

**CENTRAL WATER DISTRICT
AND
SOQUEL CREEK WATER DISTRICT**

**MEMORANDUM OF AGREEMENT FOR COOPERATIVE MONITORING AND
MITIGATION MEASURES IN RESPONSE TO SOQUEL CREEK WATER
DISTRICT'S OPERATION OF THE POLO GROUNDS WELL**

This Agreement is entered into as of _____, 2011, by and between the Central Water District (hereinafter "CWD") and the Soquel Creek Water District (hereinafter "SqCWD"); two County Water Districts organized pursuant to section 30000 *et seq.* of the California Water Code.

RECITALS

- A. CWD is responsible for providing water for beneficial use within its service area which encompasses roughly five square miles of unincorporated rural area in the foothills of the Santa Cruz Mountains east of Aptos.
- B. SqCWD is responsible for providing water for beneficial use to customers in the City of Capitola and the unincorporated communities of Soquel, Seacliff, Aptos, Rio Del Mar, Seascape and La Selva Beach.
- C. CWD and SqCWD have entered into a Joint Powers Agreement to form an AB3030 Groundwater Management Authority, and in 2007, adopted an updated and comprehensive Groundwater Management Plan for the Soquel-Aptos Area. Groundwater conditions and an update on groundwater management activities are summarized annually in the Soquel-Aptos Area Annual Review and Report.
- D. CWD now and for the foreseeable future depends on underlying groundwater resources known as Aromas Red Sands and to a lesser extent Purisima Unit F for its water supply. CWD currently has sufficient groundwater resources at its Rob Roy and Cox well fields to meet its projected demand at build out.
- E. SqCWD depends on the Aromas Red Sands aquifer for approximately one-third of its supply and finds it necessary to redistribute pumping away from coastal areas where seawater intrusion is a concern. To address this issue, SqCWD has developed a Well Master Plan that includes adding a well in the Polo Grounds area to its system, which, along with the Aptos Jr. High Well, would be completed in the Purisima Unit F aquifer.

- F. As a result of increased SqCWD pumping in the Purisima Unit F, there is a potential for drawdown of nearby CWD Wells, which, if excessive, could have a restrictive effect in the form of physical damage or reduced yield at impacted wells.
- G. This agreement is specifically to avoid substantial harm to CWD wells because of an increased risk of physical damage to any of its wells from groundwater levels falling below the well screen or the pump intake as the direct result of increased localized pumping by SqCWD.
- H. This agreement is also meant to prevent reduced yield resulting from increased pumping lift or seawater intrusion at the CWD wells as the direct result of increased localized pumping by SqCWD.
- I. The potential for interference between SqCWD and CWD production facilities requires a cooperative monitoring and mitigation agreement that will satisfy both districts that the shared area will be appropriately managed so as to not cause material damage to either party's well facilities or production capacity.
- J. Groundwater conditions will change over time as the proposed facilities are operated. These changes must be sufficiently monitored so that future changes in production strategies can be made to the satisfaction of both agencies.
- K. The data available at the present time may be insufficient to accurately predict the amount of interactive management that may be required to optimize use of the groundwater for the benefit of both agencies.
- L. Both parties recognize that a cooperative groundwater management approach is the best method for protecting this water resource while meeting customer needs.

NOW THEREFORE, CWD and SqCWD enter into this agreement for the reasons set forth above and agree as follows:

Component 1: Both Parties Share Mutual Objectives to Manage the Shared Groundwater Basin.

Both parties agree that the Soquel-Aptos groundwater basin is a shared resource. The parties further agree that both agencies are appropriators and recognize the legal rights thereof.

It is further agreed that both parties are dependent on groundwater resources within their service areas. CWD's long-range plans call for maintaining its existing well facilities to meet future demand. SqCWD is pursuing a supplemental source of supply in order to reduce its groundwater use to a sustainable level, but groundwater will continue to be the primary source of supply to meet future demand. It is therefore in the

best interest of both parties to ensure that the following groundwater management objectives are met:

1. Protect the groundwater resource in the subject area from seawater intrusion as shown on the attached map.
2. Maintain static or pumping groundwater levels above the top of production well screens.
3. Limit pumping of each municipal well to no more than 50 percent of the time, averaged over a year while continuing to meet demand.
4. Provide both agencies adequate flexibility to respond to changing water demands, changing water supply availability, and infrastructure limitations within the mitigation actions described in Component 5, C. of this agreement.

The parties acknowledge that a groundwater budget for the shared portion of the Soquel-Aptos groundwater basin has not been established due to too many uncertainties that preclude developing estimates of the reliable groundwater yield from this portion of the basin. Therefore, the parties agree to achieve best management of the aquifers for the mutual benefit of both parties through the monitoring and mitigation measures set forth in this agreement.

