Sustainable Groundwater Management Act of 2014
Legislative Intent

In enacting this part, it is the intent of the Legislature to do all of the following:

(a) To provide for the sustainable management of groundwater basins.

(b) To enhance local management of groundwater consistent with rights to use or store groundwater and Section 2 of Article X of the California Constitution. It is the intent of the Legislature to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater.

(c) To establish minimum standards for sustainable groundwater management.

(d) To provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater.

(e) To avoid or minimize subsidence.

(f) To improve data collection and understanding about groundwater.

(g) To increase groundwater storage and remove impediments to recharge.

Sustainable Groundwater Management Act of 2014
Definitions of Sustainable Groundwater

"Sustainable groundwater management" means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.

"Sustainable yield" means 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over a base period representative of long-term conditions in the basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result.

"Undesirable result" means one or more of the following effects caused by groundwater conditions occurring throughout the basin:
(1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. 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.
(2) Significant and unreasonable reduction of groundwater storage.
(3) Significant and unreasonable seawater intrusion.
(4) Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.
(5) Significant and unreasonable land subsidence that substantially interferes with surface land uses.
(6) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

"Water budget" means an accounting of the total groundwater and surface water entering and leaving a basin including the changes in the amount of water stored.

Other Definitions related to Sustainable Yield:

Safe Yield synonymous with Perennial Yield — the maximum quantity of water that can be withdrawn annually from a groundwater resource under a given set of conditions without causing an undesirable result. The phrase "undesirable result" is understood to refer to a gradual lowering of the groundwater levels resulting eventually in depletion of the supply, subsidence, increased energy costs, desiccated wetland or degraded water supply. Safe Yield was defined in California case law in Coty of Los Angeles v. City of San Fernando (1975) 14 Cal.3d 199, 278 [123 Cal.Rptr. 1, 61-63].

Overdraft – occurs where the trend of historic groundwater level measurements indicate a continual drop in groundwater levels over time, even after wet year conditions. Under such circumstances, undesirable results are likely to eventually occur, and therefore, the basin is considered to be in a state of overdraft. Groundwater Resources Association of California, California Groundwater Management Second Edition, published in 2005.

After Todd and Mays, 2005. Groundwater Hydrology Third Edition:

- Mining Yield – If groundwater is withdrawn at a rate exceeding recharge, a mining yield exists. As a consequence, this yield must be limited in time until the aquifer storage is depleted. Many groundwater basins today are being mined; if mining continues, the local economy served by this pumping change, evolving into other forms that use less water or involve importations of water into the basins, or both.

- Perennial Yield (Safe Yield considered an old term)– the perennial yield of a groundwater basin defines the rate at which water can be withdrawn perennially under specified operating conditions without producing an undesirable result. An undesirable result is an adverse situation, such as (1) progressive reduction of the water resource, (2) development of uneconomic pumping conditions, (3) degradation of water quality, (4) interference with prior water rights, (5) land subsidence caused by lowering groundwater levels. Any draft in excess of perennial yield is referred to as overdraft. Existence of overdraft implies that continuation of present management practices will result in significant negative impacts on environmental, social, or economic conditions.

- Deferred Perennial Yield – the concept of deferred perennial yield consist of two different pumping rates. The initial rate is large and exceeds the perennial yield, thereby reducing the groundwater level. This planned overdraft furnishes water form storage at low cost and without creating any undesirable effects. In fact, reducing storage eliminates wasteful subsurface outflow of groundwater and losses to atmosphere by evapotranspiration from high water table areas. After the groundwater level has been lowered to a predetermined depth, a second rate, comparable to that of the perennial yield is established so that a balance of water entering and leaving he basin is maintained thereafter. With a large available storage volume, more water can be recharged ad a larger perennial yield can be obtained.

- Maximum Perennial Yield – the maximum perennial yield, as the name suggests, is the maximum quantity of groundwater perennially available if all possible methods and sources are developed for recharging the basin. In effect, this quantity depends upon the amount of water economically, legally, and politically available to the organization or agency managing the basin. Clearly, the more water that can be recharged both naturally and artificially to a basin, the greater the yield.

