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GROUNDWATER EXTRACTION METERING PLAN

SANTA CRUZ MID-COUNTY GROUNDWATER BASIN

Prepared for

Santa Cruz Mid-County Groundwater Agency
5180 Soquel Drive
Soquel, California 95073

Prepared by

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Oakland, California 94607

Project Number: WR3036

December 7, 2022

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ACRONYMS AND ABBREVIATIONS

AFY	acre-feet per year
Basin	Santa Cruz Mid-County Groundwater Basin
DWR	California Department of Water Resources
GSP	Groundwater Sustainability Plan
Metering Plan	Groundwater Extraction Metering Plan
Metering Policy	Groundwater Extraction Metering Policy
MGA	Santa Cruz Mid-County Groundwater Agency
SGMA	Sustainable Groundwater Management Act

1. INTRODUCTION

The Santa Cruz Mid-County Groundwater Basin (Basin) is classified by the California Department of Water Resources (DWR) as a high priority basin in a state of critical overdraft (DWR 2016). In accordance with California's Sustainable Groundwater Management Act (SGMA), the Santa Cruz Mid-County Groundwater Agency (MGA) was formed to develop and implement a basin-specific Groundwater Sustainability Plan (GSP, MGA 2019). The DWR approved the GSP for the Basin on June 3, 2021. The purpose of the GSP is to develop an approach to achieving the long-term sustainability of the Basin within a 20-year implementation period as measured by locally defined sustainable management criteria.

The GSP identified groundwater pumping for non-de minimis use as a source of uncertainty in the groundwater model and water budget for the Basin. Groundwater pumping from non-de minimis use that was not already reported was estimated indirectly using potential evapotranspiration, crop coefficients, and irrigation efficiencies (MGA 2019). The GSP recommended the implementation of a metering program to measure and document groundwater pumping for non-de minimis use to improve the accuracy of the Basin's numeric groundwater flow model and the MGA's ability to sustainably manage groundwater resources. Metering of pumping is particularly important in areas near the coast and near streams where pumping is most likely to influence seawater intrusion and the interconnection between surface waters and groundwater, which are two of the six Sustainability Indicators defined by SGMA.

The *Groundwater Extraction Metering Plan* (Metering Plan) presented herein describes how such a program will be implemented, including how to meter groundwater pumping and how to report the data to the MGA. An overview of the Metering Plan is presented in Appendix A.

The MGA has the authority under SGMA to require metering of non-de minimis groundwater use (as codified under California Water Code §10725.8). De minimis pumping, defined by SGMA as 2 acre-feet per year (AFY)[1] or less for domestic purposes, is exempt from metering requirements and is not required by this plan. For comparison, a typical household in Santa Cruz County uses approximately 0.35 AFY or 300 gallons per day (MGA 2019). A Groundwater Extraction Metering Policy (Metering Policy) requiring compliance with this Metering Plan, and providing additional details of the metering program, will be developed by the MGA beginning in early 2023.

1.1 Metering Objectives

The objective of this Metering Plan is to outline the procedures for metering non-de minimis, non-reporting groundwater pumping to enable proactive management of water resources and compliance with SGMA. The metering will provide the following benefits:

- Improve the understanding of the quantity and distribution of pumping in the Basin, which will facilitate refinement of the groundwater flow model and estimates of the sustainable yield of the Basin.

[1] One acre-foot equals about 326,000 gallons, or enough water to cover an acre of land (about the size of a football field) one foot deep.

- Supplement other data (e.g., groundwater level data, municipal pumping data) to track changing conditions and the SGMA Sustainability Indicators for the Basin, including:
    - decline of groundwater levels and groundwater storage
    - depletion of surface water flows that are interconnected with groundwater
    - degradation of groundwater quality, including sea water intrusion
- Help in assessing the performance of projects and management actions undertaken by the MGA throughout the GSP implementation period.