Component 2: Both Parties Agree to Maintain and Share Data from Groundwater Elevation and Quality Monitoring

Both parties currently monitor groundwater elevations and groundwater quality at their respective production wells and a number of coastal and inland monitoring wells. Lowered groundwater levels could impact well production. Groundwater quality data from the coastal wells provide an important early warning of seawater intrusion. The relevant SqCWD coastal wells are located at Cliff Drive (SC-A1), at Sumner/Dolphin (SC-A8), and at Sumner (SC-A2). The relevant inland monitoring wells are SqCWD's wells at Polo Grounds (SC-20) and CWD's wells at Rob Roy (CWD-ABC). Groundwater elevations and quality will be monitored at the Polo Grounds area production well when it is added to SqCWD's system.

The parties agree that groundwater levels at SqCWD's Polo Grounds monitoring and production wells, at Aptos Jr. High, and at CWD's Cox and Rob Roy monitoring and production wells will be monitored using groundwater level loggers or transducers for groundwater level changes from pumping. The parties agree to share data from groundwater quality measurements that will continue on a schedule that is at least as frequent as established practice.

Component 3: Mitigation and Monitoring Objectives and Baseline

It is agreed that there is a potential impact to CWD wells as a result of increased pumping by SqCWD in the Purisima Unit F through converting the Polo Grounds Well for SqCWD use. Both parties further agree that equitable and fair mitigation measures are necessary if planned pumping results in unacceptable groundwater levels or groundwater quality. It is agreed that it is unacceptable for increased pumping by one party in the vicinity of existing wells to render any established well incapable of meeting its:

- (a) Historically measured maximum daily production level;
- (b) Historically measured dry-season production levels; or
- (c) Historically measured annual production levels under drought conditions.

Exhibit A establishes historical production levels at the CWD wells. SqCWD and CWD agree that 2005-2008 production totals establish an acceptable baseline for historic daily, dry-season production levels, annual production levels under drought conditions, and annual average pumping run times. The annual baseline for CWD pumping is established as 200 million gallons or 614 acre-feet, slightly above the maximum annual pumping during the baseline period of 2005 to 2008.

Exhibit B establishes static and pumping groundwater levels **since 2005** and top of screen elevations for the CWD production wells. SqCWD and CWD agree that these data establish whether current groundwater levels are above or below the tops of screens.

Exhibit C establishes current total dissolved solids (TDS) and chloride levels for the CWD production wells and SqCWD production and monitoring wells. CWD agrees that these water quality data establish an acceptable baseline and are sufficient to determine seawater intrusion impacts that could occur as the result of lowered groundwater levels caused by SqCWD pumping at the subject wells.

Component 4: Impacts that Trigger Mitigation Action

SqCWD has conducted a hydrological impact analysis of potential impacts to CWD wells as a result of adding the Polo Grounds well to its system and cumulative impacts of increased pumping by SqCWD in the Purisima Unit F from both the Aptos Jr. High and Polo Grounds Wells. Simulated groundwater drawdown at CWD wells from the collective impacts of the planned redistribution of SqCWD pumping during both non-drought and drought years indicates that the groundwater levels at CWD's well fields should not drop below screen levels, with the exception of potentially dewatering the screen at CWD Rob Roy Well No. 10 by approximately 0.4 foot in a drought similar to 1993-94 and for use of that well similar to 1993-94. The impact analysis also concluded that the simulated drawdown effect on CWD well yield due to increased pumping lift

would be marginal. With respect to seawater intrusion impacts, the EIR concluded that implementing the Well Master Plan would reduce susceptibility to seawater intrusion as it would allow redistribution of pumping away from the coast. However, due to uncertainties regarding the potential for pumping by SqCWD to adversely affect CWD's production wells, the parties agree on the monitoring and mitigation actions set forth below.

No less frequently than at the end of each water year, the parties agree to collaboratively review groundwater monitoring data from CWD's existing production and monitoring wells in conjunction with data collected from the SqCWD's production and monitoring wells to assess whether increased SqCWD pumping (above the 2005-2008 baseline of 100 acre-feet per year combined from the Polo Grounds and Aptos Jr. High wells used in the hydrological impact analysis) in the vicinity of the Polo Grounds Well has had any restrictive effects on CWD's existing production wells defined as follows:

1. *Risk of damage to the production well caused by static or pumping water levels falling below the top of well screens.* This effect could occur if static or pumping groundwater levels are above the top of the well screen prior to SqCWD pumping at the Polo Grounds Well, and subsequently fall below the top of the well screen after SqCWD assumes operation of the Polo Grounds Well. The parties agree that any lowering of pumping groundwater levels on wells that have static or pumping groundwater levels below the top of the well screens at the time of this agreement would not necessitate pumping restrictions by SqCWD unless the well screens were to become fully dewatered.
2. *Reduced well yields due to increased pumping lift.* This effect could occur if future pumping from the Polo Grounds Well were to adversely affect well yield at CWD's wells due to increased pumping lift such that the cumulative pumping of the Rob Roy wells exceeds 50 percent of the time, averaged over a year. However, since annual production from CWD's Rob Roy wells for the water years 2005 through 2008 has been equivalent to pumping just over 25% of the time, the parties agree that small decreases in pumping rates can be compensated for by increased operating time without resulting in adverse effects.
3. *Reduced well yields due to seawater intrusion* This effect could occur if chloride concentrations measured at CWD's Rob Roy well field exceed 125 mg/L, half of the secondary maximum contaminant limit; and chloride concentrations measured between the coast and the Rob Roy well field confirm that seawater intrusion had advanced to the Rob Roy well field. The parties agree that implementation of the Well Master Plan should reduce susceptibility to seawater intrusion by shifting extractions from the coast. Operation of the Polo Grounds Well is intended to reduce risk of seawater intrusion to CWD's wells by allowing

pumping reductions at SqCWD wells such as Bonita, San Andreas, and Seascape. These wells are located between CWD's Rob Roy well field and coastal monitoring wells, particularly SC-A2B, where chloride and TDS concentration trends show an apparent landward movement of seawater. Pumping reductions at these SqCWD wells are intended to raise groundwater levels between CWD's Rob Roy well field and the coast to prevent seawater intrusion further inland.

Component 5: Monitoring, Assessment and Mitigation Actions

Restrictive Effect 1: Risk of damage to the production well caused by static or pumping water levels falling below the top of well screens.

A. Monitoring:

- 1) At least one full pumping season prior to operation of the Polo Grounds Well, SqCWD will, with CWD's cooperation and consent, install transducers or data loggers at each of the Rob Roy and Cox Wells. The transducers/data loggers will be set to record static and pumping groundwater levels at least hourly.
- 2) Prior to the commencement of pumping at the Polo Grounds Well, CWD will collect the initial monitoring data.
- 3) Prior to the commencement of pumping at the Polo Grounds Well, SqCWD will review the hourly data and historical data from the Rob Roy and Cox Wells. SqCWD will document the results of the data review and provide a copy to CWD. A copy will also be kept on file.
- 4) Quarterly, following commencing operation of the Polo Grounds Well and for the life of the well, SqCWD will, with CWD's cooperation and consent, collect the long-term monitoring data.
- 5) Quarterly, within one month of receiving monitoring data from CWD, SqCWD will review the monitoring data to determine if a restrictive effect is occurring to any CWD well. SqCWD will document the results of the assessment and provide a copy to CWD. A copy will also be kept on file.

B. Assessment:

The assessment for this restrictive effect shall be based on measured groundwater levels at CWD's Rob Roy and Cox Wells. Prior to bringing the Polo Grounds Well online, the SqCWD shall review the hourly data as well as historical data from the CWD wells to determine if groundwater levels have been observed below the top of a well screen.

The SqCWD shall consider that this restrictive effect has occurred if static or pumping groundwater levels at one or more of the CWD's production wells falls below the top of the well screen, groundwater levels below the top of the well screen have not been observed prior to operation of the Polo Grounds Well since 2005, and there is a clear correlation between the lowered groundwater levels and pumping at the Polo Grounds Well (e.g., the lowered groundwater levels would not be anticipated to occur in absence of pumping at the Polo Grounds Well).

Once the Polo Grounds Well has been brought online, the SqCWD shall review the pumping and static groundwater level data provided by CWD on a quarterly basis to evaluate if this restrictive effect is occurring. The results of the evaluation will be documented and forwarded to CWD. CWD may also notify the SqCWD if CWD observes the restrictive effect prior to the end of the quarter. If this restrictive effect is demonstrated, the SqCWD shall implement the corrective actions described below.

C. Mitigation

If CWD's pumping distribution among its wells has changed significantly from the current distribution when this restrictive effect is observed, the SqCWD may request that CWD redistribute its pumping to more closely resemble the current distribution. In addition, the SqCWD shall, within one work day of a determination that a restrictive effect has occurred, reduce its pumping at the Polo Grounds, Aptos Jr. High, and/or Bonita Wells by a minimum of ten percent of the largest producing well, until groundwater levels are elevated above the top of the well screen(s).

After CWD redistributes pumping as requested by SqCWD (as applicable), the SqCWD shall be solely responsible for pumping reductions to eliminate the restrictive effect if total annual CWD pumping is within 200 million gallons, or 614 acre-feet. If CWD pumps greater than these amounts, SqCWD and CWD shall both reduce pumping to eliminate the restrictive effect. SqCWD's pumping reductions would likely take place at the Polo Grounds, Aptos Jr. High, and/or Bonita Wells and pumping could be redistributed to other SqCWD production wells in the SqCWD's service area.

