A REPORT BY
THE 2015-2016 CONTRA COSTA COUNTY GRAND JURY
725 Court Street
Martinez, California 94553

Report 1602

Protecting Our Groundwater Resources

Who's Minding the Storage?

APPROVED BY THE GRAND JURY:

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Contra Costa County Grand Jury Report 1602

Protecting Our Groundwater Resources

Who's Minding the Storage?

TO: Board of Supervisors, County Assessor, and City Councils for the Cities of El Cerrito, Pittsburg, Richmond, and San Pablo

SUMMARY

Due to a fourth consecutive year of drought in California (State), residents and governmental agencies are increasingly focusing on the fact that water is a critical and limited resource. The anticipated drought relief from this year's El Niño storms has not completely remedied the drought situation. Even as the State's reservoirs fill again, many parts of the State are still experiencing a groundwater deficit. The need to use this valuable resource more wisely is clear.

Water agencies within Contra Costa County (County) are starting to more closely monitor and conserve our groundwater. Groundwater is contained within an aquifer (an underground geological formation able to store and yield water). The Sustainable Groundwater Management Act of 2014 (SGMA) mandates formation of management agencies for groundwater basins identified as 'medium' and 'high' priority by the California Department of Water Resources (DWR). Three of the eight basins that are either within or partially extend into the County have this designation: Tracy Sub-Basin; Livermore Valley Basin; and East Bay Plain Basin. For all other groundwater basins, agency formation is optional under SGMA.

This report concerns the protection of groundwater basins in the County. It concludes that more can and should be done to monitor the groundwater supply in the County, including the over 2,500 domestic water and irrigation wells, and to preserve and enhance the quantity and quality of groundwater in the County.

The Grand Jury's recommendations include:

- Preparing and distributing cautionary health information about domestic water wells.

- Identifying and mapping the existing domestic and irrigation wells in the County to check their status and safety.

- Forming a Groundwater Advisory Council to include stakeholders: (i) to support and participate in agency formation under SGMA, (ii) to advise the Board of Supervisors on the status of the wells that currently exist in our County, and (iii) to make recommendations to enhance and protect our Groundwater resources.

- Directing the Contra Costa Water Agency to participate in the formation of groundwater sustainability agencies (for both the medium and low priority groundwater basins) and the development of sustainability plans.

- Directing the Environmental Health Division (EHD) and the Flood Control District to cooperatively pursue matching grants afforded by State Proposition 1 to assist Disadvantaged Communities (DACs) to maximize groundwater protection.

METHODOLOGY

The Grand Jury conducted interviews, attended public meetings and technical presentations, and reviewed documents. More specifically, we interviewed, and/or obtained information from sixteen senior and junior level specialists from:

- Contra Costa Assessors Office
- Contra Costa Environmental Health Division
- Contra Costa Department of Public Works
- Contra Costa Flood Control District
- Contra Costa Department of Conservation and Development
- Contra Costa Water District (CCWD)
- Diablo Water District (DWD)
- East Bay Municipal Utilities District (EBMUD), and various cities within the County that produce all or part of their domestic water supply from groundwater sources

The Grand Jury attended meetings and witnessed technical presentations at or by:

- Contra Costa Water District (CCWD)
- East Bay Municipal Utilities District (EBMUD)
- San Francisco Bay Regional Water Quality Control Board
- Bay Area Integrated Regional Water Management
- East Contra Costa County Integrated Regional Water Management
- California Water Resources Control Board
- East County Water Management Association
- East Bay Leadership Council (Water Task Force)

- Contra Costa Local Agency Formation Committee (LAFCO)
- The Board of Supervisor's Transportation, Water, and Infrastructure Committee (TWIC)

The Grand Jury studied and reviewed documents relating to water wells and groundwater issues including:

- County ordinances related to domestic wells
- The Sustainable Groundwater Management Act (the new groundwater law)
- Various groundwater basin studies prepared by Luhdorff & Scalmanini, Norfleet Consultants, and DWR, including Bulletin 118
- Water-industry standards, Government and Non-Governmental Organization (NGO) documents related to groundwater, well drilling, and groundwater quality

BACKGROUND

The population of California has more than doubled in the past 50 years. During this time, California has experienced three periods of drought: 1976-1977; 1987-1992; and the current drought, which started in 2012.

In 2020, the 20X2020 Water Conservation Law, which mandates a reduction of water consumption by 20% per capita from the base year (2005), will come into effect. The State is currently meeting that goal because of severe drought cutbacks, but historically consumption increases (bounces back) when a drought abates.

Groundwater has always been essential in California. Due to variable precipitation and droughts, California has relied on groundwater when surface water is scarce. According to a fact sheet prepared by DWR and other water experts:

- *More than eighty percent of Californians rely, in part, on groundwater for their drinking water.*
- *Many rural areas and small urban areas rely entirely on groundwater, as well as some larger cities, such as Fresno.*
- *Even in wet years, groundwater is over a third of the state's total annual water supply and increases up to sixty percent in dry years.*
- *Groundwater basins are one of the most cost-effective and environmentally friendly places to store water locally during wet years.*
- *Collectively, groundwater basins are the state's largest reservoirs – more than ten times the size of all its surface reservoirs combined.*

- *There are eight groundwater basins that either entirely or partially underlie the "footprint" of our County.*

DISCUSSION

To better identify and understand this complex subject, the report has been divided into the following sections; groundwater, wells, concerns, and path forward.

GROUNDWATER

Groundwater is water that fills the pore spaces in the earth, the ground beneath your feet. By way of example, a ground water basin can be thought of as sand in a bathtub or marbles in a jar to which water is added. The coarser the material, (sand, pebbles, and gravel), the more space there is for water to be stored. This storage space is called an aquifer.

When the County was first settled, groundwater supply was sufficient for its population, but as the population grew, groundwater was impacted by the increased demands on it. This was exacerbated by periodic droughts and, in urban areas, by contamination from septic sources and diffusion of adjacent higher salinity water brought on by well over-drafting (the pumping of water from a groundwater basin or aquifer in excess of the supply flowing into the basin).

