Montecito Groundwater Basin

GROUNDWATER SUSTAINABILITY AGENCY

GSA Fee Study

Final Report / May 6, 2020

RAFTELIS

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May 6, 2020

Mr. Nicholas Turner
General Manager
Montecito Groundwater Basin Groundwater Sustainability Agency
583 San Ysidro Road
Montecito, CA 93108

Subject: GSA Fee Study Report

Dear Mr. Turner,

Raftelis is pleased to provide this Groundwater Sustainability Agency (GSA) Fee Study Report (Study) to the Montecito Groundwater Basin Groundwater Sustainability Agency (Agency) to establish groundwater basin fees that fairly and reasonably recover operating, administrative, and regulatory costs from properties which overlie the basin and comply with the requirements of Proposition 218.

The major objectives of the Study include the following:

- Develop the Agency budget to account for the comprehensive costs associated with managing the agency and preparing the Groundwater Sustainability Plan (GSP)
- Assist the Board of Directors in identifying their policy framework for a GSA fee
- Determine acreage overlying the basin subject to the GSA fee
- Develop fees in compliance with Proposition 218

Our report summarizes the key assumptions, analyses, and recommendations in the development of the GSA fee as well as the proposed fee for a five-year horizon. The report includes a brief Executive Summary followed by a description of the process undertaken during the Study. The process included significant outreach to the community, several meetings with the Finance Committee, the Board of Directors, and GSA staff to discuss the funding process, funding options, policy objectives, and legal considerations. The result of these efforts is the proposed fee found in this report.

It was a pleasure working with you and we wish to thank you for your and other Staff members' support during the study.

Sincerely,
RAFTELIS FINANCIAL CONSULTANTS, INC.

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Vice President

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1. Executive Summary

1.1. Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA), comprised of AB 1739, SB 168, and SB 1319, was enacted in September of 2014 to provide a framework for managing groundwater supplies in the State of California. The State identified basins that are critically overdrafted, high-priority, and medium-priority as the focus of the legislation. These basins are required to achieve sustainability within 20 years from Groundwater Sustainability Plan (GSP) implementation. Critically overdrafted basins must reach sustainability by 2040, while high- and medium- priority basins have until 2042, or 20 years post-implementation for reprioritized basins. Montecito Groundwater Basin Groundwater Sustainability Agency (Agency) is designated as a medium-priority basin by the Department of Water Resources (DWR). Figure 1 shows the SGMA timeline for the Agency as well as the funding phases, pre- and post-GSP implementation. The compliance schedule for the Montecito Groundwater Basin may be extended due to late reprioritization by DWR. The proposed fees found in this report address Phase I funding requirements only. The Agency anticipates completion and adoption of the GSP in calendar year 2022.

Figure 1: AGENCY SGMA Timeline

1.2. Background of the Study

In 2019, Raftelis was contracted to develop a revenue source for Phase I funding requirements. Phase I includes the regulatorily required GSP development as well as agency operations, administration, professional services, and establishment of a prudent cash reserve. Developing and implementing a GSP will be a significant and costly undertaking over the next several years. The Agency applied for and received a Proposition 68 (Prop 68) Sustainable Groundwater Management (SGM) grant (Prop 68 grant) to fund most of the development of the GSP. While the Agency was awarded the maximum grant amount, the grant requires a 25 percent cost share ("local match") from the Agency. The GSP is estimated to cost $2.17 million with the Agency responsible for approximately $542 thousand and the remainder covered by the Prop 68 grant.

The Agency was founded as a single-agency GSA formed over a two-year process by Montecito Water District (MWD). To date, the Agency has been staffed, managed, and funded by the MWD. Sharing of staff and resources will continue with additional staff and resources added as necessary[1]. The Agency will be responsible for their share of staff time, new dedicated staff, and for the reimbursement of MWD costs spent to date on Agency activities. While there is a great degree of shared staff, resources, and facilities, Agency is an independent entity, with a distinct

[1] Agency Resolution No. 3 and MWD Resolution No. 2192, adopted on April 14, 2020 and April 28, 2020 respectively, memorialize the entities' intent to share staff and resources.

beneficiary base, which requires a dedicated funding source for the financial independence and financial sustainability of the Agency. This report details the development of a GSA fee for funding Agency operations through Phase I. This report also describes the variety of funding methods considered, outreach and decision processes, data utilized, and development of a five-year financial plan.

1.3. Objectives of the Study

The Agency's mission is to "ensure a reliable and sustainable groundwater supply for the community through effective basin management pursuant to the SGMA". The Agency's Communications and Engagement Plan states the commitment "to developing a GSP that is reflective of and responsive to the values and goals of basin stakeholders."

The major objectives of the fee study included the following:

- Develop the budget to account for the comprehensive costs of managing the Agency and preparing the GSP
- Assist the Board of Directors in identifying their preferred policy framework for a GSA fee
- Determine acreage overlying the basin subject to the GSA fee
- Develop a five-year financial plan to adequately fund the continuing operating, administrative, and regulatory costs of the Agency
- Develop fees in compliance with Proposition 218

This Study derives a GSA fee to fund the mandate of SGMA, achieve Agency objectives, and sustainably fund the Agency.

1.4. Context and Benefits of Sustainably Managed Groundwater

Sustainably managed groundwater basins can reduce the risk of undesirable results such as overdraft. Overdraft can have many long-term negative effects including well failure, water quality deterioration, land subsidence, aquifer capacity depletion, and seawater intrusion, among other environmental harms. Managing groundwater basins in a sustainable manner not only avoids these negative outcomes but can also protect in-basin property values and community characteristics. Moreover, by keeping local control of the Montecito Groundwater Basin (Basin), the Agency can prevent additional regulations from the State and implementation of State-mandated fees. Maintaining local control ensures that local concerns can be heard and managed as they arise.

Implementation of the GSP will provide a roadmap to sustainably manage the Basin's groundwater resources. Sustainably managed groundwater is beneficial for a variety of reasons including maintaining surface water flows, providing water for agricultural operations, and providing water for municipal users and private domestic pumpers. Groundwater provides nearly 100 percent of water for private water users in-basin and a share of water supply for municipal water users served by MWD. In addition to normal pumping, local groundwater represents an important supplemental and backup source of supply for MWD in dry years to serve its customer base, most of which jointly overlie the Agency boundaries and receive direct and indirect benefits from both entities. Managing groundwater conditions is critical in maintaining the local communities of Montecito, Summerland, and Toro Canyon.

SGMA defines sustainable groundwater management as "the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results." Undesirable results are defined as any of the following:

- Chronic lowering of Groundwater levels
- Significant and unreasonable reduction in Groundwater Storage
- Significant and unreasonable degradation of water quality
- Land subsidence due to collapsing of aquifer pore space
- Surface water depletions that have significant and unreasonable impacts on beneficial uses
- Seawater Intrusion

Several of these undesirable results are of concern in the Montecito Groundwater Basin.

1.5. Basin Characteristics

The Montecito Groundwater Basin is designated as Basin Number 3-049 by the State of California DWR. The basin is located in southeastern Santa Barbara County and is bounded by the Santa Barbara Groundwater Basin to the west, Carpinteria Groundwater Basin to the east, Santa Ynez Mountains to the north, and Pacific Ocean to the south. A map of the Basin is provided in Figure 2. As of 2015, the Basin's population was estimated at 11,370[2]. DWR estimates that up to 45 percent of the Basin's total water supply is met by groundwater[3]. The remainder is met from conveyed local surface water and imported water served by MWD. The total groundwater pumped from the basin in 2017 is estimated at 2,422 acre-feet (AF). Of the 2,422 AF, 2,001 AF was estimated as private pumpage and 421 AF was pumped from MWD's 12 groundwater production wells[4]. Estimates from DWR show a slightly higher reliance on groundwater of 3,084 AF from an estimated 386 wells[5]. The accuracy of the count of private wells is a known deficiency and is a significant component of the GSP in development. Groundwater is heavily relied upon for residential use, along with some commercial and agricultural uses. Available data suggests that groundwater levels are low following the most recent and worst drought in the region's history.

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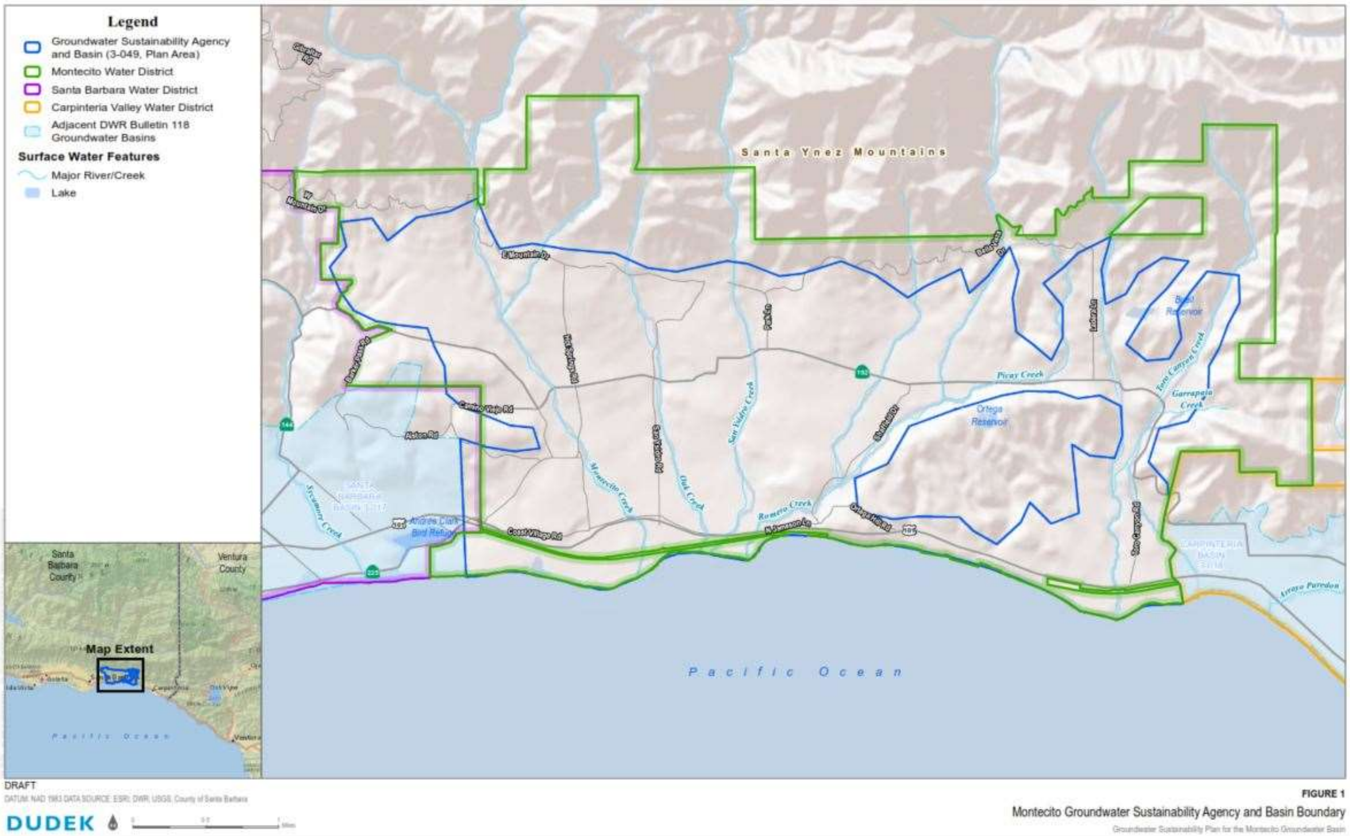
[2] Population analysis from MWD's 2015 Urban Water Management Plan (UWMP)
[3] Source: DWR Basin Prioritization Dashboard, accessed here: https://gis.water.ca.gov/app/bp-dashboard/p2/#
[4] Six potable wells and six non-potable wells
[5] https://gis.water.ca.gov/app/bp-dashboard/p2/#

