SACRAMENTO GROUNDWATER AUTHORITY

WATER ACCOUNTING FRAMEWORK
PHASE III EFFORT

June 10, 2010

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Sacramento Groundwater Authority

Water Accounting Framework

Phase III Effort

I. Introduction

The Water Accounting Framework (Framework) establishes a set of policies and procedures that will encourage and support conjunctive use operations within the Sacramento Groundwater Authority (SGA) area of jurisdiction to facilitate the long-term sustainability of the underlying groundwater basin as source of public water supply. The Framework recognizes investments by the SGA member agencies in the development of conjunctive use programs and supports groundwater banking programs that enhance the long-term sustainability of the groundwater basin.

II. Background

In June 2007, the SGA Board adopted Phase II of the Framework for the SGA area. Phase II established that SGA would maintain an ongoing record of groundwater banking and withdrawal activities within the SGA area, maintain necessary groundwater management tools (e.g., groundwater model, monitoring wells, etc.), and coordinate with regional stakeholders as necessary to communicate essential information regarding banking and withdrawal activities. Phase II also directed staff to develop a Model Groundwater Banking Program (MGBP) for use by SGA member agencies should they choose to implement a groundwater banking program that would result in transfers of water outside the SGA area.

At the direction of the MGBP Oversight Committee and the SGA Board, three additional elements were proposed in addition to the MGBP itself. The following four Framework components are described in this Phase III document:

A. principles that reflect current understanding of the underlying groundwater basin[1] and existing management practices, including basin sustainability goals, as a foundation of the Framework;

[1] The basin as referenced here is the groundwater basin underlying the SGA management area, which includes Sacramento County north of the American River.

B. standardized methodology for determining the volume of water available for banking and withdrawal operations under the framework;

C. elements of an MGBP for agencies proposing groundwater exchanges under the Framework; and

D. specific roles and responsibilities of SGA staff, the SGA Board, and member agencies in implementation of the Framework.

This Framework is intended to provide guidance to SGA member agencies on voluntary actions to help ensure the long-term sustainability of groundwater resources in the SGA area. It is not intended to restrict or limit the access to groundwater of any individual or agency.

III. Framework Principles

Based on current understanding of the underlying groundwater basin and existing groundwater management practices, the following principles are generally applicable within the SGA area. Specific principles are applicable to three sub-units (central, eastern, western) of the SGA area as listed below.

A. To ensure the long-term sustainability of the groundwater basin underlying the SGA area, SGA should establish a basin sustainability[2] goal for each sub-unit.

B. Achievement of basin sustainability goals can be met by agencies through either direct implementation (e.g., conjunctive use operations, conservation measures, etc.) or indirect means (e.g., purchase credits).

C. Basin sustainability goals developed for this Framework should be pursued as feasible for each agency. In evaluating whether an agency is progressing toward meeting its sustainability goal, the availability of water, costs, significant water conservation that offsets groundwater extraction, and other factors affecting feasibility shall be taken into account.

D. Basin sustainability goals established through the Framework do not include consideration of impacts associated with known or unknown contaminants. Putting to beneficial use any water from contaminant plume remediation shall be recognized as beneficial to the basin and shall not be assessed against an agency's basin sustainability goal.

[2] Sustainability as used here is the planned use of a resource in a manner such that the resource is not depleted or damaged through time.

E. Basin sustainability goals will not be developed for agricultural and other self-supplied groundwater users at this time.

F. This Framework and basin sustainability goals will be reviewed at least every five years to evaluate their effectiveness and equitable application among the participating agencies.

G. Agencies interested in participating in a banking and exchange program with a party outside the SGA area will submit a plan for operation to demonstrate that the exchange will not adversely impact the sustainability of the groundwater basin or negatively impact Framework objectives.

H. A proposed exchange arrangement resulting from this Framework should honor contracts within the region as the highest priority.

I. The SGA area is set up as three discrete operating units (central, eastern, and western units), each with unique hydrogeology and water use characteristics. These units were previously described in the SGA Groundwater Management Plan and Basin Management Report (see Figure in Exhibit 1).

1. Central Unit

a) A cone of depression has developed in the central portion of the SGA area (Central Unit) as a result of historic reliance on groundwater as the primary source of water by agencies within the Central Unit.

b) The Central Unit agencies have a common interest in maintaining the sustainability of the basin and share responsibility for implementing programs to stabilize groundwater elevations.

c) Central Unit agencies should implement measures to ensure the groundwater basin is sustainable.

d) The initial sustainable pumping estimate, i.e., the estimated volume that can be pumped from the central portion of the basin while maintaining a stable groundwater elevation, is presented in Table 1 . This estimate of 90,000 ac-ft is based on an analysis in the Central Unit as of 2004. It is not intended that this be a fixed number, and may change over time with continued monitoring of water levels, pumping amounts and locations, new facilities, and future operational changes. It is also not intended to limit the amount of groundwater that an agency can extract to meet its service area water supply demands.

