SOLANO IRRIGATION DISTRICT

SENATE BILL 1938

GROUNDWATER MANAGEMENT PLAN UPGRADE

January 2006

SUMMERS ENGINEERING, INC.
Consulting Engineers
Hanford, California

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INTRODUCTION

District Information

The Solano Irrigation District (District), Plate 1, was organized in 1948 under the provisions of the California Irrigation District Law for the purpose of contracting for a surface water supply from the Solano Project being developed by the U. S. Bureau of Reclamation. The District is located in Solano County along Interstate 80 from approximately Fairfield in the southwest to the Dixon-Davis area in the northeast. It extends into several small valleys in the Fairfield and Vacaville area, but the majority of the District lands lie to the east of the Vaca Mountains. At present, there are approximately 72,500 acres in the District.

Following the District's formation, a substantial effort was initiated by the District and Solano County resulting in project authorization and congressional funding for the construction of Monticello Dam and Lake Berryessa, the Putah Diversion Dam, the Putah South Canal, and the District's irrigation distribution system. The construction of Solano Project facilities was completed in six years and the first project water delivered in the spring of 1959. All lands within the District had water available by the spring of 1963. A principal purpose of the supplemental Solano Project water supply was to offset the overdraft which resulted from groundwater extraction for irrigated agriculture in Solano County.

Groundwater Management Plan Upgrade

In 1995, following public hearings, the District adopted a Groundwater Management Plan prepared in accordance with the requirements of Assembly Bill 3030. Since adoption of the Groundwater Management Plan, the District has continued monitoring the groundwater levels and quality within its service area to assure groundwater resources of the basin are maintained and sustainable for the beneficial use of all parties. Senate Bill 1938, passed by the legislature and approved by the Governor in

September 2002, encourages an agency with an existing groundwater management plan to upgrade its plan if it wants to be eligible for state funds which may become available in the future for the construction of groundwater projects or groundwater quality projects in Solano County. The District made the decision to upgrade its existing Groundwater Management Plan to be eligible for any future available funding.

A letter was sent to cities and public water agencies in the Solano County Putah Creek Fan which utilize groundwater resources notifying them of the District's plan to upgrade their Groundwater Management Plan. The District also notified farmers through the District Irrigation Newsletter. A Public Hearing was held on August 15, 2005, to provide interested parties with information on the anticipated changes which might be incorporated into an upgraded Groundwater Management Plan and to give everyone the opportunity to provide comment on any issues of concern regarding groundwater management within the Solano Irrigation District. A copy of the letter sent to Public Agencies and the Irrigation Newsletter notification is included in Appendix A.

GROUNDWATER BASINS

The Solano Irrigation District is located within two different groundwater basins as described by the California Department of Water Resources in Bulletin 118 (Update 2003). The Vaca Mountains west of Vacaville divide the District between the San Francisco Bay Hydrologic Region and the Sacramento River Hydrologic Region. The two different groundwater basins depicted on Plate 2 are named the Solano Subbasin and the Suisun-Fairfield Groundwater Basin. The Suisun-Fairfield Groundwater Basin includes the District lands located in Green Valley, Suisun Valley, and the area southerly and westerly of Fairfield. The Solano Subbasin is located in the southwestern portion of the Sacramento-San Joaquin Delta and includes the vast majority of the agricultural lands of the District. Plate 3 indicates the boundaries of other adjacent public agencies that overlie the same groundwater basins.

GEOLOGY AND GROUNDWATER RESOURCES

The geology and groundwater resources of the Solano Irrigation District have been described and detailed in various reports prepared by the U.S. Bureau of Reclamation, the California Department of Water Resources, and the United States Geological Survey (U.S.G.S.). The most detailed report on geology and groundwater resources for the Solano County area was prepared by the U.S.G.S. in their Water Supply Paper 1464. Geologic mapping and field studies were conducted for this report during the 1950's and the report was published in 1960. The Solano Irrigation District prepared a "Groundwater Resources" report summarizing existing data and many of the previous groundwater reports in 1988.

District acreage is located in seven different hydrogeologic sub areas within Solano County as indicated on Plate 4. Following is a general description of the geology and groundwater resources for each sub area.

Putah Creek Fan (Area I)

Putah Creek, after leaving its narrow canyon in the Vaca Mountains, flows southeasterly from the foothills towards the Sacramento River where it has deposited a delta-like mass of sands, gravels, and silts. This deposit is usually referred to as an alluvial fan. The apex of the alluvial fan lies near Winters and the fan deposits, through geologic time, have spread out to the east and southeast for a distance of approximately twenty miles.

An alluvial fan is formed over geologic time by a creek which has often changed its course through the years. Sands and gravels are deposited by high velocity flows during times of flood while lower velocity flows deposit silts. Without obstructions, the Putah Creek Fan would have swung farther to the north into Yolo County. Putah Creek's swing to the north, however, was limited by the low hills associated with the Dunnigan-Plainfield anticline; an up-arching of older sedimentary deposits. This constraint resulted

in the Putah Creek Fan being developed in what is now easterly Solano County. The alluvial deposits in the Putah Creek Fan extend to depths of 50 to 130 feet. The shallowest deposits are found near the apex of the fan close to Winters, while to the east and southeast near Dixon they become thicker.

Within the Solano Irrigation District, the most productive groundwater wells have been those constructed in the Putah Creek Fan which tap the groundwater aquifers in the alluvial material and the underlying coarse grained sediments of the Tehama Formation. The Tehama Formation is a mixture of sandy clays, sands, gravels, and related sediments which daylights in the English Hills westerly of Interstate 505. The Tehama Formation extends to depths of nearly 3,000 feet beneath the central and eastern portions of the Putah Creek Fan. The specific capacity for wells in the Putah Creek Fan typically exceeds 20 gallons per minute/foot (gpm/ft) and well flows have exceeded 2,000 gallons per minute (gpm).

Los Putos Foothills (Area II)

This sub area consists of the rolling hills between Vacaville and Lake Solano and includes the easterly region of the English Hills. These hills are outcrops of the Tehama Formation which contain the only aquifers that might be expected in the sub area. There are some stringers of shallow alluvium of which Sweeney Creek is the most extensive. This alluvium, however, is insignificant as a source of groundwater. Test holes drilled by the District in 1988 indicate there are few gravel layers in the upper 1,000 feet of the Tehama Formation near Interstate 505 in this sub area. See Plate 4 for location. The electric logs suggest that the coarse grained gravels of the Tehama Formation may be found at depths ranging from 1,000 to 2,000 feet at this location. Westerly of the District boundary, gravels in the upper portion of the Tehama Formation may be present at relatively shallow depths.

Southwest Putah Plain (Area III)

The Southwest Putah Plain lies to the south and west of the Putah Creek Fan. The soils in this area are alluvial in nature but have been deposited from the smaller streams such as Sweeney, Ulatis, and Alamo Creeks. These alluvial deposits consist mostly of clay and have thinner less extensive and less permeable gravels than those of the Putah Creek Fan. The alluvial deposits in this sub area also overlie the Tehama Formation. The coarse grained permeable zones of the Tehama Formation have been tapped by the wells of the City of Vacaville along Elmira Road where wells to a depth of approximately 1,200 feet have been drilled.

English Hills Vaca Valley (Area IV)

Portions of the District are located within Vaca Valley and on the westerly slopes of the English Hills. This sub area is underlain by old sedimentary rocks. Such rocks are usually considered non-water bearing. Small supplies of groundwater, however, may be obtained from sandstones which are poorly cemented or from fractured cemented sandstones. The yield of wells in this area is usually only a few gallons per minute.