Figure 2: Montecito Groundwater Basin



1.6. Fee-Setting Legal Mechanism

A critical component of the Study was evaluating funding mechanisms to determine the most appropriate mechanism for the Agency considering the legal requirements of the funding mechanisms under consideration. Agency staff, Raftelis, and the Agency's special legal counsel (Colantuono, Highsmith & Whatley, PC) discussed the benefits, challenges, policy considerations, legal risks, and procedural requirements associated with each funding approach. The Board of Directors (Board) opted to pursue a fee subject to the substantive and procedural requirements of Proposition 218. A summary of Raftelis' understanding of fees subject to Proposition 218 is summarized in Section 2[6].

1.7. GSA Financial Authority

CALIFORNIA WATER CODE 10730 (A)

SGMA's enabling legislation established California Water Code Section 10730. This section dictates the financial authority of a GSA and states:

> *"A groundwater sustainability agency may impose fees, including, but not limited to, permit fees and fees on groundwater extraction or other regulated activity, to fund the costs of a groundwater sustainability program, including, but not limited to, preparation, adoption, and amendment of a groundwater sustainability plan, and investigations, inspections,*

[6] Raftelis is not a law firm.

compliance assistance, enforcement, and program administration, including a prudent reserve. A groundwater sustainability agency shall not impose a fee pursuant to this subdivision on a de minimis extractor unless the agency has regulated the users pursuant to this part."

The proposed fees in this Study are for the purposes of funding the cost of a GSP and other administrative costs related to Phase I of SGMA.

1.8. Proposed Fees

Several potential Phase I funding methods were considered as part of the Study. Ultimately, the selected structure is a fee based on the total acreage of a parcel overlying the Montecito Groundwater Basin. Parcel acreage is derived with County Assessor Geographic Information System (GIS) data and the Basin boundary. The selected fee calculations are described in more detail in Section 1. Table 1 shows the proposed fee per acre overlying the Basin. Total charges are dependent on the total parcel acreage overlying the Basin. The calculated fee per acre is rounded to the nearest whole dollar. These fees are proposed for fiscal years (FYs) 2020-21 through 2024-25. Each FY begins July 1 and ends June 30 of the following calendar year. For example FY 2020-21 is July 1, 2020 through June 30, 2021.

Table 1: GSA Fee per Acre per Year (FY 2020-21 through FY 2024-25)

	FY 2020-21	FY 2021-2022	FY 2022-23	FY 2023-24	FY 2024-25
Agency Acreage	5,597 acres				
Fee per acre	$194.00	$194.00	$194.00	$120.00	$120.00

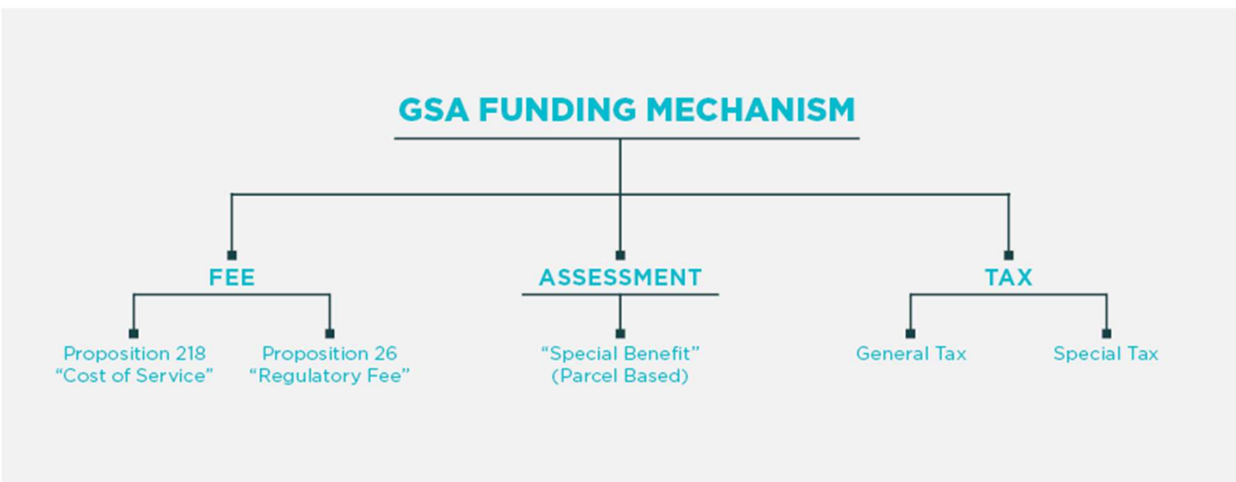
2. SGMA Fee-setting and California's Legal Framework

2.1. Potential Funding Methods

A critical component of the Study was determining which funding mechanisms could be used and which legal requirements governed the funding mechanisms under consideration. Agency staff, Raftelis, and the Agency's special legal counsel met several times to discuss the legal requirements associated with each funding approach[7].

Due to constitutional limitations imposed through Propositions 13, 218, and 26, there are nuanced distinctions between what constitutes a fee versus a tax. Taxes and assessments require voter approval. Proposition 218 fees for service are subject to mandatory noticing and majority protest. Regulatory fees identified as an exemption from taxes under Proposition 26 can be passed by the vote of the governing body of an agency levying the charge. Figure 3 summarizes the various funding mechanisms available to a GSA which are discussed in further detail in the following sub-sections.

Figure 3: GSA Funding Options



2.1.1. CALIFORNIA CONSTITUTION - ARTICLE XIII D, SECTION 6 (PROPOSITION 218) FEE FOR SERVICE

Proposition 218, passed by the voters in 1996, governs property-related fees including water, wastewater, and solid waste service. The measure created an amendment to the California Constitution (Article XIII D, Section 6). It was enacted to ensure, in part, that fees and charges imposed for ongoing delivery of a service to a property are proportional to, and do not exceed, the cost of providing service. Proposition 218 defines property-related fees for service and the criteria for meeting the requirements of Proposition 218. The principal requirements, as they relate to public water service fees and charges are as follows:

- Revenues derived from the fee or charge shall not exceed the costs required to provide the property-related service.

[7] Raftelis is not a law firm. Special legal counsel is provided to the Agency by Colantuono, Highsmith & Whatley, PC.

- Revenues derived by the fee or charge shall not be used for any purpose other than that for which the fee or charge was imposed.
- The amount of the fee or charge imposed upon any parcel shall not exceed the proportional cost of service attributable to the parcel.
- No fee or charge may be imposed for a service unless that service is actually used or immediately available to the owner of property.
- A written notice of the proposed fee or charge shall be mailed to the record owner of each parcel not less than 45 days prior to a public hearing, when the agency considers all written protests against the charge.

Procedurally, Proposition 218 requires noticing of all affected properties with each property allowed to protest the proposed rates. Absent a majority protest, rates may be adopted by the governing body at a public hearing at least 45 days after providing notice to affected properties. SGMA explicitly states that fees imposed based on the extraction of groundwater "shall be adopted in accordance with subdivisions (a) and (b) of Section 6 of Article XIII D of the California Constitution" [commonly referred to as Proposition 218] (Water Code 10730.2(c)).

However, recent case law asserts that fees for groundwater extraction are not property-related charges because they are based on an activity (groundwater pumping) and not property ownership[8]. Therefore, groundwater fees are subject to Article XIII C commonly referred to as Proposition 26. While this decision is not related to SGMA it has been widely interpreted to apply to the regulatory requirements of SGMA which mandate GSA formation, GSP development, and associated ongoing administrative and reporting activities.

2.1.2. CALIFORNIA CONSTITUTION - ARTICLE XIII C, SECTION 1 (PROPOSITION 26)

Regulatory fees are exactions intended to recover the cost of regulation. Passed by the voters in 2010, Proposition 26 provides that these fees cannot exceed the cost of governmental activity associated with regulation and that the fee amount allocated to any payor must bear a fair or reasonable relationship to the payor's benefits from or burdens on the regulatory activity. As a crucial point of distinction, these fees can be imposed by a governing body without voter approval. A Proposition 26 exempt fee must achieve the following:

» Fees allocated to a fee payor must be related to a governmental regulatory program that either benefits the fee payor or that the payor burdens;
» Fee revenue cannot exceed the reasonable cost of the activity for which the fee is imposed, and

[8] *City of San Buenaventura (Ventura) v. United Water Conservation District*

United Water Conservation District imposes groundwater pumping fees on extractors in its service area. The District charges non-agricultural users three times that of agricultural uses. The City of Ventura challenged that the difference in pumping charges represented an illegal subsidy to agricultural users and violated Article XIII D, Section 6(b) (Proposition 218) because the fees exceeded the cost of service. The appellate court held, and the Supreme Court of California affirmed, that the charges are not property-related fees because they are based on the pumping activity and not property ownership (Ventura Water customers do not have their own wells). The court ultimately determined that the pumping charges are regulatory fees meeting the first two exceptions of Article XIII C, Section 1(e): fee imposed for a specific benefit and does not exceed the reasonable cost of the service. Further, the court stated that the reasonableness of costs is not to be measured on an individual basis, but rather, on a collective basis. Since the total cost recovery across all users is reasonable, so is the fee.

- The fee amount allocated to any payor must bear a fair or reasonable relationship to the payor's benefits from or burdens on the regulatory program.