Sustainable Groundwater Management Approaches

Components	Butte County	Orange County Water District	Paso Robles	Sacramento Groundwater Authority	Santa Clara Valley Water District	Water Replenishment District
Type Organization	County	Special Legislation	Evolving	Joint Powers Authority	Special Legislation	WRD and Adjudicated basins
Approach	Quantitative BMOs by subarea for levels and quality; gw model for scenarios and water budget; enhanced recharge; notifications for alerts	Comprehensive monitoring and GIS data system – recharge focused to replace groundwater pumped annually	Water balance analysis, current and future pumping projections, and measured gw level trends – declare LOS if not sustainable	Co-equal goals of safe reliable water supply and preservation of fisheries on American River – collaborative effort under JPA	Groundwater recharge, imports, treated water sales, recycled water partnerships, aggressive conservation to offset demands	Comprehensive monitoring and GIS data system – replenish basin – and detailed model
Key Strategy	Ordinances – GW Mgmt, Well Head Protection, Conservation	Tiered fees	Series of Actions	Tiered fees & Water Accounting Framework	Fee zones	Tiered fees and Water Independence Now (WIN)
Management Objectives	Narrative- GW levels, quality, surface water-gw interaction, subsidence, evaluate, & replenish gw- – set and publish alert stages for notifications	GW Quality, sustainable yield & operational efficiency enhancement - Manage annual overdraft, accumulated overdraft, gw levels, change in storage	Narrative and LOS - Level of Severity stages: I - 9 yr projection II - 7 yr project III – currently equals or exceeds perennial yield	Narrative – Sustainable Yield set by Model – M&I Groundwater Extractions – GW Levels/Thresholds	Groundwater levels compared to subsidence thresholds	Manage annual overdraft, accumulated overdraft, gw levels, change in storage
Annual storage change	Estimated and model based	GIS and multi-aquifer based	Estimated and model based	Model based	Calculated monthly	Calculated annually
Pumpage	Public Suppliers measured	Measured except de Minimis 1AF	Public Suppliers measured	Public Suppliers measured	Measured except De minimis 1AF	Measured except De minimis 1AF
Water budget	Annual	Annual		Annual	Annual?	Annual
Sustainable?	No	Yes	No	Yes	Yes	Yes

Responses to General Comments Regarding Update of Sonoma Valley Groundwater Flow Model

Incorporating return flows into the model (residential irrigation, agricultural irrigation, and septic systems)

Return flows (portion of irrigation water not used by plants which infiltrates past the root zone of plants and septic system return flows) will be incorporated into the model. Consistent with assumptions made in the Sonoma Valley Salt and Nutrient Management Plan no return flows will be incorporated for vineyard crops, which are generally managed using deficit irrigation.

Sensitivity Analysis

A sensitivity analysis will be performed on select model parameters as part of the predictive uncertainty analysis.

Validation/Verification Process

We propose performing a process we would refer to as a *Model Calibration Assessment* which will follow the general process referred to as model "validation or verification" by others. We feel this iterative approach would provide for a check on the model's accuracy with a separate independent set of data and will help develop a tool capable of simulating predictive scenarios with a sufficient level of accuracy and confidence. The proposed Model Calibration Assessment Approach includes:

- During model calibration, we would not use groundwater-level data from monitoring wells with data only from 2012 – 2014 (i.e., wells that we began monitoring only within the last 3 years). This represents 93 groundwater-level observations from 12 locations spread (somewhat randomly) throughout the model domain.
- After an acceptable calibration for the model has been achieved, an assessment of the calibration will be performed with this separate set of groundwater level data representing the 12 newer wells.
- Should the Model Calibration Assessment indicate a poorer fit between the observed and simulated data in comparison with the calibration statistics, a subsequent phase of recalibration would be considered (depending upon the degree and location of any errors identified during the process).

Some aspects we have considered in the proposed process include:

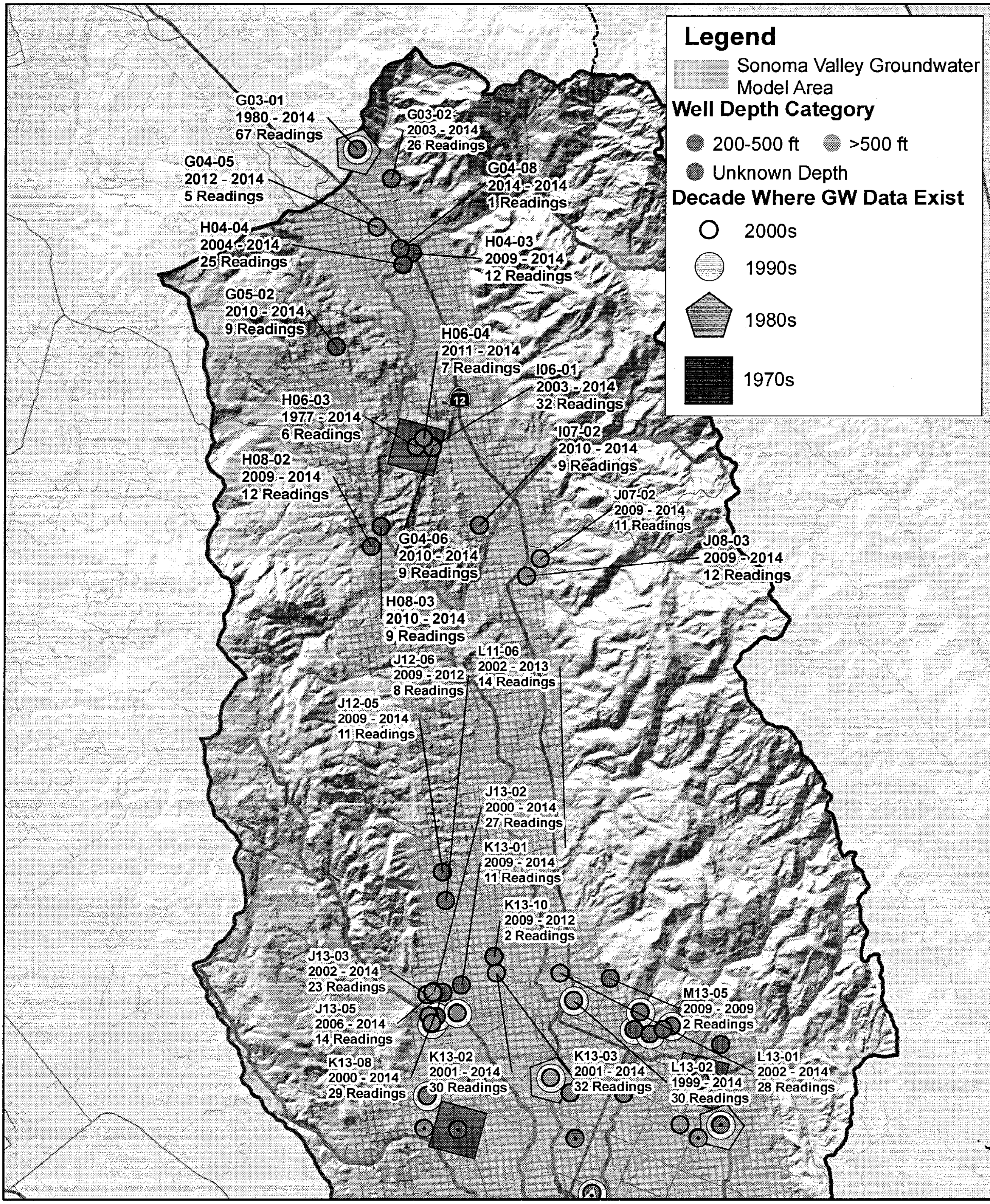
- Ensuring that the initial calibration process is as robust and complete as possible and takes advantage of the additional data that has been collected since the groundwater model was last updated. Any data that we exclude from the calibration process will necessarily result in a poorer calibrated model, resulting in predictions with greater uncertainty and reduced model utility.
- If we were to completely exclude the recent drought from the calibration we would not take advantage of an opportunity to "train" the model to perform well under these unique conditions.
- Balancing the benefits of performing the calibration assessments with resource and schedule constraints.

Future Model Scenarios (land use changes, future demands, simulation of sea level rise)

Components and assumptions to include in future model scenarios will be selected in consultation with the Model Subcommittee, TAC, and Panel with the goal of supporting the goal of the model, which is to evaluate water management alternatives for addressing declining groundwater levels in Sonoma Valley.

Future Model Updates

Data that continues to be collected through the Groundwater Management Program and other efforts will be used to further update and refine the model in the future. The timing for such updates will be based on specific needs and resource availability.



Sonoma Valley
Groundwater Management Program
Groundwater Monitoring Well Coverage
Deep Wells - Northern Valley

