

Monterey County Water Resources Agency's Groundwater Monitoring Program Manual

[Date of Adoption]

Section 1 Introduction

This Groundwater Monitoring Program Manual (“Manual”) is a supplement to Monterey County Water Resources Agency (“Agency”) Ordinance No. XX-XXXX. The purpose of the Manual is to establish guidelines for the types of data collected, the schedule and time frames for data submittals, the applicability of certain programs based on geography or water user type, and methods and equipment for data collection.

The Manual also establishes the guidelines for data that is requested from the Agency by external entities, in accordance with Ordinance No. XX-XXXX and outlines requirements associated with those requests. The Manual is reviewed regularly and may be updated as the Agency’s or external entity’s needs evolve.

Four Agency groundwater monitoring programs are covered by the Manual: Well Registration, Groundwater Extraction Monitoring, Groundwater Level Monitoring, and Groundwater Quality Monitoring.

Section 2 Definitions

1. Accuracy – means the measured value relative to the actual value, expressed as a percentage and calculated as: $\text{Accuracy} = 100\% * (\text{Measured Value} - \text{Actual Value}) / \text{Actual Value}$.
2. Actual Value – means the value as determined through laboratory, design, or field-testing protocols.
3. Agency – means the Monterey County Water Resources Agency.
4. Agency Act – means the Monterey County Water Resources Agency Act, California Water Code, Appendix Chapter 52 (Stats. 1990, Chap. 1159).
5. Board – means the Board of Supervisors of the Monterey County Water Resources Agency.
6. County – means the County of Monterey.
7. De minimis extractor – means a person who extracts, for domestic purposes, two acre-feet or less per year (California Water Code section 10721(e)).

8. Human consumption – means the use of water for drinking, bathing or showering, hand washing, food preparation, cooking, or oral hygiene.
9. Local Small Water System – means a system for the provision of piped water for human consumption that serves at least two, but not more than four, service connections. It includes any collection, treatment, storage, and distribution facilities under control of the operator of such system which are used primarily in connection with such system. “Local small water system” does not include two or more service connections on a single lot of record where none of the dwellings are leased, rented, or offered for remuneration.
10. Measured Value – means the value indicated by a Measuring Device or determined through calculations using other measured values.
11. Measuring Device – means any device capable of recording the date, time, and a numeric value of either water flow rate, water velocity, water elevation, or volume of water diverted.
12. Monterey County – means the geographical area of Monterey County.
13. Qualified Individual – means any person meeting the criteria specified in the Manual who can perform the required tasks for using and installing a Measuring Device.
14. Reference Point – means the fixed location from which a groundwater level measurement is collected at a well and the elevation of that fixed location.
15. Requesting Entity – means an entity engaged in the management of groundwater resources within Monterey County, either through the monitoring and reporting of groundwater level, usage, and/or quality data; scientific investigations; or in the administration and compliance of a regulatory program(s).
16. Service connection – means a connection to any habitable structure, except a guesthouse, or parcel which uses potable water from a water system for domestic and not agricultural purposes.
17. Small Public Water System – means a system for the provision of piped water to the public for human consumption that has at least fifteen but not more than one hundred ninety-nine service connections or regularly serves at least twenty-five individuals at least sixty days out of the year. A small public water system includes “community water system” and “noncommunity water system” as defined in Section 116275(i) and (j), respectively, of the California Health and Safety Code, and “non-transient noncommunity water system” as defined in Section 116275(k) of the California Health and Safety Code, and a “transient-noncommunity water system” as defined in California Health and Safety Code Section 116275(o), as these sections may be amended from time to time.

18. State Small Water System – means a system for the provision of piped water to the public for human consumption that serves at least five, but not more than fourteen (14), service connections and does not regularly serve drinking water to more than an average of twenty-five (25) individuals daily for more than sixty (60) days out of the year. It includes any collection, treatment, storage, and distribution facilities under control of the operator of such system which are used primarily in connection with such system, and any collection or pretreatment storage facilities not under the control of the operator which are used primarily in connection with such system.
19. Water Year – means the 12-month period between October 1, of any given year, through September 30, of the following year, as defined by the United States Geological Survey.
20. Well – means any artificial excavation constructed by any method for the purpose of extracting water from, or injecting water into, the underground. “Well” includes abandoned wells, inactive wells, monitoring wells, and observation wells. For the purposes of this Manual, “well” does not include: (1) oil and gas wells, or geothermal wells constructed under the jurisdiction of the Department of Conservation, except those wells converted to use as water wells; (2) wells used for the purpose of dewatering excavation during construction, or stabilizing hillsides or earth embankments; (3) cathodic protection wells; or (4) test wells or dry wells.
21. Well Operator – means a person or entity authorized by a Well Owner to operate a Well.
22. Well Owner – means a landowner or landowners that own a Well.