In the early part of the last century, surface waters captured and transported from the Sierra snowmelt and locally from the San Joaquin River, were tapped to provide a more reliable water source for the growing population. Nevertheless, for a significant number of families in exurban and rural areas of the County, groundwater remains an important source for both domestic and irrigation purposes. In East County, many disadvantaged communities (DACs) rely on groundwater for all or part of their water needs. Consequently, water quality issues in these areas have a greater impact in the absence of affordable water alternatives. (For more information about DACs in our County see Appendix 1)

Groundwater Resources within Contra Costa County –

The County's footprint overlays all or parts of eight groundwater basins. The shaded areas in Figure 1 below indicate the groundwater basins. The northwest corner contains the northern end of the East Bay Plain Basin. Proceeding east across the northern edge are Arroyo del Hambre Valley, Ygnacio Valley, Clayton Valley, Pittsburg Plain, and the Tracy Sub-Basin. The San Ramon Valley and (an extension of) the Livermore Valley basins are in the southwest corner of the County. Compared to more agricultural Bay Area counties, the County has much smaller and in some cases lower quality basins.

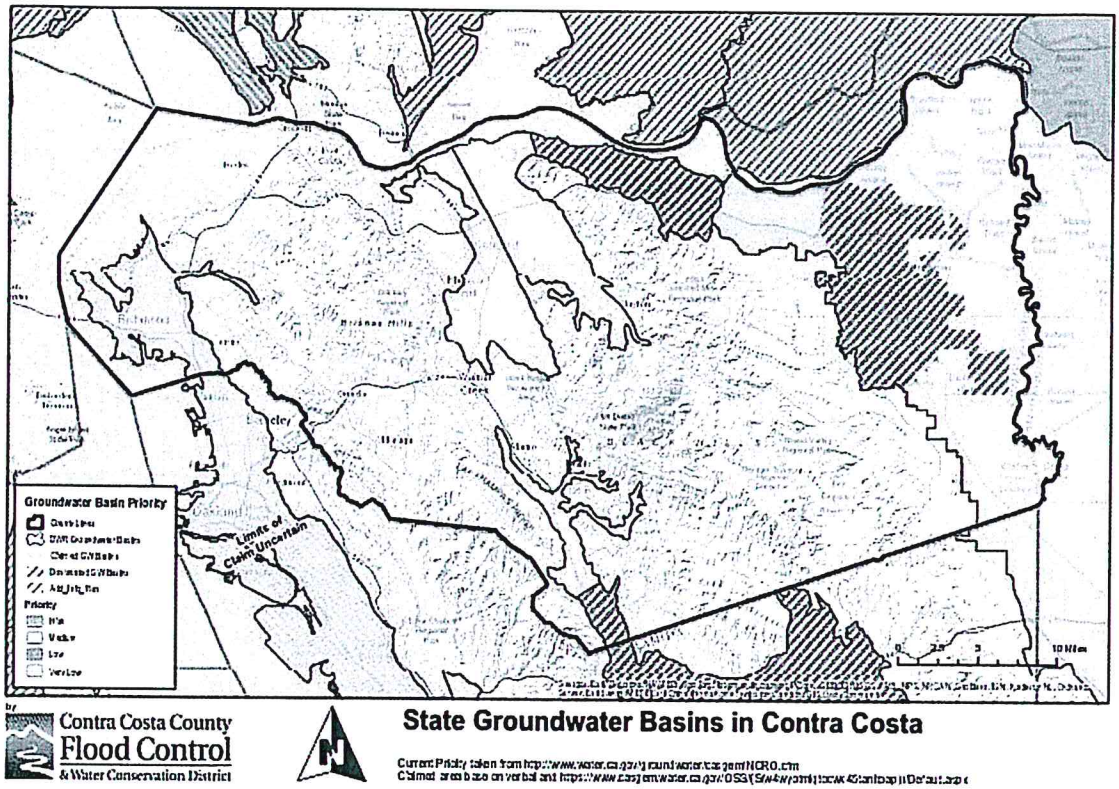


Figure 1- Groundwater Basins in Alameda and Contra Costa Counties

(Consult Table 3 in Appendix 4 for additional data obtained from DWR Bulletin 118.)

Sustainable Groundwater Legislation –

Last year the Sonoma County Civil Grand Jury evaluated sustainable groundwater for its county. In their report, they provided the following summary of the SGMA:

> *In November 2014, the State Legislature passed the Sustainable Groundwater Management Act (SGMA). It supersedes and strengthens previous legislation (AB 3030) that addressed groundwater management. It provides for the formation of Groundwater Sustainability Agencies (GSA's) to oversee each defined groundwater basin. It appropriated $100 million toward the formation of GSA's. While only 'medium' and 'high' priority basins are required to form GSA's, the Act allows and encourages GSA formation for 'very low' and 'low' priority basins.*

Each GSA is responsible for assuring that groundwater monitoring wells reflect the true condition of the aquifer; pumping records are accurate; all necessary studies and modeling of groundwater basins have been identified and performed; and all decisions about how to achieve sustainability goals are properly validated.

While forming a GSA that is not legally mandated may appear to add an additional layer of bureaucracy, there are three potential advantages of doing so:

(i) elucidation of how much available water exists within a defined basin;
(ii) confirmation of how much water could be sustainably withdrawn on an annual basis or during an emergency and;
(iii) agreement on who is entitled to withdraw from it.

For instance, if a basin confirmed to have unfilled space was intentionally charged with surplus water during wet years, basin users should agree on the rate at which the "water charger" may remove that water – for instance, a rate that would not negatively impact other basin users. It would also be important to agree that other users could not increase their withdrawal rates beyond their respective historical use. The GSA reaches, documents, and enforces these understandings and agreements

Planning for Groundwater Sustainability –

To comply with the SGMA, each designated basin will need a detailed plan that addresses SGMA requirements. These requirements include:

(i) a description of the basin's parameters and characteristics;
(ii) measurable objectives for achieving sustainability;
(iii) a timeline and milestones for accomplishing the defined goals;
(iv) provisions for monitoring and timely reporting of performance and;
(v) verification that the plan aligns with general plans of the applicable city/cities and the County.