e) The proportion of total annual groundwater use within the Central Unit by each of the overlying agencies nearest the time of

formation of SGA has been determined to be an appropriate basis for assignment of an annual basin sustainability goal. The average extractions for the five-year period 1993 through 1997 are deemed to be representative of the highest level of groundwater extraction from the Central Unit by the various agencies pumping from the Central Unit. This pumping totaled 101,784 ac-ft, as presented in Table 1 (See Exhibit 2). There have been no significant increases in groundwater extraction since that time.

d) The initial basin sustainability goal of 11,784 acre-feet for the Central Unit represents an average annual goal for reduction in groundwater extractions from this portion of the basin, which will contribute to stabilizing groundwater levels. Table 1 identifies the average extraction by each agency in the Central Unit for the period 1993 through 1997. Based on the each agency's relative groundwater extraction during this period, each agency is assigned a basin sustainability goal (expressed as a pumping target). This goal may be revised based on future observations of groundwater conditions or changing future demands. Member agencies will voluntarily identify programs by which they propose to meet these goals. While SGA promotes basin sustainability through a conjunctive use[3] program, the SGA Board shall not unreasonably withhold endorsement of alternative programs.

e) Attainment of basin sustainability goals for each agency will be required for SGA's endorsement of banking and exchange programs in which water is exported from the SGA area.

f) Central Unit agencies will endeavor to attain their respective basin sustainability goals beginning in calendar year 2012.

2. Eastern Unit

a) Past groundwater extractions by agencies overlying the eastern portion of the SGA area (Eastern Unit) have been comparatively low, averaging approximately 1,300 acre-feet per year from 1998 through 2008. The SGA Board recognizes that this nominal past pumping has benefited the groundwater basin as compared to conditions that would exist if water demands in the Eastern Unit had been met with groundwater from the SGA area.

[3] Conjunctive use as referred to in this document is maximizing operational capacity to utilize either surface water or groundwater as a source of supply. Surface water is used preferentially during wet periods, while groundwater is used preferentially in dry periods.

b) Additional groundwater pumping by these agencies may be needed in certain years to achieve environmental goals and maintain flows in the American River watershed. The agencies in the Eastern Unit estimate that they would use groundwater to meet overlying demand as follows: up to 3,000 acre-feet per year when inflow[4] to Folsom Reservoir is above 950,000 acre-feet; up to 9,000 acre-feet per year when inflow to Folsom Reservoir is less than 950,000 acre-feet but greater than 400,000 acre-feet; up to 18,000 acre-feet per year when inflow to Folsom Reservoir is at or below 400,000 acre-feet.

c) As a result of current and past practices, and the current water supply systems in place in the Eastern Unit, the Eastern Unit has not been assigned a basin sustainability goal at this time. However, groundwater pumping in excess of the amounts identified in part 2b above, which results in an exchange of water outside the SGA area, should include a plan to mitigate impacts resulting from the increased groundwater use (e.g., expanding conjunctive use to import additional surface water in wet periods).

d) The planned groundwater pumping identified in part 2b above does not include consideration of potential shortage conditions resulting from cutbacks of Federal water project deliveries or other shortage conditions within the San Juan Wholesale Area. Additional pumping during these conditions is not subject to mitigation planning identified in Part 2c above.

e) The planned groundwater pumping identified in part 2b above does not include consideration of impacts associated with known and unknown contaminants in groundwater. Current and future pumping associated with remediation efforts in the Eastern Unit is not subject to mitigation planning identified in part 2c above.

f) The pumping amounts identified above will be evaluated not later than five years from the date of adoption.

3. Western Unit

a) The Western Unit historically has relied almost exclusively on surface water for supply. Groundwater pumping has been primarily by independent pumpers, and no significant impacts to the groundwater basin have been observed.

[4] This is the calculated unimpaired inflow to Folsom Reservoir for March through November as presented in Department of Water Resources Bulletin 120.

b) As a result of current and past practices, and the current water supply systems in place in the Western Unit, the Western Unit has not been assigned a basin sustainability goal at this time.

c) The geology of the Western Unit is characterized by finer-grained flood basin deposits associated primarily with the Sacramento River. As a consequence of this geologic structure, additional pumping could result in significant drawdown of groundwater elevations. Groundwater pumping in the Western Area, therefore, should include an appropriate monitoring and mitigation program.

IV. Banking and Exchange Principles

Determining the Volume of Water Available for Exchanges Outside of the SGA Area.

The quantity of water available for exchange will be based upon a variety of factors, including the effective date on which the project participant is awarded banked water credits, how much water can be demonstrated to have been banked, and the quantity of banked water that should remain in the basin to mitigate against any unforeseen impacts (referred to as the "basin mitigation factor") or to meet an agency's sustainability goal.

A. Effective Date – the SGA[5] was formed in August 1998. The SGA Joint Powers Agreement (JPA) cites the following purposes for establishing SGA: 1) to maintain the long-term sustainable yield of the North Area Basin; and 2) to manage the use of groundwater in the North Area Basin and facilitate implementation of an appropriate conjunctive use program by water purveyors. Given that these foundational purposes are linked to the formation of SGA, it is recommended that water available for exchange operations under the program managed by SGA should include documented banked water dating back to August 1998.