Tolenas Bench (Area V)

The Tolenas Bench is used to designate the sub area which extends for about 8 miles northeasterly from Fairfield, and in which there is essentially no pumping of groundwater. Topographically, the Tolenas Bench is characterized by many flat valleys and low hills. The valleys are underlain by alluvial deposits less than 100 feet thick. Beneath the thin alluvium are hard non-water bearing rocks. Some water may be found in fractures, but such water is highly mineralized. The alluvium, much of it deposited by Laurel Creek, has poor permeability.

Suisun Valley (Area VI)

The Suisun Valley sub area is underlain by the alluvium of Suisun and Ledgewood

Creeks deposited during the same geologic period as the Putah Creek Fan. However, because these creeks have smaller flows the alluvial materials are finer-grained and less permeable. There are many silty sands and only thin gravel layers. In the upper reaches of Suisun and Ledgewood Creeks, the alluvium is narrow and less than 100 feet deep. Further south where the valley widens, the alluvial deposits thicken to 200 feet or more. In the southern area, the top 50 feet is mostly clay and the gravel layers are found at greater depths. Beneath the alluvial deposits are old sedimentary and volcanic rocks containing highly mineralized waters. Well yields in the alluvium beneath Suisun Valley average about 200 gpm with specific capacities around 5 to 10 gpm/ft. The old (cretaceous) rocks tributary to Suisun and Ledgewood Valleys contain highly mineralized waters, including high boron concentrations. Waters draining from these rocks into the alluvium of Suisun Valley have created a general problem of elevated boron concentrations limiting the use of these waters for many crops.

Green Valley (Area VII)

The Green Valley sub area, located in the extreme southwestern corner of the Solano Irrigation District, has some unique hydrogeologic characteristics. This valley has been developed by erosion along an important north-south geologic structure, the Green Valley Fault. Active fault movement has stopped and the outcrop of the fault trace has been covered by the alluvial deposits of Green Valley Creek. Beneath these alluvial deposits are the Sonoma volcanics. Whereas drilling into the bedrock below Suisun Valley would not be expected to yield reasonable quantities of good quality water, deeper drilling in Green Valley would have a much better chance of success. The specific capacity of wells in this area, however, is only about 2 gpm/ft.

HISTORICAL MANAGEMENT OF GROUNDWATER RESOURCES

Prior to the construction of the Solano Project and the start of surface water deliveries to the Solano Irrigation District in 1959, groundwater levels in the Putah Creek Fan

were dropping due to the excessive agricultural groundwater pumping. With the arrival of a surface water supply there was a significant reduction in groundwater pumping. The combination of reduced pumpage and recharge from the surface water applications caused a reversal in the downward trend of water levels. Within a short number of years shallow groundwater levels occurred in some areas of the District. This reversal is documented by Plate 5 which shows historic groundwater profiles across the Putah Creek Fan. In accordance with their contract with the U.S. Bureau of Reclamation for a distribution loan, the District installed a grid of shallow groundwater wells throughout the District. These observation wells together with other wells scattered throughout the District continue to be measured regularly to monitor the groundwater level status within the District.

In order to conjunctively use the groundwater in the Putah Creek Fan, the District applied for a Rehabilitation and Betterment Loan from the U.S. Bureau of Reclamation in 1967. When loan funds became available in 1971, a portion of the funds were used to undertake a program of well construction to give the District the capability of increasing their groundwater pumping in the critical shallow water table areas of the Putah Creek Fan near Dixon. The District began its program of constructing drainage wells based on the depth to groundwater levels measured in the fall of 1966 and the spring of 1967. The District drilled eleven drainage wells between 1971 and 1974 that give the District the flexibility of pumping additional groundwater when shallow groundwater levels begin to rise within the District. The wells are predominately located in areas where the discharge from the wells can be introduced into the existing distribution system to augment the District's surface water supply. In addition, the District entered into cooperative agreements with many landowners whereby private deep wells were turned over to the District for operation, maintenance, and water supply purposes. The District operates these existing deep wells to manage both the elevation of shallow groundwater and also, during drought periods, to provide an additional supply of water for the District.

Groundwater levels are also monitored and contour maps have been prepared by the District and by the Solano County Water Agency providing an ongoing status for groundwater conditions in the service area. Through the years the Department of Water Resources, the U. S. Bureau of Reclamation, and the U.S. Geological Survey have also monitored water levels in various wells located throughout the service area. The District obtains water quality analyses on a rotating basis for some agricultural wells in the Putah Creek Fan. Additional analyses are performed, when needed, throughout the service area. Concern regarding the potential for groundwater contamination plus additional monitoring regulations, have increased the number of analyses in recent years.

GROUNDWATER MANAGEMENT PLAN GOALS

Groundwater is an important factor in the District's water supply, and their overall goal in preparation of this plan is to help maintain a long term, sustainable, reliable supply of high quality groundwater which will benefit the water supplies for all parties within the service area. Senate Bill 1938 incorporated all of the original Assembly Bill 3030 groundwater management plan requirements but stated the new plan should also include basin management objectives, "... components relating to the monitoring and management of groundwater levels within the groundwater basin, groundwater quality degradation, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping in the basin."

The upgraded plan includes the following specific basin management objectives:

1. Monitor and manage groundwater levels that will result in a net benefit to groundwater users throughout the District.
2. Strive to maintain a reliable and consistent groundwater quality for the beneficial use of groundwater users in the District.
3. Strive to minimize the risk of future significant impacts from land surface

subsidence.

4. Facilitate conjunctive use operations which will encourage the optimum beneficial use of water resources within the District.

Within the Solano Irrigation District there are only small uncontrolled streams flowing easterly out of the Vaca Mountains or westerly and southerly through Suisun Valley (See Plate 1). There are no substantial surface steams where changes in flow and surface quality directly affect groundwater levels or quality or are significantly impacted by groundwater pumping in the basin. The flows in Putah Creek, located north of the District boundaries, and the source of the surface water supply provided by the Solano Project are managed by water right agreements recently resolved through litigation. Therefore, no basin management objective is included in this plan addressing management of surface flows and surface water quality.

GROUNDWATER MANAGEMENT PLAN COMPONENTS

Monitoring of Groundwater Levels

One of the primary objectives of the groundwater management plan is to provide the means to expeditiously monitor and analyze groundwater use and trends in order to be in a position to recommend any necessary actions for the wise and beneficial use of groundwater resources in the service area. As mentioned, monitoring wells were installed in the Solano Irrigation District following the construction of the distribution system in the early 1960's. Depth to groundwater measurements have been made on an annual basis in the spring and fall of each year. The District will evaluate on an annual basis changes in groundwater levels, and, if appropriate, recommend necessary actions that will result in a net benefit to groundwater users throughout the District. The number and location of existing monitoring wells will also be evaluated and recommendations regarding the installation of additional monitoring wells will be made as needed.

Water Quality Monitoring

The District will continue to monitor groundwater quality on a rotating basis using existing agricultural wells in the District service area. Groundwater quality is generally excellent except for high naturally occurring boron levels in Suisun Valley and in recent years high nitrate levels around Dixon in the Putah Creek Fan. It appears the higher nitrate levels originate in the shallower sediments. It is thought the nitrate levels are due to farming practices or from percolation from the many dairies and industries that historically were located in the area. Ongoing monitoring of water quality at select wells throughout the service area will provide a basis for determining if there is any future degradation to groundwater quality.