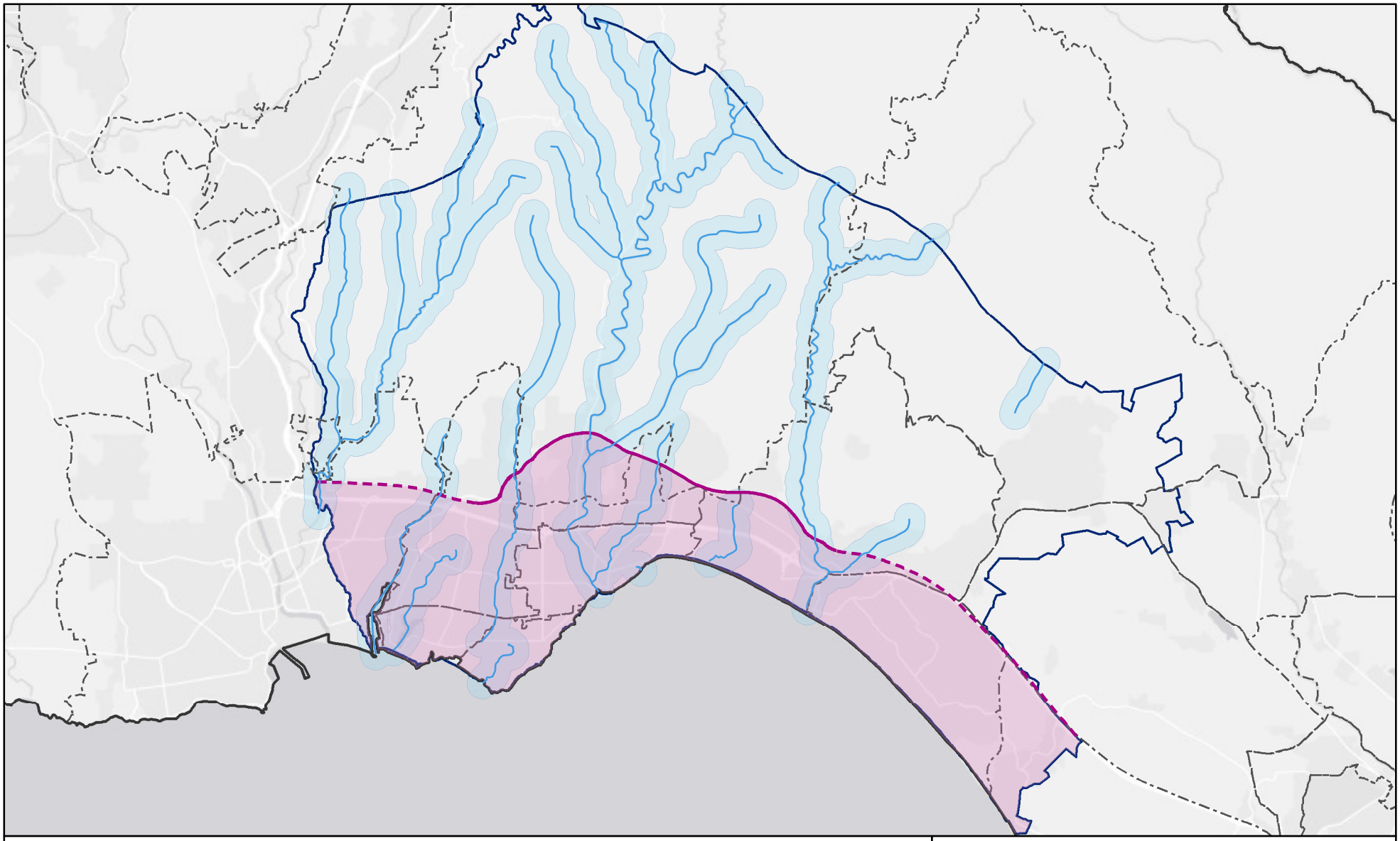
1.2 Applicability

Metering and reporting are required for existing and future wells that supply parcels with estimated or known groundwater use that meets one of the following criteria:

- More than 5 acre-feet per year (AFY)
- More than 2 AFY and located within 1,000 feet of surface water that is interconnected with groundwater, as defined in the GSP (MGA 2019), and as shown in Figure 1 below.
- More than 2 AFY and located where the groundwater elevation was less than 50 feet above mean sea level (msl) based on groundwater elevation contours from Fall 2005, as shown in the GSP (Figure 2-24, MGA 2019) and as shown in Figure 1 below.

Groundwater use for parcels with unmetered pumping are based on the indirect estimates prepared for the GSP (MGA 2019). For parcels with estimated groundwater use that meets the above criteria, metering and reporting is required for all wells that are on the parcel, serve the parcel, or are part of a group of parcels operated by the same entity (i.e., an operation, such as a farm). Continued metering and reporting are required if the groundwater use for a parcel or an operation as a whole meets the above criteria.

Figure 2 illustrates an example of multiple wells serving multiple parcels within an operation. In this example, if the total groundwater use for one parcel within the farm or for the entire farm meets the above criteria, all wells associated with the operation shall be metered and reported.