B. Exchangeable Water Balance – while the intent of the banking program is to recognize investment in conjunctive use operations in the basin, it is important to consider the commitment needed to ensure the sustainability of the underlying groundwater basin for future beneficial uses. A significant cone of depression developed in the Central Unit of the basin is a potential threat to basin sustainability if not managed. Therefore, water available for banking and exchange through this program should be a quantity of water over and above that needed to stabilize groundwater elevations in the basin. In 2006, SGA conducted a study of water agencies that were historically reliant on groundwater for supply in the Central Unit overlying the cone of depression. That study determined that an annual average reduction of

[5] SGA was initially formed as the Sacramento North Area Groundwater Management Authority (SNAGMA) on August 1, 1998. The organization's name was changed to SGA through an amendment of the joint powers agreement on May 7, 2002.

groundwater extraction of 11,784 acre-feet from the average extraction from 1993 through 1997 would result in stable groundwater elevations in the Central Unit. The study also estimated the responsibility of each agency to attain this target, based on their historical use. For agencies in the Central Unit, the initial amount of exchangeable water will be calculated as:

> For the period August 1, 1998 through December 31, 2011, the amount of documented banked water will include the volume of surface water put to beneficial use within the Central Unit above baseline levels of surface water use during or prior to the period 1993 through 1997.

Beginning January 1, 2012, exchangeable water in a given year will be calculated as:

> The volume of surface water put to beneficial use within the Central Unit in excess of the amount necessary to offset groundwater extraction to meet the agency's respective basin sustainability goal. The annual exchangeable water will be added to the exchangeable water balance on an annual basis.

There is currently no methodology for accurately determining savings from conservation efforts as a component of water supply[6]. While water conservation efforts will help an agency meet its basin sustainability goal (by reducing pumping), conserved water will not be included as net banked water for purposes of banking and exchange from the SGA area at this time.

For agencies in the Eastern and Western units, the amount of exchangeable water will be individually determined by the SGA Board, based on records of surface and groundwater use and observations of groundwater elevations.

C. Basin Mitigation Factor – In 2009, SGA completed an analysis using the Sacramento County Integrated Groundwater and Surface Water Model to determine the fate of water banked in the basin. The simulation included banking of nearly 150,000 acre-feet of water from actual in-lieu recharge operations in the basin from 1998 through 2008. The model demonstrated that banked groundwater generally remains within the operational control of SGA member agencies (i.e., the banked groundwater did not flow out of the groundwater basin). These results generally reflect the significant cone of depression in the Central Unit of the SGA area.

Notwithstanding the foregoing, the SGA Board proposed a conservative approach to basin losses to ensure that banking and exchange programs are consistent with other

[6] DWR has been tasked with developing a method for correcting annual demand data to reflect changes in annual climatic conditions in 2010, which may help better identify water savings associated with conservation efforts.

basin sustainability objectives in the Framework. The Framework, therefore, assigns a basin mitigation factor to exchanges outside of the basin to protect against negative impacts of the loss of this resource and to help recovery of the cone of depression in the basin. SGA will assess a 5% reduction to water banked on behalf of agencies from outside the SGA area that is subsequently exchanged outside the SGA area or substituted for surface water that will be exchanged. The basin mitigation factor will be applied during the withdrawal phase of the banking and exchange operation. SGA will work with agencies that participate in banking and exchange programs to develop and implement the basin mitigation factor as warranted by the specific circumstances of each transaction.

D. Use of Banked Water to Meet Basin Sustainability Goal – An agency with a positive exchangeable water balance may reduce its balance and apply the credit toward meeting its basin sustainability goal.

E. Transfer of banked water credits - An agency with both a positive exchangeable water balance and a positive basin sustainability balance may transfer exchangeable water credits to another agency in the basin. The receiving agency may apply the credit to either its exchangeable water or basin sustainability balance.

F. Attainment of the basin sustainability goal (i.e. maintaining a positive basin sustainability balance), as well as maintenance of a positive balance of exchangeable water will be required for SGA endorsement of banking and exchange programs in which water is exported from the SGA area.

Examples of how a few agencies could operate under this Framework are provided as Exhibit 3.

V. Model Groundwater Banking Program Elements

The purpose of this MGBP is to recognize and create incentives for agencies developing or expanding conjunctive use practices beyond basin sustainability goals. Conjunctive use will be critical to the region's future water supply and to the sustainability of the underlying groundwater basin. The MGBP will establish a consistent set of policies to ensure the sustainability of the groundwater basin, while creating opportunities to recover investments for agencies that can demonstrate they have banked water in the basin in excess of basin sustainability goals.

The MGBP elements listed below include all of the elements arising over an entire banking and exchange cycle. The timing as to when information would be required by SGA would depend on the timing of the operations. For example, a banking and exchange agreement might involve the banking of excess surface water on behalf of an agency from outside the SGA area in a wet year, with the recovery of that water occurring in a future dry year. In

such a case, the exchange agreement and environmental documentation may be required at the time water is banked. Since the recovery of banked water could occur several years into the future, it may be more appropriate to secure permits and develop the plans listed below at that time.

