

Marin County Groundwater Elevation Monitoring Program

December 2011
(Updated May 2019)

1.0 Overview

This Monitoring Plan (Plan) has been prepared to satisfy the requirements of the California Statewide Groundwater Elevation Monitoring (CASGEM) Program. CASGEM was developed by the Department of Water Resources (DWR) in response to the passage of Senate Bill 7-6 in November 2009. The law directs that groundwater elevations in all basins and sub-basins in California be regularly and systematically monitored, preferably by local entities, with the goal of demonstrating seasonal and long-term trends in groundwater elevations. DWR is directed to make the resulting information readily and widely available. The CASGEM program establishes a permanent, locally-managed system to monitor groundwater elevation in California's alluvial groundwater basins and sub-basins identified in DWR Bulletin No. 118. The CASGEM program relies and builds on the many, established local long-term groundwater monitoring and management programs. Through the CASGEM program, local monitoring parties with appropriate authority may notify DWR of their intent to be a Monitoring Entity. A Monitoring Entity is a local agency or group that voluntarily takes responsibility for conducting or coordinating groundwater level monitoring and reporting for all or part of the groundwater basin.

This Plan is subject to change as the monitoring network for each basin changes. Revisions will be submitted to DWR when additions or removal of wells from the monitoring network occurs.

It is noted that on September 16, 2014, the California Sustainable Groundwater Management Act (SGMA) was signed into law by a three-bill legislative package of AB 1739, SB 1168, and SB 1319. This act requires governments and water agencies of high and medium priority basins to prepare Groundwater Sustainability Plans to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. Since the groundwater basins within Marin County have been ranked by DWR as low priority, there are no requirements for the County to prepare a Groundwater Sustainability Plan at this time.

Monitoring Entity

The Marin County Environmental Health Services Division (EHS) of the Community Development Agency is the lead agency for carrying out the CASGEM program in Marin County. The North Marin Water District is a participating agency. The EHS contact is Rebecca Ng, Deputy Director, (415) 473-6907, rng@marincounty.org.

Purpose

The purpose of this Plan is to describe the approach and activities of Marin's groundwater level monitoring program to satisfy the CASGEM program requirements. The basic components of a CASGEM plan include the following:

- A discussion of the well network
- Identify the wells in the monitoring network including maps of the wells in each basin
- Discussion of the monitoring schedule
- Description of the field methods used to collect water level data
- Discussion of the roles of cooperating agencies, if applicable
- Description of the monitoring plan rationale

Plan Organization

Section 2.0 of the plan provides an overview of Marin County geology and briefly describes the hydrogeologic conditions beneath each basin. Section 3.0 describes monitoring sites and timing. Section 4.0 discusses procedures for monitoring procedures and data collection. It also describes how the water level data is managed and stored, as well as reporting requirements for the CASGEM program.

2.0 Marin County

The County of Marin encompasses an area of 828.20 square miles. Geographically, the county forms a large, southward-facing peninsula, with the Pacific Ocean to the west, San Pablo Bay and San Francisco Bay to the east, and the city of San Francisco to the south across the Golden Gate Bridge. Marin County's northern border is with Sonoma County.

As described in the California Department of Water Resources Bulletin No. 118, there are four groundwater basins within or partially within Marin County's boundaries. This monitoring plan addresses the three significant basins shown in Map 1. These groundwater basins are entirely within the county boundaries and are identified with the San Francisco Bay Hydrologic Region. The fourth basin is the Ross Valley Groundwater Basin, which is a small 1.765-acre basin that is not well suited for regular groundwater development. Therefore, this basin is not included in Marin County's monitoring plan.

The groundwater use in the San Francisco Bay Hydrologic Region is generally about 5 percent of the region's estimated average water supply for agricultural and urban uses and accounts for less than one percent of statewide groundwater uses. In general, groundwater quality throughout most of the region is suitable for most urban and agricultural uses with only local impairments. The primary constituents of concern are high Total Dissolved Solid (TDS), nitrate, boron, and organic compounds. Areas of high TDS (and chloride) concentrations are typically found in the region's groundwater basins situated close to the San Francisco Bay, such as southern Sonoma and Petaluma valleys. The shallow aquifer zone within Petaluma Valley also shows persistent nitrate contaminants. Some of the more remote areas in west Marin County are completely reliant upon groundwater as their sole source of water.

