Modesto Subbasin

Groundwater Use Management Program

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STRGBA GSA
Adopted January 28, 2026

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1. PURPOSE AND BACKGROUND

1.1 Purpose

On January 18, 2024, the California Department of Water Resources (DWR) issued an Incomplete Determination letter to the Modesto Groundwater Subbasin (Subbasin) for their 2022 Groundwater Sustainability Plan (GSP or Plan). In that letter, DWR stated that the Groundwater Sustainability Agencies (GSAs) "…should revise the GSP to include a reasonable means to arrest groundwater level declines and stop the overdraft that is continuing to occur in the Subbasin. Specifically, the GSAs should describe feasible, effective proposed projects and management actions that are commensurate with the level of understanding of groundwater conditions in the Subbasin and provide sufficient details for DWR staff to be able to clearly evaluate how the Plan's projects and management actions will ensure achieving the sustainability goal in the Subbasin." In responding to this Corrective Action, in the Revised July 2024 GSP, the Stanislaus & Tuolumne Rivers Groundwater Basin Association (STRGBA) GSA and the County of Tuolumne GSA (Tuolumne GSA) committed to preparing management actions consisting of a Pumping Management Framework (including a groundwater allocation and pumping management program, groundwater extraction and surface water reporting program, groundwater extraction fee and groundwater pumping credit market and trading program), Demand Reduction Strategies (consisting of voluntary conservation and/or land use fallowing and conservation practices), and a Dry Well Mitigation Program. In response, this Groundwater Use Management Program (GWUMP or Program) was prepared, incorporating a pumping management framework and demand reduction strategies. A Dry Well Mitigation Program was prepared as a separate, stand-alone program.

While it is still the goal of the Subbasin GSAs to first implement supply projects to reach basin sustainability, this GWUMP is a management action intended to respond to direction provided by DWR and outlines the demand management actions that will be taken as long as supply actions are not effective in meeting overall basin sustainability goals. Nothing in this framework is intended to be a determination of water rights and is not evidence for or against any claim of a water right that can be used in any adjudication of water rights[1].

1.2 Background

1.2.1 Modesto Subbasin

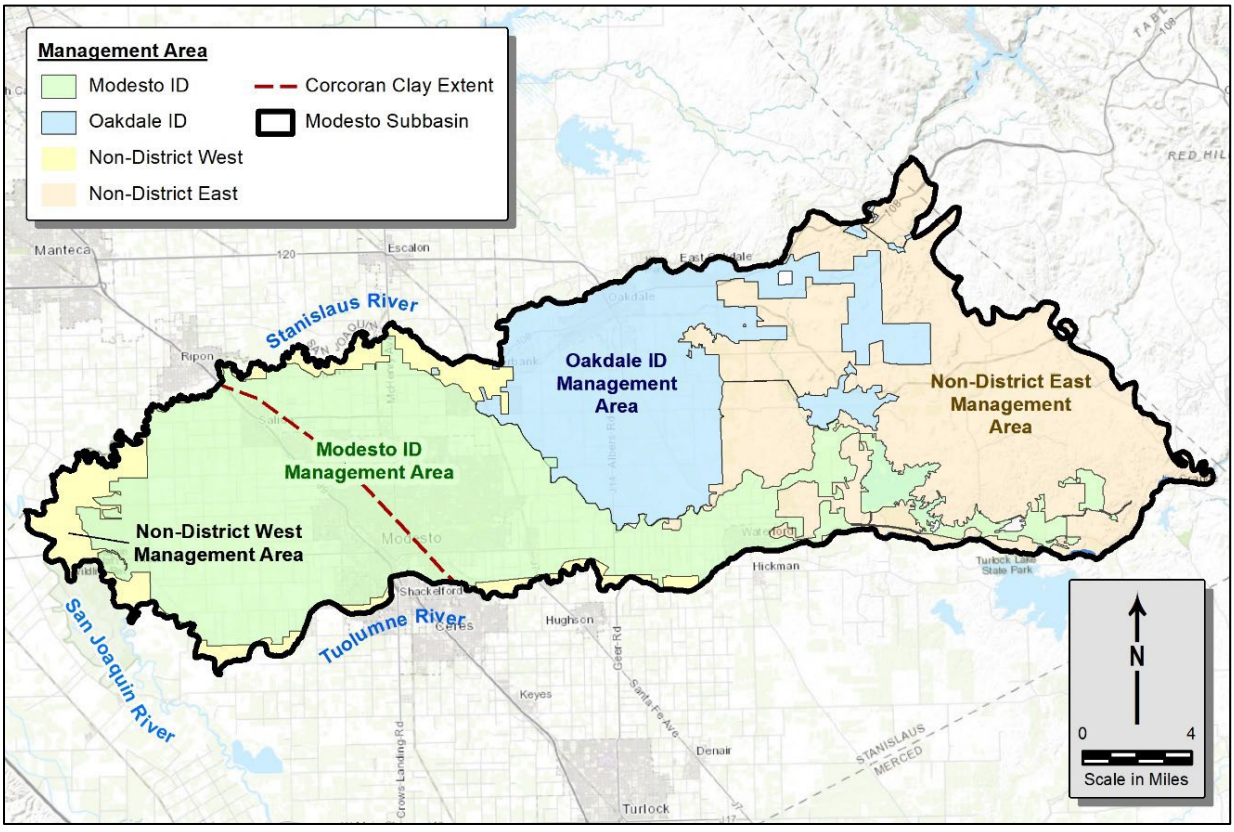
The Modesto Groundwater Subbasin (5-22.02) is a high-priority basin covering approximately 245,253 acres in the northern San Joaquin Valley Groundwater Basin. The Subbasin is bounded by the Stanislaus River on the north, the Tuolumne River on the south, the San Joaquin River on the west, and the crystalline basement rocks of the Sierra Nevada Foothills on the east. The Modesto Subbasin relies on two primary sources of water supply – surface water from the Stanislaus and Tuolumne Rivers and groundwater pumped from the principal aquifers described in the GSP. About 64 percent of the Modesto Subbasin is agricultural, with major crop types including almonds and other deciduous trees, corn, grains, pasture, vines, citrus and truck crops. Urban areas cover about 13 percent of the Subbasin. Remaining lands consist of non-agriculture, non-irrigated agriculture, undeveloped areas, and surface water (23 percent). Most of the undeveloped land