A. Exchange agreement - an exchange agreement is the agreement between the seller and buyer. While there is no single model for this agreement, SGA staff can provide examples of existing exchange agreements in other parts of the state.

B. Environmental documents – depending on the program, preparation of environmental documentation may be necessary. In other cases, banking and exchange programs may rely on existing environmental documentation. For example, the 2009 Drought Water Bank used existing CEQA coverage under the Environmental Water Account (EWA). Therefore, potential participants in the program would not require CEQA. Potential exchanges not falling under an existing state Department of Water Resources program (e.g., EWA) may require NEPA compliance, if the exchange involves the use of federal facilities.

C. County permit – Sacramento County has an ordinance that pertains to the export of groundwater and surface water outside the county. Sacramento County Water Agency Code Title 3 Chapter 3 under Section 3.40.090 is as follows:

Groundwater and Surface Water Export

Groundwater or surface water shall not be transported in any manner from Sacramento County to any point outside the County, except pursuant to a permit issued by the Engineer for each and every source and/or location of water export in accordance with the following:

1) Application. To obtain a permit the owner or authorized agent shall first file an application in writing stating the following:

a) Name of applicant, owner of source, owner of place of use, consulting engineer who will plan and design the work;
b) Description of proposed action, location of source(s) and point(s) of use;
c) Justification for proposed action;
d) Any other information requested by Engineer.

2) Engineer shall within thirty days of receipt of the application, or within thirty days of receipt of additional information, make such investigations as necessary to determine if the proposal is in conformance with County water planning policies adopted and revised from time to time by the County and the Sacramento County Water Agency, and if the proposal will impose liability on

the County or the Water Agency, or cause adverse impacts on the source, the area of use, or the environment.

3) After investigation Engineer shall approve, approve conditionally, or disapprove the application for permit. Engineer shall not grant a permit if the permit will authorize work or activity which is inconsistent with the general plan of the County of Sacramento, the water plan of the Sacramento County Water Agency, or a specific plan of the County or Water Agency which may be affected by the work or activity.

Nothing in this section contained shall apply to those public water purveyors providing water service in two or more counties within a legally defined service area.

D. Exchange Recovery Plan – prior to the extraction of groundwater for the purposes of exchanging surface water or groundwater from the SGA area, the project proponent[7] shall submit an Exchange Recovery Plan (ERP) to SGA and any appropriate state and federal agencies. The ERP should be submitted at least two months in advance of expected operations to allow staff time to review the ERP and report to the SGA Board. Consistent with criteria developed for state and federal groundwater substitution transfers, the ERP shall include the five elements discussed below. Note that the state and federal programs also have a minimum two month review time, so these documents should be submitted concurrently to the appropriate agency.

i. General proposal information – the project proponent should provide a brief summary of the proposed project including, but not limited to, the participants, the contracted volumes available for exchange, and the term of the agreement.

ii. Exchange project map – the project proponent shall prepare a project map showing the locations of all production wells and clearly identifying the wells to be used in the recovery operations. The map should also include major roads, hydrology, district boundaries, and wells of adjacent water purveyors to the purveyor subject to the exchange operations. Additionally, the map should show the locations of any small water systems licensed through the County or State within one mile of the proposed operations. SGA can provide information on production wells of member agencies as well as the locations of small water systems.

[7] The project proponent is the SGA member agency proposing to enter into an exchange agreement.

iii. Well information table – the project proponent shall prepare a table of information for all wells expected to participate in the operation. The following information shall be included in the table, with each data item listed in columnar format:

1. Well owner name
2. Well identification number (per owner's naming)
3. State Well Number (if assigned)
4. Latitude of well
5. Longitude of well
6. Township/range/section descriptor of well
7. Land surface elevation at well location
8. Total depth of well
9. Depth of annular seal
10. Well construction method
11. Diameter of well casing
12. Screen interval (include top and bottom of interval referenced in feet below land surface. For wells with multiple screens, each interval should be indicated in distinct rows on the spreadsheet)
13. Gravel pack interval (include top and bottom for each gravel pack interval corresponding to screen interval from item above)
14. Estimated well capacity (gallons per minute)
15. Pump power source (electric, diesel, etc.)

iv. Geologic logs – for each well, provide available geologic/lithologic information (e.g., Driller's log, electric log). SGA maintains much of this information in its data management system. SGA staff may be able to assist in compiling this information.

v. Water quality data – baseline water quality data should include the information listed below. SGA maintains much of this information in its data management system. SGA staff may be able to assist in compiling this information.