Land Subsidence Monitoring

Differential land surface subsidence has occurred in several California groundwater basins following excessive groundwater pumping and the lowering of water levels. Significant land surface subsidence has not been reported in Solano County. A recent level circuit conducted from the Putah South Canal to near the northeast corner of the District indicated bench mark elevations along the Vaughn Canal were almost identical with the elevations originally established when the canal was constructed nearly 50 years ago. To minimize the risk of future land subsidence, the District will continue to monitor and review existing groundwater levels. Significant variations from the historic groundwater levels would indicate there is a greater risk of land subsidence.

Facilitate Conjunctive Use Operations

Conjunctive use includes the planned management and coordination of two or more water resources to accomplish the greatest long term benefit. Conjunctive use has the goal of balancing recharge and extraction of groundwater over a given time. Excessive pumping in a groundwater basin has the potential of lowering groundwater levels and increasing water quality deterioration if there is not adequate long term recharge occurring. The Solano Irrigation District has practiced and facilitated a conjunctive use

operation since the construction of the Solano project in the early 1960's. One reason the construction of the Solano Project was pursued was because of the over pumping and lowering of groundwater levels in the Putah Creek Fan. When the District first began delivery of water to lands in the Putah Creek Fan, groundwater levels near Dixon were approximately seventy-five feet below ground level. The reduction of groundwater pumping following the delivery of surface water caused a significant rise in groundwater levels. Since the late 1960's, spring groundwater levels throughout the Putah Creek Fan have been maintained at a fairly constant level varying from approximately five to thirty feet below ground level.

Following the completion of the distribution system, landowners who now had a surface supply were encouraged to sell their existing wells to the Solano Irrigation District. The District presently owns approximately forty groundwater wells throughout the District. The District drilled or purchased wells to provide the capability of facilitating conjunctive use operations throughout the District, if needed. Some landowners still own and operate their own wells. Additional deep wells were installed by the District adjacent to pipelines, ditches, or conveyance facilities so that the yield of the wells could be delivered into the existing distribution system. The District will continue to encourage landowners wanting to drill additional wells to place these wells adjacent to District distribution facilities so that the well's capacity could be utilized by the District and delivered into District facilities for distribution throughout the District to further facilitate conjunctive use operations.

During the last few years of California's six-year drought (1987-92), increased groundwater pumping occurred to supplement the District's available surface supplies. The increased groundwater pumping did lower groundwater levels in the Putah Creek Fan. The District's limited conjunctive use program allows landowners to pump groundwater when surface supplies are reduced. The availability of a surface water supply limits groundwater pumping in years of excess surface supplies allowing the groundwater basin to recharge and water levels to rise. This is what occurred following

California's six-year drought. Typically, the cost for surface water supplies is less than the energy cost to pump groundwater. Therefore, when the surface supply allocation is adequate, there is usually a minimal need for the District or landowners to pump groundwater to supplement their water supply needs.

Under the Groundwater Management Plan, the District will continue to educate landowners within the District on the costs of well water. The District will review and revise, as necessary, its existing allocation of costs for surface and groundwater supplies to determine if there is a more efficient method for managing conjunctive use operations. If shallow groundwater levels begin to rise in a certain area of the District, the Distinct may attempt to estimate the amount of groundwater which can be made available from District and privately owned wells in that area and attempt to increase the allocation to all District landowners by operating the District wells and offering inducements to private landowners to operate their wells. When surface water is available, however, the District will continue to encourage landowners to use this supply versus groundwater pumping to allow the groundwater levels to recharge in the Putah Creek Fan. Groundwater levels have been maintained at a fairly consistent level in the Putah Creek Fan for the last 40 years. Generally levels have reduced during drought periods when increased pumping has occurred and have risen during excessive wet years when there has been minimal groundwater pumping.

The District will continue to review and analyze the groundwater data developed to determine if there are more efficient methods for facilitating conjunctive use operations in the District. The problem with establishing fixed methods, however, is that there are often many factors affecting conjunctive use operations. The District does not know with certainty the long term surface supply that will be available. Encouraging excessive surface water use when the supply may not be available is counterproductive to efficient water resource planning and management. Cropping patterns are also individual landowner decisions. A change in cropping patterns may affect the total water demand and the availability of water throughout the District. The District plans to

maintain flexible operating criteria concerning management of the groundwater levels in the District due to the uncertainty of supply and annual demand.

Continuing education and information provided to landowners in the District will be an important part of facilitating conjunctive use operations in the District. The District has established an agricultural advisory committee that will be utilized to obtain input and provide information to landowners in the District. Some landowners and their families have been farming in the District for many years and can remember the conditions during the early 1960's, at the commencement of the project, when groundwater levels dropped to the lowest they had ever been in the Putah Creek Fan. These landowners understand the benefits of a conjunctive use program and appreciate the ongoing groundwater management that has occurred within Solano Irrigation District.

Water Management

During the last 20 years the District has had an active water management (conservation) program. During the California 1976-77 and 1987-92 droughts the District was actively involved constructing check dams and installing recovery pumps in various District drains so available tailwater and drainage flows could be utilized as efficiently as possible. This helped minimize the amount of groundwater pumped to meet irrigation supplies. Farmers have also been challenged to increase on-farm irrigation efficiency. As a Federal water contractor, and in response to the requirements of the Central Valley Improvement Act of 1992, the District prepared a Water Conservation Plan in 1997 in accordance with the criteria developed by the U.S. Bureau of Reclamation (USBR). The USBR endorsed this plan and in 2003 the District prepared their first update to their plan. During the 1990's the District attended meetings coordinated by the California Department of Water Resources in response to the *Agricultural Water Suppliers Efficient Water Management Practices Act of 1990* (Assembly Bill 3616). Through this involvement they voluntarily became a signatory of the 1996 *Memorandum of Understanding Regarding Efficient Water Management*

Practices by Agricultural Water Suppliers in California and a founding member of the California Agricultural Water Management Council established thereof.

Well Construction Policy

Solano County has an existing water well ordinance regulating the construction, reconstruction, destruction, and inactivation of water, cathodic protection, and monitoring wells within Solano County. Individuals constructing a well are required to obtain a permit from the County for the construction of such a well. The County has adopted by reference the minimum standard for the construction of wells as specified in the Department of Water Resources Bulletins 74-81 and 74-90. All wells constructed within the Solano Irrigation District are required to meet the minimum construction standards outlined in the Solano County Water Well Ordinance. The District will develop additional construction and well spacing guidelines for the construction of District deep wells, as needed, to minimize concerns related to unanticipated drawdown problems and potential water quality contamination between shallow and deep aquifers.

Development of Relations with State and Federal Regulatory Agencies

The District, due to its many water resource activities, presently maintains a working relationship with State Water Resources Control Board staff and Regional Water Quality Control Board staff that oversee and provide the framework and direction for California's groundwater protection efforts. National policy and direction relating to groundwater protection efforts are provided by the Environmental Protection Agency (EPA). The California Department of Health Services, Division of Drinking Water, has administered for EPA the preparation of Drinking Water Source Assessment and Protection Program reports. The District has prepared several of these reports for groundwater wells providing a potable supply to different developments within the District. The District will continue to evaluate information provided by both the State and Regional Water Quality Control Boards and also the Environmental Protection Agency regarding planning efforts to improve and protect groundwater resources.

Coordination with Local Agencies

The Solano Irrigation District maintains a strong working relationship with public agencies/cities in Solano County that are involved in groundwater resource issues. These include the City of Vacaville, City of Dixon, Maine Prairie Water District, Reclamation District No. 2068, and Solano County. The entities are cooperating on groundwater issues and studies under the auspices of the Solano Water Authority, a Joint Power Authority formed in 1987 to study, plan and finance water projects. The Solano County Water Agency also participates, providing financial support and expertise. The District provides the leadership for interagency groundwater studies. A cooperative study was entered into in 1993 among the District, Vacaville, and the Solano County Water Agency to develop a "Coordinated Groundwater Data Base and Monitoring Program" for the service area (Dixon area groundwater data was also included in the study). The purpose of the study was to build common data bases to provide information on the quality and quantity of groundwater in the Putah Creek Fan/Tehama Formation groundwater basin which could be utilized to analyze and help estimate the impacts of existing and proposed groundwater pumping in the basin.