Section 3 Well Registration Program

3.1 Geographic Extent

The Well Registration Program applies to all wells located in Agency Zone 2C and/or the following subbasins of the Salinas Valley Groundwater Basin: 180/400 Foot Aquifer (3-004.01), East Side Aquifer (3-004.02), Forebay Aquifer (3-004.04), Langley Area (3-004.09), Monterey (3-004.10), and Upper Valley Aquifer (3-004.05). Such geographic locations are depicted in a map attached to this Manual as Attachment A.

3.2 General Requirements

Well registration must be completed by submitting the required data to the Agency using the well registration portal available at *[insert link when available]*. Information about and assistance with completing well registration are available at *[insert URL when available]* or by contacting the Agency at 831-755-4860. Wells that are currently registered with the Agency and which meet the data requirements in Section 3.3 will not have to re-register but the Well Owner may be asked to verify the well registration data on file with the Agency and provide updates as applicable.

3.3 Data Requirements

The following data must be submitted to the Agency when a well is initially registered and must be updated by contacting the Agency when any changes occur.

1. Well owner name, address, phone number, and email address.
2. Well operator name, address, phone number, and email address.
3. Name of Local Small Water System, Small Public Water System, or State Small Water System, if applicable.
4. Number of connections to Local Small Water System, Small Public Water System, or State Small Water System, if applicable.
5. Geographic coordinates of the well location collected via GPS, with accuracy within 20 feet. Note that GPS-enabled smartphones are typically accurate to within a 16-foot radius under open sky (www.gps.gov).
6. Scaled map showing the well location and the area served water from the well, with relevant geographic features and landmarks labeled (e.g., roads, intersections).
7. Well name (owner-given well identification).
8. Well construction details including all the following information:
 - a. Date of construction
 - b. Drilling method
 - c. Total well depth
 - d. Perforation/screen interval(s)
 - e. Annular seal depth
 - f. Casing diameter
 - g. Casing material
 - h. Depth of pump
 - i. Pump motor horsepower
 - j. Discharge pipe diameter
9. Use category(ies) for which water from the well will be used (e.g., domestic, municipal, agriculture).
10. Status of the well (active, standby, or inactive).
11. Number of existing and anticipated service connections.
12. Description of water quantity measuring device(s) on the well.
13. Description of each water quantity measuring device on all service connections receiving water from the facility.
14. Electrical meter service numbers and plant numbers for each well having such a number.
15. Copy of the Well Completion Report.
16. Copy of the County of Monterey well construction permit that was issued for the well, and any other related County well permits.
17. Copy of any borehole geophysical logs collected during the well drilling.
18. Copy of any pump testing data obtained during well drilling and development.

Section 4 Groundwater Extraction Monitoring Program

4.1 Geographic Extent

The Groundwater Extraction Monitoring Program applies to non-*de minimis* extractors located in Agency Zone 2C and/or the following subbasins of the Salinas Valley Groundwater Basin: 180/400 Foot Aquifer (3-004.01), East Side Aquifer (3-004.02), Forebay Aquifer (3-004.04), Langley Area (3-004.09), Monterey (3-004.10), and Upper Valley Aquifer (3-004.05). Such geographic locations are depicted in a map attached to this Manual as Attachment A.

4.2 General Requirements

1. Groundwater extraction data are required from all non-*de minimis* users i.e., wells pumping more than 2 acre-feet per year (AF/yr.) for domestic use.
2. Groundwater extraction data must be collected on a monthly basis for each Water Year (i.e., October 1 through September 30).
3. Monthly totals of groundwater extracted must be reported to the Agency no later than November 1 for the prior Water Year.
4. Data that are reported to the State Water Resources Control Board Electronic Water Rights Management System (eWRIMS) must also be reported to the Agency and be identified as being reported to both entities.
5. Any Measuring Device required by this Manual must be purchased, installed, and maintained by the well owner or operator.