Proposition 26 states that everything is a tax under the California Constitution Article XIII C, Section 1(e), except:

1. A charge imposed for a specific benefit conferred or privilege granted directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of conferring the benefit or granting the privilege.
2. A charge imposed for a specific government service or product provided directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of providing the service or product.
3. A charge imposed for the reasonable regulatory costs to a local government for issuing licenses and permits, performing investigations, inspections, and audits, enforcing agricultural marketing orders, and the administrative enforcement and adjudication thereof.
4. A charge imposed for entrance to or use of local government property, or the purchase, rental, or lease of local government property.
5. A fine, penalty, or other monetary charge imposed by the judicial branch of government or a local government, because of a violation of law.
6. A charge imposed as a condition of property development.
7. Assessments and property-related fees imposed in accordance with the provisions of Article XIII D.

2.1.3. CALIFORNIA CONSTITUTION - ARTICLE XIII D, SECTION 4 (PROPOSITION 218) SPECIAL BENEFIT ASSESSMENT

Like fees for service, assessments for special benefit are also governed by Proposition 218 and are exempted from Proposition 26. Property owners can be assessed to pay for a public improvement or service if it provides a special benefit to the properties. To assess, local government bodies must:

- Develop a Special Benefit methodology to determine each parcel's assessment.
- Ensure that each owner's assessment does not exceed its special benefit.
- Ensure only special benefits are assessable.
- Ensure all parcels which benefit are assessable (no government exemptions), unless there is clear and convincing evidence that a government-owned parcel receives no special benefit.
- Prepare an Engineer's Report that determines the amount of special benefit to each property.
- Notify all affected property owners by mail with mail-in protest ballot form.

The agency must then hold a Public Hearing to determine if a majority protest exists. Protest ballots are tabulated and weighted based on the *amount* of each proposed assessment. Once the Engineer's Report is approved, notices must be mailed at least 45 days prior to the public hearing. The notice must include the affected parcel's protest ballot.

2.1.4. GENERAL AND SPECIAL TAXES (APPROVAL FROM ELECTORATE)

Everything that does not meet the exceptions defined in Proposition 26 is considered a tax and must be approved by the voters. The tax could potentially be spread based on acreage or per parcel or by pumping allocation. These are not the only options. General taxes require a simple majority vote, however, the charges for funding the activities of the GSA would most likely be considered a special tax. A special tax requires a 2/3 approval from the electorate (i.e., registered voters).

2.2. Selected Funding Mechanism – Proposition 218 Fee for Service

The approach selected by the GSA Board acknowledges that sustainable management of the Montecito Groundwater Basin and availability of local groundwater as a water resource, when needed, benefits all property owners in the community. Some parcels overlying the Basin directly benefit from private pumping, others receive direct and indirect benefits from groundwater as a source for MWD. For example, groundwater availability offsets the need to obtain water from other sources. Still others have MWD service and private wells to draw upon. All properties benefit generally from the GSP and a sustainably managed Basin, therefore the amount charged to each payor is proportional to the benefit received through the Agency's GSP and sustainable management.

The Board opted to pursue a fee subject to the substantive and procedural requirements of Proposition 218. While the Board reserved the right to adopt GSA fees as a Proposition 26-exempt regulatory fee, the desire of the Board to adopt via Proposition 218 is two-fold. First, the process is perceived to add an additional layer of defensibility to the Agency's GSA fees. Second, the Board wanted the GSA fee process to be as transparent as possible with the maximum degree of community engagement and the ability of property owners to weigh in on proposed fees by protest.

3. Fee Structure Evaluation

3.1. Fee Structure Options

A key understanding supporting the selected approach is the scarcity of much of the groundwater data (e.g., number and location of all wells, estimates of groundwater use). Further, many of the tasks of the GSP are related to developing this data more fully. All approaches that were considered relied on the assumption that reasonable estimates could be made, and in fact, that estimates must be made, to proceed with any proposed funding mechanism during this Phase I period. Better data will be available after the GSP has been prepared and adopted because of those efforts. Consequently, the selected method of estimation uses data that is currently available and applied in a reasonable way, while recognizing that all data is subject to further refinement and that the Agency will encourage additional data sources or other suggestions that may help improve the data.

Several fee options considered for evaluation by the Agency are briefly discussed below. Figure 4 shows the six options and their relative strength on four scores: Administration, equity, financial stability, and affordability.

3.1.1. ALL PARCELS - FLAT CHARGE

Advantages: Parcel-based approaches are generally simple to understand and to administer. There are few data requirements as the data necessary is simple and readily available.
Disadvantages: Generally inequitable. No relation to groundwater extraction or parcel size.
Data requirements: County Assessor's parcel database.
Other/Policy Requirements: None identified.

3.1.2. ALL NON-DE MINIMIS PARCELS - FLAT CHARGE

Advantages: Generally simple to understand and to administer. There are few data requirements, but it requires a good data set of parcel owners and non-de minimis classification.
Disadvantages: Inequitable among non-de minimis users. No relation to groundwater extraction or parcel size.
Data requirements: County Assessor's parcel database including non-de minimis classifications.
Other/Policy requirements: None identified.

3.1.3. PER PARCEL FEE – TOTAL ACREAGE

Advantages: Simple to understand and to administer. Minimal data requirements. Data is readily available. Acts as a proxy for potential groundwater benefit.
Disadvantages: Assumes a general benefit but with a stronger nexus than parcel count. Not related to actual water extraction.
Data requirements: County Assessor's parcel database.
Other/Policy requirements: None identified.

3.1.4. PER PARCEL FEE – IRRIGATED ACREAGE

Advantages: Absent another source of supply, irrigated usage is directly tied to groundwater extraction. More equitable than parcel or acreage. Proxy for potential or actual groundwater benefit.
Disadvantages: Data intensive. Requires regular updates. May be prone to challenges and manual surveys for confirmation. Requires plant/crop type being irrigated.
Data requirements: Accurate geospatial land cover data and independent estimation.
Other/Policy requirements: Land cover update interval and appeals process.

3.1.5. FEE ON ESTIMATED GROSS GROUNDWATER EXTRACTION

Advantages: Great equity with fee based on actual extraction. Easy to understand. Easy to administer provided wells are known and metering plan is adopted.

Disadvantages: Requires flow meter installation to implement. If not, more time, effort, and cost than other options (i.e. Parcel or acreage options) if remote/indirect data based. More difficult to administer. More opportunities for users to request audit of estimates.

Data requirements: Validated metered data or sophisticated water use estimation data relying on area and crop cover among other inputs.

Other/Policy requirements: Requires adoption of metering plan or access to data allowing accurate estimated pumping with consideration for well service area, crop type, and geographical location.

3.1.6. FEE ON ESTIMATED NET GROUNDWATER EXTRACTION

Advantages: Greatest equity with fee based on actual extraction and accounts for permeability allowing for groundwater recharge. Promotes fairness and encourages adapting land to improve basin sustainability.

Disadvantages: Requires flow meter installation to implement. If not, more time, effort, and cost than other options (i.e. Parcel or acreage options) if remote data based. More difficult to administer and understand. More opportunities for users to request audit of estimates.

Data requirements: Validated meter readings or sophisticated water use estimation data relying on modeling consumptive use.

Other/Policy requirements: Requires adoption of metering plan to access data allowing accurate estimated pumping with consideration for well service area, crop type, geographical location, and recharge estimates.

Figure 4: Fee Structure Options

Policy Objective	All Parcels	Non-de minimis Parcels	Total Acreage	Irrigated Acreage	Est. Gross Pumping	Est. Net Pumping
Administration	★★★★	★★	★★★	★★	★	★
Equity	★★	★	★★	★★★	★★★★	★★★★
Financial Stability	★★★★	★★★★	★★★★	★★★★	★★★	★★★
Affordability	★★	★	★★★	★★★		

3.2. Selected Approach

The Board opted to develop a fee based on the total acreage of a parcel. The parcel count options (all parcels and non-de minimis parcels) does not provide equity across Basin property owners and may impact affordability and the ability of some parcel owners to pay their GSA charges. Conversely, while very equitable relative to other options, the pumping options (estimated gross pumping and estimated net pumping) were eliminated from consideration based on data limitations and the difficulty in administering such a fee at this time. The total acreage option was selected over the irrigated acreage option as it provides similar levels of equity, financial stability, and affordability, while reducing the administrative burden on the Agency. An irrigated acreage approach not only requires additional data collection and data assumptions up front but requires regular updates to account for changes in land cover.

A GSA fee based on the size of the parcel equitably recovers costs of the Agency, ensuring that the benefit received from sustainable management of the Montecito Groundwater Basin is proportional to the fees paid. By spreading the fee widely and proportional to total acreage, the burden of these costs is recovered equitably.

4. Public Meetings

Raftelis participated in numerous meetings with Agency staff, and presentations at public meetings with the Finance Committee and the full Board of Directors as part of this Study. The Finance Committee members consist of Board members providing input to Agency staff and the external consultants and providing information and recommendations to the Board of Directors. The Board of Directors holds regular meetings quarterly, on the second Tuesday of that month. For a complete listing of outreach including committee meetings and other public meetings, please see the Montecito Groundwater Basin website, www.montecitogsa.com.

- June 7, 2019 Study Kickoff with GSA staff
    - Outlining study process and timeline
- July 24, 2019 GSA Board Meeting
    - Study tasks and objectives presentation to Board of Directors
- November 14, 2019 Finance Committee Meeting
    - Policy framework discussion
- January 14, 2020 GSA Board Meeting
    - Policy framework decision points
- March 10, 2020 Finance Committee Meeting
    - Five-year financial plan review
- April 1, 2020 Finance Committee Meeting
    - Fee alternatives presentation and recommendation
- April 14, 2020 GSA Board Meeting
    - Fee recommendation presentation and authorization to draft the study report and initiate Proposition 218 proceedings

5. Cost Share between MWD and GSA

The total groundwater pumped from the basin in 2017 is estimated at 2,422 AF in total. Private pumpage estimates are based on Dudek's 2016 Groundwater Basin Recharge Feasibility Study and the succeeding 2017 DWR groundwater basin Reprioritization Process. An Agency letter associated with the Reprioritization Process and Recharge Feasibility Study are attached to this study report as Appendix A. The study used land cover data, source water information, and statistical methods to identify total annual groundwater extraction. Dudek estimated private pumping at 2,001 AF and MWD production records for the same time period reflects 421 AF. The Recharge Feasibility Study represents the best available data to inform municipal versus private pumping in the Basin.

As the sole municipal water provider with properties directly benefiting from groundwater extraction, MWD will be responsible for its proportional share of Agency costs based on estimated groundwater extractions. Table 2 shows the cost responsibility of MWD. MWD will be responsible for 17.4 percent of all future Agency costs, net of grants. The cost responsibility is rounded to the nearest tenth of a percent.

The Agency's discussion with the MWD in determining the cost share is specific to MWD's cost responsibility. The groundwater pumping estimates used to derive the cost responsibility do not imply a basis for determining MWD's prescriptive right to Basin water.