January 13, 2015

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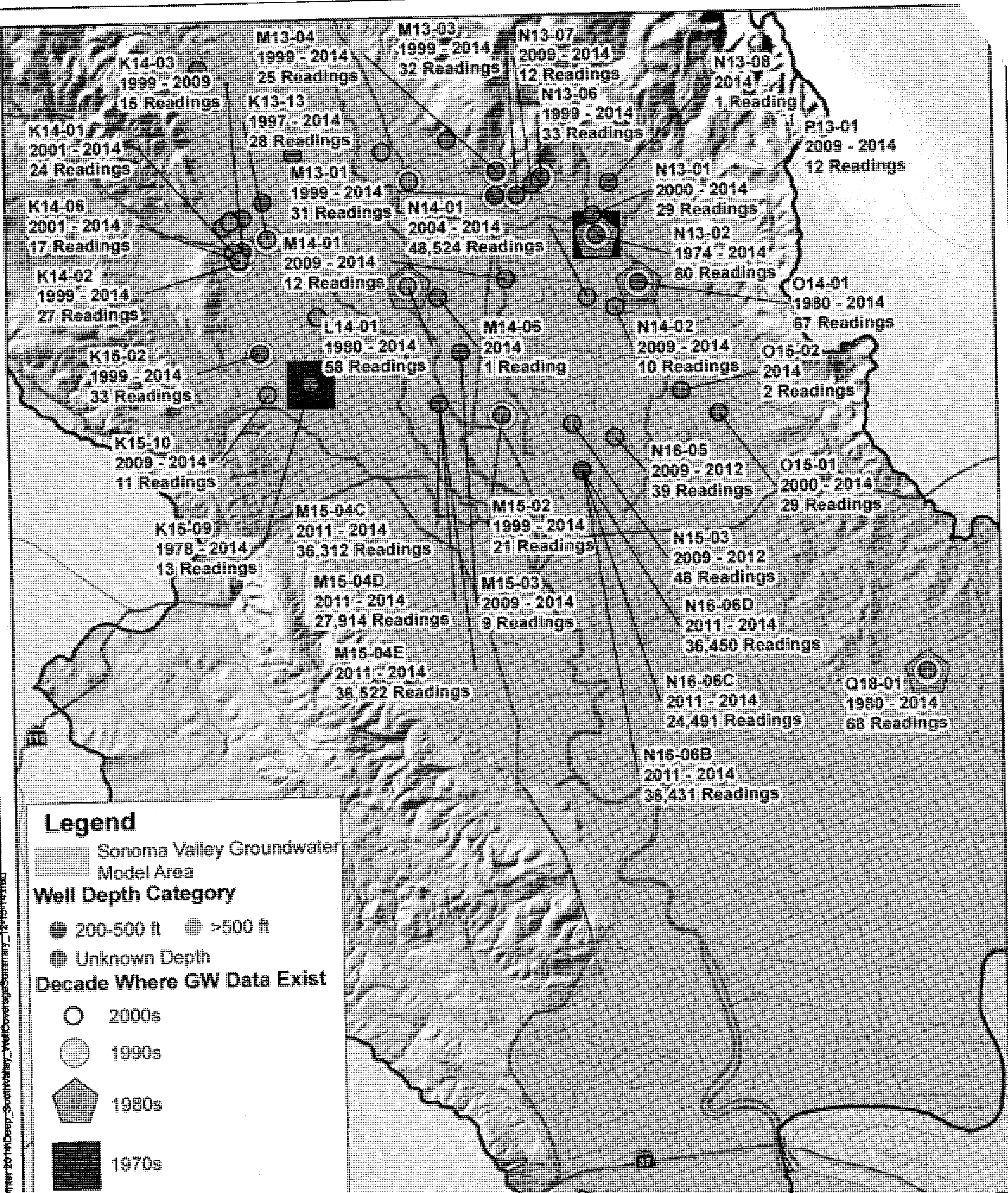

Sonoma Valley
Groundwater Management Program
Groundwater Monitoring Well Coverage
Deep Wells - Southern Valley

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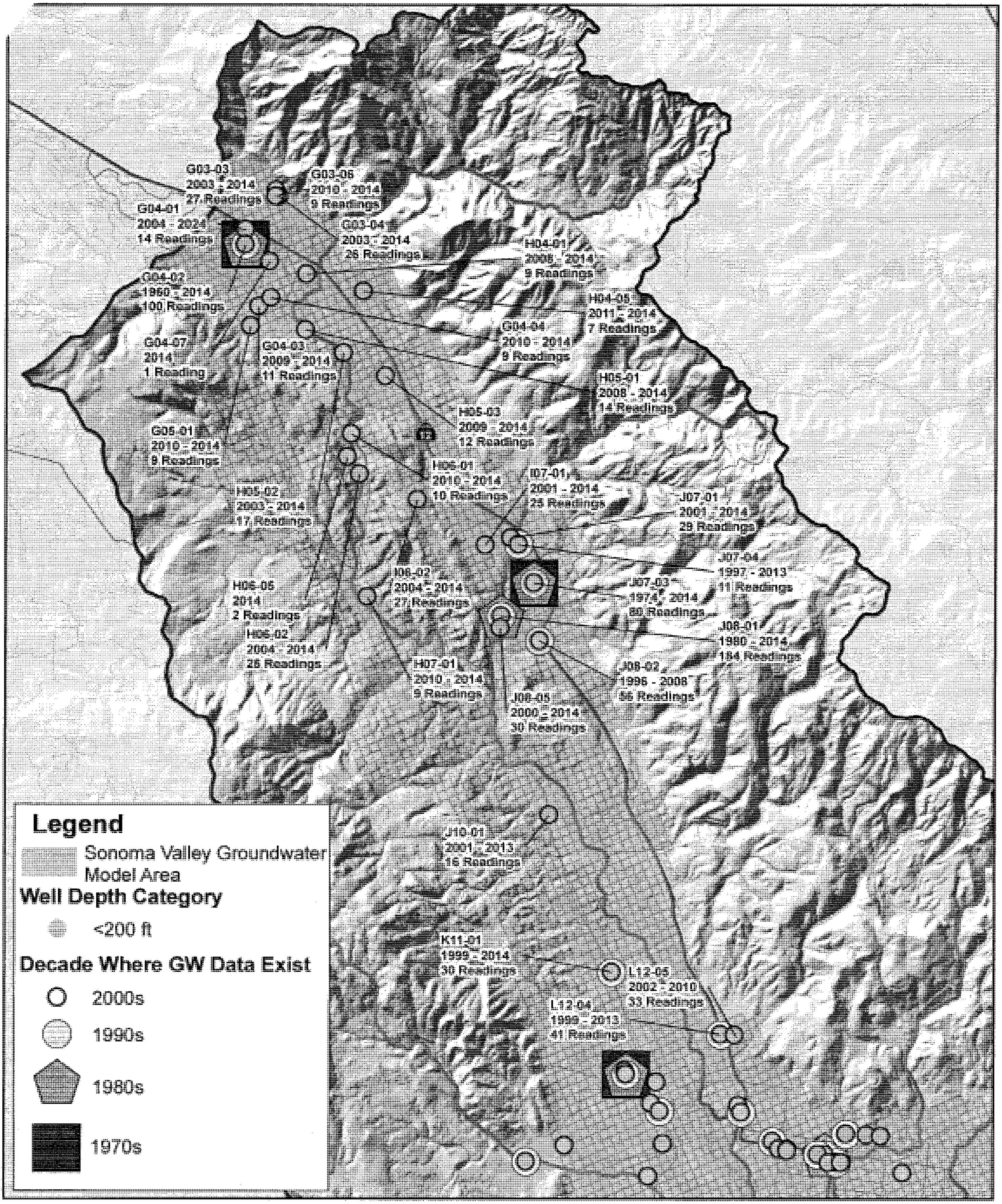