1. For each well in the program, include the most recent measurement of total dissolved solids (TDS) or electrical conductivity (EC) and the date of the measurement.
2. For each well in the program, disclose any past primary or secondary maximum contaminant level (MCL) exceedances and the current status of the well with respect to the MCL.
3. Disclose any known areas of groundwater contamination within one mile of the service area (or the proposed wells in the program) of the project proponent.

vi. Baseline extraction – for each well in the program, the project proponent should provide a baseline extraction by month in acre-feet to serve as a baseline from which additional extraction will serve to document "performance" of the exchange. The 2009 Drought Water Bank used 2008 as the baseline unless the project proponent was able to demonstrate that a different method for determining a baseline was more appropriate. Additionally, monthly data is important because of potential restrictions as to when the water can be physically transported. For example, the 2009 Drought Water Bank could only use additional extractions from July 1 through September 30 because of through-Delta pumping restrictions. SGA staff coordinated with DWR on the 2009 Drought Water Bank and can assist in determining an appropriate basis for establishing a baseline.

vii. Extraction schedule – for each well in the program, the project proponent should provide an estimated pumping schedule for each month that exchange operations are expected to occur. This information should be combined with the table of baseline extraction above and include the estimated net delivery of each well resulting from extractions above the baseline.

E. Monitoring plan – prior to the extraction of groundwater for the purposes of exchanging water from the SGA area, the project proponent shall submit a Monitoring Plan to SGA and any applicable state or federal agencies. To allow time for review and discussion, the Monitoring Plan should be submitted two months prior to expected exchange operations. Consistent with guidelines developed with state and federal groundwater substitution transfers, the plan should include the following elements:

i. Monitoring – the project proponent should design a monitoring program that is intended to characterize the expected impacts of the pumping during and following the exchange recovery operations. The project proponent should demonstrate that it has coordinated with adjacent purveyors and is monitoring to minimize impacts to it s neighbors. Additionally, there are more than 20 small water systems[8] that are reliant on groundwater as their primary supply within the SGA area. The monitoring plan should identify any systems within one mile of the

[8] A small water system is defined by the California Department of Public Health as water for human consumption that has 15 or more service connections or regularly served at least 25 individuals at least 60 days out of the year, but has fewer than 200 service connections. This includes any collection, treatment, storage, and distribution facilities.

boundary of the proposed operations and address the monitoring in place to observe potential impacts to these small systems.

When possible dedicated monitoring wells (i.e., non-producing wells) should be incorporated into the monitoring well network. SGA maintains a series of dedicated wells in the basin, so the project proponent should also coordinate with SGA to ensure that these wells are monitored where applicable. Required monitoring includes:

1. Pre-exchange water elevations – in order to determine the potential impacts to groundwater elevations following the exchange operations, the project proponent shall measure groundwater elevations in the selected water elevation monitoring network by April 15 prior to commencing exchange operations (levels should be collected earlier if the performance period starts prior to the April 15 target date).
2. During exchange water elevations – during the performance period, water elevations will be collected at the beginning of each month from the approved monitoring well network. Elevations should be as static as possible by cycling the well out of production for as long as practicable prior to collecting the data. Typically, a minimum of several hours should be sufficient.
3. During exchange water quality – water quality shall be measured at a subset of 10% of wells participating in the program. The project proponent should attempt to achieve the highest practicable level of geographic distribution and the deepest wells in its system. During the performance period, water quality shall be monitored at the wellsite by collecting a grab sample of water from the production well and measuring either TDS or EC.
4. During exchange groundwater extractions – for each well in the program, the project proponent should provide meter readings of extracted data for each calendar month of performance compared to the baseline for that well. The net groundwater exchanged will be the result of subtracting the baseline from the actual water produced.
5. Post-exchange water level monitoring – typically, monthly water level monitoring continues until water levels have recovered to elevations prior to operations or until April of the year following the exchange, whichever comes first. Requests to consider discontinuing water level monitoring prior to these times should be submitted to SGA.

ii. Reporting – monitoring and extraction data should be submitted on a monthly basis by the 15th day of the month for the previous calendar

month for the duration of the performance period. A final report will be submitted by May of the year following the exchange operation that shows a comparison of spring groundwater elevations (assume measurement of April 15) from prior to the exchange to those after the exchange.

F. Mitigation plan – the mitigation plan is intended to minimize impacts to adjacent water purveyors or other third parties. Prior to the extraction of groundwater for the purposes of exchanging water from the SGA area, the project proponent shall submit a Mitigation Plan to SGA and any applicable state or federal agencies. To allow time for review and discussion, the Mitigation Plan should be submitted two months prior to expected exchange operations. Consistent with guidelines developed with state and federal groundwater substitution transfers, the plan should include the following elements:

i. A designated point of contact for the project proponent where all concerns related to operation of the exchange program can be directed.
ii. A timeline/schedule for responding to any concerns.
iii. A procedure for verifying whether a problem exists related to the exchange operations.
iv. A procedure for notifying SGA and other potentially impacted parties.
v. A discussion of the range of possible actions to respond to verified problems resulting from the exchange operations.

VI. Roles under Phase III of the Framework

Role of SGA Staff:

- Develop sustainability goals for the basin in consultation with water agencies and the SGA Board.
- Review water agency plans for meeting sustainability goals and report to the SGA Board.
- Preliminarily determine net banked water and track changes to banked water amounts for each agency.
- Review and report on whether the sustainability goals appear to be appropriate for basin sustainability in the Biennial Basin Management Report beginning in 2012.