Table 2: MWD Cost Responsibility

	Groundwater Extraction (AF)	% Share
MWD Production	421	17.4%
Private Pumpage	2,001	82.6%
Total Estimated Pumping	**2,422**	**100%**

6. Required Revenue and Five-Year Financial Plan

The overall purpose of the financial plan is to determine annual revenues required to provide adequate cash flow for operations and maintain adequate cash reserves. The following subsections include estimates and projections of annual O&M expenses, reserve funding, and annual revenues. Revenues and expenses are estimated and projected over the five-year planning period from FY 2020-21 through FY 2024-25.

To date, the Agency's operating costs have been funded by MWD. MWD has tracked expenditures related to the Montecito Groundwater Basin SGMA activities from 2016 through GSA formation and expenditures from Agency formation through the current fiscal year. The Agency will reimburse MWD for pre-GSA fee expenses over a three-year period. Table 3 shows the MWD expenditures and repayment schedule. The Agency will fund expenses in FY 2020-21 and beyond with parcel fees and other revenue sources described in this section. The following subsections explain the Agency's estimated expenditures and revenues.

Table 3: Montecito Water District Reimbursable Expenses

	Expenses 2016-February 2019	Expenses April 2019-June 2020	FY 2020/21	FY 2021/22	FY 2022/23
MWD Reimbursable Expenses					
Staffing	$ 0	$ 74,967	$ 0	$ 0	$ 0
Professional Services	176,328	384,689	$ 0	$ 0	$ 0
GSP Development / Long-term Monitoring	0	96,820	$ 0	$ 0	$ 0
Administrative Expenses - Total	0	109,111	$ 0	$ 0	$ 0
Total MWD Expenses	**$ 176,328**	**$ 665,587**	**$ 0**	**$ 0**	**$ 0**
Agency Reimbursement	**$ 0**	**$ 0**	**$ 280,638**	**$ 280,638**	**$ 280,638**

6.1.1. GSP DEVELOPMENT GRANT FUNDING

The Agency applied for and received a $1.63 million grant to assist in funding the development of the GSP. By applying the grant as a revenue offset, the grant reduces the Agency's total revenue requirement over the next three years by $1.63 million. This funding was made available to Groundwater Sustainability Agencies throughout the State because of 2018's voter-approved Proposition 68. Funding for this project has been provided in full or in part from the Water Quality, Supply, and Infrastructure Improvement Act of 2018 and through an agreement with the State Department of Water Resources. This Proposition authorized $100 million be made available for competitive grants for projects that develop and implement groundwater plans and projects in accordance with groundwater planning requirements established under Division 6, commencing with §10000, Water Code §79775. DWR formed the Sustainable Groundwater Management (SGM) Grant Program to provide funding for sustainable groundwater planning and implementation projects through a competitive grant solicitation process, including the development of GSPs[9].

Table 4 shows the components of the GSP, as well as the respective grant amount, local match, total cost, and percent cost share of each. The total cost of the GSP is estimated at $2.17 million of which $1.63 million will be funded with the Proposition 68 grant award. Note that the total costs for GSP development in Table 4 do not tie to the total GSP Development costs in Table 5. This is because Component 2 and Component 4 of the GSP are captured in the professional services category of operating expenses. In addition, Table 5 is a forward-looking plan while roughly $450k has been, or is estimated to be, spent on GSP development between April 2019 and June 2020. See Appendix B for a detailed GSP Development Cost Reconciliation.

Table 4: GSP Development Funding Sources, by GSP Component

Source of Revenue	(a) Grant Amount	(b) Local Cost Share (Non-Grant Funded)	(c) Total Cost	% Local Cost Share (Col (b) / Col (c))
Component 1: Grant Agreement Administration	$0	$110,000	**$110,000**	100%
Component 2: Groundwater Sustainability Plan Development	$181,128	$352,402	**$533,530**	66%
Component 3: Sea Water Intrusion Monitoring	$178,704	$20,000	**$198,704**	10%
Component 4: Development of a Basin Numerical Model	$162,400	$5,000	**$167,400**	3%
Component 5: Private Well Metering Pilot Program	$213,556	$25,000	**$238,556**	10%
Component 6: Surface Water Flow Gage Installation	$184,100	$15,000	**$199,100**	8%
Component 7: Monitoring Well Construction	$707,317	$15,000	**$722,317**	2%
Total GSP Development Costs	**$1,627,205**	**$542,402**	**$2,169,607**	**25%**

6.1.2. OPERATING EXPENSES

Raftelis worked with Agency staff and the Agency's professional engineers to create a five-year financial plan for the Agency. The first step in determining the parcel fee is determining how much revenue the Agency will require to cover its costs. The budget for the Agency's first five years is shown below in Table 5. Costs rely on best available estimates of salaries and benefits of additional staff, estimated hours and effort from outside professional services firms, and overhead. Operating expenses are summarized into five categories: staffing, professional services, GSP development, administrative expenses, and other. Line item detail for each category is presented in Appendix B. Staffing consists of fully burdened salaries and benefits for one full-time GSA Groundwater Specialist as well as a time allocation for existing MWD staff who will serve both agencies. Professional services consist of legal services and professional engineering services. GSP development includes the costs shown in Table 4, less funds spent to date on GSP development and reimbursable to MWD. GSP development also includes costs for annual monitoring and

[9]Information on Proposition 1 and Proposition 68 Grants can be found on DWR's website here: https://water.ca.gov/Work-With-Us/Grants-And-Loans/Sustainable-Groundwater

a pro-rata share of five-year GSP updates costs (five-year update in FY 2027-28). Administrative expenses include overhead related to office space, utilities, equipment, and supplies. Other expenses are majority MWD reimbursements. As this is the inaugural multi-year financial plan for the Agency, a 10 percent contingency is assumed for cost variances.

In addition to the estimated operating expenses and contingency, the Agency must establish a cash reserve. Water Code Sections 10730(a) and 10730.2(a)(1) explicitly authorize a prudent cash reserve. Reasonable and achievable reserves are a financial tool to aid in cash flow timing and unforeseen expenditures. Generally, a reserve for operations targets a specific percentage of annual operating costs or days of cash on hand. The reserve target is influenced by several factors including the frequency of billing and the recurrence of expenses. The parcel fees will be submitted for collection by the County of Santa Barbara with the Agency receiving revenues only twice per year in December and April. Given the infrequency of parcel fee revenue and the monthly recurrence of many expenses, the Board has established a cash reserve target of approximately six months of operating expenses, averaged over the first three fiscal years. To smooth the impact of the new parcel fee, the Board elects to fund the reserve over three years beginning FY 2020-21.

Table 5: Montecito Five-Year Phase I Expenses

	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Operating Expenses					
Staffing	$ 368,300	$ 344,176	$ 355,506	$ 367,313	$ 379,622
Professional Services	380,241	229,841	125,000	125,000	125,000
GSP Development / Long-term Monitoring	1,011,559	245,098	115,200	134,140	134,140
Administrative Expenses - Total	85,500	81,897	84,398	86,975	89,631
Other	295,398	295,618	295,838	15,425	15,657
Subtotal Operating Expenses	**$ 2,140,998**	**$ 1,196,630**	**$ 975,942**	**$ 728,853**	**$ 744,050**
Contingency (10%)	$ 214,100	$ 119,663	$ 97,594	$ 72,885	$ 74,405
Total: Operating Expenses	**$ 2,355,098**	**$ 1,316,293**	**$ 1,073,536**	**$ 801,739**	**$ 818,455**
Annual Reserve Funding	$ 275,000	$ 275,000	$ 275,000	$ 0	$ 0
Total Revenue Requirements	**$ 2,630,098**	**$ 1,591,293**	**$ 1,348,536**	**$ 801,739**	**$ 818,455**

6.1.3. OPERATING REVENUE

The total revenue requirement of the Agency is recovered from three components: grants, direct payments by MWD, and parcel charges. Grants are first applied against the total annual revenue requirement to yield the net revenue required from other sources. The remainder, net of grants, is split between MWD and parcel fees based on the cost share derived in Section 5. Each year MWD will be responsible for 17.4 percent of Agency costs (net of grants) which will be paid directly to the Agency. The other 82.6 percent will be recovered through the parcel fees calculated in this Study and billed directly against the property via the County property tax bill. Table 6 shows the revenue sources over the five-year study period. The total revenues in Table 6 are equal to the revenue requirement identified in Table 5.

Table 6: Phase I Source of Revenues – Five-Year Schedule

Source of Revenue	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Prop 68 SGM Grant	$1,303,983	$235,400	$87,823	$0	$0
MWD Cost Share	$230,744	$235,925	$219,364	$139,503	$142,411
Parcel Fees	$1,095,371	$1,119,968	$1,041,349	$662,236	$676,044
Total Revenue	**$2,630,098**	**$1,591,293**	**$1,348,536**	**$801,739**	**$818,455**

7. Montecito Groundwater Basin Acreage

Section 3.2 discussed the selected fee approach of total parcel acreage. This section describes the acreage overlying the Montecito Groundwater Basin, the acreage subject to the parcel fee, and an analysis of acreage by land classification.

7.1. Fee Acreage

To determine the Parcel Fee Raftelis analyzed the results from a Geographic Information Systems (GIS) dataset provided by Dudek, the Agency's professional engineering firm. This analysis employed parcel data from the County of Santa Barbara Assessor, the Water District's boundary, and the limits of the Montecito Groundwater Basin as defined in the DWR Bulletin 118. Parcel data were split into two groups, inside or outside, of both the Water District's and the Montecito Groundwater Basin boundary. The split parcels' acreage was calculated to identify the amount of a parcel inside and outside each boundary. Any parcel that occupied both the Water Districts' and Montecito Groundwater Basin boundaries was then listed and provided to Raftelis for further analysis and categorization.

Several parcels are partially inside and partially outside the Montecito Groundwater Basin. Any fraction falling inside the Basin is subject to the parcel fee. For parcels wholly inside the Basin, the entire area of the parcel is subject to the fee. The gross area as determined by the Dudek analysis is 5,684 acres.

The Basin includes several parcels owned by public agencies including schools and special districts. While the Agency is electing to adopt parcel charges as a Proposition 218 fee for service, the charges recover the costs of regulatory activities. On advice of the Agency's Special Counsel, all government property and property belonging to public agencies will be excluded from the parcel fee.

The parcel database includes 87.4 governmental or public agency acres. Montecito Water District accounts for 11 acres. The County of Santa Barbara and City of Santa Barbara account for 53.2 and 0.1 acres, respectively. Public school district acreage includes Montecito Union School District, Cold Spring School District, Carpinteria Union High School, and Summerland School District. Fire Districts include the Montecito Fire Protection District and Carpinteria Summerland Fire Department. Sanitation districts include the Montecito Sanitary District and Summerland Sanitary District. Reducing the gross acreage by governmental and public agency property yields the net acreage subject to the GSA fee of 5,597 acres shown in Table 7.