[1] Consistent with California Water Code Section 10720.5 the Sustainable Groundwater Management act may not determine or alter surface water rights or groundwater rights under the common law. This GWUMP is meant to provide an equitable allocation of yield to each management area.

is in the eastern portion of the Subbasin. A significant expansion of irrigated agriculture occurred in the Subbasin during the GSP study period. In 1996, irrigated agriculture covered approximately 46 percent of the Subbasin (approximately 111,946 acres). Over the next 20 years, irrigated agriculture expanded by about 40 percent, and by 2017 had added another 45,965 acres (totaling 157,911 acres, approximately 64 percent of the Subbasin). The increase in irrigated agriculture primarily resulted from a conversion of pasture and previously non-irrigated and undeveloped areas to deciduous/almond orchards. Much of this expansion occurred in the eastern portion of the Subbasin – outside of Modesto Irrigation District (MID) and Oakdale Irrigation District (OID) service areas – where groundwater is the primary source of water supply.

The GSP delineates four separate Management Areas (MAs) to reflect areas of similar water supplies, streamlining coordination of water management and prioritizing areas for GSP project implementation. These management areas include the Modesto Management Area, Oakdale Management Area, Non-District East (NDE) Management Area, and Non-District West (NDW) Management Area as shown on **Figure 1**.

FIGURE 1: MODESTO SUBBASIN MANAGEMENT AREAS



The Non-District West Management Area contains lands along the western rim of the Subbasin, where both groundwater and surface water are available for beneficial uses. The Non-District East Management Area includes lands outside of MID and OID service areas in the eastern portion of the Subbasin where groundwater is the primary water supply. The Modesto and Oakdale Management Areas coincide with the service area boundaries of their respective irrigation districts. MID manages Tuolumne River water and groundwater conjunctively, and OID manages Stanislaus River water and groundwater conjunctively. The

Non-District East and Non-District West Management Areas cover remaining lands outside of MID and OID jurisdiction, where Stanislaus County is the lead member agency.

1.2.2 Determination Letter and Commitments

The Revised 2024 Modesto Subbasin GSP was approved by DWR in 2025 and is currently being implemented by the STRGBA GSA and the Tuolumne GSA. The goal of the GSP is to achieve sustainability by 2042 in compliance with the Sustainable Groundwater Management Act (SGMA).

As described in the Revised 2024 GSP, long-term declines in groundwater levels have occurred in the NDE Management Area and currently are impacting groundwater levels in the Oakdale Management Area. As a result, 2027 Interim Milestones (IMs) below the Minimum Threshold (MT) have been developed for representative monitoring wells in those management areas. The anticipated decline between adoption of the initial GSP in 2022 and 2027 (the first interim milestone) depends on future unknown hydrologic conditions. Since drought conditions began in Water Year (WY) 2013, dry hydrologic conditions have persisted in the Subbasin with five out of seven water years between WY 2014 and WY 2020 having been categorized as below normal, dry, or critically dry. Water level declines associated with the last seven years may continue if hydrologic conditions do not improve, and/or if the aquifer response to GSP project implementation is delayed or overestimated. To evaluate and prevent undesirable results, 2027 IMs have been developed for monitoring sites based on groundwater level declines observed over the last seven years. Based on modeling completed in support of the GSP, by 2032, projects and management actions are expected to support water level recovery; therefore, the 2032 IMs were set as the MT. If needed, the IMs for 2037 have been defined as the halfway point between the MT and the Measurable Objective (MO).

In general, there are two principal ways to reach the Subbasin IMs and ultimately achieve basin wide sustainability as the GSP is implemented:

1. Increase supply; or
2. Decrease demand; or

Reducing groundwater demand can be done through a variety of strategies, including changes to cropping patterns, land fallowing, land repurposing, and conservation in response to numeric groundwater allocations, which would be less than those currently extracted. Strategies to increase supply have been identified by the GSA and are included as projects in Chapter 8 of the Revised 2024 Subbasin GSP. These projects are proposed to either recharge groundwater with surface water or provide surface water to meet groundwater demand so that groundwater pumping is reduced without changing the land use or total water demand (in-lieu recharge). To date, the GSP has focused on implementing projects to address overdraft. However, the schedule of implementation, source, and timing of the funding, design, and construction of the supply projects poses uncertainties in terms of realizing the benefits in the expected timeline. Recognizing these uncertainties, the GSAs acknowledge that more timely reductions in groundwater use will be required to meet the planned IMs. For this reason, this GWUMP has been developed as a backstop to prevent significant and unreasonable impacts related to groundwater level decline.

The GWUMP, as outlined herein, is the first step in demand management. The GSAs may adjust the GWUMP as projects are implemented and further develop additional aspects of the overall Program as it is implemented and evolves.