Role of the SGA Board:

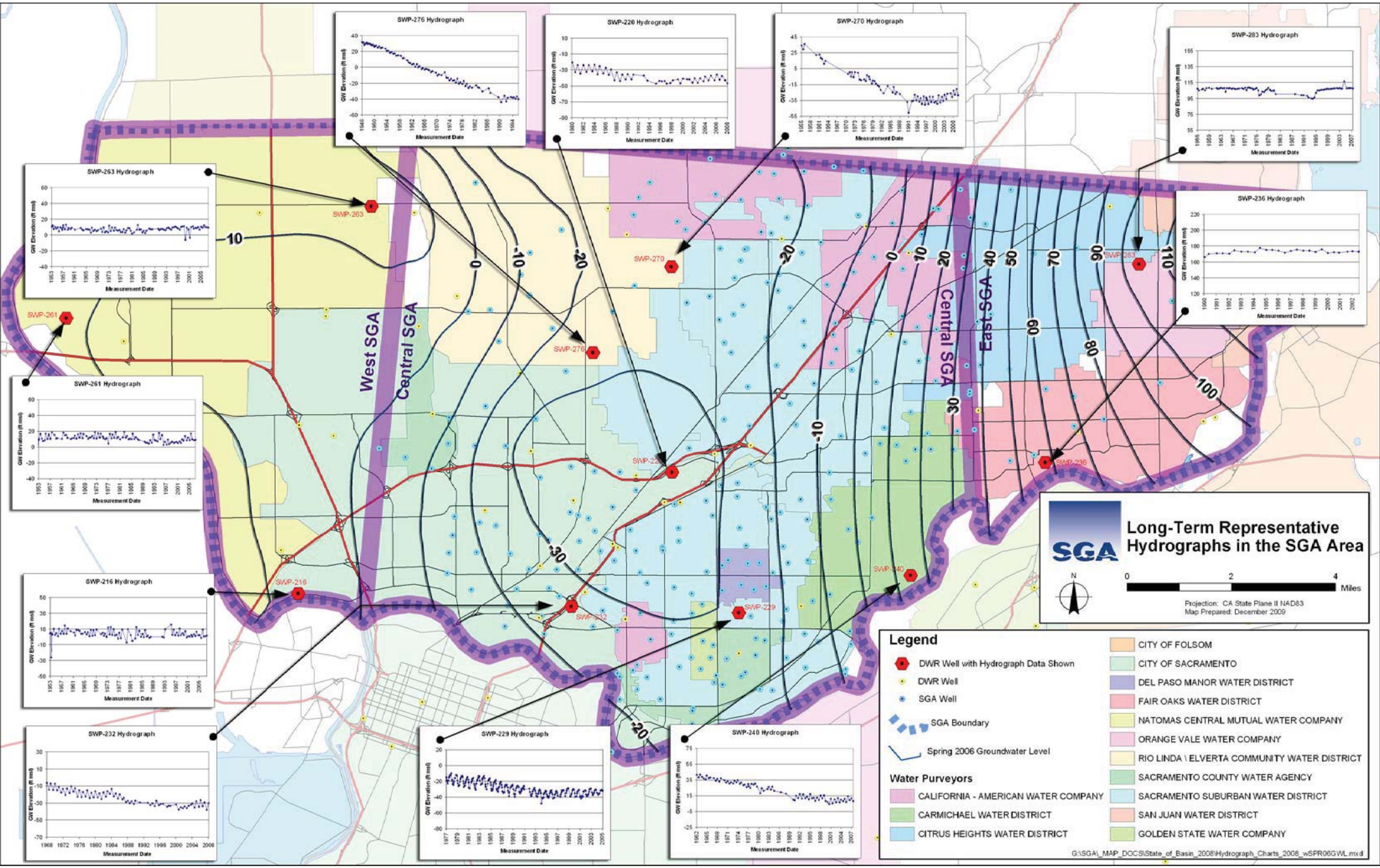
- Adopt the Water Accounting Framework Policy.
- Adopt the initial voluntary basin sustainability plans for agencies in the Central Unit.
- Approve initial net banked water and annual transactions.
- Make determinations if basin sustainability plans are consistent with Framework intent.

- The Board will not have any enforcement power to prevent an agency from implementing alternatives to achieve basin sustainability goals.
- The Board will not have authority to enforce basin sustainability goals, or otherwise limit groundwater extractions.

Role of the overlying agencies:

- Implement programs to achieve the agency's basin sustainability goal on a voluntary basis.
- If desired, develop a basin sustainability plan that allows increases in groundwater pumped in dry years (beyond the basin sustainability goals) while not changing their long-term groundwater extraction rate.
- If desired, enter into agreements that allow water to be banked in the basin and exchanged outside the basin.
- If desired, enter into agreements with other water agencies inside the basin to improve water supply reliability by transferring groundwater or surface water.
- Submit alternative basin sustainability plans to the SGA.