Table 7: Fee Acreage Summary

	Acres
Gross Acreage	5,684
Less	
Montecito Water District	11.0
County of Santa Barbara	53.2
City of Santa Barbara	0.1
Public School Districts	13.2
Fire Districts	2.1
Sanitation Districts	7.8
Net Acreage	**5,597**

Within the parcel database provided by Dudek, Raftelis consolidated the numerous county land use codes into fewer, more common categories to describe the data. County land use designations were summarized in the following categories:

- SFR: Single Family Residential parcels
- Other Residential: Apartments, condos, mobile homes, and any other non-SFR category
- Agriculture: orchards, vines, and nurseries, among others
- Commercial: restaurants, retail, office buildings, etc.
- Institutional: golf courses, universities, hospitals, and parks
- Vacant: vacant land
- Miscellaneous: highways and streets, parking lots, etc.
- N/A: lacking use code or owner name in database but confirmed to be real property

Table 8 shows summary statistics describing the consolidated land classifications including the count of unique parcels in each class, the acreage overlying the Basin in each class, and the average size of each class, in acres. Averages are rounded to the nearest tenth of an acre. Roughly 65 percent of acreage and 70 percent of all parcels are SFR.

Table 8: Consolidated Land Classification Statistics

Summary Statistics	SFR	Other-Residential	Agricul-ture	Comm-ercial	Insti-tutional	Vacant	Misc.	N/A	Total
Unique Parcel Count	3,421	703	21	142	49	360	95	57	**4,848**
Basin Acreage	3,627	417	197	202	377	550	180	47	**5,684**
Average Size (Acres)	**1.1**	**0.6**	**9.4**	**1.4**	**7.7**	**1.5**	**1.9**	**0.8**	

Table 9 expands the summary statistics in Table 8 to include parcel size for each classification by percentiles and qualitatively categorized from very small to very large. The median SFR parcel is 0.84 acres compared to the average of 1.06 (rounded in the table to the nearest tenth).

Table 9: Land Classification Statistics, by Acreage Percentiles

Parcel Size	Percentile	SFR	Other-Residential	Agriculture	Commercial	Institutional	Vacant	Misc.	N/A
Very Small	10%	0.17	0.02	0.01	0.07	0.72	0.07	0.05	0.12
Small	25%	0.35	0.02	0.81	0.16	2.12	0.21	0.12	0.17
Median	50%	0.84	0.04	4.92	0.37	4.75	0.90	0.58	0.30
Large	75%	1.10	0.14	10.10	0.91	13.89	1.89	3.65	0.58
Very Large	90%	2.03	0.35	23.47	2.87	37.30	3.84	6.24	2.28
Max		40.2	51.6	77.0	28.1	67.3	32.6	33.3	6.3
Average		**1.1**	**0.6**	**9.4**	**1.5**	**11.4**	**1.6**	**2.5**	**0.8**

8. Fee Calculation

8.1. Harmonized Revenue Requirement

Because of GSP development and reserve funding in the first three years of the five-year financial plan, the Agency will adopt a "harmonized" fee approach. This approach accounts for the two distinct revenue periods (pre- and post-GSP adoption). Period 1 is FY 2020-21 through FY 2022-23 and includes GSP development costs, reserve funding, and GSA operational and administrative costs. Period 2 is FY 2023-24 and FY 2024-25 and includes modest GSP monitoring and assessment costs, a portion of future GSP update costs, and GSA operational and administrative costs. In delineating these two distinct periods, the proposed fee per acre will be harmonized for each. What this achieves is a fee that is certain and easier to explain and understand to property owners. The harmonized revenue required from the GSA fee is presented in Table 10.

Table 10: Harmonized Revenue Requirement

	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Revenue Required from Parcel Fees	$1,095,371	$1,119,968	$1,041,349	$662,236	$676,044
Harmonizing (Averaging) Period		3 years		2 years	
Average Revenue Required from Parcel Fees	**$1,085,563**	**$1,085,563**	**$1,085,563**	**$669,140**	**$669,140**

8.2. Fee Calculation

To develop the fee per acre, the harmonized revenue required from parcel fees in Table 10 is divided by the net acreage overlying the Basin from Table 7. The fee per acre is rounded to the nearest whole dollar. As the Board desires to levy the GSA fee equitably, regardless of land use, the fee per acre is the same for all parcels. The resulting fee per acre per year for all properties is $194.00 for the first three years and $120.00 for the final two years of the study period. The schedule of proposed fees is shown in Table 11. Individual charges are determined by multiplying the acreage overlying the Basin by the fee per acre.

Table 11: Proposed Five-Year GSA Fee Schedule

	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Revenue Required from Parcel Fees	$1,085,563	$1,085,563	$1,085,563	$669,140	$669,140
Basin Acreage subject to Fee	5,597	5,597	5,597	5,597	5,597
Fee per acre per year	$193.98	$193.98	$193.98	$119.57	$119.57
Fee per acre per year (Rounded)	**$194**	**$194**	**$194**	**$120**	**$120**

9. Fee Impacts

9.1. Parcel Impacts

Table 12 shows the proposed fee per acre per year and includes two additional impact points: fee per acre per installment representing the two equal tax bill payments during the year; and fee per acre per month which is a familiar measurement for properties served by MWD.

Table 12: Fee per Acre Per Year Calculation

	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Fee per Acre per year (rounded)	**$194**	**$194**	**$194**	**$120**	**$120**
Fee per Acre per installment	$97	$97	$97	$60	$60
Fee per Acre per month	$16.17	$16.17	$16.17	$10	$10

Table 13 shows the approximate GSA charges by class, for parcels of varying sizes (sizes shown in Table 9). All charges in the table are rounded to the nearest whole dollar for ease of viewing. SFR is the largest class by count and acreage. SFR parcels will pay an annual charge of $162 for a median-sized parcel and $206 for an average size parcel. Vacant land is the second largest class by acreage. Vacant parcels will pay an annual charge of $174 for a median sized parcel and $315 for an average size parcel. Other Residential parcels will have the lowest GSA charges on average as the parcels in this class tend to be small.

Table 13: Parcel Size and Customer Class Impacts

Parcel Size (Acres)	SFR	Other-Residential	Agriculture	Commercial	Institutional	Vacant	Misc.	#N/A
Very Small	$32	$4	$1	$14	$140	$14	$10	$22
Small	$67	$5	$158	$32	$412	$40	$23	$33
Median	$162	$8	$954	$71	$921	$174	$112	$59
Large	$214	$27	$1,959	$176	$2,694	$367	$708	$113
Very Large	$394	$68	$4,552	$557	$7,237	$745	$1,211	$442
Average	**$206**	**$115**	**$1,819**	**$282**	**$2,214**	**$315**	**$477**	**$160**

9.1. SFR Parcel Impacts

Table 14 shows SFR impacts of varying sizes. As presented in Table 9, the median SFR parcel size is 0.84 acres and the average size is 1.06 acres. The 95th percentile is 3.1 acres. Two-thirds of all SFR parcels are between 0.25 acres and 1.5 acres in size. In addition to showing the fee in dollars per year, the charge is shown two additional ways: dollars per installment to represent the two equal tax bill payments and dollars per month which is a traditional measurement of the cost of municipal water service.

Table 14: SFR Fee Impacts (FY 2020-21)

Parcel Size (Acres)	Fee ($/Year)	Fee ($/Installment)	Fee ($/Month)
1/8 Acre	$24.25	$12.13	$2.02
1/4 Acre	$48.50	$24.25	$4.04
1/2 Acre	$97.00	$48.50	$8.08
3/4 Acre	$145.50	$72.75	$12.13
1 Acre	$194.00	$97.00	$16.17
1-1/2 Acres	$291.00	$145.50	$24.25
2-1/2 Acres	$485.00	$242.50	$40.42
5 Acres	$970.00	$485.00	$80.83
10 Acres	$1,940.00	$970.00	$161.67

Table 15 shows the five-year GSA fee impact for median and average size SFR parcels. Impacts are again shown on an annual basis and a monthly basis.

Table 15: Five-Year SFR Fee Impact for Median and Average Parcels

	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
			Median SFR Parcel		
Fee per year	$162.49	$162.49	$162.49	$100.51	$100.51
Fee per month	*$13.54*	*$13.54*	*$13.54*	*$8.38*	*$8.38*
			Average SFR Parcel		
Fee per year	$205.76	$205.76	$205.76	$127.27	$127.27
Fee per month	*$17.15*	*$17.15*	*$17.15*	*$10.61*	*$10.61*

10. State Intervention Fees

The fees developed and proposed by this Study ensure revenue available to the Agency to implement the GSP, conduct monitoring activities, acquire necessary data, carryout administrative duties, and report regularly to DWR. If the Agency does not have dedicated funding, and if it fails to sustainably manage the Basin, the State reserves the right to intervene through the State Water Resources Control Board (SWRCB). Triggers to State intervention include rejection of a GSP by DWR, as well as the future failure of the GSP to avoid undesirable results. Should this happen the Basin may be designated as "probationary" or require the SWRCB to develop an interim plan. Table 16 provides a schedule of fees which would be imposed by the State on probationary and interim basins. Note when State intervention is required all users of water must pay a base fee per well as well as a variable rate on each acre-foot of water extracted.

Table 16: SWRCB State Intervention Fees – Water Year 2018[10]

Fee Category	Fee Amount	Applicable Parties
Base Filing Fee	$300 per well	All extractors
Unmanaged Area Rate	$10 per AF metered $25 per AF unmetered	Extractors in unmanaged areas
Probationary Basin Rate	$40 per AF	Extractors in probationary basins
Interim Plan Rate	$55 per AF	Extractors in interim plan basins
De minimis Fee	$100 per well	Domestic and <2AFY
Late Fee	25% of total each month	All

[10] Most recent fees available from the State Water Resources Control Board

11. Appendices

Appendix A: DWR Reprioritization Letter and Groundwater Recharge Feasibility Study

MONTECITO WATER DISTRICT

June 30, 2017

Mr. Tim Ross
Department of Water Resources
Senior Engineering Geologist
770 Fairmont Ave, Ste 102
Glendale, CA 91203

RE: Montecito Water Groundwater Basin (Basin Number: 3-49) Prioritization

Mr. Ross,

Thank you for speaking with the Montecito Water District (District) Staff and consultants on May 10, 2017 about groundwater use in the Montecito Groundwater Basin (Basin). The District understands the Department of Water Resources (DWR) is currently refining and reevaluating groundwater basin data for the purposes of accurately prioritizing groundwater basins state-wide. The District and District's consultant, Dudek, reviewed the prioritization of the Basin DWR completed in 2014 for the California State Groundwater Elevation Monitoring (CASGEM) Program. The attachments included with this letter summarize the results of Dudek's evaluation of data relevant to DWR's basin prioritization process.