Marin County Groundwater Basin Boundaries and Hydrology

This section provides a brief description of the geologic and hydrogeologic setting of the groundwater basins in Marin County shown in Map 1. In 2019, in response to an application by Marin County for a jurisdictional basin boundary change, DWR approved the reconfiguration of the Sand Point Area basin to include that portion of the Wilson Grove Formation Highlands basin previously within Marin County. It is expected that the 2020 update of Bulletin 118 will include a description of the new Sand Point Area basin:

San Francisco Bay Hydrologic Region

Basin 2-27 Sand Point Area Groundwater Basin Surface Area: 22,342 acres (34.9 square miles)
Average Well Depth: unknown, to be updated with 2020 Bulletin 118

The Sand Point Area groundwater basin is a coastal basin that is bounded to the southwest by Tomales Bay. Tomales Bay is a geologic feature of high significance, as it delineates the north, northwest trending San Andreas Fault Zone. The basin's northern boundary lies along the Estero Americano Creek and the Marin border with Sonoma County, where it adjoins the newly reconfigured Wilson Grove Formation Highlands basin. Small tributaries in the northern portion of the basin flow north to Estero Americano Creek, which runs east west to enter Bodega Bay. The southwestern portion of the basin drains east west to Tomales Bay. The

southeastern basin boundaries approximately follow the alluvial sand deposits in the basin and the surrounding bedrock. Holocene beach sands and Latest Pleistocene to Holocene dune sands are the predominant basin deposits. According to one water well log available for the southwestern-portion of the basin, bedrock, consisting of the Franciscan Formation, was encountered beneath the alluvium at 94 feet below ground surface (bgs.) The Franciscan Formation consists mainly of sandstone, with minor amounts of conglomerate, chert, and shale. The annual precipitation in the basin averages 35 inches.

Basin 2-029 San Rafael Valley Groundwater Basin

Surface Area: 896 acres (1.4 square miles)

Average Well Depth: 159ft.

The San Rafael Valley groundwater basin is a small, coastal basin located 12 miles north of San Francisco, and includes the City of San Rafael. It is bounded to the east by San Rafael Bay, which lies between San Pablo Bay to the north and San Francisco Bay to the south. The basin extends from its southernmost boundary near San Quentin, about 1.5 miles to its northern boundary of Rafael Creek. The basin extends inland (west) a distance that varies from about 1/2 mile in the south to just under 2 miles in the north. The basin boundaries approximate the contact between the artificial fill (predominantly) and alluvium (minor) in the basin and the surrounding bedrock. The artificial fill is characterized as fill overlying San Francisco Bay mud; and the alluvium as Holocene, undifferentiated deposits. The annual precipitation in the basin averages 33 inches.

Basin 2-030 Novato Valley Basin

Surface Area: 20,500 acres (32 square miles)

Average Well Depth: 243 ft.

The Novato Valley groundwater basin occupies a structural depression in the Coast Ranges immediately west of San Pablo Bay and north of San Rafael. San Antonio Creek bounds the Novato Valley basin to the north and the Mendocino Range forms the western and southern boundary. Streams discharging to San Pablo Bay drain the basin and are tidally influenced in the lower reaches. Annual precipitation in the basin ranges from less than 28 inches adjacent to the bay to more than 40 inches in the upland areas in the Mendocino Range.

3.0 Monitoring Sites and Timing

There is no history of groundwater monitoring in any of the Marin County basins except for two wells in the Novato Valley Basin that have been monitored by DWR since 1973 and 1989. There is no published information regarding groundwater storage capacity and recharge for the Marin County groundwater basins.

Due to the urban setting and availability of municipal water supplies in Marin County, there are few available wells of sufficient depth located within a particular groundwater basin. Additionally, due to the relatively small size of the groundwater basins in Marin County, there are few wells included in the well network for monitoring.

Five wells will be monitored as part of Marin County's CASGEM Plan. Together, these wells represent the three major basins within the county. Marin County EHS will administer the monitoring of these wells. The general location of these wells is shown in Map 1.