The Groundwater Sustainability Plan (GSP) has to consider all of the above criteria. To complete a GSP, the GSA will need to collect data on the current water extraction and recharge rates. It also needs to have studies conducted that better characterize the basin's holding capacity, its ability to recharge, and its maximum extraction rate. SGMA provides authority for the GSA to obtain information about how much water is being extracted. Each GSA is also empowered to fund its own operations and enforce its own rules. However, stakeholders can opt out of SGMA requirements by demonstrating to the DWR that their basin is being managed sustainably.

Status of Groundwater Sustainability Agencies in the County –

A GSA is currently being formed for the Tracy Sub-basin. Participants include Diablo Water District, CCWD, East Contra Costa Irrigation District, Byron-Bethany Irrigation District, the cities of Antioch and Brentwood, the Town of Discovery Bay, and the County Water Agency. The County is considering full membership in this GSA based on a recommendation by TWIC.

A GSA for the East Bay Plain basin, which is primarily within Alameda County but extends into the County, is being formed under the leadership of EBMUD. The team

working on formation of this GSA intends to work with the Contra Costa cities that overlie the basin and the County.

Previously, EBMUD had considered petitioning to sever the portion within the County from its "medium" priority status because it has limited storage capacity compared to the rest of the basin and the groundwater is degraded from salt-water intrusion in some areas. Nevertheless, the East Bay Plain basin contains producing wells, some of which are being used to water parks and public landscaping. In fact, as recently as 2009, a new well was drilled in El Cerrito. Also, the Richmond and El Cerrito General Plans acknowledge the potential benefits of using groundwater for emergencies such as an earthquake or an extended supply disruption.

Given that Richmond and San Pablo both had active municipal wells up into the 1930s that pumped over one million gallons per day, those cities might consider reassessing drilling new wells for irrigation and emergency use. According to a 1998 study produced by Norfleet Consultants, "Since [the over pumping and saltwater intrusion that occurred in the 1920-1930 era] groundwater levels have recovered and it is likely that they are now at 1880 levels or higher."

The Pittsburg Plain basin is classified as "low" priority and therefore does not require the formation of a GSA. Even though municipal wells in the Pittsburg Plain basin are extracting over 2000 acre-feet/year, the basin has historically shown itself to be sustainable. It would be useful to determine the basin's maximum capacity and suitability for enhanced storage. However, without stakeholder (municipal well owners) consensus that GSA formation would be beneficial, (and there has been none from municipal users) it would take the County's or City of Pittsburg's involvement to push agency formation forward.

The San Ramon Valley and the Ygnacio Valley basins are also classified as "low" priority. While there are slightly more than four hundred individual wells removing water from each basin, there have been no documented reports of permanent lowering of the water table. If the storage capacity of these basins were better understood, they might also be used for banking surplus water for future irrigation use. Again, GSA formation could be beneficial in establishing a mechanism for allowing such a banking plan to go forward.

Constraints on Use of Groundwater within Contra Costa County –

Water quality in parts of basins within the County has been compromised by misuse. Water quality problems include saline intrusion, toxic plumes from prior industrial activity, and the risk of introduction of new contaminants from undocumented abandoned wells. The risks of recontamination discourage cleanup of the existing groundwater basins for use as underground reservoirs and particularly affect industrial areas such as Richmond and along the northern waterfront from Martinez to Antioch.

Even where chemical pollution is only a minor concern, the overall quality of naturally

occurring water represents a problem for use and additional storage. High total dissolved solids (TDS), i.e. hardness and other naturally occurring elements and compounds (various salts, arsenic, boron, and hexavalent chromium), are issues that must be evaluated before moving forward.

The geological structure of the County's basins is inferior compared to the basins in the surrounding Bay Area counties and the large, highly permeable basins in Southern California. The latter contain thick layers of coarse sand and gravel that are ideal for water storage. Contra Costa's groundwater basins are smaller because the water-bearing layers are thinner, and often overlain with clay. The clay layers act as "aquitards" that inhibit natural recharging of the groundwater basins. However, despite these facts, significant amounts of water are currently being sustainably withdrawn to support domestic, industrial, and agricultural needs.

WELLS: ACCESSING GROUNDWATER IN CONTRA COSTA COUNTY

Wells and Well Drillers – (for description of different well types, see Appendix 2)

Modern water wells have common features: a bore hole: a sleeve or liner called a "casing" that extends down the previously drilled hole to reach the aquifer; a sanitary seal that fills the annular space between the casing and the hole; a well pad on which the well head assembly rests; and the pump/motor/water conduit piping that extracts the water. Figure 2 shows a schematic representation.

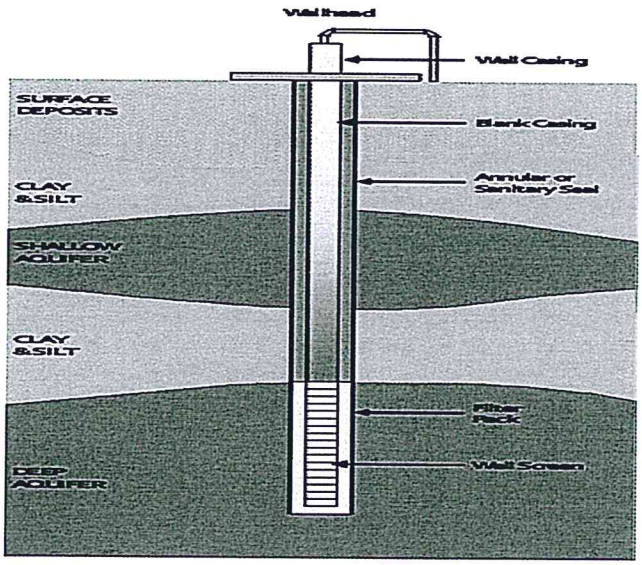


Figure 2 – Schematic Drawing Showing Completed Well (DWR)

When a well is abandoned, it is required to be plugged with an approved material to a specified depth from the ground surface. Plugging is nothing more than removing the pump and internal piping and filling the space with the approved material.