4.3 Data Collecting and Reporting

1. Well owners or operators must collect and maintain monthly records of groundwater extraction volumes and cumulative totals including:
 - a. Quantity of water produced by each well.
 - b. Quantity of water produced for each use type.
2. Annual reporting submitted to the Agency must specify the type of approved Measuring Device that was used to collect data at each well. Currently approved Measuring Devices include all of the following: flow meter, electrical meter, or hour meter. Additional types of Measuring Devices or equipment may be considered and approved for use in the future. When new Measuring Devices are approved by the Agency as described in Ordinance XX-XXXX, Well Owners or Well Operators of Wells currently registered with and reporting extractions to the Agency using a currently approved Measuring Device as described in this Manual will not have to re-request approval from the Agency to continue using a currently approved Measuring Device.
 - a. Annual reporting occurs online through an application maintained by the Agency at https://apps.co.monterey.ca.us/wra_gems/.
 - b. Information about how to use the application is available at <https://www.countyofmonterey.gov/government/government-links/water-resources-agency/programs/groundwater-extractions-gems.>

3. Well owners or operators using the flow meter method must abide by the following:
- a. Flow meters must be tested every five years by a Qualified Individual and calibrated to comply with applicable Agency specifications in (b) and (c) below. Upon completion of the test, a copy of the test report including the flowmeter reading must be submitted to the Agency.
 - i. A Qualified Individual may be any of the following:
 - I. Anyone trained and experienced in water measurements and reporting.
 - II. A California-registered Professional Engineer or a person under their supervision.
 - III. A California-licensed contractor for C-57 well drilling or C-61/D-21 Limited Specialty: Machinery and Pumps.
 - IV. Any individual who has completed a class on measurement devices and methods offered through the University of California Cooperative Extension.
 - V. Hydrologist or Professional Engineer experienced and trained in water measurement.
 - b. Flow meters must be installed per manufacturer instructions.
 - c. Flow meters must come from the manufacturer with a provable accuracy of +/- 2%. The Measured Value must read within +/- 10% at all times after installation.
 - d. Reported data must include monthly readings from the flow meter and associated meter number.
4. Well owners or operators using the electrical meter method must abide by all of the following:
- a. Quantities of water must be reported based on calculations using accurate electrical bills, data from pump efficiency tests, and formulas that are approved by the Agency.
 - b. Electrical bills must be based on electrical meters on the well. The well's use of electricity must be the only electrical use measured by the electrical meter.
 - c. Reported data must show the kilowatt hours used each month by each well.
 - d. A pump efficiency test must be completed annually. The test must be a three-point efficiency test which evaluates three discharge pressures and is obtained during the period from March through June. Upon completion of the test, the tester must submit to the Agency a report of the testing that includes the electrical meter reading on the

date of the test. The pump efficiency test report must be submitted to the Agency no later than October 31 of the year in which it was conducted.

- e. Reporting party must submit all computations necessary to show the quantity of water used, including the raw data, the computation itself, and the result as prescribed by the Agency.
5. Well owners or operators using the hour meter method must abide by all of the following:
 - a. Quantities of water must be reported based on calculations using readings from hour meters, discharge rates from pump efficiency tests, and formulas approved by the Agency.
 - b. Hour meters must be accurate to within 2% of correct time.
 - c. Information showing the total number of hours each facility was operated in each month must be submitted to the Agency.
 - d. A pump efficiency test must be completed annually. The test must be a three-point efficiency test which evaluates three discharge pressures and is obtained during the period from March through June. Upon completion of the test, the tester must submit to the Agency a report of the testing that includes the hour meter reading on the date of the test and discharge rates determined pursuant to the test.
 - e. Reporting party must submit all computations necessary to show the quantity of water used, including the raw data, the computation itself, and the result as prescribed by the Agency.

Section 5 Groundwater Level Monitoring Program

5.1 Geographic Extent

The Agency monitors groundwater levels throughout Monterey County, primarily within the Salinas Valley Groundwater Basin, but also in areas of Lockwood Valley (Attachment B).

5.2 Record Keeping

Wells that are part of the Agency's groundwater level monitoring network are required to be registered, per the criteria described in Section 3 of this Manual. In addition to the data requirements therein, the Agency will collect data regarding the Reference Point elevation of the well.

The Agency may install a well data tag at the well site to indicate that the well is part of a monitoring program. The well data tag will be labeled with the site's State Well Identification Number.