Priority Management Areas

Groundwater Extraction Metering Plan
Santa Cruz Mid-County Basin, California

Geosyntec consultants

WR3036	November 2022

Figure 1

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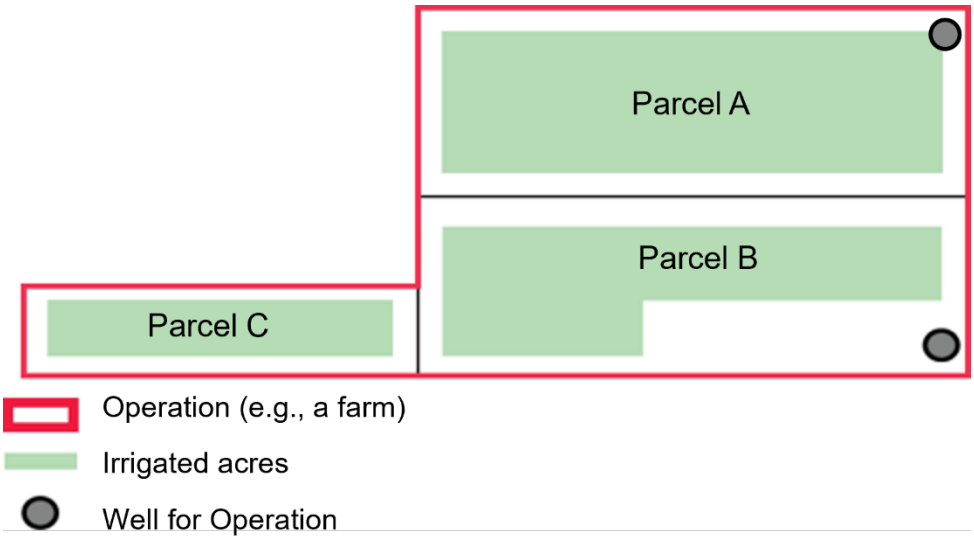

Figure 2. Example of an Operation with Multiple Parcels Served by Multiple Wells

1.3 Well Registration

Upon adoption of the MGA Metering Policy, owners of parcels with expected non-de minimis, non-reporting groundwater use as defined in Section 1.2 of this Metering Plan shall register pumping wells with the MGA. Owners will register wells by submitting the registration form electronically to the MGA. An example of the registration form is provided as Appendix B with details for electronic submittal. The registration form shall be submitted within 180 days of adoption of the MGA Metering Policy.

Registration information includes owner and operator contact information, well location, the Santa Cruz County Assessor's Parcel Number (APN) for each parcel served by each well, well construction details, flowmeter details, and type of water use. Owners are encouraged to submit any available hydrogeologic data to help with groundwater management, including but not limited to water quality, water levels, boring logs, etc.

1.4 Flowmeters

A flowmeter shall be installed on each registered well within 180 days of adoption of the MGA Metering Policy. Existing flowmeters on wells may continue to be used if proper installation and calibration is verified by a third-party contractor[2].

1.4.1 Flowmeter Types

Wells owners may choose the type of flowmeter, but it must have an initial manufacturer warranted accuracy of a minimum of plus or minus 2%. Examples of the types of flowmeters that may be used include:

[2] MGA may review qualifications of third-party contractors used by well owners to install or calibrate flowmeters.

- **Propeller flowmeters** are commonly used in agriculture and municipal settings and have proven to be a reliable mechanism for long-term monitoring. These flowmeters use mechanical parts to measure flow rate and record total pumping volume. Flowmeters shall be sized based on expected flow rate and pipe diameter. Propeller meters require regular maintenance and calibration, as bearing wear can occur from the internal propeller and other physical damage. Flowmeter accuracy is commonly plus or minus 2%.

Figure 3. Example Propeller Type Flowmeter (Source: McCrometer 2022)

- **In-line ultrasonic flowmeters** measure flow rate by transmitting sound waves through water flowing in the pipe. These flowmeters have no moving parts and therefore require less frequent maintenance and are more reliable than propeller-type flowmeters. However, ultrasonic flowmeters are more expensive than propeller flowmeters. Flowmeter accuracy is commonly plus or minus 2% or better.
- **Electromagnetic flowmeters** measure flow rate using electrodes to measure changes to an applied voltage. Like ultrasonic meters, electromagnetic flowmeters have no moving parts, and therefore require less frequent maintenance and are more reliable. These meters also tend to cost more. Flowmeter accuracy is commonly plus or minus 2% or better.