2. GROUNDWATER ALLOCATION FRAMEWORK

GSAs have the authority to develop and implement management actions within their GSPs that are based on local conditions, priorities, and management objectives. Under the California Water Code, a GSA has the authority to regulate, limit, or suspend groundwater extractions from individual wells or other facilities within a groundwater basin.[1] As a result, this Groundwater Allocation Framework has been developed to equitably distribute the sustainable yield amongst the Management Areas (Allocation Framework) to achieve groundwater sustainability consistent with SGMA. Any demand reductions actions must be approved by the applicable GSA(s) and would be implemented by Management Area Stewards if authorized and directed by the GSA(s).

This Allocation Framework is intended to be an adaptive program, modified over time to reflect changing hydrologic conditions and implementation of water supply projects. Nothing in this framework is intended to be a determination of water rights, and is not evidence for or against a water right that can be used in any adjudication of water rights[2].

2.1 Groundwater Allocation Framework

The STRGBA GSA developed a groundwater allocation framework based on the estimated sustainable yield of the Subbasin as documented in the GSP and considering developed supply and local groundwater use. The goal of the framework is to equitably distribute the sustainable yield to each Management Area throughout the Subbasin and allow the Management Area Stewards to decide how to implement components of the framework in their respective management areas as needed to operate within those allocations. Only de minimis extractions occur in the Tuolumne GSA which are exempt from receiving allocations (see Section 2.1.2.2).

As used herein, the Management Area Steward is defined as the STRGBA GSA member agency/agencies from each Subbasin management area. The Modesto Subbasin Stewards in the STRGBA GSA area are shown below in **Table 1**.

Overall, the process of developing the Allocation Framework included establishing the sustainable yield, accounting for special considerations of allocatable groundwater, determining the volume of developed water, allocating the sustainable yield of native groundwater, and establishing measures for management area stewardship by the STRGBA GSA member agencies.

[1] CWC § 10726.4(a)(2)

[2] Consistent with California Water Code Section 10720.5 the Sustainable Groundwater Management act may not determine or alter surface water rights or groundwater rights under the common law. This GWUMP is meant to provide an equitable allocation of yield to each management area.

TABLE 1: MODESTO SUBBASIN STEWARDS

Management Area	Stewards
Modesto Management Area	Modesto Irrigation District
	City of Modesto
	City of Waterford
Oakdale Management Area	Oakdale Irrigation District
	City of Oakdale
Non-District West Management Area	Stanislaus County
	City of Riverbank
Non-District East Management Area	Stanislaus County Tuolumne County GSA

2.1.1 Sustainable Yield

Sustainable yield is defined under SGMA as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result."[1] The sustainable yield for the Modesto Subbasin was calculated to be 267,000 acre-feet per year (AFY). Sustainable yield for the Subbasin was calculated using a C2VSimTM numerical modeling scenario in which the long-term (50-year) sustainable management criteria are maintained. The development of sustainable yield incorporates the reduction of groundwater demand from net groundwater extractors, which forms the basis for the Allocation Framework. Additional information on the methodology utilized to determine the sustainable yield is presented in Section 5.3 of the Revised 2024 GSP.[2]

While the sustainable yield provides the basis for the volume of allocatable water within the Subbasin, special considerations for certain entities were considered and incorporated into the Allocation Framework (see Section 2.1.2). The amount of water allocatable to applicable entities is termed "native sustainable yield", which is discussed further in Section 2.1.3.

2.1.2 Special Considerations

Special considerations for the Allocation Framework were evaluated by the STRGBA GSA and included legal considerations and local management objectives. The following entities were determined to have limited requirements under the Allocation Framework:

[1] CWC §10721(w))
[2] Modesto Subbasin GSP, Revised July 2024, Section 5.3, pp. 303-310

- Federal & Tribal Lands (not present)
- Adjudicated Areas (not present)
- Developed Water Supplies
- *De Minimis* Water Users
- Municipal Water Use

Federal lands, tribal lands, and adjudicated areas are not present within the Subbasin. As a result, developed water, supplies for *de minimis* water users, and municipal water use were the only entities with special considerations or limitations under the Allocation Framework. Additional information on developed water supplies, *de minimis* water users, and municipal water users are discussed further herein.

2.1.2.1 Developed Water Supply Users

Developed supplies are water that is intentionally sourced, imported and made available for use through human-made systems. California law recognizes imported water that is added to and withdrawn from an underground basin and credits this 'developed water' to the importer bringing the water into the basin. California law also recognizes that a party who imports water into a basin or develops new supplies may retain rights to that water, including the right to recapture that water. As such, Developed Supply is controlled by the entity that developed the imported water supply.

Developed supply systems in the Modesto Subbasin include:

- **Imported Water**: Surface water brought into the basin from external sources, such as through canals, pipelines, or water transfers.
- **Recycled Water**: Wastewater or other non-traditional water sources that are treated to meet specific quality standards for reuse.
- **Artificial Recharge Projects**: Groundwater replenishment efforts using intentionally captured and injected water.

Recovery of imported and recycled water includes seepage resulting from storage, conveyance and/or land application. Recovery of water from artificial recharge projects correlates to the volume of water recharged by the project.