5.3 Data Collection

The Agency measures groundwater levels on a monthly basis at some well sites and biannually or annually at other well sites. The Agency adheres to the following field methods and data management practices.

5.3.1 Field Methods

Groundwater level data collected from wells is intended to reflect static (i.e., non-pumping) groundwater conditions. Best efforts are made to ensure that wells are not pumping and have not recently been pumped prior to collecting a groundwater level data point. Depth to water measurements are made using one or more of the methods discussed in the following sections. The Agency's groundwater level data collection methodology is based on the standardized *Groundwater Technical Procedures of the U.S. Geological Survey* (2011) available at <https://pubs.usgs.gov/tm/1a1/> and the State of California Department of Water Resources *Groundwater Elevation Guidelines* (2010).

5.3.1.1 Graduated Steel Tape

The following steps must be completed prior to taking a measurement:

- Ensure that the reference point on the well can be clearly determined. Check notes in the field data collection notebook or application.
- Review the notes and comments associated with previous measurements to determine if there are any unique circumstances at the well.
- Take note of whether oil has previously been present at the well. This will be recorded in the comments section of the data collection form.
- Evaluate the well and surrounding area to determine if the well may have recently been operating.

To collect a measurement:

- Use the previous depth to water measurement to estimate a length of tape that will be needed.
- Lower the tape into the well, feeling for a change in the weight of the tape, which typically indicates that either (a) the tap has reached the water surface or (b) the tape is sticking to the side of the well.
- Continue lowering the tape into the well until the next whole foot mark is at the reference point. This value on the tape should be recorded in the field data collection notebook or application.
- Bring the tape to the surface and record the number of the wetted interval to the nearest foot.
- In an oil layer is present, read the tape at the top of the oil mark to the nearest foot. Note in the comments section of the data form that oil was present.

- Repeat this procedure a second time and note any differences in measurement in the field data collection notebook or application. If needed, repeat additional times until two consistent depth readings are obtained.
- After completing the measurement, disinfect and rinse the part of the tape that was submerged below the water surface.

5.3.1.2 Electric water level meter

This method of measurement employs a battery-powered water level meter and a small probe attached to a ruled length of cable. Depth to water measurements collected using this equipment are recorded to the nearest tenth of an inch. This instrument is sometimes referred to as a “sounder.”

The following steps must be completed prior to taking a measurement:

- Review the field data sheet for the well and note whether oil has been present at this well in the past. The electric water level meter should not be used in wells where oil is present.
- Ensure that the reference point on the well can be clearly determined. Check notes in the field data collection notebook.
- Confirm that the water level meter is functioning and is turned on so that the beeping indicator will operate properly.

To collect a measurement:

- Review previous depth to water measurements for the well to estimate the length of tape that will be needed.
- Lower the electrode into the well until the indicator sounds, showing the probe is in contact with the water surface.
- Place the tape against the reference point and read the depth to water to the nearest 0.1 foot. Record this value on the field data sheet.
- Make a second measurement and note any differences in measurement in the field data collection notebook or application. If needed, repeat additional times until two consistent depth readings are obtained.
- After completing the measurement, disinfect and rinse the part of the tape that was submerged below the water surface.

5.3.1.3 Sonic water level meter

This meter uses sound waves to measure the depth to water in a well. The meter must be adjusted to the air temperature outside the well. There is a card with reference temperatures in the case with the sonic meter.

Making a measurement:

- Insert the meter probe into the access port and push the power-on switch. Record the depth from the readout.
- Record the depth to water measurement in the field data collection notebook or application.

- No disinfection of the instrument is required because it does not come into contact with the water surface.

5.3.1.4 Pressure transducer

Automated water-level measurements are made with a pressure transducer attached to a data logger. Pressure transducers are lowered to a depth below the water level in the well and fastened to the well head at a reference point. Data points are logged on an hourly basis.

The Agency uses factory-calibrated, vented pressure transducers; the specific model and cable length is customized for each well. A desiccant is also used to avoid damage to the equipment from moisture.

Agency staff collects the pressure transducer data once per quarter. During the data collection process, data loggers are stopped, and the data is downloaded onto a laptop, and then the data logger is reactivated and scheduled to begin collecting data again on the next hour.