The site identification number of these wells, their respective basin, identification number, location, and other pertinent information is detailed in the Table 1 - Marin County CASGEM Sites. Each well will be monitored twice a year, once in the spring and again in the fall.

Well completion reports for each well are not included in this plan. The Department of Water Resources should have copies of each well completion report that can be identified by the unique well completion number. The reports, which are made confidential by Water Code Section 13752, may be disclosed with permission of the well owner.

4.0 Monitoring Procedures

Field Methods

It is anticipated that monitoring will be conducted using an electronic sounding tape (Solinst Model 102 Water Level Meter) in April and October of each year to obtain seasonal high and low groundwater levels.

Field Preparation

1. Sanitize or pre-clean equipment and ensure that it is in working order. Ensure batteries are fresh and the line is not kinked, knotted, frayed, or cut. Test the equipment prior to going out.
2. Check the distance from the electrode probe's sensor to the nearest foot marker on the tape to ensure that this distance puts the sensor at the zero-foot point for the tape. If it does not, a correction must be applied to all depth-to-water measurements. Record this in an equipment log book and on the field form.
3. Print new field sheets (attached DWR Form 1213) with updated previous levels.
4. Contact those well owners that require notification prior to monitoring or for wells that need to be shut off.
5. Ensure keys to gates and assorted wrenches are in vehicle.
6. If this is the initial visit, conduct a well information inventory, plan to identify and photograph measurement reference points, and measure distance from measurement reference point to ground surface.
7. Identify site information and documentation required and measurement locations.

Field Procedures:

1. Check that the well is not pumping. If the well is pumping mark a 1 in the no measurement (NM) column of the field sheet, and do not take a measurement. If the pump motor is off but warm, take a measurement and mark 4 in the questionable measurement (QM) column due to recent pumping. If the pump is off and the motor is cold take a measurement.
2. Remove well cap or plug and report date and time on data sheet.
3. Ensure that the opening into the casing, the reference point (RP), is still available. If the reference point needs to be changed or adjusted, take an accurate measurement of the new RP height from ground surface and note on the field sheet.
4. Wipe off the electrode probe and lower 5 to 10 feet of the tape with a disinfectant wipe, rinse with de-ionized or tap water, and dry.
5. Place groundwater-level measuring device into the well.
6. For electrical tapes, record the distance from the water surface, as determined by the audio signal or meter, to the reference measuring point and record. For sonic meter, record the level displayed on the LED readout.
7. Wait several minutes and repeat the measurement.
8. Repeat measurements consistently going up or down. If measurements are going up, ideally take measurements until the level stabilizes within 0.1 feet; otherwise note the measurements as questionable. If going down, then note "questionable."
9. If known, note the time since the well was last pumping.
10. Remove all downhole equipment, and replace well plug or cap.

11. Clean and rinse all downhole equipment and store for transport to the next well.
12. Note any changes in the well condition since the previous measurement (e.g., new reference point, new well enclosure, etc.)

Recording Data in the Field (DWR Form 1213)

1. Local well identification number from Table 1, which is coded to the latitude and longitude, North American Datum, NAD 83
2. Measurement date and time (military time/24-hour format)
3. No measure code (NM) as described on the form
4. Questionable measurement code (QM) as described on the form
5. Reference point elevation (RP) of the well in feet, North American Vertical Datum (NAVD 88)
6. Ground surface elevation at the well in feet, NAVD88 – referred to land surface datum (LSD) on the form
7. Tape at reference point (RP)
8. Tape at water surface (WS)
9. Reference point to water surface, feet
10. Land surface datum to water surface, feet – calculation
11. Previous depth
12. Comments and observations

Quality Assurance/Quality Control

The following general quality assurance/quality control procedures apply:

1. Document measurements, notes and codes on the groundwater level data forms or field notebook.
2. Operate instruments in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified.
3. Each well should be tested at least twice in order to compare results. If results do not agree to within 0.1 feet, a third measurement should be taken and the readings averaged. Consistent failure of consecutive readings to agree suggests that levels are changing because of one or more conditions as indicated on Form 1213 and should be noted accordingly.
4. Results should be compared to historical measurements while in the field and significant discrepancies noted and resolved, if possible.
5. Wells for which no measurements or questionable measurements are obtained should have the codes entered as described on the field form:
6. Upon return from the field, appropriate corrective actions need to be communicated and completed prior to the next survey event.
7. All data entered into electronic spreadsheet or database should be double-keyed or hard copy printed.
8. Questionable wells or measurements noted during data compilation need to result in corrective actions, if applicable.