Sonoma Valley
Groundwater Management Program
Groundwater Monitoring Well Coverage
Shallow Wells - Northern Valley

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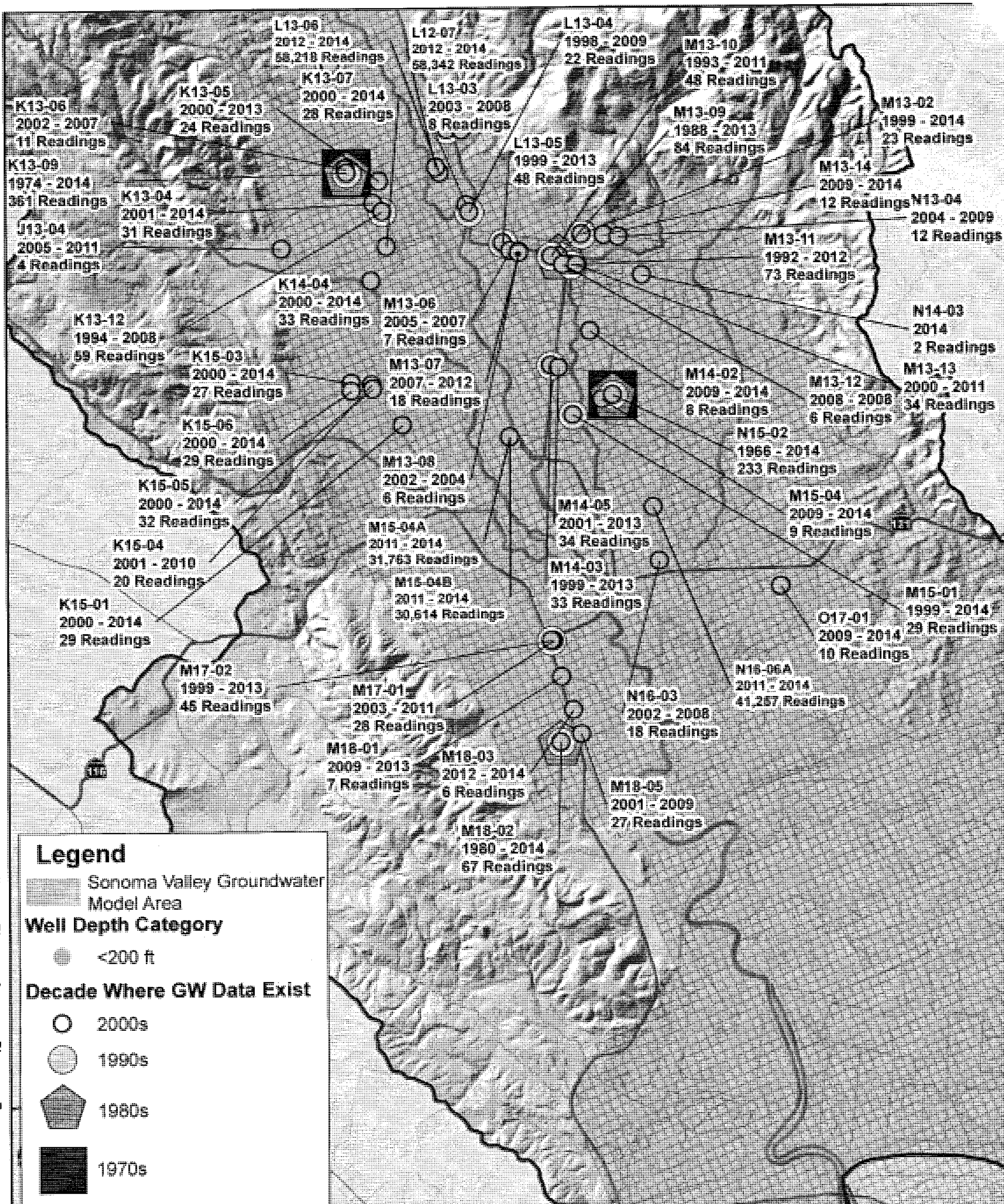