Section 6 Groundwater Quality Monitoring Program

6.1 Geographic Extent

The Agency monitors groundwater quality in the coastal region of the Salinas Valley Groundwater Basin and at selected monitoring wells in the Forebay Aquifer (3-004.04) and Upper Valley Aquifer (3-004.05) Subbasins (Attachment C).

6.2 Record Keeping

Wells that are part of the Agency's groundwater level monitoring network are required to be registered, per the criteria described in Section 3 of this Manual.

6.3 Data Collection

The Agency collects groundwater quality samples twice per year from wells in the groundwater quality monitoring program. Additional samples may be collected as needed for special projects or to meet the needs of a Requesting Entity.

Field blanks and field duplicates are collected as part of the groundwater quality monitoring program to evaluate the sample collection process for contamination from exposure to ambient conditions, sample containers, or improper sampling and handling techniques. Field blank samples are obtained by pouring deionized (DI) water acquired from the Monterey County Consolidated Chemistry Laboratory into a sample container that has been triple-rinsed with DI water at the sampling location. If target analytes are identified in field blanks, sampling and handling procedures will be reevaluated and corrective actions, consisting of but not limited to re-training of field personnel, contact with the laboratory, invalidation, or qualifying of results, will be taken.

Field duplicates are collected and analyzed for the same analytical parameters as the native samples. The duplicate sample will be collected immediately after collection of the native sample, following the same sampling protocols.

The Agency adheres to the protocols set forth in the *Quality Assurance Project Plan for Water Quality Monitoring Associated with the Salinas Valley Integrated Water Management Plan* (EPA R9#03-238, X-97994701-0) approved by the U.S. Environmental Protection Agency in August 2007.

6.3.1 Groundwater Quality Sample Identification and Handling

Sample containers are high density polyethylene (HDPE), 0.25-gallon (approximately 1 liter) size for complete mineral analysis. Sample containers and caps are purchased in bulk and the caps for the containers are packaged separately. Sterility of the sample containers is not of importance because samples are not analyzed for microbiological testing. No chemical field preservation of the samples is required.

Sample containers are labeled with pre-printed labels. The collection date, collection time, and sampler name are recorded in the field with an indelible marker.

All samples are handled, prepared, transported, and stored in a manner so as to minimize contamination and spills. After collection, samples caps are checked for tightness, and the samples are immediately placed in an ice chest. During travel between sites, ice chest lids are kept tightly closed. Blue ice packs are used in sufficient quantity so that all samples are stored at $4\pm 2^{\circ}\text{C}$.

Chain-of-custody (COC) forms are provided by the Monterey County Consolidated Chemistry Laboratory and filled out by field personnel while in the field. The COC accompanies the samples at all times in order to ensure the custodial integrity of the samples. The COC form includes the sample site, which is identified by State Well Identification Number or Quality Control sample, if appropriate.

Upon relinquishing the sample(s) to the Monterey County Consolidated Chemistry Laboratory, the sampler signs and dates the COC form. Lab personnel will then receive the sample(s), check the temperature, mark the date and time received, assign unique lab identification numbers (lab IDs) to each sample, and sign the COC form. The signed COC form is copied; the lab keeps the original and a copy is given to the sampler. Hard copies of COC forms are maintained by Agency for a period of ten years.

6.3.2 Analytical Methods

Groundwater samples, including field blanks and field duplicates, are analyzed for an “Ag Waiver Panel” consisting of the following analytes: calcium, cation-anion balance, chloride, conductivity, magnesium, nitrate, pH, potassium, sodium, sulfate, total alkalinity, and total dissolved solids.