Well Permitting and Inspection –

In the mid-1980s the County passed ordinances that mandated permitting and inspection of all wells, including domestic and agricultural water wells. Since these ordinances were established to protect public health, enforcement was assigned to EHD, a branch of the County Health Department. EHD is responsible for permitting individual wells, inspecting well completions, and maintaining well records.

In order to drill wells in the County, each well drilling contractor must be bonded and possess a current (valid) state contractor's license. Both the County and the State maintain lists of licensed drillers.

EHD is responsible for monitoring and documenting one-hundred twenty small water service systems (those with up to one hundred ninety-nine service connections) that serve small communities, the public in commercial establishments, and remote regional parks.

EHD has no mandate to monitor individual households (single connection) or two related households sharing a well on the same parcel. A single test for contamination at well completion is all that is required. In comparison, most of the small systems the County monitors require routine bacteriological, chemical (including a more frequent test for nitrates), and radiological testing.

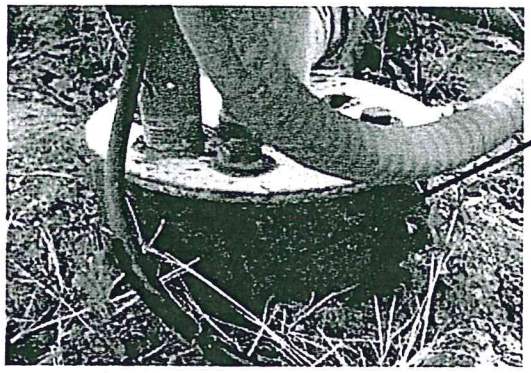
Although periodic testing and treatment of well water is recommended, private owners are not required to do so unless testing after well completion finds harmful bacteria in the water that was present prior to the drilling process.

Individuals using well water are at greater risk than those using municipal water, since the well water requires minimal testing, while municipal water is tested several times a day. According to Joan Brunkard, PhD. of the Centers for Disease Control and Prevention, the lack of testing impedes researchers trying to understand the scope and severity of disease outbreaks that could be linked to contamination from septic systems.

Well Documentation –

The EHD records each well completion (sealing of the well to prevent future contamination from surface or near surface water) and documents that the water source meets State water quality requirements. Each completed well record is filed in a folder. Folders are ordered by street address. Since 2002, well records have been electronically entered into a database for easier access. Older records are slowly being entered into this database as resources become available. There is no current deadline for all older records to be electronically entered. EHD staff does not know how many operational or abandoned well records are in their paper files. There may be many wells for which the County may not have documentation because EHD well records only go back to the mid-1980s.

Those undocumented wells and abandoned wells that have a breach in the casing or well head can be a potential health risk to nearby wells that are properly sealed. These compromised wells provide a "short cut" for contaminants from the earth's surface to travel to deeper water bearing zones from which drinking water is extracted. Figure 3 illustrates an entry point for contaminants.



A cracked well casing may allow surface water and contaminants into your well. One of the most common water quality issues associated with a cracked well casing is the presence of coliform bacteria. Other chemicals can also be introduced into the well through the cracked casing. Consult a water quality professional, such as a licensed well driller, to repair or replace the cracked casing.

Figure 3 – Entry Point for Contaminated Water to Reach the Aquifer (DWR)

As part of the well permitting process EHD notifies the County Assessor's Office when wells are put into service. The Assessor's Office shows or notes the presence of wells in the parcel files that it maintains. Such records can only be accessed manually (one at a time), which makes it difficult to identify all wells in the County since there are roughly 360,000 such records.

DWR maintains the well log records for drilling contractors going back to the early 1950s. These records document the date completed; the well type (domestic water, irrigation, monitoring, etc.); the well depth; the street address (in most cases); and, most importantly, geographic coordinates (latitude and longitude).

According to DWR's website, "In June 2015, Senate Bill 83 amended California Water Code §13752....to allow public access to Well Completion Reports. However, the law requires the DWR to comply with *The Information Practices Act of 1977*, redacting personal information from the Well Completion Reports before making them public. Since there are about 800,000 reports on file with the Department, it requires a significant effort to redact the personal data from all reports. DWR is in the process of redacting the personal information with the goal of making all Well Completion Reports available online at no charge within the next year."

There are over 17,000 wells in the County, although the majority are either monitoring wells or test wells. Test wells are usually plugged soon after completion. Domestic water and irrigation wells account for over 2500 of the total number of wells. The DWR data are organized on an Excel spreadsheet, so the active well locations can be converted into the County Geographic Information System (GIS) as a discrete overlay.

This "water well overlay" can identify the location of known water wells, as well as help confirm the status of old wells. It can also assist in locating possible abandoned wells so that they can be inspected to verify that they are correctly sealed.

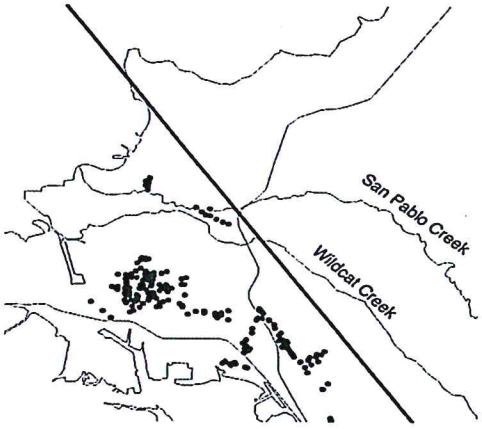
The distribution of domestic water and irrigation wells by associated groundwater basin is summarized in Table 2 in Appendix 2.

Performing a review of historical maps, United States Geographical Service (USGS) topographic maps, and old fire insurance maps (known as Sanborn Maps) also could aid in locating old wells to determine if they have been correctly abandoned.

The 1999 East Bay Plain Beneficial Use Study, prepared using data collected by Norfleet Consultants, identified the locations of wells dating back to at least 1910 in West County. Figure 4 shows the part of the data relating to West County. The black diagonal line represents the location of the Hayward Fault.