1.4.2 Minimum Flowmeter Requirements

Flowmeters shall meet the following requirements:

- Minimum warranted accuracy of plus or minus 2%
- Calibrated by manufacturer prior to installation
- Display both an instantaneous flow rate and the total volume of water pumped
- Proper installation such that (1) the meter is upstream of all discharge connections and measures all flow from the well; (2) downstream and upstream runs of pipe meet manufacturer specifications; and (3) the discharge pipe is completely full of water when the well is pumping
- Calibration checks indicate a flow variance of less than 5%

1.4.3 Flowmeter Installation

Flowmeters shall be installed at easily accessible above-ground portions of the well according to the manufacturer's installation specification (e.g., correct upstream and downstream pipe length, correctly sized, etc.). A typical installation configuration is shown in Figure 4.

Installing a flowmeter typically requires 4 to 8 hours and may be performed by a licensed third-party contractor approved by the MGA. Alternatively, the owner may elect to install the flowmeter themselves. A third-party contractor must inspect flowmeters, whether new or existing, and provide documentation to the MGA including:

- Certification from the third-party contractor that the flowmeter is properly installed and meets the Metering Plan requirements
- Flowmeter details and photographs of the installation configuration using the electronic registration form (Appendix B)
- Certificate of calibration from the manufacturer for new flowmeters

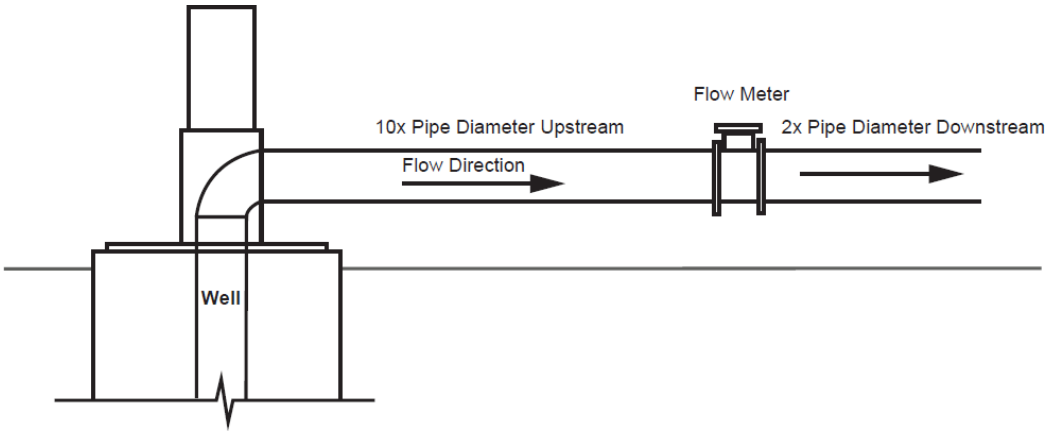

Figure 4. Typical Installation Configuration

1.4.4 Routine Calibration

Proper calibration is important for ensuring data quality and meeting the objectives of the Metering Plan. Well owners are responsible for maintaining the flowmeter(s) in good working condition and shall provide documentation of flowmeter calibration to the MGA upon request. Routine calibration checks to verify the accuracy of the flowmeter (i.e., validation) may be conducted using a calibrated, temporary, clamp-on ultrasonic flowmeter to compare the instantaneous flow rate with the permanent flowmeter, or by another approved validation method performed by an appropriate third-party contractor. At the same time as routine calibration checks, third-party contractors may also test the pump motor efficiency to estimate the remaining useful life of the motor. Replacing motors when they become inefficient can save on electrical and maintenance costs.

If the difference in flow rate during the routine calibration check is greater than 5%, then the flowmeter shall be recalibrated or replaced. This typically involves removing the flowmeter and sending it to the manufacturer to have it factory calibrated. Calibration must be conducted in conformance with National Institute of Standards and Technology (NIST) Handbook 44, as referenced in California Code of Regulations, Title 4, Division 9 Weights and Measures Field Reference Manual (2018) Section 3.36 Water Meters.

1.4.5 Costs

Well owners are responsible for installation of flowmeters and ongoing maintenance costs.

2. REPORTING

The well owner, a person authorized by the owner, or a third-party contractor shall read the flowmeter for each registered well on approximately the last day of September each year[3] and submit the reading electronically to the MGA on or before the tenth of October. An example form for data reporting is provided as Appendix C, which includes details on the electronic submittal process.