During the development of the Allocation Framework, estimates of developed supplies were refined into seepage from canals, reservoirs, drainage, and deep percolation of applied surface waters. Quantified values of developed water were sourced from MID's and OID's 2020 Agricultural Water Management Plans, the City of Modesto's 2020 Urban Water Management Plan, and are summarized below in **Table 2.**

TABLE 2: DEVELOPED SUPPLY IN THE MODESTO SUBBASIN

Developed Supply (AF)	MID[1]	OID[2]
Deep Perc of Applied Surface Water	51,500[3]	14,800[3]
Canal and Reservoir Seepage	39,400	13,100
Drainage Seepage	--	3,700
M&I Seepage	4,700	--
Total	**95,600**	**31,600**

Notes:
[1] Includes 2018 as a representative water year
[2] Average value covering water years 2006-2019
[3] estimated based on the fraction of applied surface water

MID generates approximately 95,600 AFY of recharge from their developed supply, and OID generates approximately 31,600 AFY of recharge from their developed supply. These estimations were incorporated into the Allocation Framework and the Management Areas' demand reduction targets, which are discussed further in Section 2.2.2 and Section 2.2.3. These values were estimated using the most recent data available and will be refined as the GWUMP is periodically re-evaluated.

2.1.2.2 *De Minimis* Water Users

De minimis extractors are classified as water users that extract two (2) acre-feet (AF) or less of groundwater per year.[1] *De minimis* water use totals approximately 13,800 AFY within the Subbasin. During the development of the Allocation Framework, it was determined that *de minimis* extractors should be exempt from receiving allocations and reducing their groundwater use. Of note, with only de minimis extractions in the Tuolumne GSA area, implementation of the GWUMP will not restrict or alter existing groundwater pumping activities there unless and until that were to change in the future.

2.1.2.3 Municipal Water Users

Municipal water use refers to the provision of water for residential, commercial, and public services within a city. Municipal water users within the Subbasin include the City of Modesto, City of Oakdale, City of Riverbank, and the City of Waterford. These entities account for approximately 35,000 AFY of groundwater use. During development of the Allocation Framework, the STRGBA GSA designated municipal water users as a special case and limited their future groundwater use to their historical groundwater use. This decision was supported by several local and state requirements for implementing water use efficiency programs. These requirements include:

[1] CWC § 10721(e)

- **Making Conservation as a California Way of Life** – a State regulation that establishes efficiency goals and Urban Water Use Objectives (UWUOs) for urban water suppliers to reduce municipal demands. The regulation requires urban water suppliers to determine their water use objectives and demonstrate compliance annually.[1]
- **Growth Obligations** – Municipalities have State mandated housing and population growth targets that drive water demand.
- **Public Service Constraints** – Cities are non-profit entities that typically operate with limited flexibility in pricing for the purchase of water supplies.
- **Supply Limitations** – Groundwater supplies are limited and meeting future demand will require surface water development, recharge projects, additional conservation, or purchased allocation credits.

Under this Allocation Framework, groundwater allocations are set at current groundwater use quantities per annum for municipalities, and the municipalities will be required to conserve water or provide other water supplies to supply future growth. If additional lands are annexed into municipal water provider's service areas, those lands will be removed from the overlying allocation of the sustainable yield in future updates of the GWUMP, and the special case allocation to municipal water users will remain unchanged.

2.1.3 Allocation Framework Methodology

Multiple approaches to Subbasin groundwater allocation were considered by the STRGBA GSA to determine the best method for reducing groundwater demand to achieve the Subbasin's sustainability goals. The approaches included allocations based on consumptive use (amount of water used and not returned to the Subbasin), pumping (total volume extracted), and other metrics such as crop type, economic value, or negotiated agreements. Ultimately, pumping, or the total volume of groundwater extracted by user, was selected as the basis for the Allocation Framework as it was both directly measurable and could easily be estimated by other means in cases where metering data were not available.

A proportional allocation by the overlying area, excluding those urban and domestic areas where the service area was provided a special consideration, was selected as the approach for distributing allocatable yield by management area within the Subbasin. This method was selected as it facilitates resource pooling in management areas that are more reliant on groundwater, eliminates the 'double allocation' of water to municipal and *de minimis* areas, and promotes equity across all overlying users, despite their intended use.

Following the selection of the Allocation Framework's basis and distribution method, estimations of allocations for the Subbasin and each Management Area (as defined in the Revised 2024 GSP) were made. As previously discussed, allocations are calculated by distributing the allocatable yield (i.e., non-special considerations) across the Subbasin's overlying area, where:

[1] 23 CCR, § 966

$$AY = SY - D - M - DS$$

AY = Allocatable Yield
SY = Sustainable Yield
D = *De minimis* Users
M = *Municipal Users*
DS = Developed Supply

The allocatable yield calculated for the Modesto Subbasin was determined to be 95,700 AFY.

Overlying Allocation: The Subbasin-wide overlying allocation of 95,700 AFY was subsequently distributed amongst the Management Areas using a proportional allocation methodology based on each zone's overlying land area minus the area covered by urban and domestic land uses (referred to herein as Overlying, Non-Urban Area). This equitable distribution approach ensures that water allocations correspond directly to the spatial extent of overlying land use within each Management Area without 'double allocating' water to urban and domestic land areas. The proportional distribution method calculates each Management Area's share by dividing its overlying non-urban acreage by the total subbasin overlying acreage, then multiplying this percentage by the total overlying allocation. An illustrative calculation demonstrating how individual Management Area overlying allocations are determined is presented below.

$$OVR_{MA} = (OVR_S)(\frac{Area_{MA}}{Area_S})$$

$\boldsymbol{OVR_{MA}}$ = Overlying Allocation of the Management Area
$\boldsymbol{OVR_S}$ = Overlying Allocation of the Subbasin
$\boldsymbol{Area_{MA}}$ = Overlying Non-Urban Area of the Management Area
$\boldsymbol{Area_s}$ = Total Area of the Subbasin

Table 3, below, summarizes the 'baseline' allocations for the individual management areas as calculated using the above methodology.