The 1999 Report recommended undertaking well abandonment programs by appropriate county agencies in areas where groundwater resources are at risk.

The 1999 Report also noted that EBMUD's backflow preventer installation records are a good indication that backyard wells existed at those addresses. EBMUD records show that over 600 backflow preventers were installed in El Cerrito, Richmond and San Pablo. It is uncertain whether similar records are kept by other water districts within the County, which could be used to verify the existence of wells in areas served by the districts.



WATER WELLS IN 1910

The • indicates the location of public and private water wells in the East Bay Area in the Fall of 1910. At that time, there were approximately 3400 active wells. The data were collected by Dockweiler (1912). The map does not include wells that had been abandoned prior to 1910.

The pattern of wells provides an indication of the population density of the cities at the time. Oakland, Alameda Island, and Berkeley were well developed, while Richmond (founded in 1900), Hayward, and San Leandro were just beginning to develop.

The well locations shown on this map are approximate.

Figure 4
1910 Map showing existing public and private well in the Richmond Area
(From 1998 Report Prepared by Norfleet Consultants)

The original information collected by Dockweiler over 100 years ago was largely performed by door-to-door canvassers. It has long since been lost, but could be regathered.

CONCERNS

Groundwater Availability –

As California endures its fourth year of drought, there have been media reports of wells going dry and families being forced to haul water. These reports concern the Tassajara Valley in the southern part of the County where a defined groundwater basin does not supply the wells. Historically there have been problems during drought years in the area west of Briones Regional Park and along Marsh Creek Road. Last year EHD attempted to survey domestic well owners about seasonal or drought-related problems, but only received a limited response. The reason for the low response is not known but suggests that there is not a widespread issue with wells in other parts of the County.

As the drought persists, some drillers' backlogs have increased and a few have extended their workweek to 6 days to meet demand. While this might suggest an increase in construction of domestic or irrigation wells, EHD records for the County do not show this to be the case. There has only been a modest increase in well construction over the past 5 years and many of the new wells were associated with new building construction. EHD data shows that only 258 well permits were issued in the past 5 years. The peak year was 2014 when 84 permits were issued.

Groundwater Quality –

DWR states that unused and abandoned wells can provide a pathway for contamination to reach aquifers used as drinking water sources. "The risk of groundwater contamination increases when other wells are operating, since pumping can draw poor quality water down the abandoned well and into the drinking water aquifer."

The lack of any testing or reporting requirement places families that are reliant on groundwater from their wells for domestic purposes at a greater risk compared to families using municipal water, who have their water tested dozens of times each day. The absence of testing is also an obstacle for researchers who are trying to understand the scope and severity of disease outbreaks that could be linked to faulty septic systems. The predominance of these issues falls within DACs.

Groundwater in the County can be high in total dissolved solids, commonly termed "hardness," and other contaminants such as arsenic, boron, chloride, hexavalent chromium and nitrates that must be filtered out or blended with higher quality water before distribution. Sometimes the limit (maximum permissible amount) on these "impurities" is driven by public health concerns. For example, the Beacon West community well on Bethel Island was recently found to contain arsenic levels more than double the current State Primary Drinking Water Standards. Previously controlled by the Department of Public Health, the maintenance of these standards now comes under the State Water Resources Control Board. Low interest loans from the State Revolving Fund were obtained in order for the community to drill a new, deeper well to reach higher quality water. Other times the "limits" are aesthetic: taste, color, odor and

usability without in-home water softening.

While lower quality groundwater is unsuitable for many uses, it may be used for irrigation. Where such water is available, it could be blended into recycled water distribution systems in summer months.

The County's stated water-related goals and policies in its current General Plan include:

- *To employ alternative drainage system improvements which rely on increased capacity to lessen or eliminate the need for structural modifications to water courses, whenever economically possible*
- *Preserve watersheds and groundwater recharge areas….*
- *Preserve and enhance the quality of surface and groundwater resources*
- *Provide development standards in recharge areas to maintain and protect the quality of groundwater supply*
- *Develop a program that fosters the participation of public agencies, private organizations, and individuals in the development of watershed management practices….*

These goals and policies confirm the County's interest in protecting its groundwater resource and in encouraging the broadest participation of its citizens in reaching those goals.

THE PATH FORWARD

While the groundwater basins within the County are not as large or productive as those in surrounding counties, these basins can contribute to the local water supply. When issues related to basin capacity, sustainable withdrawal rate, recharge, and water quality are resolved; the basins can make an important contribution during times of peak demand, extended drought or emergencies.

Thousands of domestic water and irrigation wells are known to exist throughout the County. Historical records indicate that thousands more, which cannot be fully accounted for, may have been improperly abandoned or left to deteriorate. This represents a potential public health risk that needs to be addressed.

FINDINGS

F1. With the exception of Community and non-Community wells, the County is not required to provide oversight of individually owned wells; aside from permitting well construction and inspecting wells upon completion.

F2. Improperly maintained wells or wells that are located too close to surface contaminants or failing septic systems risk contamination, which also may lead to the contamination of neighboring wells.

F3. Improperly abandoned wells or undocumented wells can threaten groundwater quality because improper construction or maintenance may result in breaches in these wells that permit ground contaminants to reach potable water in lower water bearing strata.

F4. The lack of a comprehensive and readily accessible County database of wells hinders the ability to track wells to assure they are either properly maintained or correctly abandoned.

F5. EHD and the County Assessor can access DWR well log data, water district backflow preventer installation records, and related historical data that tie well locations to specific property parcels.

F6. Residents of the County who live in disadvantaged communities are more likely to have their sole potable water source come from domestic wells, which have fewer checks on water quality than municipal water sources derived from surface water. County Flood Control and EHD have the data to assess those most at risk. With this information they would be able to develop projects eligible for Proposition 1 matching grants, i.e., projects that could enhance water quality and reduce risk of well contamination during flood conditions.

F7. A "Groundwater Advisory Council" may coordinate stakeholders to help achieve the water-related goals and policies articulated in the County General Plan, as well as raise public awareness about groundwater issues in the County.