We appreciate the opportunity to provide you with this information. Please don't hesitate to contact me for additional information or if you have any questions.

Sincerely,

Nicholas Turner
Montecito Water District
General Manager

Attachments:

1) Dudek. Independent Analysis of the Montecito Groundwater Basin Prioritization, June 30, 2017.

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To: Nicholas Turner – General Manager, Montecito Water District
From: Dudek
Subject: Independent Analysis of the Montecito Groundwater Basin Prioritization
Date: June 30, 2017

Attachment(s): Figure 1: Groundwater Basins and Water Districts
Figure 2: Montecito Water District and Privately Owned Wells
Figure 3: Irrigated Areas

This memorandum has been prepared for the Montecito Water District (MWD) to document the results of Dudek's review of the Montecito Groundwater Basin (Basin) prioritization conducted by the Department of Water Resources (DWR) (Figure 1). DWR assigned to the Basin a ranking of Very Low when they first conducted the ranking process in 2014.The score previously assigned by DWR was 12.75 which corresponds to a Low priority Ranking. The Basin was ranked as Very Low, apparently due to the determination that less than 2,000 acre feet per year (AFY) was extracted from the basin. Dudek's independent analysis of the DWR prioritization indicates that based on the DWR criteria and methodology, the prioritization ranking for the Basin is within the Medium range, with an Overall Basin ranking score of 16.75. In addition, total extractions from the Basin are in excess of 2,400 AFY.

For the analysis, Dudek assessed the various data components of the DWR basin prioritization process. The data components assessed are: 1) population, 2) rate of current and projected growth of population, 3) number of public supply wells, 4) total number of wells, 5) irrigated acreage, 6) groundwater reliance, 7) documented impacts to the basin, and 8) other relevant information. Dudek has reevaluated these data components, gathered Basin specific data, and compared them to DWR's California Statewide Groundwater Elevation Monitoring (CASGEM) Basin Prioritization Process (DWR 2014).

BACKGROUND

The Sustainable Groundwater Management Act (SGMA) was passed in September 2014. The SGMA was passed as a means of for management of groundwater throughout the State of California. Per the SGMA, all groundwater basins prioritized as Medium or High by the DWR must designate a Groundwater Sustainability Agency (GSA) by June 30, 2017. Formation of a GSA for groundwater basins prioritized as Low and Very Low is voluntary.

The GSAs for groundwater basins designated as Medium or High must prepare a Groundwater Sustainability Plan (GSP) for each basin by January 2022. If a basin is in critical overdraft, the deadline to prepare a GSP for that basin is January 2020. If a basin is adjudicated, different requirements apply. The GSP is required to address the management needs of the basin in order to avoid undesirable results. The undesirable results as defined by DWR include: 1) chronic lowering of groundwater levels, 2) reduction of groundwater storage, 3) sea water intrusion, 4) degraded water quality, 5) land subsidence, and 6) depletions of interconnected surface water.

Groundwater basin prioritization was completed for the CASGEM Program. The CASGEM Program was established under the 2009 Groundwater Monitoring legislation (SBX7-6) in order to provide groundwater elevation information for all of California's groundwater basins (CWC §10933).

DATA COMPONENTS

The data components used in the basin prioritization are summarized as follows (DWR 2014):

1. Population overlying the basin;
2. Rate of current and projected growth of the population overlying the basin;
3. Total number of public supply wells (PSW) that extract water from the basin;
4. Total number of wells that extract from the basin;
5. Irrigated acreage overlying the basin;
6. Degree to which persons overlying the basin rely on groundwater as their primary source of water;
7. Documented impacts on the groundwater within the basin, including overdraft, subsidence, saline intrusion, and other water quality degradation;
8. Any other information determined to be relevant by DWR.

Several of these components are expressed in designations per square mile. The Montecito Groundwater Basin is 9.8 square miles.

All 515 California groundwater basins were assessed as part of the CASGEM program. A ranking system was developed using the above data components 1-6. The statistical distribution was broken down by the CASGEM Program staff into six ranking values, 0 to 5 as shown in Table 1. Data component number six is comprised of the two factors shown under Groundwater Reliance in Table 1. Data component number seven was applied by DWR staff based on a review of DWR Bulletin 118 Update 2003, local groundwater management plans, public comments, and other published information. The overall Basin ranking score is calculated by summing the ranking value of the data components. The groundwater reliance adjusted ranking value shown in Table 2 is determined by averaging the ranking values of groundwater use and percent of the total supply (DWR 2014).

Table 1
Data Components and Ranking Ranges

Ranking	Ranking Value	Data Components and Ranking Ranges						
		Population		PSW Density	Total Well Density	Irrigated Acreage	Groundwater Reliance	
		Density	Projected Growth				GW Use	% of Total Supply[1]
		per sq.-mi	%	per sq.-mi	per sq.-mi	ac/sq.-mi	ac-ft/acre	%
Very Low	0	x < 7	x < 0	x = 0	x = 0	x < 1	x < 0.03	x < 0.1
Low	1	7 ≥ x < 250	0 ≥ x < 6	0 > x < 0.1	0 > x < 2	1 ≥ x < 25	0.03 ≥ x < 0.1	0.1 ≥ x < 20
Moderately Low	2	250 ≥ x < 1000	6 ≥ x < 15	0.1 ≥ x < 0.25	2 ≥ x < 5	25 ≥ x < 100	0.1 ≥ x < 0.25	20 ≥ x < 40
Medium	3	1000 ≥ x < 2500	15 ≥ x < 25	0.25 ≥ x < 0.5	5 ≥ x < 10	100 ≥ x < 200	0.25 ≥ x < 0.5	40 ≥ x < 60
Moderately High	4	2500 ≥ x < 4000	25 ≥ x < 40	0.5 ≥ x < 1.0	10 ≥ x < 20	200 ≥ x < 350	0.5 ≥ x < 0.75	60 ≥ x < 80
High	5	5 x ≥ 4000	x ≥ 40	x ≥ 1.0	x ≥ 20	x ≥ 350	x ≥ 0.75	x ≥ 80

Note:
Population growth is percent growth from 2010 to 2030.
1 Percent of total water supply (groundwater and surface water) that is provided by groundwater.
x = component data value
Source: DWR 2014

Population

The population within the Basin is not directly available through census data. Dudek used Census data from 2010 (US Census 2010) to quantify the population in all Census tracts that completely or partially intersect the Basin. Using this technique, the population overlying the Basin was approximately 1,447 people per square mile. However, this method likely overestimates the population by including people within the census tracts but outside of the Basin.

Montecito Water District also estimated population within the MWD service area using the DWR online Population Tool (Baker 2017). The service area excludes relatively small portions of the Basin but also extends significantly beyond it in less populated areas. The calculation yields approximately 1,187 people per square mile and it is noted in the UWMP that, for various reasons, it may underestimate the actual population. Population calculation by either method results in a ranking of 3, which is consistent with the previous CASGEM ranking.

The population change in the unincorporated area of Montecito from 2000 to 2010 was a reduction of 1,035 people resulting in a total population decrease of 10% (SBCAG 2012). Per the Montecito Growth Management Ordinance, the growth of Montecito is to be limited to 19 dwelling units per year (Santa Barbara County 2010). Therefore, the population growth rate is consistent with the CASGEM Program ranking range of $R < 0$ percent resulting in a ranking value of 0.

Basin Wells

There are eight active public supply wells operated by the MWD, as shown in Figure 2 (MWD 2005). The normalized value of the public supply wells is 0.8 wells per square mile, which falls within the assigned ranking range of $0.5 \leq R < 1.0$ wells per square mile resulting in a ranking value of 4.

Dudek has identified 535 wells as being in or around the Basin. (Note that only the wells that could be located precisely are shown on Figure 2). This does not include wells operated by MWD, drilled prior to 1955, or constructed with a cable tool as indicated on the DWR Well Completion Report. The cable tool well construction method utilizes a hammer style bit to break up the soil material. This method of well construction has been obsolete for the last few decades. Therefore, these wells may not still be in operation and were excluded from the analysis. Wells were identified using the DWR Well Completion Report online database and sorted by Township, Range, Section and City.

Previously, DWR identified the total number of wells within the Basin using the DWR Well Master database (WellMa). The WellMa database contains well locations by township, range, and section as recorded on the Well Completion Reports. DWR did not remove wells based upon construction type, owner or use (DWR 2014).

The normalized total number of wells is 55 wells per square mile. This value is equivalent to the ranking range of $R \geq 20$ wells per square mile and matches the initial DWR Ranking Value assigned of 5. Due to uncertainty regarding the number of active wells in comparison to the number of identified wells based on the DWR Well Completion Reports, the DWR reduced the ranking value by 25%, resulting in an adjusted ranking value of 3.75. To date, Dudek was unable to verify the total number of active wells within the Basin and has therefore maintained the adjusted ranking value of 3.75.

Irrigated Acreage

Dudek used aerial imagery to identify and calculate the size of large irrigated areas within the Basin using Geographic Information System (GIS) tools. The analysis did not consider small irrigated or turf areas (such as those attached to single family residences).

Irrigated areas were digitized using the World Imagery aerial base map (USDA 2014) at a scale of 1:3,000 and 1:2,400. These scales are the equivalent of 1-inch equals 350 feet and 1-inch equals 200 feet respectively. At these scales and with the resolution of the aerial photography, it is possible to distinguish features such as single family homes, agricultural areas including orchards and row crops, and landscape features such as swimming pools and lawn areas. Note that the imagery used was from 2014, a dry year following several dry years. It is assumed that only irrigated areas show as green in this imagery as areas un-supplemented by irrigation had browned.

Irrigated areas were adjusted to include those shown on the Santa Barbara County Agricultural Commissioner Pesticide Permit applications (Santa Barbara County 2015). Such areas may include golf courses, cemeteries, and farms. Only bushes, turf grass (lawns), crops, and orchard areas were included due to the difficulty of identifying other types of irrigated landscaping. In addition, parcels and irrigated areas were constrained to only those areas located within the Basin (see Figure 3: Irrigated Areas). Note that only the parts of parcels that were identified as irrigated were counted for water use calculations. For example, paved areas and buildings were not included in the water use calculations so as not to over-estimate water use.

This method resulted in the identification of 706 irrigated acres. (For land and water use type, see Groundwater Reliance Below). The normalized value for irrigated acreage is 72 acres per square mile. This value is within the ranking range of $25 \leq R < 100$ acres per square mile and a ranking value of 2. This is greater than the previously assigned CASGEM Program ranking range of $1 \leq R < 25$ acres per square mile (Ranking value of 1). It is likely that the discrepancy is due to the CASGEM Program use of the DWR land use data and/or the Department of Conservation Farmland Mapping Program. The most recent DWR land use data for Santa Barbara County is from 1996 and the Department of Conservation Farmland Mapping Program only categorizes areas based upon the potential for farming activity. The estimates prepared by the CASGEM Program likely did not account for the irrigated acreage of golf courses and cemeteries and therefore may have underestimated the actual irrigated acreage.