TABLE 3: BASELINE MODESTO SUBBASIN GROUNDWATER ALLOCATIONS

	Subbasin TOTAL	Modesto MA	Oakdale MA	NDW MA	NDE MA
Developed Supply[1]	127,200	95,600	31,600	0	0
Special Cases[1]	48,800	33,700	8,900	6,200	0
Overlying Use[1]	91,000	33,600	22,000	5,300	30,100
Total Allocation[1]	267,000	162,900	62,500	11,500	30,100
Total Historical Pumping[1]	317,600	173,000	39,800	15,100	89,700
Reduction Required[1]	50,600	10,100	-22,700	3,600	59,600
Total Allocation (Percent of Historical)	84%	94%	157%	76%	34%

[1] *Volumes are presented in acre-feet.*
NDW – Non-District West
NDE – Non-District East

The initial allocation estimations ("Baseline Allocations") indicate an average annual reduction of Total Historical Pumping by approximately 16% is needed. However, allocations applied to certain management areas, such as the Oakdale Management Area, were greater because of OID's development and use of surface water and thus appear in **Table 3** as negative required reductions. To collaborate and assist in easing reductions in other Management Areas, and to allow supply projects to be constructed, OID has agreed to redistribute the portion of its developed supply that is not anticipated to be used by OID in the near term to other Management Areas on a temporary basis, not to exceed five years (2027-2031), at no cost to the beneficiaries. The reallocation option, referred to herein as 'Collaborative Management, is presented below in **Table 4**. It is important to note that any potential 'reallocation' of the native sustainable yield would have to be agreed upon by the STRGBA GSA. However, reallocation of developed supply is controlled by the entity that developed the imported water supply. Any such redistribution of OID's developed water is not a forfeiture of the right or claim of right in the future. Furthermore, by reallocating developed supply to another party under this Framework, the potential pumping reduction in other management areas is reduced from what it may have to be in the future. OID specifically hereby disclaims that by approving this Plan it waives any of its water rights and/or the rights of its landowners; but rather, affirms that it puts all water to which it or its landowners have a right to full beneficial use.

TABLE 4: COLLABORATIVE MANAGEMENT OF GROUNDWATER ALLOCATIONS

	Subbasin TOTAL	Modesto Management Area	Oakdale Management Area	NDW Management Area	NDE Management Area
Base Allocation[1]	267,000	162,900	62,500	11,500	30,100
Historical Pumping[1]	317,600	173,000	39,800	15,100	89,700
Developed Water[1]	-	0	-22,700	0	0
Redistribution of Developed Water[1]	0	10,100	-22,700	1,900	10,700
Allocation with Redistribution of Developed Water[1]	267,000	173,000	39,800	13,400	40,800
Reduction Required[1,2]	50,600	0	0	1,700	48,900
Allocation with Redistribution[2] (Percent of Historical)	84%	100%	100%	89%	45%

[1] Volumes are presented in acre-feet.
[2]Assumes long-term use of Redistributed Developed Water.
NDW – Non-District West
NDE – Non-District East

Long-term redistribution of developed water would result in smaller reduction targets for the Modesto, Non-District West, and Non-District East Management Areas - 6%, 13%, and 12%, respectively. However, OID has only agreed to allow temporary utilization of their developed water for the first five years of implementation (2027-2031).

The STRGBA GSA prepared an implementation schedule for meeting the allocation targets while allowing groundwater users the opportunity to adapt to reductions in groundwater use. The implementation schedules for the Management Areas are presented in Section 4. Distribution of these allocations to groundwater users will be completed by Management Area "Stewards", as discussed in Section 2.1.4. However, it is important to keep in mind that this framework is one of the Subbasin's first steps towards achieving groundwater sustainability, and this Program will continue to be reviewed and adjusted as needed in future updates.

3. IMPLEMENTATION

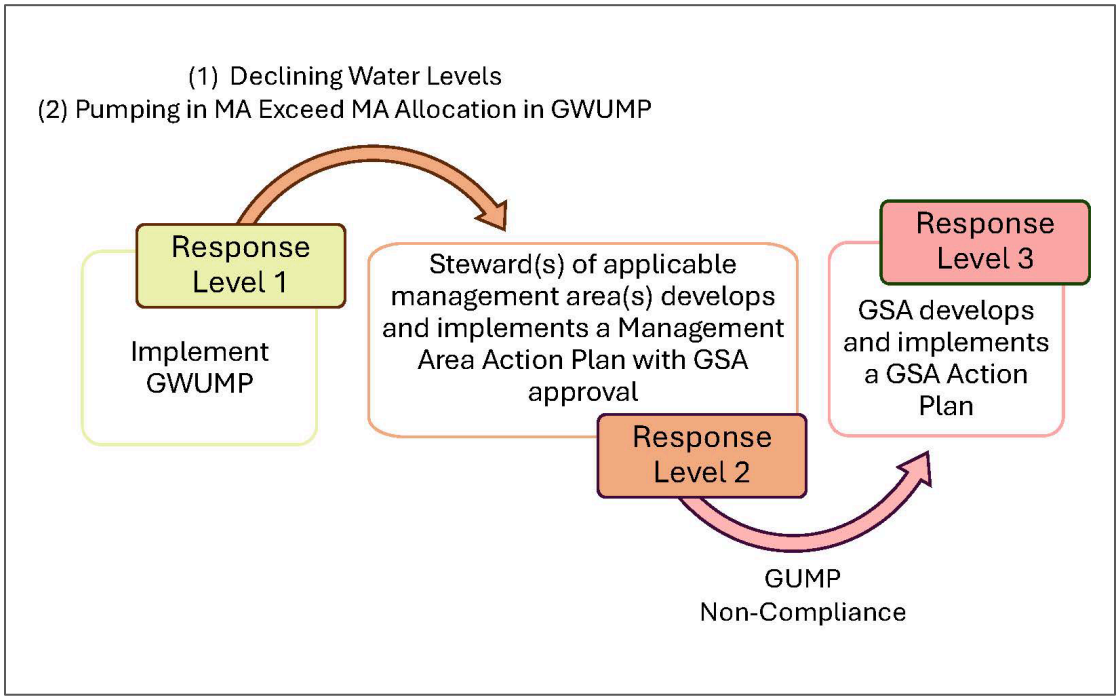
Member agencies of the STRGBA GSA determined that the GWUMP would be best implemented locally in the individual Management Areas within the Subbasin. As previously noted, with only having de minimis extractors, groundwater pumping activities in the Tuolumne GSA area will not change with implementation of the GWUMP. The Management Areas are defined in the Revised 2024 GSP as areas of similar water supplies and similar ongoing water management activities.[1] As discussed in Section 2 and shown in **Figure 1**, four management areas are present within the Modesto Subbasin: Modesto Management Area, Oakdale Management Area, Non-District West Management Area, and Non-District East Management Area. These management areas and their Stewards (agencies with jurisdiction) are shown in **Table 1**.