F8. There is insufficient data to confirm either a maximum sustainable withdrawal rate or storage capacity for any of the groundwater basins within the County.

F9. The County can choose to support the formation of GSAs for "low" and "very low" risk basins, even though not required by the SMGA.

F10. GSAs can be helpful in elucidating how much available groundwater exists within a defined basin; how much water can be sustainably withdrawn on an annual basis or during an emergency and in helping stakeholders reach agreement about who is entitled to withdraw from a groundwater basin.

F11. Three GSA agencies are in the early stages of formation: one for the East Bay Plain, one that incorporates the "thumb" of the Livermore Valley Basin, and one for the Tracy Sub-Basin.

F12. Approximately $100 million has been allocated by Proposition 1 (2014) to support GSAs in developing sustainability plans.

F13. Based on historical records and more recent hydrological studies, the City could access more groundwater for landscape watering and emergency purposes.

F14. To help establish the Pittsburg Plain basin's sustainable yield and storage capacity, the City of Pittsburg could initiate formation of a GSA for this basin.

RECOMMENDATIONS:

R1. As funds are identified or become available, the Board of Supervisors should consider directing EHD to update their website alerting domestic well owners about the risks of not periodically checking the water quality of their potable water wells, and preparing an informational brochure containing the same cautionary information.

R2. As funds are identified or become available, the Board of Supervisors should consider directing appropriate County departments to review the well records and databases of DWR, water districts, and the County to document well locations, develop a county-wide database, and map the locations as an overlay on the County GIS.

R3. As funds are identified or become available, the County Assessor should consider verifying that the assessed value of each parcel reflects the presence or absence of wells by reviewing assembled well data and, where discrepancies between records are identified, confirming whether a well exists and its status, active or abandoned.

R4. As funds are identified or become available, the Board of Supervisors should consider directing EHD and the County Flood Control District to jointly review proposed flood control projects to determine how to design or modify the projects to protect local wells, and the groundwater below, in DACs.

R5. The Board of Supervisors should consider establishing a Groundwater Advisory Council to further promote public awareness about groundwater conservation and protection.

R6. The Board of Supervisors should consider directing the County Water Agency to become involved in the formation of GSAs in the County and to periodically report to the Board on the status of each GSA.

R7. The Board of Supervisors should encourage each water district whose sphere of Influence overlays "low" and "very low" priority groundwater basin in the County to form a GSA to analyze its groundwater basin and determine its potential for expansion and exploitation.

R8. As funds are identified or become available, the City should consider consulting hydrological specialists to provide advice about the best locations for accessing groundwater for landscape irrigation and emergency purposes.

R9. As funds are identified or become available, the City of Pittsburg should consider forming a GSA for the "low priority" Pittsburg Plain groundwater basin in order to establish its practical sustainable yield and maximum storage capacity.

REQUIRED RESPONSES

	Findings	Recommendations
Contra Costa County Board of Supervisors	1-12	1-2, 4-7
Contra Costa County Assessor	5	3
El Cerrito City Council	13	8
Richmond City Council	13	8
San Pablo City Council	13	8
Pittsburg City Council	14	9

These responses must be provided in the format and by the date set forth in the cover letter that accompanies this report. An electronic copy of these responses in the form of a Word document should be sent by e-mail to epant@contracosta.courts.ca.gov and a hard (paper) copy should be sent to:

Civil Grand Jury – Foreperson

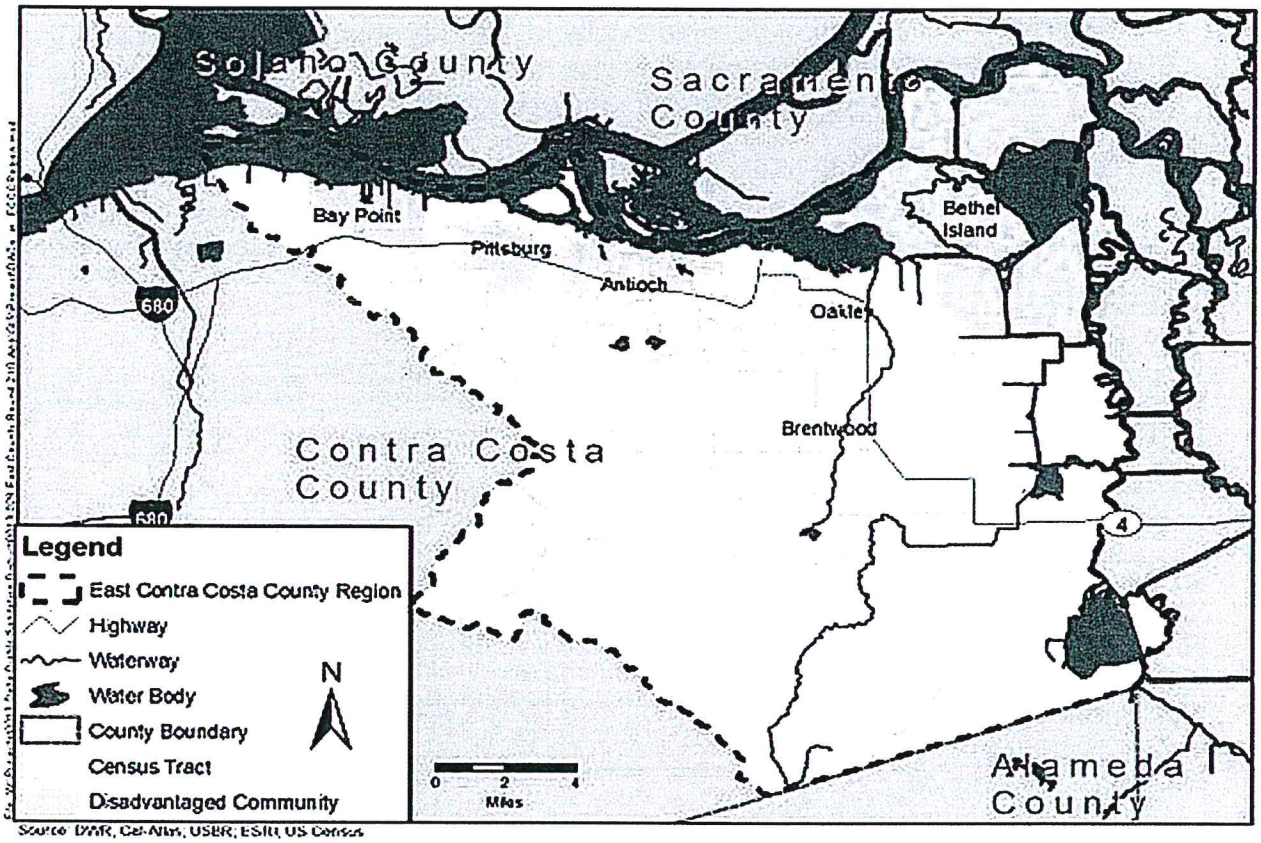
725 Court Street

P.O. Box 431

Martinez, CA 94553-0091

APPENDIX 1

Disadvantaged Communities in Contra Costa County

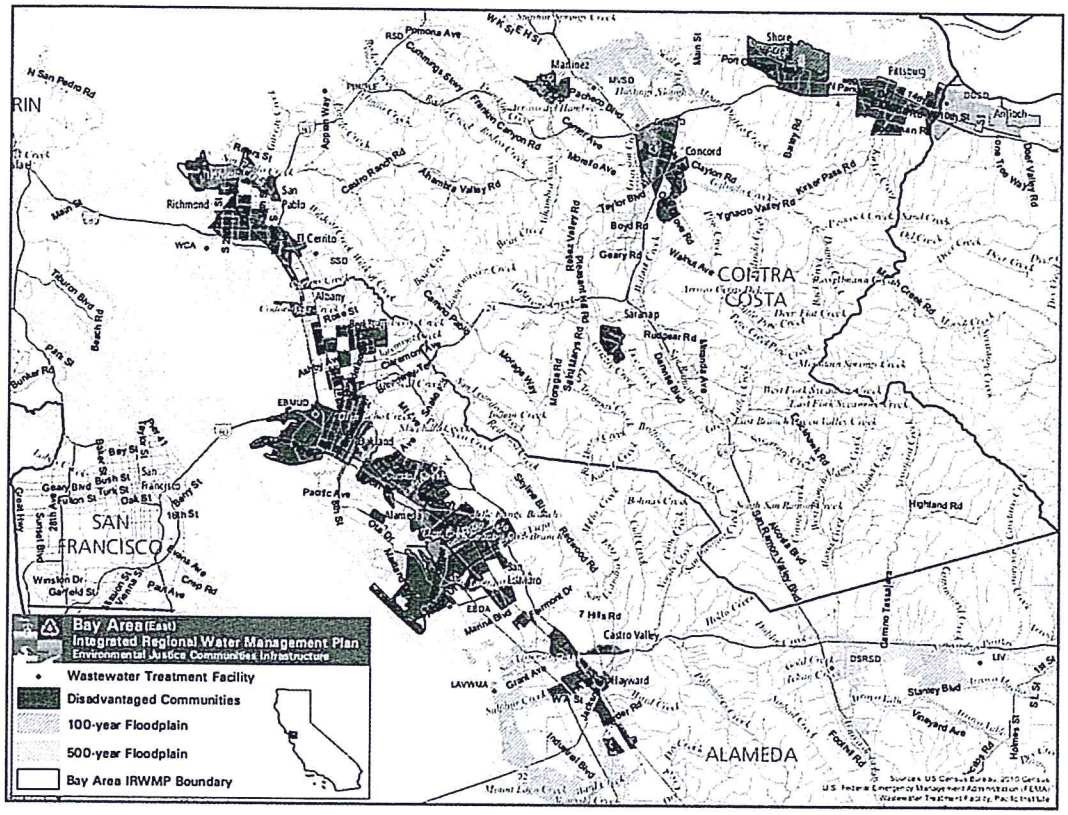


Map of Disadvantaged Communities (DACs) in the East County Region

The map shown above was taken from the East Contra Costa County Integrated Regional Water Management Plan (ECCCIRWMP) website. The website describes DACs as follows:

According to the 2012 Proposition 84 and 1E Guidelines, a 'disadvantaged community' (DAC) is defined by the State of California as a community with an annual median household income (MHI) that is less than 80 percent of the statewide MHI (Public Resources Code (PRC), 75005(g)).

A community with an MHI of $48,706 or less is considered a DAC. Under past grant funding applications, approximately 19% of the Region's area qualifies as DAC, while 23% of its population lives within a DAC. As of the 2015 IRWM Plan update, this number had dropped to 19% of the region's population qualified as DAC, reflecting some recovery from the recent economic downturn.



DACs in West and North County *Regions*
(The map also shows portions of Alameda County)

Critical Water Supply and Water Quality Needs of DACs in the Region –

Many water supply and water quality issues facing DACs in the Region relate to requirements to maintain drinking water quality that meets applicable standards, the threat of damage from flooding, and a strong reliance on Delta supplies. Increase costs of supplies or treatment have disproportionately adverse effects on DACs, whose limited resources may threaten their access to drinking water if costs grow too high. Bethel Island, which is entirely DAC, relies on groundwater for its drinking water. This groundwater has high levels of arsenic; and projects are currently being developed to address this issue. [Note: At least one of these projects has now been completed.]

Issues of special concern to DACs in the Region include:

- Improved water supply reliability/reduced reliance on Delta supplies
- Water quality of groundwater supplies used to supplement Delta supplies
- Infrastructure renovations necessary to assure continued reliability of the minimum quality and quantity of water
- Affordability programs to offset the rising costs of water service
- Flood and stormwater management projects designed to protect disadvantaged communities from flooding impacts

APPENDIX 2

Smaller Community Wells –

EHD monitors the water quality reports required to be submitted for smaller community wells (up to 199 individual connections) and periodically visit the sites to verify their condition. Monitoring of larger water systems is the responsibility of the State. There are approximately thirty community water systems that EHD oversees. In addition, there are over ninety other smaller water systems, including commercial establishments, churches, parks, and much smaller "State Small Water Systems," that the State delegated to EHD for oversight. In some cases these systems required disinfection and filtration systems. Table 1 summarizes both community and municipal wells within the County.