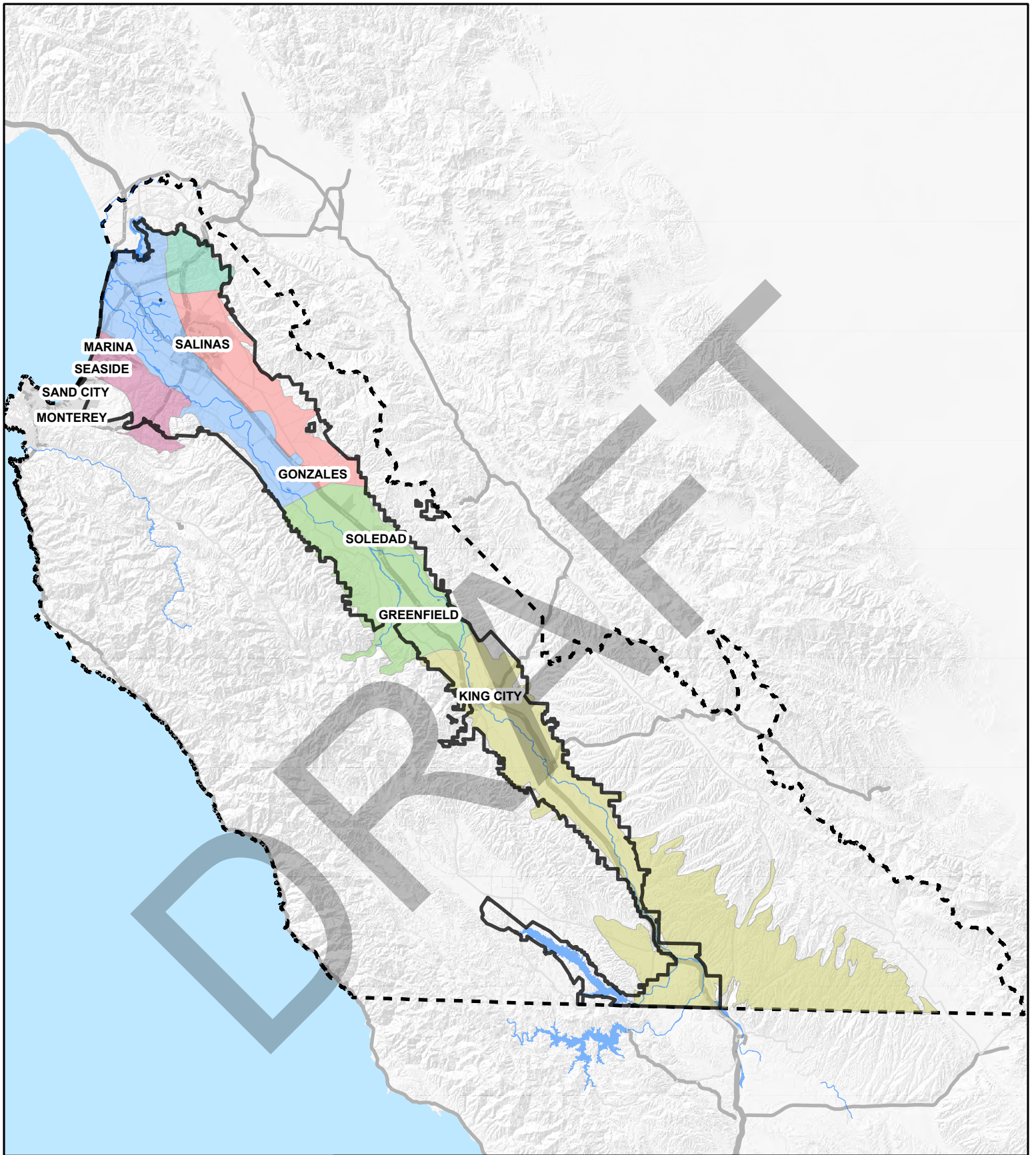
Samples are analyzed at the Monterey County Consolidated Chemistry Laboratory, which is part of the Monterey County Health Department and holds Certification Number 1395 from the

Environmental Laboratory Accreditation Program (ELAP). ELAP is part of the Division of Drinking Water at the State Water Resources Control Board.

PENDING APPROVAL








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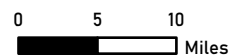
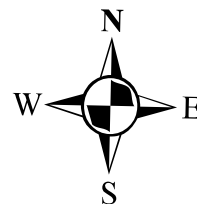
ATTACHMENT A