Restrictive Effect 2: Reduced well yield due to increased pumping lift.

A. Monitoring

CWD will notify SqCWD and provide CWD's pumping and groundwater level data if there is a decrease in CWD's Rob Roy production well yield such that the Rob Roy well field must be pumped greater than 50% of the time averaged over the year for CWD to produce annual amounts equal to or less than 200 million gallons or 614 acre-feet.

B. Assessment

The assessment for this restrictive effect shall be based on reporting by CWD that the effect has occurred and will be promptly confirmed by SqCWD based on review of CWD's pumping and groundwater level data from production wells. The reduction in yield must have a clear correlation with a decline in static groundwater levels at the CWD wells and pumping at the Polo Grounds Well in order for the restrictive effect to be confirmed. SqCWD shall provide the results of its assessment to CWD within one month. A copy of the assessment will also be kept on file. Any dispute over the assessment findings shall be resolved using the arbitration provision of this agreement.

C. Mitigation

If restrictive reductions in well yield at CWD's wells due to increases in pumping lift caused by increased SqCWD pumping in the vicinity of the Polo Grounds Well are observed, the SqCWD shall reduce pumping at the Polo Grounds, Aptos Jr. High, and/or Bonita Wells within one work day by a minimum of ten percent of the largest producing well and continue to reduce pumping on a monthly basis until the well yields at CWD production wells increase such that the Rob Roy well field can produce annual amounts equal to or less than 200 million gallons or 614 acre-feet without pumping greater than 50% of the time averaged over the year.

Restrictive Effect 3: Reduced well yields due to seawater intrusion

A. Monitoring

CWD will continue to monitor its production wells for TDS and chlorides on a tri-annual basis. SqCWD will continue to monitor its production and monitoring wells for TDS and chlorides in the Aromas area on a quarterly basis. These data will be included in the Soquel-Aptos Area Annual Report

and Review each water year. CWD will notify SqCWD and provide up-to-date TDS and chlorides data if concentrations in a CWD production well are observed to exceed 125 mg/L, or increase at a rate that concerns CWD.

B. Assessment

The assessment for this restrictive effect shall be based on reporting by CWD that the effect has occurred; and will be promptly confirmed by SqCWD based on review of water quality data from CWD and SqCWD. First, concentrations at a SqCWD well between the CWD Rob Roy well field and the current freshwater-seawater interface need to confirm that seawater intrusion is causing the increased concentrations at CWD's well field. SqCWD wells that would be used for this assessment are the **SC-A1 monitoring well cluster** and the Country Club, Bonita, and San Andreas production wells. In order to confirm the restrictive effect, TDS and chloride concentrations at one of the SqCWD wells would need to be greater than observations in the CWD well and have shown increases over a corresponding time period. Second, SqCWD shall conduct general minerals analysis of samples from the affected CWD and SqCWD wells to confirm that mineral mixtures are indicative of seawater intrusion. SqCWD shall provide the results of its assessment to CWD within one month. A copy of the assessment will also be kept on file. Any dispute over the assessment findings shall be resolved using the arbitration provision of this agreement.

C. Mitigation

If the restrictive effect is confirmed, SqCWD shall immediately reduce pumping at the Polo Grounds, Aptos Jr. High, Bonita, Country Club and/or San Andreas Wells within one work day by a minimum of ten percent of the largest producing well and continue to reduce pumping on a monthly basis until chloride concentrations decline below, and are maintained below, 125 mg/L. During this period of pumping reduction, and for one year after concentrations decline below 125 mg/L, SqCWD shall monitor the affected CWD and SqCWD wells for general minerals and TDS on a monthly basis.

Component 6: Arbitration Clause

In the event of a dispute arising out of or in connection with this agreement, it shall be determined by the appointment of a single arbitrator to be agreed upon by both parties. Nominees for arbitrator should be knowledgeable in the field of groundwater law and

considered neutral by both agencies. Failing agreement within fourteen calendar days after either party has given to the other a written request to concur in the appointment of an arbitrator, either party can apply to the presiding judge of the Superior Court of Santa Cruz County for the appointment of a qualified, neutral arbitrator. The decision of the arbitrator shall be final. All costs associated with arbitration shall be shared equally by CWD and SqCWD.

Component 7: Term

This agreement shall be reviewed in calendar year 2013 or following adoption of the 2012 Groundwater Management Plan Update by the Soquel-Aptos Groundwater Management Joint Powers Authority and every five years thereafter. Either party may request to re-open the agreement at such time as a significant change in well operations may be considered that might alter the components set forth in this agreement.