San Antonio Basin Groundwater Sustainability Agency

2020 Annual Groundwater Level Monitoring Report

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Introduction

GSI Water Solutions, Inc. (GSI) is pleased to present this annual groundwater and surface water monitoring report for the San Antonio Creek Valley Groundwater Basin (Basin) to the San Antonio Basin Groundwater Sustainability Agency (SABGSA). Groundwater monitoring in the Basin provides hydrologic information needed to understand groundwater conditions and to monitor effects of groundwater management programs. In previous years, the U.S. Geological Survey (USGS) collected groundwater level data in 40 wells as part of their ongoing *Geohydrology and Water Availability of the San Antonio Creek Valley* study. GSI assumed the contract to monitor the network (Figures 1 through 3) from the USGS in 2019; the USGS continues to monitor and maintain two stream gages on San Antonio Creek. The following sections summarize activities associated with groundwater and surface water monitoring in the San Antonio Creek Valley Groundwater Basin in 2019 and 2020. The San Antonio Creek Groundwater Basin is a rural agricultural area that is reliant on local water supplies, predominantly groundwater. The Basin borders the Santa Ynez Groundwater Basin to the east in upland areas and extends to the west past Los Alamos to the Barka Slough and the Vandenberg well field. Major activities in 2020 included replacing 10 transducers for water level monitoring, monitoring groundwater levels, and evaluating new locations for surface water monitoring. These activities are described in the following sections.

Transducer Installation

As part of the Sustainable Groundwater Management Grant Program's Proposition 68 grant agreement between the California Department of Water Resources (DWR) and SABGSA, existing transducers installed by the USGS were replaced with 10 new transducers for water level monitoring by SABGSA. The Sustainable Groundwater Management (SGM) Grant Program provides funding for sustainable groundwater planning and implementation projects through a competitive grant solicitation process. This funding program is intended to provide financial assistance to Groundwater Sustainability Agencies (GSAs) and others to comply with the Sustainable Groundwater Management Act (SGMA) Regulations. The following sections describe the work performed in accordance with the Proposition 68 grant agreement.

Transducer Removal

Previously installed transducers were required to be removed and replaced with new transducers. The old transducers were owned and maintained by the USGS and Santa Barbara County. GSI staff worked with USGS and the County to remove the old equipment in the wells shown in Figures 4 and 5. Specifications for the new transducers were coordinated to ensure that the transducers provide a consistent data record and placed at an appropriate depth below static water levels to capture seasonal and annual fluctuations.

Transducer Installation and Maintenance

The new transducers were installed over the course of three quarterly monitoring events. As specified in the grant agreement, VanEssen TD-Diver Pressure Transducers have been installed in 10 of the 38 wells in the monitoring network. Each transducer is programmed to measure groundwater elevation once every 4 hours and are calibrated quarterly by GSI staff. Wells equipped with transducers are shown in Figures 4 and 5. The time frame for transducer installation was driven by the need to obtain access agreements with well owners and the removal of existing transducers. The following timeline summarizes important events associated with transducer installation and maintenance:

- Seven transducers were installed February 2020.

- An eighth transducer was installed in the SALA well in June 2020.
  - During this monitoring event, it was found that a transducer failed in well SAHC and a cable failed in well SASA. Both items were removed from the wells and returned to VanEssen for inspection. The transducer and cable were replaced by VanEssen under warranty.
- The ninth and tenth transducers were installed in wells 16C2 and 16C4 in September 2020.

Table 1 summarizes transducer specifications and installation details. The transducers are suspended in the water column of each well using a VanEssen DTX cable that enable data download from the top of the wells without removing the transducer. The DTX cables are mounted to custom well caps fabricated by GSI staff that use cord grips to secure the cables.

Table 1. Transducer Specifications and Installation Details

Well Name	Latitude	Longitude	Well Depth (ft)	Transducer Type	Depth of Transducer (ft)
SAHC	34.81005	-120.4502284	90	Diver DI802	85
SASA	34.76333	-120.4618221	65	Diver DI802	62
SAGR	34.77288	-120.428551	90	Diver DI802	85
SAHG	34.76291	-120.4253242	75	Diver DI802	70
SALS	34.75663	-120.3388285	70	Diver DI802	69
SALA	34.74354	-120.2715034	90	Diver DI805	85
SACR 5	34.75902	-120.3942959	110	Diver DI802	108
SACC 5	34.75581	-120.2946153	120	Diver DI802	118
16C2	34.77789	-120.4631	169	Diver DI805	120
16C4	34.77789	-120.4631	560	Diver DI805	120

Note

Depths shown are in feet (ft).

