valley National Grassland Groundwater Recharge Project
- Strategic Groundwater Pumping Restriction

Additionally, other management actions are outlined that may be explored during GSP implementation~~ are outlined~~.

ES-5: PLAN IMPLEMENTATION, BUDGET AND SCHEDULE (CHAPTER 5)

Section 5 details key GSP implementation steps and timelines. Cost estimates and elements of a plan for funding GSP implementation are also presented in this section.

Implementation of the GSP will focus on the following several key elements:

1. GSA management, administration, legal and day-to-day operations.
2. Implementation of the GSP monitoring program activities.
3. Technical support, including BVIHM model updates, SMC tracking, and other technical analysis.

4. Reporting, including preparation of annual reports and five-year evaluations and updates.
5. Implementation of PMAs.
6. Ongoing outreach activities to stakeholders.

Annual implementation of the GSP over the 20-year planning horizon is projected to cost between $~~135~~65,000 and $~~230~~260,000. The GSA may pursue funding from state and federal sources for GSP implementation. As the GSP implementation proceeds, the GSA will further evaluate funding mechanisms and fee criteria and may perform a cost-benefit analysis of fee collection to support consideration of potential refinements.