During the 1990's the Solano Irrigation District and the City of Vacaville, the two largest groundwater users in Solano County, entered into a Master Water Agreement with specific management goals related to groundwater use. The purpose of this agreement was to work together in a cooperative manner to protect and maintain the groundwater resources of the area and to prevent the annual use of groundwater that exceeds the safe yield.

In 1995 the Solano Water Authority developed guidelines for optimum well spacing to minimize potential groundwater impacts from excessive groundwater pumping in the basin. The Solano Irrigation District also recently participated with other basin groundwater stakeholders in the development of guidelines for the upgrade of groundwater management plans originally prepared under Assembly Bill 3030. The

goal was to encourage cooperation and support for the preparation of uniform basin guidelines that would be compliant with the recent amendments to the California Water Code resulting from Senate Bill 1938.

The District will continue to participate in future Solano Water Authority groundwater studies, and will continue to interact with any other agencies, as required, to protect and encourage the wise use of the valuable groundwater resources within the Solano Irrigation District. Where feasible, the District will enter into a Memorandum of Understanding (MOU) with local public entities to encourage the coordination and utilization of groundwater resource information and the development of consistent design criteria.

MONITORING PROTOCOLS

In accordance with Senate Bill 1938, the District is to adopt appropriate monitoring protocols designed "*... to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or groundwater pumping in the basin. The monitoring protocols shall be designed to generate information that promotes efficient and effective groundwater management.*"

The upgraded water management plan includes the following monitoring protocols:

Groundwater Level Monitoring

Under the Groundwater Management Plan, the District will continue monitoring the groundwater levels throughout the District. This will be done by measuring the depth to groundwater in the various District groundwater supply wells and monitoring wells a minimum of twice each year, during the spring and fall. This data will be entered into a computer data base that can be utilized to create hydrographs of individual wells and/or

to prepare groundwater contour maps or other reports summarizing the status of the groundwater basin as needed. On an annual basis a brief report will be prepared summarizing the condition of the groundwater basin.

Static water levels often fluctuate from year to year and sometimes vary substantially within each year. The groundwater extraction, recharge, and storage of a given groundwater basin is considered to be in a good condition or in dynamic equilibrium when water level monitoring determines static water levels have generally stabilized over a period of years and there is neither a continuing increase nor decrease in groundwater levels. To determine whether or not the basin is in a dynamic equilibrium, the long term rise or fall in static water levels needs to be reviewed. It is recommended water levels be monitored for a period of at least five years to determine whether or not this has been achieved. The monitoring program should include a periodic review and evaluation of groundwater use in the area together with a summary of available surface water supplies to determine if there are other factors impacting the rise or fall of water levels. If during this five year period static water levels are found to be dropping in relation to the historic levels or set goals, then the District in their annual report, could issue a "caution" and notify other local agencies that groundwater pumping may be exceeding the acceptable yield of the groundwater basin. This caution period would remain in effect for two years and the District would continue to carefully monitor their groundwater pumping and static water levels. If after this two year period static water levels have not recovered or if they are found to still be dropping, and if there is no water supply emergency justifying continued pumping, then a decision should be made in coordination with other local agencies to reduce the respective annual groundwater pumping of each agency until the static water level measurements stabilize.

Groundwater Quality Monitoring

Groundwater wells providing a potable supply are already required, under Title 22 of the California Code of Regulations, to provide analytical results of domestic water

quality monitoring to the California Department of Health Services Drinking Water Program on a regular basis. The District will also monitor the groundwater quality of agricultural wells in the District. A minimum of 4 District agricultural wells spread out through the Putah Creek Fan will be sampled each summer and an irrigation water quality analysis performed. These 4 wells will be rotated with a different set of 4 wells every other year to develop and maintain a baseline of the service area groundwater quality. The water quality data will be tabulated in a brief annual report. This monitoring and ongoing review of groundwater quality will provide a basis for determining if degradation to groundwater quality is occurring.

Inelastic Surface Subsidence Monitoring

Significant land subsidence has not been reported in Solano County. To further verify whether land subsidence may be occurring, it is recommended a Global Positioning System (GPS) level survey of specific bench marks be performed across the Putah Creek Fan at 5 year intervals. GPS technology will provide the means to quickly and inexpensively determine if land subsidence is occurring. The elevation measurements of selected bench marks would be tabulated every 5 years and then compared to determine the significance of any subsidence occurring within the District service area.

Surface Water Flow and Quality Monitoring

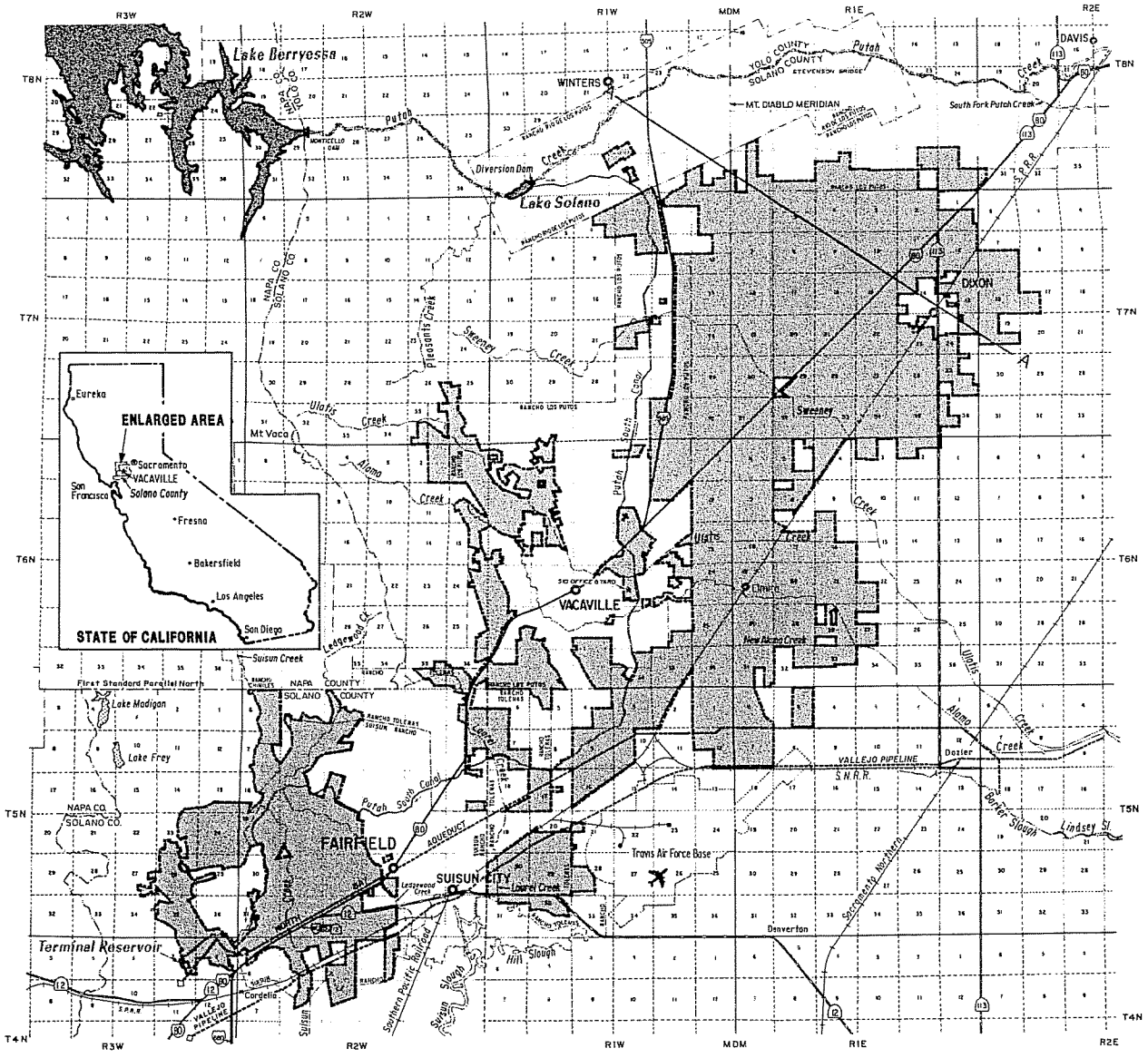
As mentioned, there are only small uncontrolled streams flowing easterly out of the Vaca Mountains or westerly and southerly through Suisun Valley (See Plate 1). There are no substantial steams where changes in flow and surface water quality directly affect groundwater levels or quality or are significantly impacted by groundwater pumping in the basin. Therefore, this groundwater management component is not applicable to the District and specific monitoring protocols are not proposed.