Exhibit 1
SGA Basin Figure Showing SGA Units


SWP-276 Hydrograph
SWP-220 Hydrograph
SWP-270 Hydrograph
SWP-283 Hydrograph
SWP-263 Hydrograph
SWP-236 Hydrograph
SWP-261 Hydrograph
SWP-216 Hydrograph
SWP-232 Hydrograph
SWP-229 Hydrograph
SWP-240 Hydrograph
GW Elevation (ft msl)
Measurement Date
West SGA
Central SGA
East SGA
Central SGA
SWP-263
SWP-270
SWP-283
SWP-261
SWP-276
SWP-236
SWP-216
SWP-232
SWP-229
SWP-240
10
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-20
-30
-20
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20
30
40
50
70
90
110
60
80
100
-10
-20
SGA
Long-Term Representative Hydrographs in the SGA Area
N
0
2
4
Miles
Projection: CA State Plane II NAD83
Map Prepared: December 2009
Legend
DWR Well with Hydrograph Data Shown
DWR Well
SGA Well
SGA Boundary
Spring 2006 Groundwater Level
Water Purveyors
CALIFORNIA - AMERICAN WATER COMPANY
CARMICHAEL WATER DISTRICT
CITRUS HEIGHTS WATER DISTRICT
CITY OF FOLSOM
CITY OF SACRAMENTO
DEL PASO MANOR WATER DISTRICT
FAIR OAKS WATER DISTRICT
NATOMAS CENTRAL MUTUAL WATER COMPANY
ORANGE VALE WATER COMPANY
RIO LINDA \ ELVERTA COMMUNITY WATER DISTRICT
SACRAMENTO COUNTY WATER AGENCY
SACRAMENTO SUBURBAN WATER DISTRICT
SAN JUAN WATER DISTRICT
GOLDEN STATE WATER COMPANY
G:\SGA_MAP_DOCS\State_of_Basin_2008\Hydrograph_Charts_2008_wSPR06GWL.mxd

Exhibit 2
Central Unit Basin Sustainability Goals

Table 1. Central Unit Basin Sustainability Goals

Agency	Groundwater Pumping prior to SGA Formation (ac-ft) (1)	% Total Groundwater Pumping prior to SGA Formation	Sustainable Pumping Estimate (ac-ft) (2)	Average Annual Basin Sustainability Goal (ac-ft)
Carmichael Water District	7,516	7.4	6,646	870
City of Sac	23,287	22.9	20,591	2,696
California American Water	20,351	20.0	17,995	2,356
Del Paso Manor Water District	1,657	1.6	1,465	192
Golden State Water Company	1,242	1.2	1,098	144
Rio Linda/Elverta Community Water District	3,259	3.2	2,882	377
Sacramento, County of	4,850	4.8	4,288	562
Sacramento Suburban Water District	39,622	38.9	35,035	4,587
Total	101,784	100	90,000	11,784

1) Data based on average pumping 1993 through 1997.

2) The sustainable pumping estimate reflects observations of extractions and drawdowns based on facilities in the basin as of 2004. This should not be construed as a fixed volume of water that can be extracted from the basin under future facilities and operations.

Exhibit 3
Water Accounting Framework Examples

Exhibit 3
WATER ACCOUNTING FRAMEWORK EXAMPLES

Principles
These principles apply to the tracking of the Water Accounting Framework for those agencies within the Central Unit of the SGA area.

- All agencies start with a zero balance for basin sustainability beginning on January 1, 2012.

- Agencies that can demonstrate surface water deliveries in excess of baseline levels (1993-1997) during the period August 1, 1998 through December 31, 2011 will be credited with exchangeable water.

- Beginning on January 1, 2012, the volume of surface water imported, beyond that necessary to meet the pumping target, is the annual net banked water, credited to the exchangeable water balance.

- Credits may be transferred from an agency's exchangeable water balance to its basin sustainability balance.

- Credits may be transferred from an agency's exchangeable water balance to the exchangeable water balance *or* the basin sustainability balance of another agency.

- A basin sustainability balance is neither transferable to another agency nor to the exchangeable water within an agency's accounting.

- An agency must have a positive or neutral sustainability balance to participate in a transfer of surface water or groundwater outside the basin.

- The 5% basin mitigation factor assessed on banked water applies only to direct pumping of groundwater for transfer outside the basin or to future banking for parties outside the basin.

Examples for three agencies operating under the Framework are provided below along with the accompanying table.

Agency A – Agency A is actively practicing conjunctive use. Agency A built a large balance of exchangeable water (100,000 af) through actions prior to adoption of the Framework. Agency A will take advantage of opportunities to transfer surface water to which it has access, and may develop the capacity to transfer groundwater directly.

2012 – Agency A pumped 16,000 acre-feet (af), which is less than its target of 20,000 af. The basin sustainability balance increases by 4,000 af. Agency A took delivery of 10,000 af of surface

water. Of this amount, 6000 af went to offset pumping to meet the target (total demand was 26,000 af); 4000 af is credited toward the exchangeable water balance.