Groundwater Reliance

DWR has focused prioritization efforts on high-use basins, ranking lower use basins (2,000 AFY to 9,500 AFY) only if there are other issues or impacts (DWR 2014). The CASGEM ranking provides a value of 1 for "Impacts", apparently based on water quality concerns of high TDS and iron and manganese concentrations. In its original ranking of the Basin, DWR calculated a score of 12.5 but replaced it with a zero indicating that they determined the basin to produce less than 2,000 AFY. It is assumed that the DWR analysis did not include extractions from private entities which are largely unmonitored.

To estimate total groundwater reliance, Dudek evaluated both District and private extractions. District records indicate that the supplies from groundwater between 2011 and 2015 have ranged from 124 AFY to 636 AFY. Averaging all of the values yields 421 AFY, the value used for this analysis.

Water use within the irrigated areas was estimated by identifying irrigated parcels and assigning a water use factor to each land use within them. Because other types of irrigated landscape are less water intensive and more difficult to identify by this method, the analysis focused on turf, trees, crops, and orchard areas.

Water Source Analysis:

The water sources for the parcels identified as having irrigated landscapes were determined from the District parcel supply list, "Heal the Ocean" well list, District supply well location list, and DWR well completion logs (see Figure 2: Well location map). Parcels with irrigated areas were designated as having one of the following:

1. Only wells
2. Both wells and District supplied water
3. Unknown sources
4. District supplied water (only for parcels with irrigated areas over 0.5 acres)

The following assumptions were made about each source category:

1. Only wells – All irrigation water is obtained from the well(s) existing on the property.
2. Both wells and District supplied water – When both sources exist, well water is used for irrigation of large areas and District water for domestic uses.
3. Unknown sources – Well water is the source for irrigation in these areas.

4. District supplied water parcels (Only with irrigated areas over 0.5 acres) – Such parcels have groundwater to supplement water supplied by the District.

Water Use Factors:

The Water Use Factor is the amount of water required by a particular landscape type. There are many elements that can affect the magnitude of the factor such as location and soil type. For example, grasses existing in hotter climates may require more applied water than those in cooler climates due to higher evapotranspiration rates. Highly permeable soils such as sand and gravel may not hold moisture near the plant root as well as more clayey soils and therefore require more frequent watering. There are various methods to determine the Water Use Factor. Those used in this analysis are described below. The Factor units are Acre Feet per Year per Acre (AFY/A).

Turf and Lawn – A range of values were examined for turf and lawn. The one selected (3.38 AFY/A) was provided by the District as the amount supplied to residential turf areas after subtracting out estimated domestic use. The value chosen was for the year 2013, prior to the institution of allocation restrictions and during drought conditions.

The California Irrigation Management Information System (CIMIS) reference evapotranspiration zone information was consulted as a check on the reasonableness of the turf and lawn value determined above. CIMIS data is used to produce a map of California that is divided into 18 evapotranspiration zones having uniform characteristics. An evapotranspiration reference value (ET_0) is assigned to each zone. This value is the inches per year of irrigation required to keep turf in a "healthy" condition. The Montecito Basin is located in Zone Number 4 with a corresponding ET_0 of 46.6 inches per year or 3.8 AFY/A.

Crops - The water use factor for crops was taken from the Santa Ynez River Water Conservation District information table used for water use reporting. Water use factors for common crops range from about 1.2 to about 2.0 AFY/A. A value of 1.7 AFY/A was used as a reasonable average of the crop factors listed.

Orchards - The water use factor for Orchards was taken from the Santa Ynez River Water Conservation District information table used for water use reporting. Tree crop water use factors for avocados, citrus, olives, deciduous fruits, and walnuts range from 1.5 to 2.6 AFY/A. A water use factor of 2.0 AFY/A was selected as the average of the tree crops listed.

Water Reliance Calculations:

The following table shows the analysis results.

Table 2:
Irrigated Acreage Water Use

Landscape Type	Water Use Factor (AFY/A)	Irrigated Areas per Water Source (acres)					Total Water Use (AFY)
		MWD (Large Parcel)	MWD, Well(s)	Unknown	Wells	Total Acres	
Crops	1.7	18	0	0	0	18	31
Lawn/Turf	3.38	173	47	186	78	484	1,636
Orchards	2	53	6	46	62	167	334
District Pumping							421
Total		249	61	255	141	706	2,422

The total annual water use by this method was estimated to be 2,422 AF. The normalized value for groundwater use equals 0.38 acre-feet per acre. This value is within the range of $0.25 \leq R < 0.5$ acre-feet per acre with a ranking value of 3, greater than the CASGEM Program ranking range of $0.03 \leq R < 0.1$ acre-feet per acre and a ranking value of 1.

According to SBX7-7, MWD annual supply is limited to 4,800 AFY (Baker 2017). Combining this with 2,001 AFY of estimated private groundwater use yields a total supply of 6,801 AFY of which 2,422 AFY is from groundwater resources. Therefore, the groundwater percentage of total supply is 36%. The majority of the District water supply is from local surface water reservoirs and imported State water. This results in a modified ranking value from a CASGEM ranking of 1 to a ranking of 2 (20<R<40).

Impacts

In the CASGEM evaluation of impacts to the Basin, DWR determined water quality to be high in total dissolved solids (TDS), iron, and manganese concentrations (DWR 2003; Santa Barbara County 2011). As part of this re-evaluation, these impacts have been reviewed and determined to be consistent with the Ranking Value of 1. It should be noted that there has been evidence of seawater intrusion in coastal portions of the basin but further information is needed to evaluate its impacts.

CONCLUSIONS

As discussed in Groundwater Reliance above, MWD groundwater use averages about 421 AFY, significantly below the DWR threshold of 2,000 AFY. However, this quantity includes none of the extraction from private and agricultural wells throughout the Basin. To estimate this component, Dudek performed an indirect analysis of irrigated acreage and related groundwater use.

In evaluating the current ranking of the Montecito Groundwater Basin, Dudek found the population overlying the Basin to be commensurate with the previous CASGEM ranking of 3, and the population growth was confirmed to be within the ranking value of 0. The eight MWD wells within the Basin confirm that the public supply wells are within the ranking value of 4. A review of the DWR Well Completion Reports has also confirmed that the total wells within the Basin are within the ranking value of 5. Dudek has maintained the DWR applied confidence reduction of 25% due to the uncertainty that the wells are active and within the Basin.

Because private and agricultural groundwater within the Basin is largely unmonitored, Dudek performed an indirect analysis of irrigated acreage and related groundwater reliance. Based upon these methods, the irrigated acreage ranking value has increased from 1 to 2. The groundwater use value has increased from 2 to 3, and the Percent of Total Supply has increased from 1 to 2. The resulting adjusted ranking value is 2.5. Documented impacts to the Basin confirm that the ranking value of 1 for the impact data component is appropriate. The Basin re-prioritization has been determined to have an overall Basin ranking score of 16.25, placing the Basin within the Medium ranking range of $13.43 \leq R < 21.08$ (Table 2).

Table 2
Basin Re-Prioritization Ranking Summary

<table>
<tr><th colspan="2">Data Component</th><th>Ranking Range (R)</th><th>Units</th><th>Ranking Value</th><th>Confidence Adjustment</th><th>Average of Component</th><th>Adjusted Ranking Value</th></tr>
<tr><td colspan="2">Population</td><td>1,000 ≤ R < 2,500</td><td>persons/sq-mi</td><td>3</td><td></td><td></td><td>3</td></tr>
<tr><td colspan="2">Population Growth</td><td>R < 0</td><td>percent</td><td>0</td><td></td><td></td><td>0</td></tr>
<tr><td colspan="2">Public Supply Wells</td><td>0.5 ≤ R < 1.0</td><td>wells/sq-mi</td><td>4</td><td></td><td></td><td>4</td></tr>
<tr><td colspan="2">Total Wells</td><td>R ≥ 20</td><td>wells/sq-mi</td><td>5</td><td>3.75</td><td></td><td>3.75</td></tr>
<tr><td colspan="2">Irrigated Acreage</td><td>25 ≤ R < 100</td><td>acres/sq-mi</td><td>2</td><td></td><td></td><td>2</td></tr>
<tr><td rowspan="2">Groundwater Reliance</td><td>Groundwater Use</td><td>0.1 ≤ R < 0.25</td><td>acre-feet/acre</td><td>3</td><td></td><td rowspan="2">2.5</td><td rowspan="2">2.5</td></tr>
<tr><td>% of Total Supply</td><td>0.1 ≤ R < 20</td><td>percent</td><td>2</td><td></td></tr>
<tr><td colspan="2">Impacts</td><td></td><td></td><td>1</td><td></td><td></td><td>1</td></tr>
<tr><td colspan="2">Overall Basin Ranking Score</td><td colspan="5">Medium Ranking Range 13.43 ≤ Range < 21.08</td><td>16.25</td></tr>
</table>