Following the adoption of this GWUMP, the Management Area Stewards will distribute allocations as credits to groundwater users no later than January 31, 2027, per the Revised 2024 Modesto Subbasin GSP. The total allocations, per Management Area, in the first five years of implementation will be consistent with the "Collaborative Management" allocation volumes presented in **Table 4**. Management Area Stewards will monitor and evaluate groundwater use and the assigned allocations on a regular basis to ensure groundwater users are operating within their assigned allocations. The STRGBA GSA will also continue to independently assess groundwater use in each management area as part of its annual reporting process and procedures.

The intent of localized management by the Management Area Steward is to achieve sustainable management criteria, such as interim milestones and measurable objectives, as established in the GSP and prevent the occurrence of undesirable results, but to do so in a fashion that is achievable within the characteristics of each individual area. Should groundwater data and parameters, such as groundwater levels, indicate that a particular management area is not achieving their sustainable management objectives, Management Area Stewards will develop a Management Area Action Plan for STRGBA GSA approval as a corrective course of action and may, at their discretion, escalate the allocation implementation schedule to comply with these sustainable management criteria if needed. Non-compliance with these criteria may trigger other additional management strategies. **Figure 2** outlines the methodology the Management Area Stewards will follow in implementing the GWUMP. For the purposes of this GWUMP, non-compliance is defined as two (2) consecutive years of not meeting the GWUMP-mandated allocations and/or not having a GSA-approved Action Plan implemented within two (2) years.

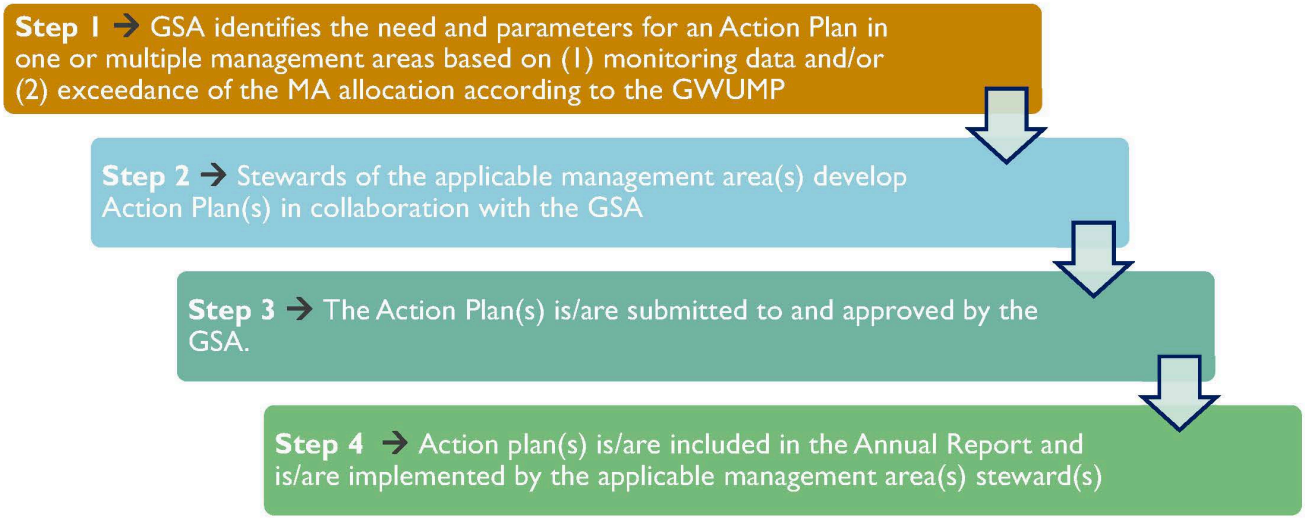
[1] Modesto Subbasin GSP, Revised July 2024, Section 6.2.3, p. 317