Sonoma Valley
Groundwater Management Program
Groundwater Monitoring Well Coverage
Shallow Wells - Southern Valley

January 13, 2015

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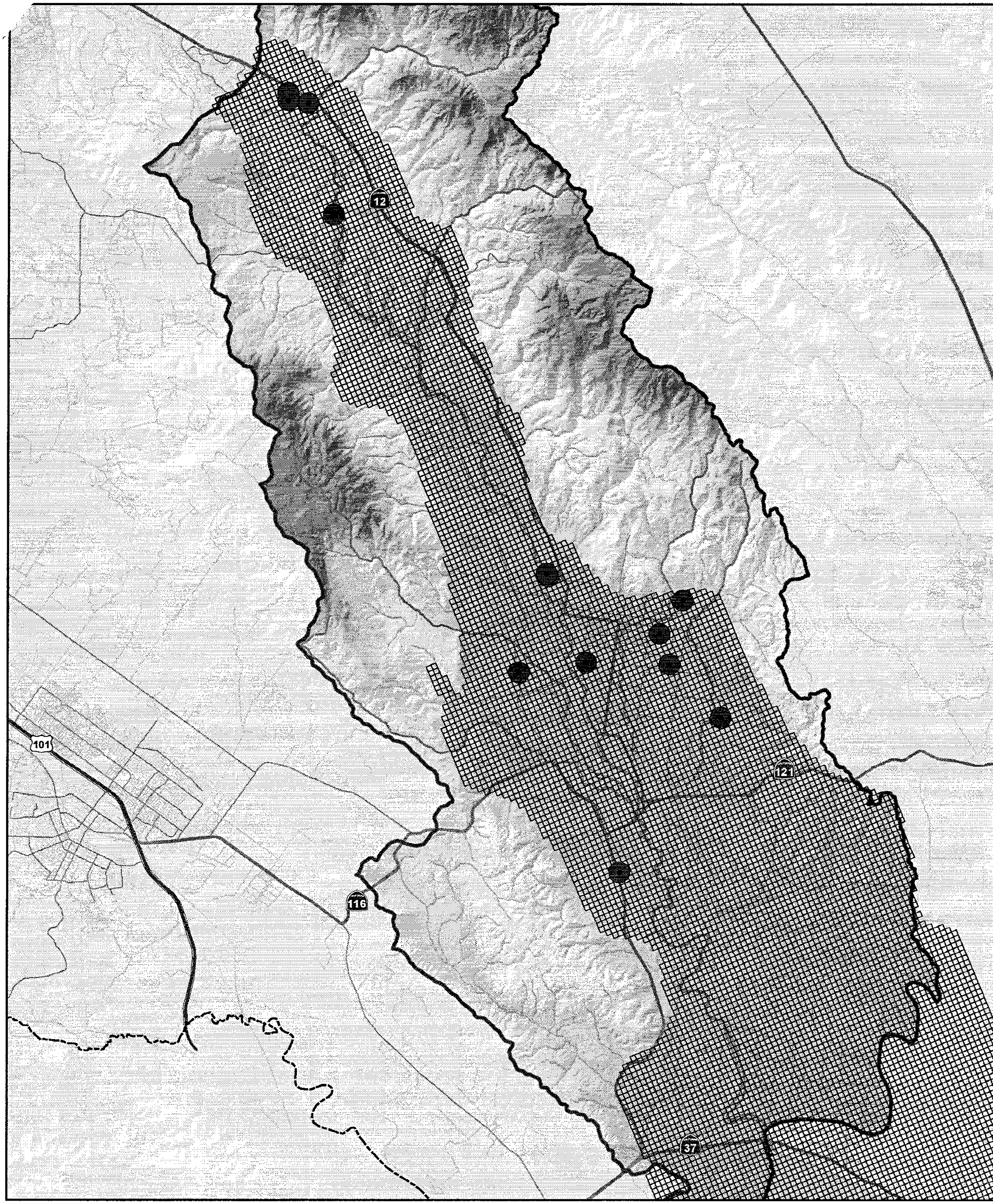

Sonoma Valley
Groundwater Management Program

DRAFT

Wells used for Model Calibration Assessment

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January 13, 2015

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POTENTIAL BMO STAGES (TRIGGERS & ACTIONS)

PHASE 1

Applies to: **Wells Currently Exhibiting Relatively Stable Groundwater Levels**

Potential Triggers:

- Groundwater levels fall below historical low or significantly exceed historical seasonal fluctuation.
- Groundwater level trends exhibit a declining trend.
- During wet season or wet year, recovery not occurring and/or exceedance of historic lows

Potential Actions:

- Verification monitoring, and if appropriate, additional evaluation regarding cause of declines.
- Notifications to stakeholders in area affected by Phase 1.
- Promote conservation measures according to guidelines (to be developed).