CONCLUSION

The Solano Irrigation District has been active in groundwater management issues since construction of the Solano Project in the 1950's. Implementation of the groundwater management components and the monitoring protocols included in this groundwater management plan upgrade will further promote responsible management of the groundwater basin in coordination with other local agencies and will provide the District with reliable information on current groundwater conditions. This information will help the District manage the groundwater resources available, and as stated in the overall goal, "... help maintain a long term, sustainable, reliable supply of high quality groundwater which will benefit the water supplies for all parties within the service area." The District will strive to meet at least once each year to coordinate its groundwater management plan with other public entities in the basin that utilize groundwater or may be impacted by the plan.

In developing and implementing the plan the District makes a commitment to minimize any adverse impacts on business activities and specifically its impact on agricultural activities. The preparation of this groundwater management plan upgrade shall not be interpreted as authorizing the District to make a determination of groundwater rights for any person or entity and will not authorize the District to limit or suspend any private groundwater extractions. If a determination is made through study and investigation that groundwater levels are dropping in the basin and a dynamic equilibrium is not being maintained, the District will coordinate with other local agencies the joint reduction of groundwater pumping until water levels recover.

Assembly Bill 3030 provided procedures for funding and implementation of groundwater management plans. This was not altered by Senate Bill 1938. However, the District's ongoing groundwater program has always been funded as part of its annual budget and it is not anticipated that any new fees will be imposed to implement the upgraded groundwater management plan.



SOLANO IRRIGATION DISTRICT

VACAVILLE CALIFORNIA

N

Scale of Miles

0 1/2 1 2 3 4 5 6

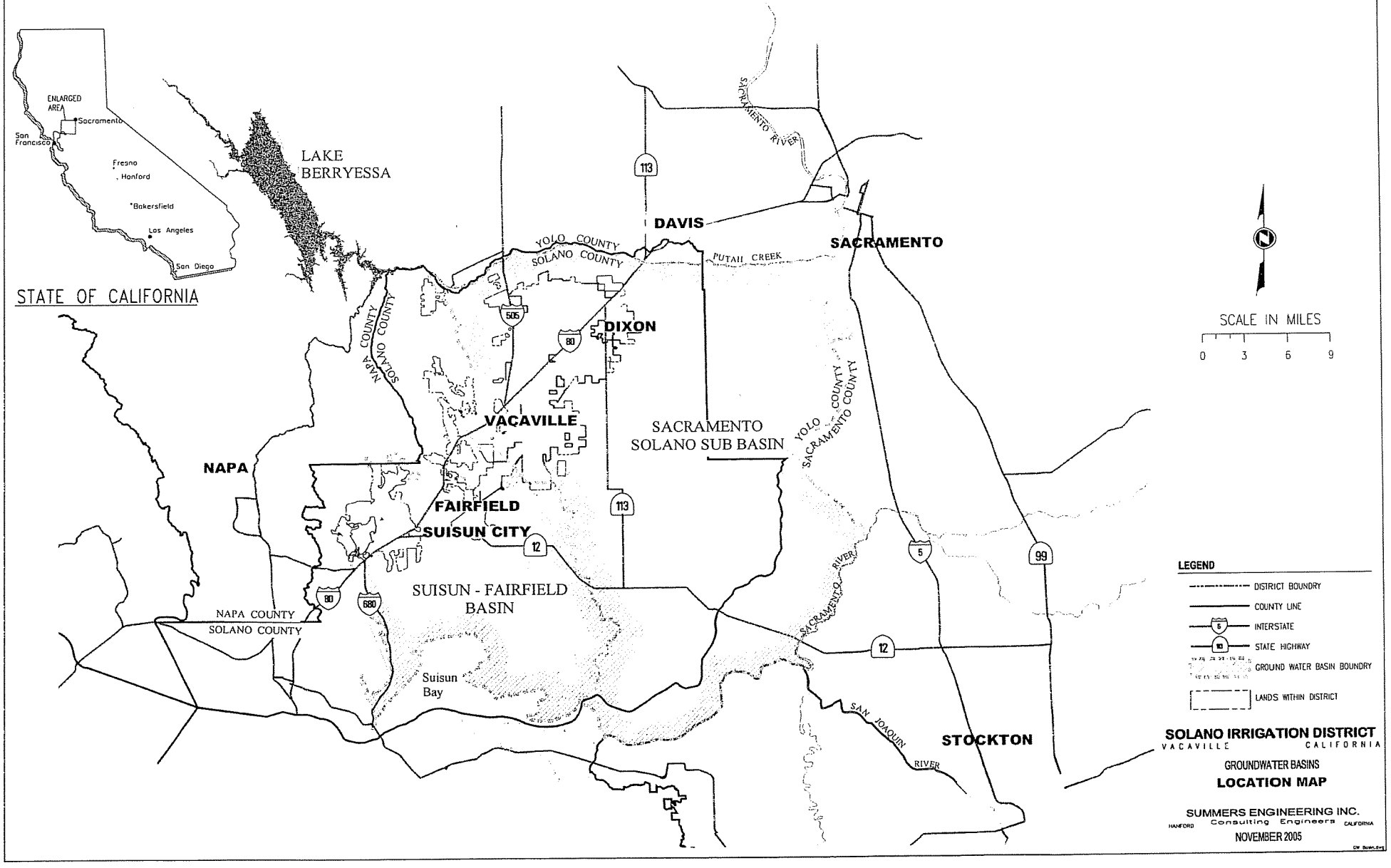
LEGEND

- DISTRICT BOUNDARY
- COUNTY LINE
- LAND GRANT BOUNDARY
- TOWNSHIP LINE
- SECTION LINE
- INTERSTATE HIGHWAY
- STATE HIGHWAY
- CREEK, SLOUGH, CANAL
- CITY
- RAILROAD
- PIPELINE
- AIRPORT (CIVILIAN / MILITARY)
- LANDS INCLUDED WITHIN DISTRICT