Water Systems in Contra Costa County

Table 1

Type of System	Number of Systems	Approximate Population Served
Community		
Very Large (>100,000)	3	550,000
Large (10,001 – 100,000)	6	222,925
Medium (3,301 – 10,000)	0	0
Small (501 – 3,300)	0	0
Very Small (>15 connections, 0-500)	31	4,643
State Small (5-14 connections)	14	200
Local Small (2-4 connections)	27	150
Non-Community		
Non-Transient	15	3,650
Transient	51	4,057

Source: Presentation by EHD to LAFCO – January 2016

Municipal Wells –

Several cities and communities, including Bay Point, Bethel Island, Brentwood, Discovery Bay, Oakley (Diablo Water), and Pittsburg, rely on groundwater for all or a portion of their potable (i.e., drinkable) water. When good quality surface water is available, it is blended with the well water to improve overall water quality.

Domestic and Agricultural Irrigation Wells –

The DWR data for domestic and irrigation wells summarized in the Appendix does not include information on annual extraction rates. A rough estimate could be performed based on the well casing size, the acreage associated with the well or wells, and the type of crop grown. East Contra Costa Irrigation District (ECCID) normally uses their pre-1914 surface water "right" in lieu of pumping groundwater. In dry years it has a contract with CCWD to sell its surface water, and use groundwater for the crops that would normally get surface water irrigation. Table 2 sets forth the number and type of well for a specific groundwater basin within the County.

Well Location vs. Groundwater Basin

Table 2

Ground-water Basin	Tracy Sub-Basin	Pitts-burg Plain	Clayton Valley	Ygnacio Valley	Arroyo Del Hambre Valley	San Ramon Valley	East Bay Plain	Other
Domestic Wells	1152	18	89	264	0	171	8	194
Irrigation Wells	111	21	18	199	2	232	9	284

APPENDIX 3

Notes from DWR Bulletin 118 –

Arroyo del Hambre Valley, Clayton Valley, Pittsburg Plain, Tracy (Sub), and Ygnacio Valley Basins

Within the CCWD service area, groundwater use is limited (CCWD 2011). The use of existing CCWD wells at the Mallard Well Fields is limited because of the threat of contamination from adjacent industrial areas. The City of Pittsburg operates two municipal wells from the Pittsburg Plain Groundwater Basin (Pittsburg 2011). The City of Martinez operates up to two wells in the Arroyo del Hambre Valley Groundwater Basin to provide irrigation water to a municipal park (Martinez 2011). In Bay Point, the Golden State Water Company operates three municipal wells.

San Ramon Valley Groundwater Basin

Groundwater use is limited within the San Ramon Valley Groundwater Basin located in southern Contra Costa County. Local wells are used for small agricultural activities and landscape irrigation by individual landowners.

Livermore Valley Groundwater Basin

In the Livermore Valley Groundwater Basin, Zone 7 Water Agency administers oversight of the groundwater basins used for water supply and provides water to California Water Service Company, Dublin San Ramon Services District, City of Livermore, and City of Pleasanton. Zone 7 Water Agency only withdraws groundwater that has been recharged using surface water supplies (Zone 7 2010). The California Water Service Company, Dublin San Ramon Services District, and City of Pleasanton also withdraw groundwater (California Water Service Company 2011h; DSRSD 2011; City of Livermore 2011; City of Pleasanton 2011).

Zone 7 Water Agency manages the groundwater levels and quality in the Livermore Valley Groundwater Basin to maintain groundwater levels that would avoid subsidence and provide emergency reserves for the worst credible drought (DWR 2006q, 2013d).

Zone 7 Water Agency artificially recharges the Livermore Valley Groundwater Basin with local surface water supplies and SWP water by releasing the surface waters into the Arroyo Mocho and Arroyo Valle (Zone 7 2005, 2010). The infiltrated water is then pumped from the groundwater basin for various uses, mostly during the summer and during drought periods when local surface water supplies are diminished and the available SWP water supplies are less than the entitlement value Zone 7 Water Agency, City of Livermore, City of Pleasanton, Dublin San Ramon Services District, and California Water Service Company are permitted to withdraw groundwater from this sub-basin.

In 2009, the Zone 7 Water Agency began operation of the Mocho Groundwater Demineralization Plant (Zone 7 2010). This plant is a wellhead treatment plant that produces potable water using reverse osmosis to remove TDS and hardness from the Main Basin.

APPENDIX 4

Summary of Groundwater Basins in Contra Costa County

Information extracted from California DWR Bulletin 118 Data

Table 3

Basin Name *NI = No Information*	**Pittsburg Plain**	**Clayton Valley**	**Ygnacio Valley**	**San Ramon Valley+'thumb'of Livermore Valley**	**East Bay Plain** *within Contra Costa County*	**Arroyo del Hambre Valley**	**Tracy Sub-basin** *within Contra Costa County*
Basin Number	2-4	2-5	2-6	2-7	2-9.4	2-31	5-22.15
Surface Area (Acres)	11,600	17,840	15,500	10,620 (est.)	7,000 (est.)	790	115,000 (est.)
Storage Capacity/ Groundwater in Storage	NI	NI	NI	NI	NI	NI	NI
Water Bearing Formations	NI	> 700 feet	> 700 feet	NI	NI	NI	NI
Groundwater Level Trends	NI	1976-1977 1987-1992 Dropped and Recovered	1976-1977 1987-1992 Dropped and Recovered	1976-1977 1987-1992 Dropped and Recovered	NI	NI	NI
Groundwater Quality	450–5737 mg/L 1821 mg/L Avg.	328-864 mg/L	NI	NI for SRV 450 mg/L Avg. for Livermore Valley	364-1420 mg/L	NI	210-7800 mg/L Higher salinity wells nearer Delta
Last Update	2004	2004	2004	2004	2004	2004	2006