**MCWRA Zone 2C and
Salinas Valley Basin
subbasins**

Legend

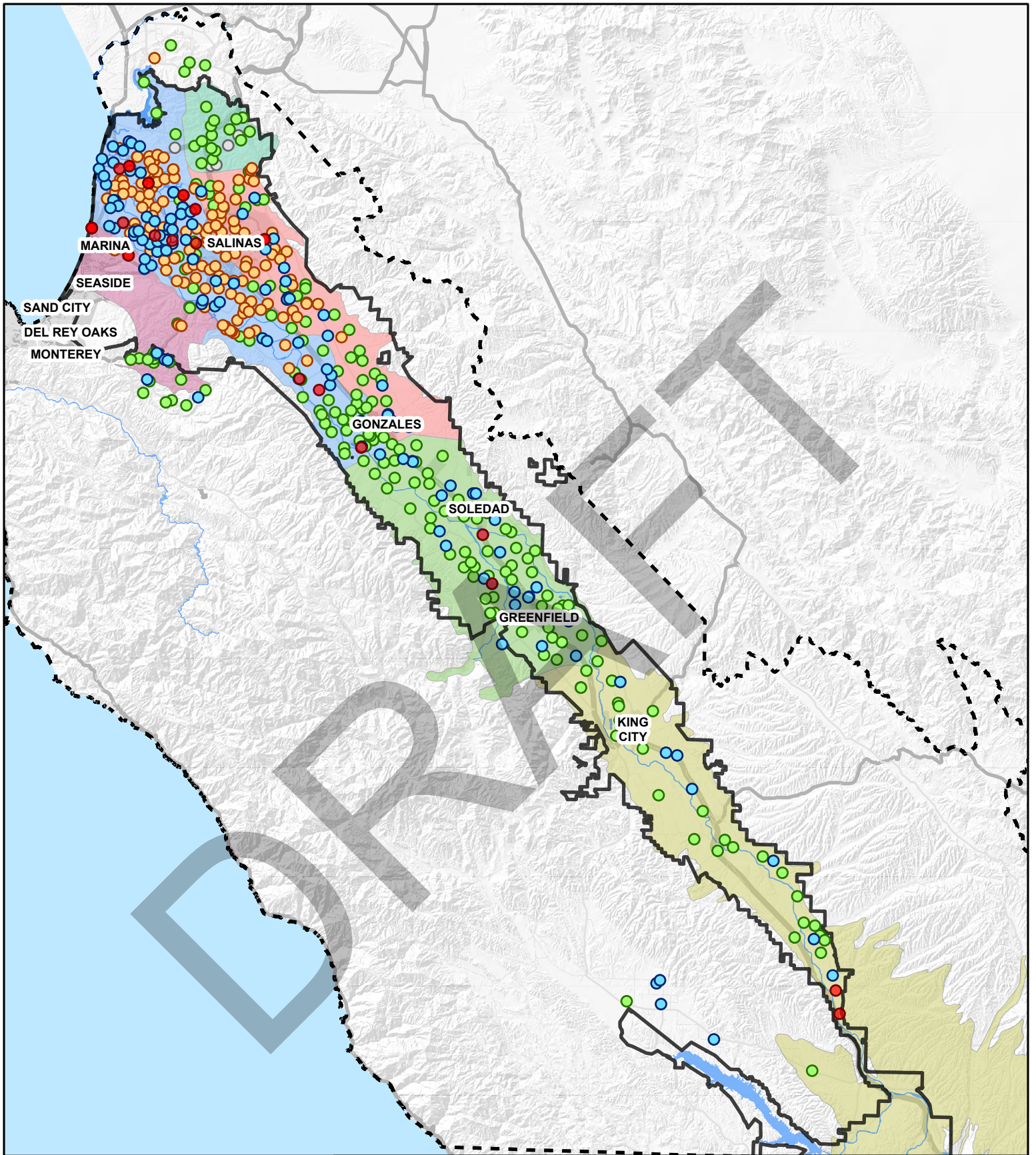
-  Zone 2C
- Salinas Valley Basin Subbasins**
-  Langley Subbasin
-  Monterey Subbasin
-  180/400 Subbasin
-  East Side Subbasin
-  Forebay Subbasin
-  Upper Valley Subbasin



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Water Resources Agency
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ATTACHMENT B



Groundwater Level Monitoring Program wells

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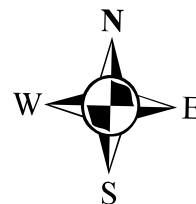
Water Level Program Wells

- Transduced Wells
- Monthly
- August Trough
- Annuals
- Other

Zone 2C

Salinas Valley Basin Subbasins

- Langley Subbasin
- Monterey Subbasin
- 180/400 Subbasin
- East Side Subbasin
- Forebay Subbasin
- Upper Valley Subbasin