SUMMERS ENGINEERING, INC.
Consulting Engineers
HANFORD CALIFORNIA

JUNE 1988

PLATE 2



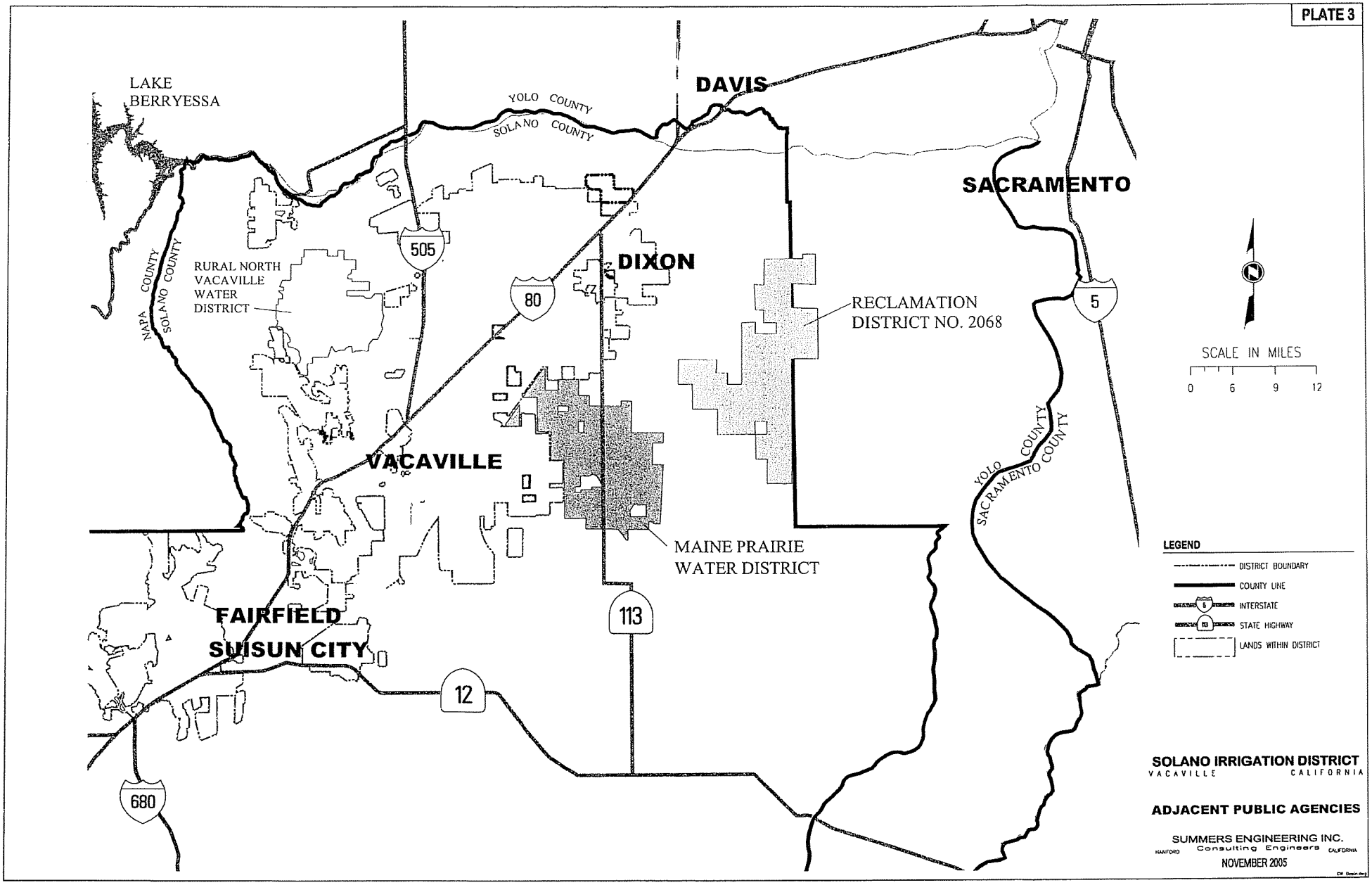
SOLANO IRRIGATION DISTRICT
VACAVILLE CALIFORNIA

GROUNDWATER BASINS
LOCATION MAP

SUMMERS ENGINEERING INC.
HANFORD Consulting Engineers CALIFORNIA

NOVEMBER 2005

PLATE 3

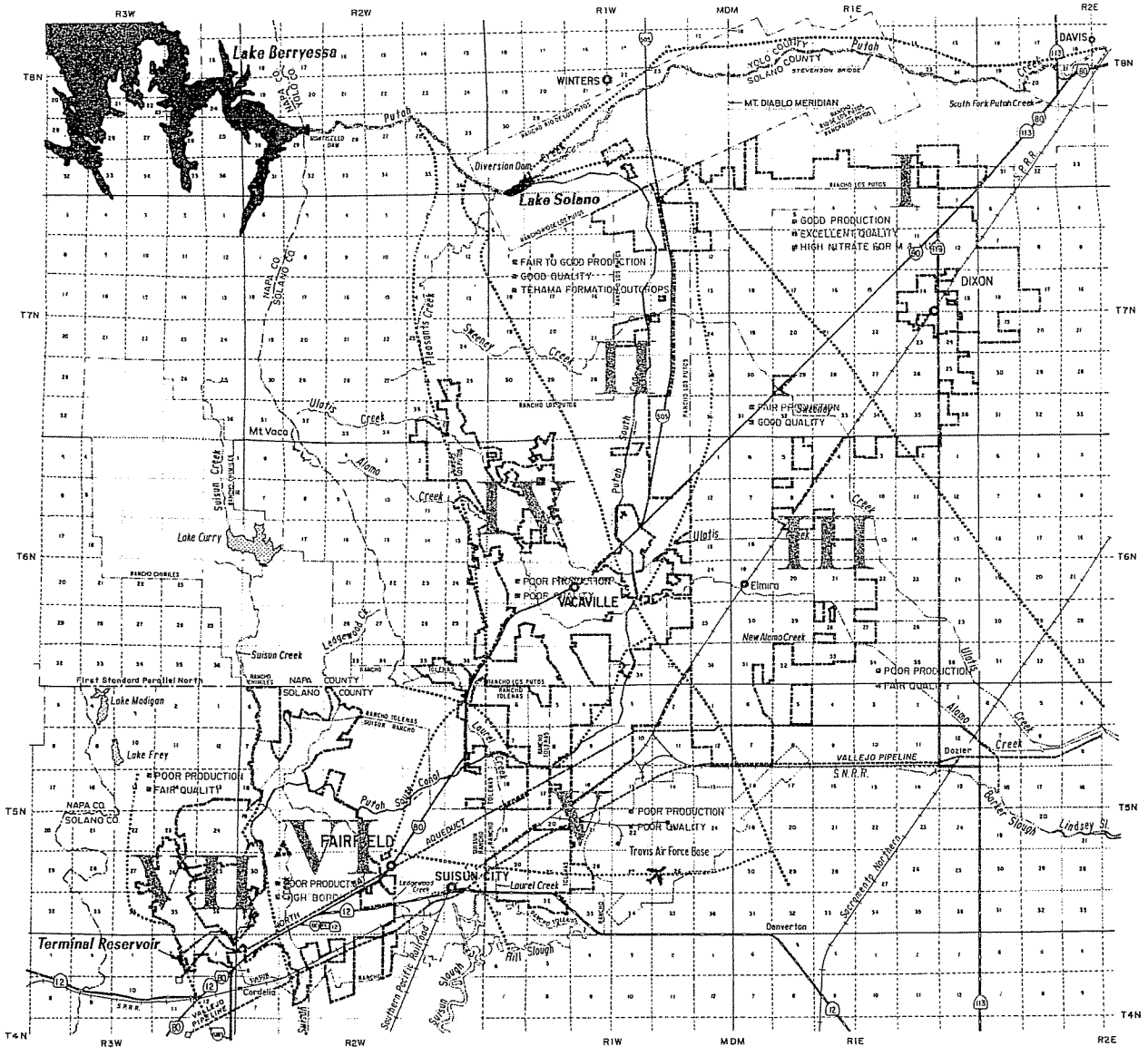


SOLANO IRRIGATION DISTRICT
VACAVILLE CALIFORNIA

ADJACENT PUBLIC AGENCIES

SUMMERS ENGINEERING INC.
HANFORD Consulting Engineers CALIFORNIA

NOVEMBER 2005



SOLANO IRRIGATION DISTRICT

VACAVILLE CALIFORNIA

HYDROGEOLOGIC SUB - AREAS
WITH POTENTIAL GROUNDWATER AVAILABILITY

N

Scale of Miles

0 1/2 1 2 3 4 5 6

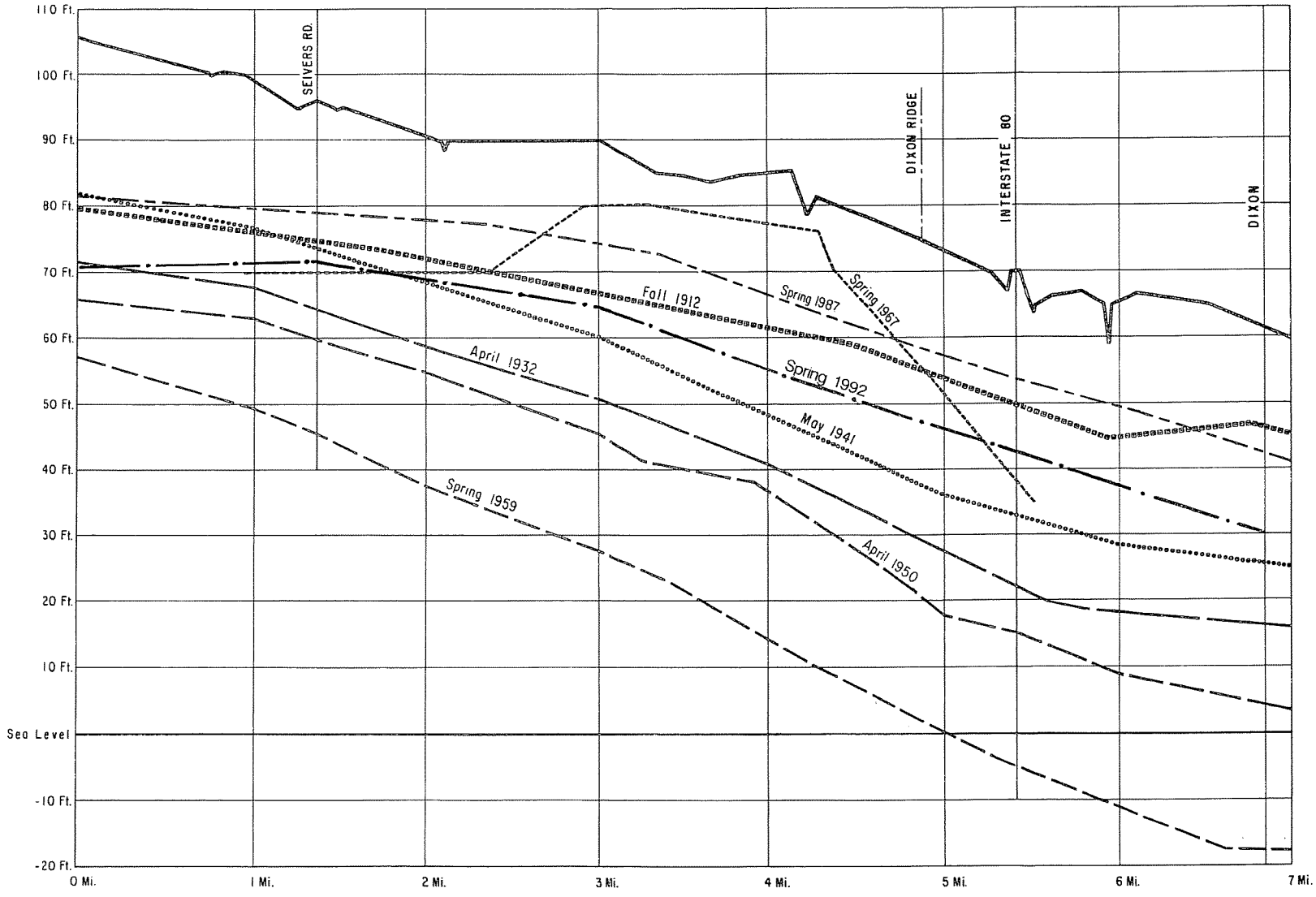
LEGEND

- DISTRICT BOUNDARY
- COUNTY LINE
- LAND GRANT BOUNDARY
- TOWNSHIP LINE
- SECTION LINE
- INTERSTATE HIGHWAY
- STATE HIGHWAY
- CREEK, SLOUGH, CANAL
- CITY
- RAILROAD
- PIPELINE
- AIRPORT (CIVILIAN, MILITARY)

PUTAH CREEK FAN	I
LOS PUTOS FOOTHILLS	II
SOUTHWEST PUTAH PLAIN	III
ENGLISH HILLS/VACA VALLEY	IV
TOLENAS BENCH	V
SUISUN VALLEY	VI
GREEN VALLEY	VII

SUMMERS ENGINEERING, INC.
Consulting Engineers
HANFORD CALIFORNIA

JUNE 1988



NOTE. For Profile Axis See Section A-A Plate 1

SOLANO IRRIGATION DISTRICT
VACAVILLE CALIFORNIA

GROUND WATER PROFILES

FEBRUARY 1995

APPENDIX A

PUBLIC NOTICES

DIRECTORS
ROBERT HANSEN
PRESIDENT - DIV #5

GUIDO E. COLLA
VICE PRESIDENT - DIV #4

ROBERT S. CURREY
DIV #1

BOB BISHOP
DIV #2

GLEN GRANT
DIV #3

OFFICERS
SUZANNE BUTTERFIELD
SECRETARY / MANAGER

SUMMERS ENGINEERING
DISTRICT ENGINEER

MINASIAN, SPRUANCE, MEITH, SOARES & SEXTON
ATTORNEYS

STEPHEN J. CARBONARO
TREASURER

TYPICAL LETTER SENT TO LOCAL PUBLIC AGENCIES

July 20, 2005

Mike Hardesty, Manager
Reclamation District No. 2068
7178 Yolano Road
Dixon, CA 95620-9621

Subject: ***Upgrade of the Solano Irrigation District Groundwater Management Plan***

Dear Mike:

In 1995, the Solano Irrigation District (District) approved a Groundwater Management Plan prepared under the authority of Assembly Bill 3030. During the past 10 years, the District has continued monitoring the groundwater levels and quality within its service area. The District, under Solano Water Authority #2, has been meeting with other public entities utilizing the same groundwater basin. The goal has been to coordinate planning efforts to assure groundwater resources of the basin are maintained and sustainable for the beneficial use of all parties.

Senate Bill (SB) 1938, passed by the legislature and approved by the Governor in September 2002, encourages an agency with an existing groundwater management plan to upgrade its plan if it wants to be eligible for state funds which may become available in the future for the construction of groundwater projects or groundwater quality projects in Solano County. The District has made the decision to upgrade its existing groundwater management plan so it will be eligible for any future funding. A public meeting will be held at 6:00 p.m on August 15, 2005 at the office of the Solano Irrigation District, 508 Elmira Road, Vacaville, CA to discuss the following anticipated changes which will be incorporated into an upgraded groundwater management plan for the Solano Irrigation District:

1. A description of Basin Management Objectives
2. Components relating to the monitoring and management of groundwater levels within the groundwater basin, groundwater quality degradation, land surface subsidence, and changes in surface flow and surface water quality that may directly affect groundwater levels or quality or are caused by groundwater pumping.
3. Monitoring protocols to detect changes in the components listed above.
4. Preparation of a map showing the groundwater basin, District boundaries and the boundaries of other local agencies that overlie the groundwater basin.