PHASE 2

Applies to: **Wells Currently Exhibiting Persistent Groundwater Level Declines over One or More Hydrologic Cycle****

Potential Triggers:

- Groundwater levels do not recover.
- Rate of declining groundwater level trends continues.

Potential Actions:

- If appropriate, additional evaluation regarding cause of declines.
- Notifications to stakeholders in area affected of Phase 2 and local planning agencies.
- Implement conservation measures according to guidelines (to be developed)
- Develop list of options for actions and alternatives for increasing local supplies, redistributing pumping stresses, and reducing demands.

PHASE 3

Applies to: **Worsening Conditions in Areas with Wells that Have Exhibited Persistent Groundwater Level Declines Over Several Hydrologic Cycles**

Potential Triggers:

- Rate of groundwater level declining trends significantly worsen.
- Groundwater levels approach x feet from bottom of well perforations for x percentage of wells within the GMA.
- Documentation of wells going dry.
- Documentation of increased depletion of streamflow correlative with declining groundwater levels.
- Groundwater quality changes correlative with declining groundwater levels.

Potential Actions:

- If appropriate, additional evaluation regarding cause(s) of declines.
- Notifications to stakeholders in area affected of Phase 3 and local planning agencies.
- Implement conservation measures according to guidelines (to be developed).
- Implement actions and alternatives identified during Phase 2*** including alternatives for increasing local supplies, redistributing pumping stresses, and reducing demands.

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*For these potential triggers, the timeframe for the triggers must be considered (eg, 3-year moving average for trendline, complete hydrologic cycle, etc.) and multiple timeframes may be needed to align with specific actions.

** Many wells located within southern Sonoma Valley currently fall into this Phase

***The process of developing options for actions and alternatives is currently being conducted for southern Sonoma Valley through the Alternatives Analysis, which will consider feasibility, funding, effectiveness and other factors

Possible Alternatives Screening & Preliminary Analysis
Assess Technical, Regulatory, & Institutional Options to Address Groundwater Depletion

Possible Technical Approaches	
Stormwater Capture & Recharge	Assess how much stormwater is potentially available and could be captured and recharged, optimal recharge locations, and facilities needed.
Option 1 Assumptions	*Medium to large scale project(s)* Possible location(s) Capture volume Cost range Timing Cost/AF Facilities description:
Option 2 Assumptions	*Agricultural distributed stormwater capture and recharge* Distributed across alluvial basin Capture volume Cost range Timing Cost/AF Facilities description:
Option 3 Assumptions	*Domestic distributed stormwater capture and recharge (LID approach)* Distributed across alluvial basin Capture volume Cost range Timing Cost/AF Facilities description:
Groundwater Banking	Bank imported Russian River in Sonoma Valley aquifers using wells. Evaluate how much Russian River water could potentially be banked, optimal banking locations, and the

	facilities needed.
Option 1 *Assumptions*	Water Contractor facilities One to two wells each for City of Sonoma and Valley for the Moon Water District Distributed in areas of City and Valley of the Moon jurisdictional areas Recharge volume Cost range Timing Cost/AF Facilities description:
Option 2 *Assumptions*	Facilities outside Water Contractor areas One to two wells each for both of the depleted areas Distributed in the two groundwater depletion areas jurisdictional areas Recharge volume Cost range Timing Cost/AF Facilities description:
Increase Recycled Water	Increase the use of recycled for agricultural and landscape irrigation. Evaluate recycled water availability with Sonoma County Sanitation District build out as in lieu substitution to reduce groundwater demand, and optimal locations for application.
Option 1 *Assumptions*	Agricultural (grape growing) irrigation and commercial landscape irrigation Build-out of Sonoma Valley Sanitation District plant recycled water piping Distributed in rural areas in southern Sonoma Valley Groundwater replacement volume Cost range Timing Cost/AF Facilities description:
Increase Conservation	Increase rural area domestic and agricultural conservation. Assess potential for rural domestic conservation by reducing groundwater demand using tools and incentives

	available for urban area BMPs. Develop assumptions and evaluate potential additional viticulture and non-viticulture additional conservation amounts.
Option 1 *Assumptions*	Rural domestic conservation Number of domestic residences and approximate savings per residence Distributed in rural areas in southern Sonoma Valley Groundwater replacement volume Cost range Timing Cost/AF Facilities description:
Option 2 *Assumptions*	Rural agricultural conservation Number of acres and approximate savings per acre Distributed in rural areas in southern Sonoma Valley Groundwater replacement volume Cost range Timing Cost/AF Facilities description:
In Lieu Surface Water Substitution for Groundwater	Assess potential for expanding deliveries of surface water for in lieu substitution to meet groundwater demands, focused in areas of groundwater declines, considering conveyance and connection costs.
Option 1 *Assumptions*	Rural agricultural and domestic wells replacement with imported surface water Number of wells to replace, cost of conveyance piping and connection Requires additional institution or institution expansion Distributed in rural areas in southern Sonoma Valley Groundwater replacement volume Cost range Timing Cost/AF Facilities description: **Requires Storage**