FIGURE 2: GWUMP RESPONSE LEVELS



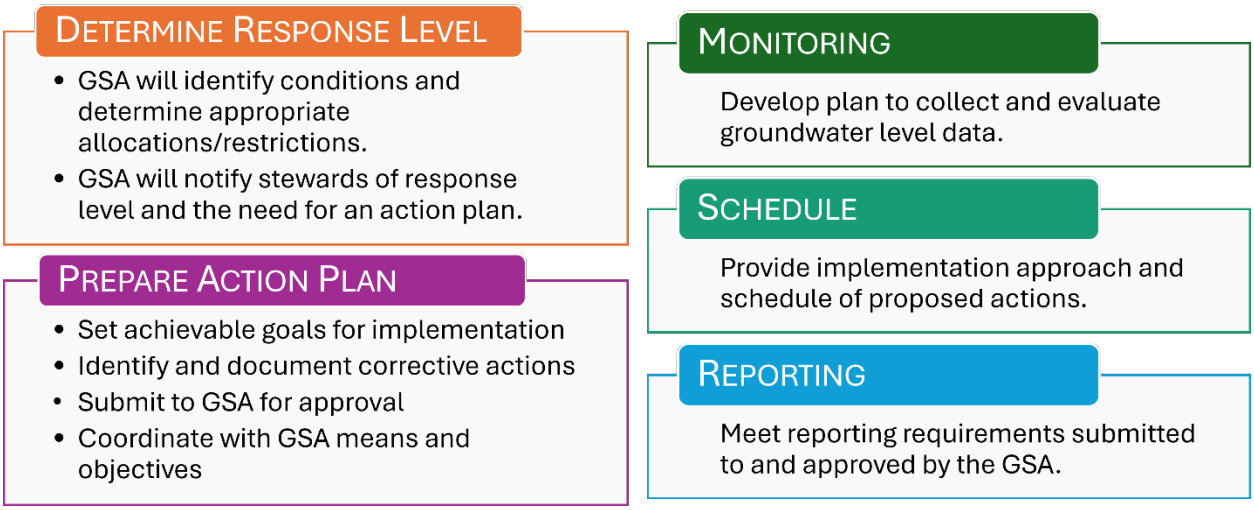
If, based on the Subbasin's monitoring program and annual analysis, it is determined that a Management Area Action Plan is required, the following steps will be implemented in developing that plan (**Figure 3**). Should a Management Area move into Response Level 3 as a result of non-compliance, the STRGBA GSA would follow the State's probationary emergency protocols/measures to meter groundwater extractions and assess fees while the STRGBA GSA drafts and executes a GSA Action Plan for the Management Area(s) and returns the Management Area(s) to the planned path towards sustainability.

FIGURE 3: MANAGEMENT AREA ACTION PLAN DEVELOPMENT PROCESS



The content of the Action Plan will vary depending on the Management Area, hydrologic condition, situation and other parameters, but in general, Actions Plans will include the following content (**Figure 4**).

FIGURE 4: ACTION PLAN CONTENT



Section 3.1 provides a list of potential adaptive management strategies that the Management Area Stewards may choose to implement to ensure the Subbasin progresses towards sustainability. In the event the Management Area Stewards are unable to progress towards sustainability (i.e., failure to achieve interim milestones or continuously exceeding minimum thresholds), the STRGBA GSA will implement additional measures to prevent the occurrence of undesirable results.

While the GWUMP will be reassessed no less than once every five years (see **Section 4** for further discussion), the condition of the Subbasin will be evaluated annually as part of the SGMA-mandated annual report process. If identified as part of that reporting process and as needed, the Management Area Stewards may opt to modify their Action Plan with STRGBA GSA approval between GWUMP assessments to proactively address any negative trends identified at that time. However, any planned regulation, limitation or suspensions of groundwater extractions from individual wells or other facilities by Management Area Stewards will require prior approval by the STRGBA GSA.

3.1 Adaptive Management Strategies

While the groundwater allocation framework discussed above in Section 2 is intended to move the Subbasin towards sustainability, it is recognized that Subbasin hydrogeology and future hydrologic conditions will impact the success of the program. As the GWUMP is envisioned, the Management Area Stewards will be responsible for monitoring progress towards achieving the Interim Milestones set forth in the Revised 2024 GSP, and for implementing adaptive management strategies and responses as needed to achieve the desired results.

Adaptive management is a key component of the GWUMP. A program that is flexible and developed to adapt to changing conditions will be the most effective. The unknown factors in meeting the demand management goals may include, but are not limited to, the following:

- Hydrology of the next five years: The benefits (recharge) accrued from planned projects vary based on the availability of surface and storm water over the next few years. Projects that rely on excess surface water to be implemented may not produce the same level of benefits in drought years.
- Implementation schedule of planned projects: It is unknown what legal, financial, or environmental hurdles could delay the implementation of the identified projects. These delays could be specific to a GSA, management area, or the Subbasin as a whole.
- Estimation of Project Contributions: Not all projects may be able, once implemented, to produce the anticipated benefits estimated during the planning process, even without project delays.
- Model Uncertainty: Through future monitoring, the GSAs will be able to assess model uncertainty and improve model estimations as new data becomes available.

To aid the Management Area Stewards with adaptively managing their areas, the following is a list of some potential strategies that may be employed to help reduce groundwater use and support achieving the Subbasin Interim Milestones and ultimately groundwater basin sustainability. This list is not intended to be all inclusive.