Groundwater Level Monitoring

Groundwater level monitoring has been conducted by GSI on a quarterly basis since the fourth quarter of 2019. As of December 11, 2020, GSI has performed five quarterly groundwater level measurements in the Basin. Well owners were notified by email two weeks in advance of each monitoring event. The notification requested that well owners turn off well pumps 24 hours prior to the measurement of water levels in an attempt to obtain static water level measurements. A complete list of wells monitored during each event is shown in Table 2. Locations of wells in the monitoring network are included in Figures 1 through 3. An overview of each quarterly monitoring event is provided below

Table 2. Wells Monitored During Quarterly Monitoring Events Since 2019

Fourth Quarter (Q4) 2019

Monitoring conducted on November 5, 2019, included groundwater levels measurements in 25 wells. The following noteworthy events occurred during this sampling event:

- Four wells on the south side of the Barka Slough were inaccessible due to overgrown vegetation including poison oak.
- GSI did not have a sounder capable of measuring water levels in Well 34P1 because of the sounding port in Well 34P1 required a specialized, small diameter, sounder, which was unavailable for measuring water levels.
- Well 2M1 was not monitored because a nearby well was pumping.
- A water level sounder became lodged in the Stephen's Well during the monitoring event and was removed soon after. An airline was installed in the well for future monitoring events.

First Quarter (Q1) 2020

Monitoring conducted on February 25, 2020, included groundwater level measurements in 23 wells. The following noteworthy events occurred during this sampling event:

- Seven transducers were installed in wells listed in Table 1 and shown in Figure 44 and 45.
- Sounders became lodged when measuring water levels in Wells 2R1 and 4 Deer Highway. The sounders were removed soon after and sounding tubes were installed for future monitoring events.
- Four wells on the south side of the Barka Slough were inaccessible due to overgrown vegetation including poison oak.
- GSI did not have a sounder capable of measuring water levels in Well 34P1 because of the sounding port in Well 34P1 required a specialized, small diameter, sounder, which was unavailable for measuring water levels.
- GSI did not have a suitable sounder to measure water levels in Well 2M1 because the small-diameter sounder was unavailable for measuring water levels in Well 2M1 because it was lodged in Well 2R1
- Well 2N1 was not monitored because the access port could not be opened.

Second Quarter (Q2) 2020

Monitoring conducted on June 16, 2020 included groundwater level measurements in 27 wells. The following noteworthy events occurred during this sampling event:

- An eighth transducer was installed in Well SALA.
- One transducer failed and was replaced under warranty during the following monitoring event.
- A smaller-diameter sounder was acquired by GSI to monitor water levels in Well 34P1.
- Four wells on the south side of the Barka Slough were inaccessible due to overgrown vegetation including poison oak.
- Well 2N1 was not monitored because the access port could not be opened.

Third Quarter (Q3) 2020

Monitoring conducted on September 16 and 17, 2020, included groundwater level measurements in 35 wells. The following noteworthy events occurred during this sampling event:

- Five wells in the Vandenberg Air Force Base (Vandenberg) well field on the north side of the slough were accessed for the first time.
- Transducers were installed in Wells 16C2 and 16C4 in the Vandenberg well field.
- Well 2N1 was not monitored because the access port could not be opened.
- Two wells on the south side of the Barka Slough were accessed by GSI for the first time after clearing overgrown vegetation.
- Two wells on the south side of the slough remained inaccessible due to overgrown vegetation including poison oak.

Fourth Quarter (Q4) 2020

Monitoring conducted on December 1 and 2, 2020, included groundwater level measurements in 37 wells. The following noteworthy events occurred during this sampling event:

- The access port for Well 2N1 was opened using a large pipe wrench and a groundwater level measurement was collected.
- Well 17Q1 on south side of the slough was accessed by GSI for the first time after clearing overgrown vegetation.
- Well 17K2 on south side of the slough remained inaccessible due to overgrown vegetation.
- A water level sounder became lodged in the Stephen's Well during the monitoring event and was later removed.