Pumping Redistribution	Assess potential for pumping redistribution to reduce demand in areas of groundwater level decline.
Option 1 *Assumptions*	Rural agricultural and domestic pumpage redistributed from groundwater depletion areas Number of wells to replace, cost of conveyance piping and connection May additional institution or institution expansion Distributed in rural areas in southern Sonoma Valley Groundwater replacement volume Cost range Timing Cost/AF Facilities description: **Requires Conveyance and may require New Wells**
Surface Water Storage	Assess the potential for small and large surface water storage ponds as temporary storage to offset a portion of agricultural groundwater demands.
Option 1 *Assumptions*	Small surface storage ponds (No. acre/storage volume) Number of acres of storage ponds Distributed in rural areas in southern Sonoma Valley Groundwater replacement volume Cost range Timing Cost/AF Facilities description:
Option 2 *Assumptions*	Large surface storage ponds (No. acre/storage volume) Number of acres of storage ponds Distributed in rural areas in southern Sonoma Valley Groundwater replacement volume Cost range Timing Cost/AF Facilities description:
Salinity Intrusion Mitigation	Consider different options and preliminary cost estimates for salinity intrusion mitigation.

Option 1 *Assumptions*	Replace groundwater wells with imported surface water along southern valley Number of wells Distributed along southern Sonoma Valley Groundwater replacement volume Cost range Timing Cost/AF Facilities description:
Option 2 *Assumptions*	Injection wells along southern valley – recycled water and/or imported water Number of wells Distributed along southern Sonoma Valley Groundwater replacement volume Cost range Timing Cost/AF Facilities description:
Desalination	Consider different options and preliminary cost estimates for seawater desalination.
Assumptions	Desalination plant with intake at San Pablo Bay Groundwater replacement volume Cost range – $0.5-1.0B capital cost Cost/AF - $+1,000 per AF
Baseline	
No Action Alternative	Considers the costs and consequences of not taking action – no changes to current practices.
Build on Adopted County General Plan Policies	
Groundwater Availability Map	Originally based on CA Geologic Survey Special Report 120, Geology for Planning in Sonoma County 1980. Work with PRMD to update the Groundwater Availability Map with more recent data published by USGS and SVGMP for use in land use planning decisions.
Policy WR-1u	"In the marshlands and agricultural areas south of Sonoma and Petaluma require all

	environmental assessment and discretionary approvals to analyze and. where practicable, avoid any increase in saltwater intrusion into groundwater." Possible action:
Goal WR-2	"Manage groundwater as a valuable and limited resource. "
Policy WR-2c	"Work with well drillers and other parties familiar with groundwater conditions in Sonoma County to develop well permit standards…" *Possible action*: Work with PRMD and provide input on Draft Ordinance for well permits and procedures.
Policy WR-2d	"Continue the existing program to require groundwater monitoring for new or expanded discretionary commercial and industrial uses using wells. Where justified by the monitoring program, establish additional monitoring requirements for other new wells. Possible action: Work with PRMD to specify areas where additional discretionary monitoring might be considered for new wells in depletion zones.
Policy WR-2e	"Requirements for proof of groundwater and test wells in Groundwater Availability Map Class 3 & 4 areas" including hydrogeologic report that establish groundwater quality and quantity." Possible action: Assess expansion of areas where "proof of available groundwater" is required, and may be linked to the update of the Groundwater Availability Map.
Possible Institutional Approaches	
Benefit Assessment District	An involuntary charge that property owners pay for a public improvement or service that provides a special benefit to their property. The amount of the assessment is directly related to the amount of the benefit their property receives.
Irrigation District	May control, distribute, store, spread, sink, treat, purify, recapture and salvage any water including but not limited to sewage waters for the beneficial use or uses of the district or its inhabitants or the owners of rights to waters therein.
Water Conservation District	May conserve, store, spread, and sink water and for such purposes may acquire or construct dams, damsites, reservoirs and reservoir sites, canals, ditches and conduits, spreading basins, sinking wells, and sinking basins, and may sell, deliver, distribute, or otherwise dispose of any water that may be stored or appropriated, owned, or controlled by the district.

Water Replenishment District	Within or outside of the district to construct, purchase, lease, or otherwise acquire, and to operate and maintain necessary waterworks and other works, machinery and facilities, canals, conduits, waters, water rights, spreading grounds, lands, rights and privileges useful or necessary to replenish the underground water basin within the district, or to augment the common water supplies of the district.
Expand Existing Institutions	Geographic jurisdictional expansion of existing institutions.
Hybrid	Combination of some of the above.
Other	Include other options if available.
Possible Legislative Amendments to AB3030	Current discussions by the Governor's Administration, the State Legislature and groundwater industry leadership indicate the need for and general agreement that groundwater management needs improvement statewide. Legislation may include additional requirements and authorities for Groundwater Management Plans.