The following information shall be submitted to the MGA using the electronic form:

- **Contact information:** Name of the individual reading the flowmeter and an email address or phone number
- **Meter reading:** Date of flowmeter reading, flowmeter serial number (if available), totalizer reading with units and scale (e.g., acre-feet, gallons, cubic feet, hundreds of cubic feet, etc.), and a photograph of the meter face that legibly shows the totalizer numbers (when requested)
- **Well identification number:** Assigned by the MGA after registration

The owner or an authorized person shall submit a photograph of the flowmeter reading to the MGA when the flowmeter is installed and at the end of each water year thereafter (i.e., September 30). The MGA may conduct audits of flowmeters through a third-party contractor or through requests for photographs.

2.1 Data Confidentiality

The Metering Plan outlines a procedure that facilitates confidential collection and reporting of groundwater pumping data to the MGA. It is the intent of the MGA that the raw data will remain confidential pursuant to Government Code §6254(e). These data will be maintained for use by the MGA, and publicly available only as aggregate values by water use sector (i.e., Agriculture, Municipal, and Recreation) and the MGA will not release the raw data of any individual well owner.

[3] SGMA authorizes a requirement of annual reporting of groundwater extraction. MGA encourages owners to voluntarily collect monthly groundwater extraction in order to more closely understand water demand patterns.

3. ENFORCEMENT AND PENALTIES

Compliance with this Metering Plan is required for all non-de minimis, non-reporting pumping wells in the Basin beginning 180 days from adoption of the MGA Metering Policy. To be in compliance, pumping wells must be registered with the MGA, flowmeters must be installed, calibrated, and documented with the MGA, and a minimum of annual flowmeter readings must be reported to the MGA. Metering is required immediately for new and replacement wells that meet the criteria described in Section 1.2 of this Metering Plan. The MGA may require metering and reporting of pumping from any well located in the Basin if it is uncertain whether it qualifies as a non-de minimis, non-reporting pumping well subject to the Metering Plan.

Owners who fail to comply with the Metering Plan or who provide inaccurate data to the MGA will be subject to penalties, including fines, as will be developed in the MGA Metering Policy.

4. PROCESS FOR APPEAL

The MGA recognizes that there will be cases that are not clearly defined by this Metering Plan or situations where special accommodations and considerations may be appropriate.

Appeals and requests for special accommodations will be handled as follows:

- Appeals or requests for special accommodations shall be emailed to the Basin Point of Contact at basinpoc@midcountygroundwater.org.
- The Basin Point of Contact will respond within 30 days to approve, deny, or request additional information.
- The applicant may appeal the Basin Point of Contact's decision. In which case, the final decision will be made by the Board of the MGA.

5. METERING PLAN UPDATES

The MGA will update the Metering Plan as needed in conjunction with five-year updates to the GSP.

6. REFERENCES

California Department of Water Resources (DWR). 2016. *Best Management Practices for the Sustainable Groundwater Management of Groundwater – Monitoring Protocols, Standards, and Sites.* California Department of Water Resources, Sustainable Groundwater Management Program. December.

McCrometer. 2022. *McPropeller Flow Meters, Installation, Operation, and Maintenance Manual.* 24517-11. Revision 4.7. 11 July.

Santa Cruz Mid-County Groundwater Agency (MGA). 2019. *Groundwater Sustainability Plan*. November.

APPENDIX A
Metering Plan Overview

Metering Plan Overview

Steps	Details
Well Registration	Property owners with expected non-de minimis, non-reporting groundwater use shall register each well that supplies water to the parcel(s) by submitting a Well Registration Form (Appendix B[1]) to the MGA within 180 days of the adoption of the MGA Metering Policy.
Initial flowmeter installation and calibration check	Property owners that already have flowmeters installed shall have the flowmeter inspected and approved by a third-party contractor within 180 days of the adoption of the ordinance. The third-party contractor shall provide the following documentation to the MGA: certification that the flowmeter is properly installed and meets the Metering Plan requirements, results of a routine calibration check, photographs of the flowmeter and wellhead, and confirmation of the flowmeter details specified on the Well Registration Form (Appendix B). If the existing flowmeter does not meet the minimum requirements described in the Metering Plan, a new flowmeter shall be installed. Property owners that have either no flowmeter or a flowmeter that does not meet the minimum requirements shall have a new flowmeter installed. Owners that install a flowmeter themselves shall have it inspected and approved by a third-party contractor. After the flowmeter is installed, the third-party contractor shall provide the following documentation to the MGA: certification that the flowmeter is properly installed and meets the Metering Plan requirements, certificates of calibration from the manufacturer, photographs of the flowmeter and wellhead, and confirmation of the flowmeter details specified on the Well Registration Form (Appendix B).
Monthly flowmeter readings	Flowmeter readings shall be submitted to the MGA on or before the 10th of October each year using the Water Use Reporting Form (Appendix C) starting the first month of October after the flowmeter is installed or approved.
Routine maintenance and calibration	Property owners are responsible for maintaining flowmeters in good working condition and shall provide documentation of flowmeter calibration or validation of flowmeter readings to the MGA upon request. If the flow rate variability exceeds 5%, then manufacturer recalibration or replacement will be required. Recalibration typically involves removing the flowmeter and sending it to the manufacturer to have it factory calibrated.
Costs	Well owners are responsible for installation of flowmeters and ongoing maintenance costs.
Appeals or special accommodations	Requests for appeals or special accommodations can be emailed to the Basin Point of Contact at basinpoc@midcountygroundwater.org.