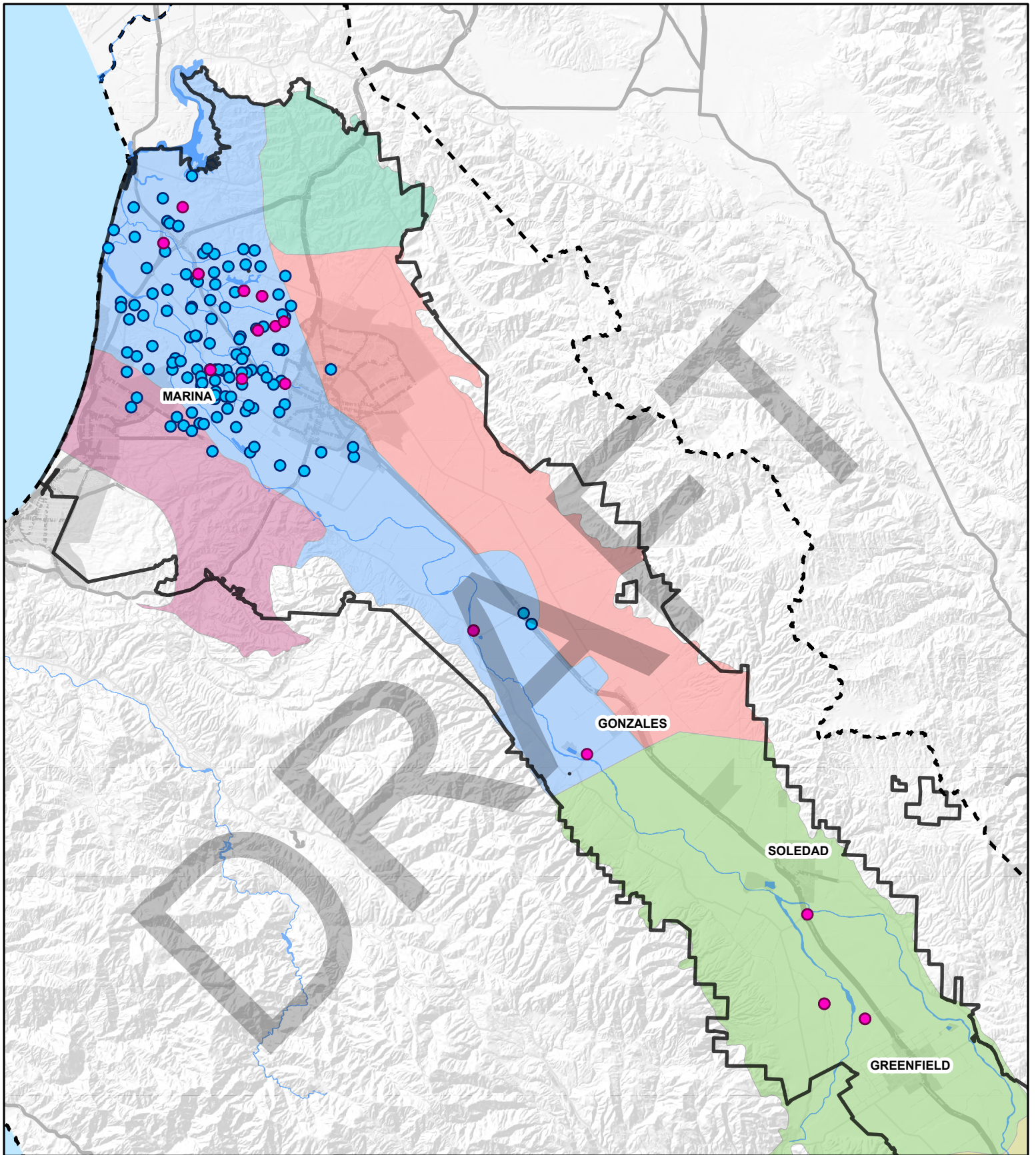
0 4.25 8.5 Miles



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ATTACHMENT C



Groundwater Quality Monitoring Program wells

Legend

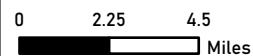
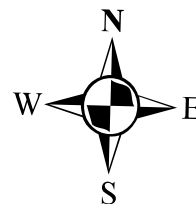
Water Quality Program Wells

- Coastal
- Dedicated Monitoring Wells

Zone 2C

Salinas Valley Basin Subbasins

- Langley Subbasin
- Monterey Subbasin
- 180/400 Subbasin
- East Side Subbasin
- Forebay Subbasin
- Upper Valley Subbasin



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