Groundwater Level Monitoring Results

Following each quarterly monitoring event, groundwater level data are provided to the SABGSA in an email monitoring report. Groundwater level measurements are housed within the SABGSA Data Management System and available upon request. Groundwater level trends observed since November 5, 2019, are consistent with historical trends; exhibiting a general decrease of groundwater elevations across the Basin. Water level measurements are presented in Table 2. Hydrographs from the wells in the monitoring network are included as Figures 6 through 43. The following noteworthy trends are observed in the hydrographs:

- Low groundwater elevations near the town of Los Alamos indicate a groundwater pumping depression in this area.
- Seasonal fluctuations are apparent in most wells with a general trend towards lower water level elevations in most, but not all wells.
- Wells with longer periods of record show a cessation of downward water level trends in a number of wells beginning in 2017 when there was above average rainfall following the drought.
- Water levels in the Barka Slough area exhibit seasonal fluctuations and have remained relatively stable since 2015. Prior to 2015, water levels were declining steadily.
- Groundwater elevations in the SACC nested monitoring well north of Los Alamos continue to decline at a higher rate than the rate for most other wells in the monitoring network.
- Pumping activity in the Vandenberg well field during Q4 2020 affected groundwater elevations in Wells 16C2 and 16C4, as shown in the continuous groundwater elevation data.
- The Stephen's Well was pumping during the Q3 2020 monitoring event.

Surface Water Monitoring

Streamflow monitoring provides hydrologic information needed to better understand hydrologic conditions including surface water/groundwater interactions. The USGS currently manages two steam gages on San Antonio Creek. Stream gage 11135800 is located just east of Los Alamos, mounted on the Highway 101 bridge. Stream gage 11136100 is 2.5 miles downstream of the Barka Slough (outside of basin boundary), mounted to a bridge on San Antonio Road. Hydrographs of annual discharge for both stream gages are presented in Figures 44 and 45.

The DWR southern region office reached out to SABGSA in August 2020 and offered to facilitate the installation of a new stream gage. In September 2020, GSI met with a DWR representative and visited six potential sites. Stream gages had previously been installed and monitored by the USGS at three of these six sites; however, the gages have since been removed. Of the three previously monitored sites, two are located at bridges just above Barka Slough on San Antonio Road and Harris Grade Road and the third is located on Harris Creek at a culvert on Highway 1. The other three sites are located just downstream from the San Antonio Road bridge site on San Antonio Creek. DWR collected information during the site visits to evaluate the feasibility of stream gage installation and management. It was the opinion of DWR that the sites are not suitable for monitoring, due to obstructions from vegetation or inadequately defined stream channels.

The Santa Barbara County Water Agency also evaluated the proposed stream gage locations. The County Water Agency found that stream gage installation at any of the sites mentioned above is possible; however, the sites would require continued maintenance for vegetation clearing and siltation and may not provide defensible data. The effort to find another stream gage location near the Barka Slough is ongoing and both agencies will continue to collaborate.

Recommendations for Future Monitoring Events

SABGSA currently has access to 38 of the 56 wells identified for water level monitoring. Table 2 depicts well access status. Green highlighted cells indicate that a well access agreement has been finalized. Yellow highlighted cells indicate that a well access agreement is pending. There are 14 wells with pending agreements. Red highlighted cells indicate that well access has been denied. GSI recommends that the SABGSA and GSI continue to collaborate on facilitating access to wells with pending access agreements. More coverage is needed in the upland areas in the eastern portions of the Basin, specifically Wells 25D1, 22N1, 22M1, and 22J1 (Figure 3). It is also important to retain wells in the upland areas of the western portion of the Basin (Stephen's Well) and, if possible, add more wells in that upland area (Well 24L1).

There are opportunities to optimize the monitoring program in the Basin. GSI anticipates being able to reduce the number of wells included in the monitoring program. There is a high concentration of wells in the Barka Slough area that will be evaluated to determine whether monitoring efforts can be streamlined in this area. The optimization of the monitoring network will be coordinated with the GSP development effort.

References

Grant Agreement Between the State of California (Department of Water Resources) and San Antonio Basin Groundwater Sustainability Agency Agreement Number 4600012675 Sustainable Groundwater Planning (SGWP) Grant Amendment #1, May 2020

United States Geological Survey. "Geohydrology and Water Availability of the San Antonio Creek Valley" *2020* https://ca.water.usgs.gov/projects/san-antonio-creek/index.html

Figures

Figure 1. Wells in the Western Portion of San Antonio Basin

Figure 2. Wells in the Central Portion of San Antonio Basin

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