Sanitary Practices for Equipment

The water level measurement equipment should be handled carefully, both when transporting the equipment and when using the equipment to take water level measurements. In effect, only the water level measurement probe end should come in contact with the well water.

The water level measurement equipment should be kept and maintained clean by preventive and standard

cleaning measures including:

1. Placing the equipment in a clean space for storage and during transport to avoid contact with dirty surfaces
2. At a minimum, cleaning the probe at the end of the tape with an appropriate cleaning agent at the beginning of field activities, whenever the probe appears dirty, and at the end of the measurement round.
3. Inspecting the probe tape carefully before and after each water measurement for any foreign materials.

In between each water level measurement, the probe should be carefully inspected. If the probe appears dirty at all or appears to have foreign material on it, the probe should be properly cleaned. If the probe appears clean, at a minimum the probe should be disinfected.

Data Handling and Reporting

As the Monitoring Entity, Marin County EHS is responsible for the handling and reporting of groundwater level information for the five wells they monitor: WG1, WG2, SP1, SR1, and NV1. The sixth well (NV2) is currently monitored by DWR, who enters their data into the state system.

Field datasheets of water levels are collected, checked for errors, and uploaded electronically to the CASGEM online system agency database. Data will be uploaded as soon as possible after being taken, but no later than January 1st for fall measurements and July 1st for spring measurements.



Monitored Groundwater Basins in Marin County

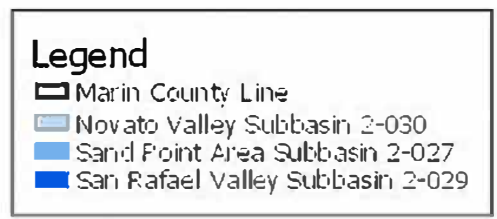


TABLE 1
MARIN COUNTY CASGEM WELL SITES
Updated May 2019

Basin Name/ Well ID	Basin No.	Address	Contact Info	Well Comp #	Well GPS	Sampling Entity*	Surface Elevation NAVD 88	Reference Point	Depth	Screened	Well Status	Use
Sand Point SP1	2-027	Lawson's Landing 137 Marine View Dr. Dillon Beach	Carl (Willy) Vogler 707-878-2443 lawsonslanding@gmail.com	312297	38.242137, -122.964420	NMWD	24.6 ft	25.86 (1.26 ft)	200 ft.	120-200 ft.	active	domestic
Sand Point SP2	2-027	599 Dillon Beach, Tomales	Tom Nunes, Tomales Fire Station* 707-878-2464	700288	38.246381, -122.909946	NMWD	107.6 ft	108.18 (0.58 ft)	191 ft.	32-191 ft.	active	domestic
Sand Point SP3	2-027	3501 Tomales Petaluma Rd, Tomales	Brittany Jensen 310-701-8461	N/A	38.2432, -122.8828**	resident	88.9 ft	90.4 (1.5 ft)	N/A	N/A	active	domestic
San Rafael Valley SRV1	2-029	Hill Well 565 Jacoby St., San Rafael	John O'Riney Marin Sanitary Service 415-458-5538	347002	37.951667, -122.50444	EHS	68	69 (1 ft)	180 ft	60-180 ft.	active	Industrial/ irrigation
Novato Valley NV1	2-030	Olive and Railroad Ave, Novato (740 Olive Ave)	Erik Brown Novato Sanitary District erikb@novatosan.com	N/A	38.110927, -122.565783	NMWD	11.3 ft	11.75 (.45 ft)	33 ft.	13 ft.	active	Irrigation/ industrial

*Well monitored by North Marin Water District (NMWD) and Marin County Environmental Health Services (EHS)

**Location of parcel, not exact location of well; groundwater elevation 18.2 ft.