2013 – Agency A pumped less than the target. Basin sustainability balance increases by 1,000 af. No surface water delivered, so banked water balance does not increase.

2014 – Agency A pumping exceeded target. Basin sustainability balance reduced. Agency A took delivery of 3,000 af surface water. No credit to exchangeable water balance since, even with surface water, pumping target still exceeded. No debit to exchangeable water.

2015 – Agency A pumping exceeds target. Basin sustainability balance decreased. No surface water transactions, exchangeable water balance does not change.

2016 – Agency A pumping exceeds target. Basin sustainability balance decreased to negative. No surface water transactions, exchangeable water balance does not change. Agency A may carry negative balance if no transfer proposed.

2017 – Agency A pumping meets target. Agency A transfers 5,000 af of available surface water. Debit 1,000 af from exchangeable water to achieve zero basin sustainability balance, because no transfers of available surface water if basin sustainability balance is negative.

2018 – Agency A pumping less than target. Basin sustainability balance increased. Agency A uses 8,000 af surface water; 7,000 af toward meeting pumping target, 1,000 af added to exchangeable water. 3,000 af surface water transfer not debited since pumping target was met.

2019 – Agency A pumps 35,000 af; of which 14,000 af is transferred through direct pumpback. 14,000 af debited from exchangeable water to achieve zero sustainability balance. 700 af (5% basin mitigation factor) debited for direct groundwater export.

Agency B – Agency B is not engaged in active conjunctive use, but intends to achieve its target pumping through water efficiency and/or purchase of credits from others.

Agency B exceeds pumping target in early years (2012-2014), resulting in negative basin sustainability balance. Beginning in 2015, conservation reduces pumping and basin sustainability balance recovers. In 2019, Agency B purchases 2,000 af of exchangeable water credits from Agency C to zero out basin sustainability balance.

Agency C – Agency C practices limited conjunctive use, taking relatively small volumes of surface water when it is available. Having done this for several years, Agency C begins with a positive exchangeable water balance of 3,000 af.

2012 – Agency C exceeds pumping target, basin sustainability balance goes negative.

2013 – Agency C takes delivery of surface water, but entire amount goes toward offsetting pumping to meet target. No increase to exchangeable water balance.

2015-16 – Surface water deliveries exceed that necessary to offset pumping. Exchangeable water balance increases.

2019 – Agency C sells 2,000 af exchangeable water credits to Agency B. No basin mitigation factor applied since transfer was in-basin.

Basin Sustainability Goal **Exchangeable Water**

Agency A	Target Pumping	Actual GW pumped	Total Demand	Transfer of Credits	Basin Sustainability Balance		Surface Water for Conjunctive Use	Water Transfer (out of basin)	Credits transferred	Net Banked Water	Exchangeable Water Balance
	20,000										100,000
2012		16,000	26,000		4,000		10,000	0	0	4,000	104,000
2013		19,000	19,000		5,000		0	0	0	0	104,000
2014		21,000	24,000		4,000		3,000	0	0	0	104,000
2015		22,000	22,000		2,000		0	0	0	0	104,000
2016		23,000	23,000		-1,000		0	0	0	0	104,000
2017		20,000	20,000	1,000	0		0	5,000	-1,000	0	103,000
2018		19,000	27,000		1,000		8,000	3,000	0	1,000	104,000
2019		35,000	35,000	14,000	0		0	14,000	-14,000	-700	89,300

Basin Sustainability Goal **Exchangeable Water**

Agency B	Target Pumping	Actual GW pumped	Total Demand	Transfer of Credits	Basin Sustainability Balance		Surface Water for Conjunctive Use	Water Transfer (out of basin)	Credits transferred	Net Banked Water	Exchangeable Water Balance
	10000										0
2012		12000	12000		-2,000		0	0	0	0	0
2013		12000	12000		-4,000		0	0	0	0	0
2014		11500	11500		-5,500		0	0	0	0	0
2015		10000	10000		-5,500		0	0	0	0	0
2016		9500	9500		-5,000		0	0	0	0	0
2017		9000	9000		-4,000		0	0	0	0	0
2018		9000	9000		-3,000		0	0	0	0	0
2019		9000	9000	2000	0		0	0	0	0	0

Basin Sustainability Goal **Exchangeable Water**

Agency C	Target Pumping	Actual GW pumped	Total Demand	Transfer of Credits	Basin Sustainability Balance		Surface Water for Conjunctive Use	Water Transfer (out of basin)	Credits transferred	Net Banked Water	Exchangeable Water Balance
	8000										3,000
2012		9,000	9,000		-1,000		0	0	0	0	3,000
2013		8,000	9,000		-1,000		1,000	0	0	0	3,000
2014		8,000	8,000		-1,000		0	0	0	0	3,000
2015		7,000	9,000		0		2,000	0	0	1,000	4,000
2016		7,000	8,500		1,000		1,500	0	0	500	4,500
2017		7,500	7,500		1,500		0	0	0	0	4,500
2018		8,500	8,500		1,000		0	0	0	0	4,500
2019		8,000	8,500		1,000		500	0	-2,000	0	2,500