You are cordially invited to attend this meeting, listen to the anticipated changes which will be proposed for incorporation into the new plan, and to provide comment on any issues of concern regarding groundwater management within the Solano Irrigation District. If you have any questions, you may reach me at 455-4009.

Sincerely,

Suzanne Butterfield

Suzanne Butterfield
General Manager

SB/RR/kj

SOLANO IRRIGATION DISTRICT
508 ELMIRA ROAD
VACAVILLE, CA 95687

PRESS RELEASE

For Immediate Release

Contact: Suzanne Butterfield
General Manager
455-4009

Upgrade of the Solano Irrigation District Groundwater Management Plan

In 1995 the Solano Irrigation District (District) approved a Groundwater Management Plan prepared under the authority of Assembly Bill 3030. During the past 10 years the District has continued monitoring the groundwater levels and quality within its service area. The District, under Solano Water Authority #2, has been meeting with other public entitles utilizing the same groundwater basin. The goal has been to coordinate planning efforts to assure groundwater resources of the basin are maintained and sustainable for the beneficial use of all parties.

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1. A description of Basin Management Objectives
2. Components relating to the monitoring and management of groundwater levels within the groundwater basin, groundwater quality degradation, land surface subsidence, and changes in surface flow and surface water quality that may directly affect groundwater levels or quality or are caused by groundwater pumping.
3. The District shall adopt monitoring protocols to detect changes in the components listed above.

4. Preparation of a map showing the groundwater basin, District boundaries and the boundaries of other local agencies that overlie the groundwater basin.

The public is invited to attend this meeting, listen to the anticipated changes which will be proposed for incorporation into the new plan, and to provide comment on any issues of concern regarding groundwater management within the Solano Irrigation District.

# # #

SOLANO IRRIGATION NEWS

PRODUCED BY SOLANO IRRIGATION DISTRICT

August 2005

Upgrade of the Solano Irrigation District Groundwater Management Plan

In 1995 the Solano Irrigation District (District) approved a Groundwater Management Plan prepared under the authority of Assembly Bill 3030. During the past 10 years the District has continued monitoring the groundwater levels and quality within its service area. The District meets periodically with other public entities utilizing the same groundwater basin. The goal has been to coordinate planning efforts to assure groundwater resources of the basin are maintained and sustainable for the beneficial use of all parties.

Senate Bill (SB) 1938, passed by the legislature and approved by the Governor in September 2002, encourages an agency with an existing groundwater management plan to upgrade its plan if it wants to be eligible for state funds which may become available in the future for the construction of groundwater projects or groundwater quality projects in Solano County. The District has made the decision to upgrade its existing groundwater management plan.

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2. Components relating to the monitoring and management of groundwater levels within the groundwater basin, groundwater quality degradation, land surface subsidence, and changes in surface flow and surface water quality that may directly affect groundwater levels or quality or are caused by groundwater pumping.
3. Monitoring protocols to detect changes in the components listed above.
4. Preparation of a map showing the groundwater basin, District boundaries and the boundaries of other local agencies that overlie the groundwater basin.

The public is invited to attend this meeting, listen to the anticipated changes which will be proposed for incorporation into the new plan, and to provide comment on any issues of concern regarding the management of groundwater wells owned by Solano Irrigation District.

Employee Profile: Watertender William "Mac" MacDonald

Mac MacDonald manages the 704 beat near Dixon, which includes the Weyand Pipeline, the lower Weyand Canal, and Vaughn Pipe Lateral 5. The beat stretches from the west side of Dixon to Pedrick Rd., on the east side. Mac is working his 4th year for S.I.D., all as a watertender on the 704 beat.

Mac says, "The 704 beat is interesting because the main part of the beat is the Weyend pipeline. During the busy part of the season the pipeline reaches capacity, and we have to schedule our deliveries to farmers on a first come first served basis. The hard part of the job is keeping all of our customers satisfied. What I like about the job, though, is that I can manage my schedule to best serve the farmers. Between the other watertenders, the farmers and irrigators, we all work together to get the water delivered."

Mac enjoys the changes in the year when water season ends and maintenance begins, and then back to water season in the Spring. "The change of pace is nice. I plan my vacations in the Winter when the time off doesn't affect water deliveries. In the Spring its nice to be back on the beat." When not on the job, Mac enjoys boating, fishing, and raising his family.

Rehabilitation & Betterment Update - Annual Projects

Excavator Operator Dennis Hennagin

Maintenance crews have been busy this month cleaning and clearing out drains throughout the District. Silt and vegetation builds up quickly up during the irrigation season, requiring annual maintenance. In addition, drain undercrossings are being replaced when necessary, with new culvert pipes being installed. Roads over new undercrossings are paved as well. Drain undercrossing replacements are one of a number of important annual projects, including:

Canal Bank Reconstruction
Ag Meter Replacements
Stanchion Weir Guide Replacements
Turbine Pump System Replacements
Pump Efficiency Testing
Canal Gate Replacements
Pipeline Gate Replacements
Sectionalizing Valve Replacements
Trash/Safety Barriers on Drainage and Irrigation Systems

weathernews

www.wxnet.com

Get Current and Historical Agricultural Weather Conditions & Crop Evapotranspiration Rates Throughout Solano County

(707) 863-8978

Do You Farm in the Suisun Valley?

Call our weather station on Suisun Valley Road for current crop weather information, updated every 10 minutes.

Watertender's Reminders

- Watertenders meet every day of the week (including weekends & holidays) at 2 p.m. for water orders. The meeting places are in Elmira at the Elmira deep well on Meridian Rd., (north of Elmira Rd.), and in Dixon at the corner of Dixon Avenue West and the Weyand Canal.
- Water changes should be made between 6 am and 6 p.m.
- District office hours are Monday-Friday from 7am-5pm.
- On weekends and holidays, contact your watertender directly.
- Call water orders in by 2 p.m. the day before requiring a water turn on or shut off.

Below is a listing of Watertenders' cell phone #'s (all 707)

701	Justin Noutary	249-6078
703	Jeff Meitrott	249-6083
704	William MacDonald (Mac)	249-6074
705	John Yandel	249-6080
706	Ramon Lemus	249-6108
708	Robert Chavez	249-6070
709	Mike Helton	249-6085
710	Randy Miller	249-5305 Relief for 703 &705
711	Larry Aguilera	249-6107 Relief for 701 & 704
712	Danny Dunham	249-6098 Relief for 706 & 708
717	Mark Martinson	249-6230 Relief for 709
713	Tavo Lizarraga	249-6229 Ag Ops Supervisor
714	Stuart Chaney	249-6006

Please note: When the regular watertender is off, their calls are automatically forwarded to the relief watertender on duty.

We are now at the peak of our water season. Due to crop rotations and the time of year, the majority of our systems are at capacity and will remain so through August.

When you are on a waiting list, please have a representative at water order everyday from 2:00 – 2:30 pm to maintain your water order and assist us with scheduling.

Lake Berryessa Levels

As of August 1, 2005

Lake Level (feet above sea level)	**436.00**
Acre-Feet Storage	**1,525,874**
Percentage of Capacity	**95%**

Lake Berryessa stores 1.6 million acre feet
And spills at 439.96 feet above sea level