[1] Appendix B is an example of the type of information that may be collected.

APPENDIX B
Example Well Registration Form

Example Well Registration Form

Please fill out and submit the Well Registration Form on a smartphone or computer. Electronic forms can be accessed using the QR code or by typing the web address into an internet browser. Special accommodations can be requested by emailing the Basin Point of Contact at basinpoc@midcountygroundwater.org.

Add QR code to Survey123 form

Add link to Survey123 form

Owner Information

Contact Name(s) _____

Business Name(s) _____

Address(es) _____

City/State/Zip _____

Phone Number(s) _____

Email Address(es) _____

Operator Information *(if different from above)*

Contact Name(s) _____

Business Name(s) _____

Address(es) _____

City/State/Zip _____

Phone Number(s). _____

Email Address _____

Well Information

Owner's Well Name/Number _____

Assessor's Parcel Number(s) (APN) of well location _____

Assessor's Parcel Number(s) (APN) served by well _____

Well Location/Address _____

Public Land Survey Location; Township _____ Range _____ Section _____

GPS Coordinates; Latitude _____ Longitude _____

State Well Number (SWN) _____

Example Well Registration Form

Additional Well Information

County Well Permit No. _____

Date Drilled _____

Well Depth _____feet

Casing Diameter _____inches

Depth to Top and Bottom of Perforations or Screen _____feet below ground surface

Motor Type *(select one)*: Submersible or Turbine Motor/Engine _____horsepower (HP)

Flowmeter Information

Existing Water Flowmeter (select one): Yes or No

Manufacturer of Water Flowmeter _____

Water Flowmeter Size _____ inches

Serial Number of Water Flowmeter _____

Water Flowmeter Units and Scale (e.g., acre-feet, gallons, million gallons, cubic feet, hundreds of cubic feet. etc.)

_____

Electric Meter Number _____

Hydrogeologic Data (If any of the below data are available, check box and please provide documentation.)

- ☐ Groundwater Quality Data Available
- ☐ Groundwater Level Data Available
- ☐ Static Groundwater Levels Available
- ☐ Pumping Groundwater Levels Available
- ☐ Aquifer Test Data Available
- ☐ Geophysical (E-log) Available

Well Water Use Type

- ☐ Agricultural/Irrigation *(list number of acres and crop categories)* _____
- ☐ Stock Watering *(number and type of animals)* _____
- ☐ Domestic *(number of persons served)* _____
- ☐ Municipal or Industrial _____
- ☐ Other *(describe)* _____

APPENDIX C
Example Groundwater Use Reporting Form

Example Groundwater Use Reporting Form

Please fill out and submit the Groundwater Use Reporting Form on a smartphone or computer. Electronic forms can be accessed using the QR code or by typing the web address into an internet browser. Special accommodations may be requested by emailing the Basin Point of Contact at basinpoc@midcountygroundwater.org.

Add QR code to Survey123 form

Add link to Survey123 form

1. Reporting Person

Name _____

Phone Number _____

Email Address _____

2. Well Information

Well ID *(as assigned by the MGA)* _____

3. Flowmeter Reading

Date of Reading _____

Totalizer Reading (*remember to multiply by scale stated on meter face. e.g., x100)*_____

Units *(e.g, gallons, acre-feet, cubic feet, etc.)*_____

Meter Serial Number *(if available)* _____

4. Photo Upload

Photographs of flowmeter readings are required when the flowmeter is installed and at the end of each water year thereafter (i.e., September 30),