- Implementation of voluntary or mandatory conservation measures including, but not limited to:
    - Land repurposing to enhance groundwater recharge
    - Land repurposing for habitat restoration (recreational use, GDE benefit, etc.)
    - Land repurposing for clean energy incentives (i.e., solar power fields)
    - Replacing higher value/water using crops with lower value/water using crops or replanting or repurposing with crops/agriculture requiring lower water demands
    - Fallowing – total or partial crop removal, rotational fallowing, dry farming

- Acceleration of the allocation reduction schedule
- Implementation of groundwater extraction fees
- Increased groundwater use reporting requirements to quarterly or monthly
- Prioritization of implementation of Supplemental Projects (Group 3)
- Incentivization of surface water deliveries/in-lieu recharge
- Implementation of targeted pumping reductions or restrictions
- Reduction of allocations beyond base allocation limits
- Restriction of pumping in areas where MTs have been exceeded
- Required flowmeter installation on extraction wells
- Invasive species removal
- Urban retrofitting and/or irrigation improvements to reduce water loss and use

It will be at the Management Area Stewards discretion and responsibility to effectively use some or all of these and potentially other measures to achieve the targeted groundwater use extractions and reach Interim Milestones, and it will be the responsibility of the STRGBA GSA to ensure there is consistency amongst the Management Areas with respect to implementation and application of adaptive management measures.

4. IMPLEMENTATION SCHEDULE

As previously described, in response to Recommended Corrective Action #2 of DWR's 2025 Determination letter, the STRGBA GSA and Tuolumne GSA committed to developing this GWUMP by no later than January 31, 2026, and will implement the program beginning no later than January 31, 2027. To meet this schedule and achieve the Interim Milestones established in the Revised 2024 GSP, the GWUMP will be the primary tool to guide the Subbasin towards sustainability as additional projects and management actions are implemented to offset continued groundwater use.

This Program is the first step towards achieving long-term sustainability. It is designed to effectively manage groundwater use while allowing growers the flexibility to adapt to new policies and frameworks within the Subbasin. Ultimately, however, groundwater management will be driven by observed groundwater level data relative to the Minimum Thresholds and Interim Milestones established in the Revised 2024 GSP and will be supported through adaptive management. The timeline for achieving Interim Milestones, as set forth in the Revised 2024 GSP, is as follows:

2027 - Arrest overdraft and groundwater level decline

2032 - Raise groundwater levels to Minimum Thresholds

2037 - Raise groundwater levels to halfway between Minimum Thresholds and Measurable Objectives

2042 - Raise groundwater level to Measurable Objectives

It is important to recognize that the allocations presented in this GWUMP are based on the best available data at this time. The STRGBA GSA will continue to gather data and refine the allocations presented herein in future updates to the GWUMP. However, even with the temporary redistribution of the OID developed water supply in the first five years of program implementation and considering historical groundwater level trends, **the NDE Management Area will begin the GWUMP Phase 1 implementation period in the Phase 2 Response Level and therefore will require preparation of a Management Area Action Plan by November 1, 2026 for STRGBA GSA approval to initiate reductions in groundwater use.** Only having de minimis extractors, the Tuolumne GSA area will be exempt from any reductions in groundwater use.

Following implementation of this GWUMP and the NDE Action Plan on January 31, 2027, reductions in groundwater extractions will 'ramp up' in five-year increments as necessary to arrest overdraft and raise groundwater levels to the Measurable Objectives identified in the GSP. **Table 5,** below, is the implementation schedule for the NDE Management Area.

TABLE 5: NDE MANAGEMENT AREA REDUCTION SCHEDULE

Year	Percent Reduction of Target Allocation	Required Reduction (Acre-Feet)
2027-2030	34% of 47,600 (Total Reduction Required less 10,400 AF of Redistributed Developed Water)	16,000
2030-2035	67%	39,000
2035-2040	100%	58,000

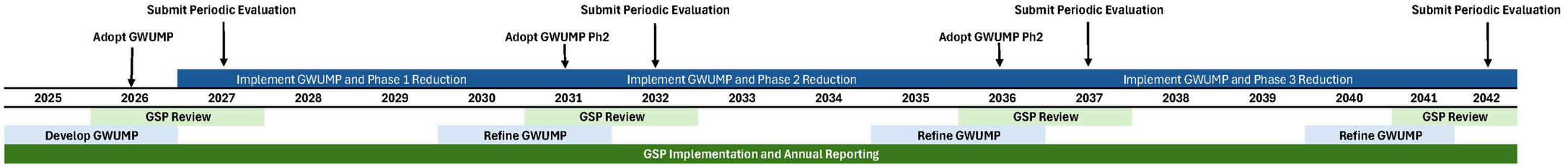
The Modesto Management Area currently exceeds its base allocation. However, after accounting for the redistribution of developed water, the management area is in balance. Additionally, groundwater levels remain relatively stable in most monitoring wells within the MID and City of Modesto service areas. The management area requires continued assessment of data and groundwater/surface water operations to prevent future overdraft, but no Action Plan is necessary at this time.

Although some reduction in groundwater pumping is indicated for the Non-District West Management Area in the first five-year implementation period, observed groundwater levels in most of the monitoring wells in the western upper and lower principal aquifers in the Management Area are currently at or above the measurable objective. Additionally, there are no indications of any long-term water level declines in the Non-District West Management Area, therefore, no Action Plan is required in the Non-District West Management Area at this time.

Even though OID's development and use of surface water results in a surplus of developed supply, groundwater levels in the eastern portion of the Oakdale Management Area continue to decline due to the influence of overdraft in the Non-District East Management Area. No reductions or Action Plan are required for the eastern portion of the Oakdale Management Area at this time.

Per SGMA, every five years, the Subbasin GSP is re-evaluated and a Periodic Evaluation is prepared for submission to DWR. Evaluation of, and any necessary revisions to, the GWUMP will occur prior to and in parallel with each GSP review and Periodic Evaluation. Additionally, other related management actions and tools, such as the development of a groundwater banking and trading program, may be developed by the STRGBA GSA in the future to further support sustainable management of the Subbasin. **Figure 5,** below, is the planned implementation and review schedule for the GWUMP.

FIGURE 5: GWUMP IMPLEMENTATION SCHEDULE



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