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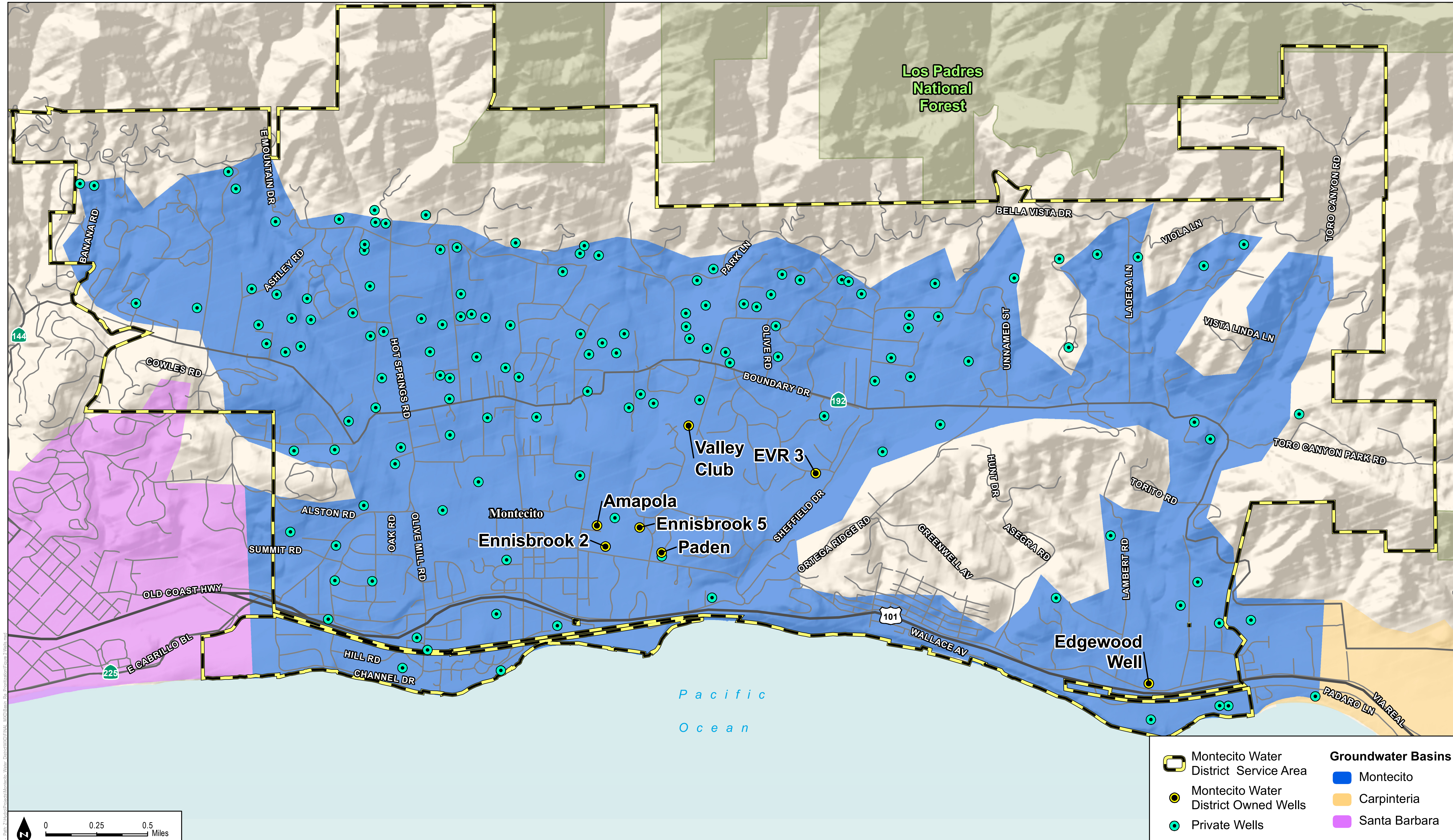
SOURCE: Santa Barbara County; USGS

FIGURE 1

Water Districts and Groundwater Basins

Montecito Groundwater Basin Re-Prioritization

DRAFT



SOURCE: USGS Bulletin 118 2016, Santa Barbara County 2016; DWR 2016; MWD 2016

DUDEK

FIGURE 2

Montecito Water District and Privately Owned Wells

Montecito Groundwater Basin Re-Prioritization

SOURCE: World Imagery (NAIP) 2014, USGS Bulletin 118 2016, MWD 2016, Santa Barbara County Agricultural Commissioner 2016, DUDEK 2017

DUDEK

FIGURE 3

irrigated Areas

Montecito Groundwater Basin Re-Prioritization

MONTECITO
GROUNDWATER BASIN
RECHARGE FEASIBILITY STUDY

Prepared for:

Heal the Ocean

Montecito Water District

Montecito Sanitary District

Prepared by:

DUDEK

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SEPTEMBER 2015

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KEY FINDINGS

- There is a limited opportunity to implement a groundwater recharge program with advanced treated recycled water in the Montecito Groundwater Basin (the Basin).
- The historical data shows that even after extended drought periods there is limited recharge potential in the Basin. Furthermore, average or above average precipitation rapidly fills the Basin, creating potential risks of liquefaction or increased surface flooding in the context of a recharge program with advanced treated wastewater. An additional obstacle to a recharge program with advanced treated wastewater is the fact that it will be difficult or impossible to achieve state mandated groundwater retention times in the Basin.
- The hydrogeologic units in which the greatest amount of storage capacity is available (Units 1 and 3) contain a high density of water supply wells, such that it would be difficult to find a location for an artificial recharge infiltration basin(s) or injection well(s) that could comply with State mandated subsurface travel times of advanced treated recycled water.
- While seawater intrusion has not been identified as a problem in the Basin to date, direct injection of advanced treated recycled water in order to limit seawater intrusion may be feasible and could be investigated by additional studies. Such a program may allow for the implementation of additional groundwater pumping in Storage Unit 3.

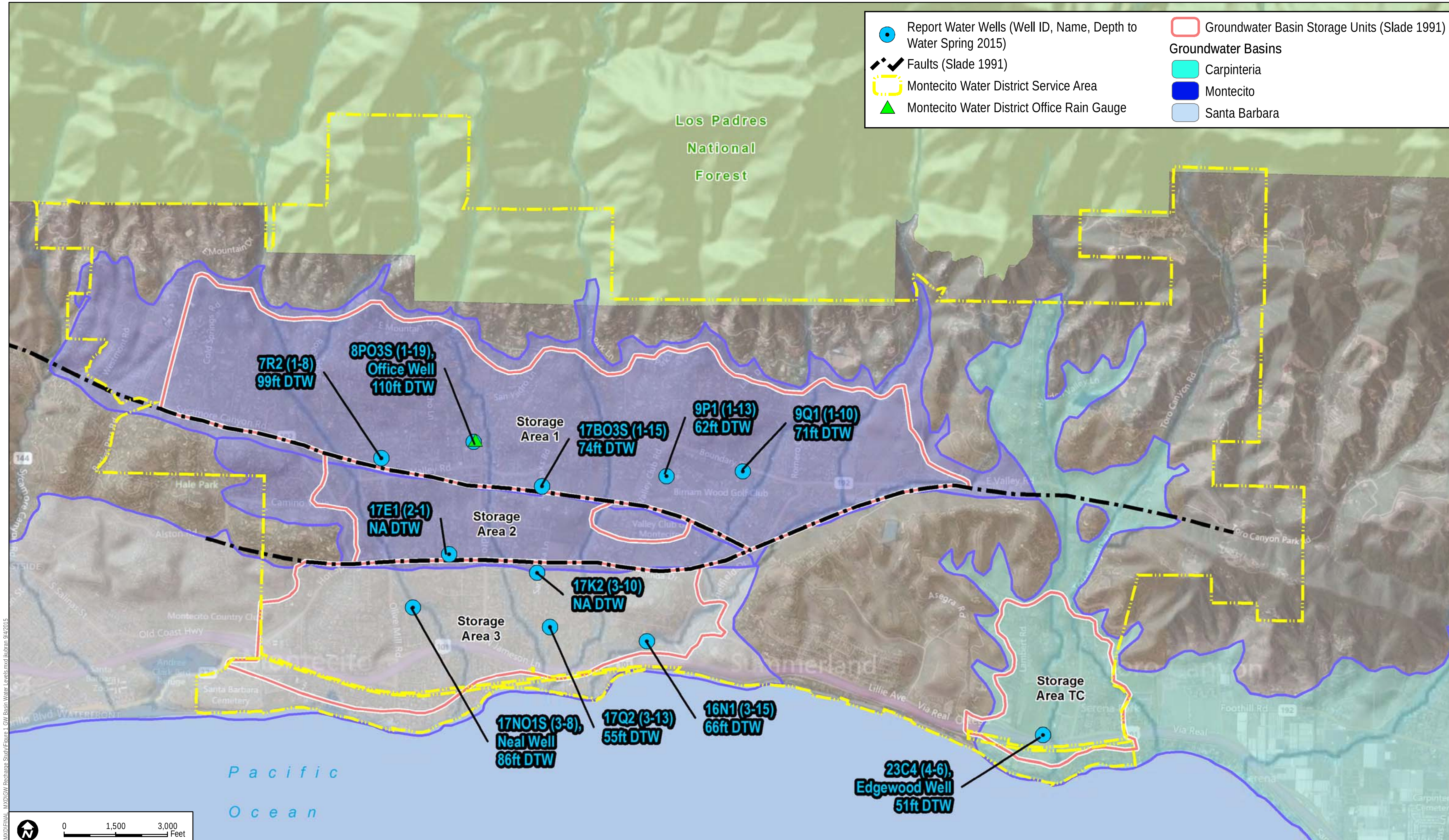
1 INTRODUCTION

This Study is intended to present findings related to potential artificial groundwater recharge in the Montecito Groundwater Basin (the Basin; Figure 1). This watershed-scale study was conducted to identify opportunities and constraints associated with advanced treated wastewater and imported water recharge, and includes considerations related to recharging by both injection wells and percolation basins. In this study, the term "groundwater basin" or sometimes simply "basin" is used to refer to an aquifer, while a percolation or infiltration basin is an engineered structure designed to receive water and hold it as it infiltrates through the soil into the groundwater.

The State Water Resources Control Board (SWRCB), the SWRCB's Division of Drinking Water (DDW) (formerly California Department of Public Health (CDPH)) and to a lesser extent, the US Environmental Protection Agency (USEPA) have water policies for recharging groundwater with advanced treated wastewater and imported water. Table 1 presents the general guidelines on groundwater recharge regulations and groundwater recharge options considered in this feasibility study.

Table 1
Summary of Regulations for Groundwater Recharge

Recharge Method	Recharge Water Type	
	Recycled Water	*Imported Water*
Injection Wells	**SWRCB and USEPA (Class V underground injection well**) WATER CODE SECTION 13540-13541(No injection of wastewater into aquifer) - Requires high treatment - reverse osmosis to purified recycled water - and TITLE 17 AND TITLE 22 CODE OF REGULATIONS, Recycled municipal wastewater shall be retained underground for a period of time no less than the retention time required pursuant to sections 60320.208 and 60320.224. Notification Requirements to Well Owners section 60320.228. Recycled Municipal Wastewater Contribution (RWC) Requirements section 60320.216.	**SWRCB 2012-0010** GENERAL WASTE DISCHARGE REQUIREMENTS FOR AQUIFER STORAGE AND RECOVERY PROJECTS THAT INJECT DRINKING WATER INTO GROUNDWATER Drinking water that has been treated pursuant to a CDPH domestic water supply permit is placed in the aquifer by injection wells.
Percolation Basins	**TITLE 17 AND TITLE 22 CODE OF REGULATIONS** Regional Board Approval for Groundwater Replenishment Reuse Projects (GRRPs) Recycled municipal wastewater shall be retained underground for a period of time no less than the retention time required pursuant to sections 60320.108 and 60320.124. Notification Requirements to Well Owners section 60320.128. Recycled Municipal Wastewater Contribution (RWC) Requirements section 60320.116.	**No Treatment** - Well Setback Regulations (Groundwater Under the Influence of Surface Water) – Basin Objectives and Non-Degradation Considerations



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SEPTEMBER 2015

SOURCE: BING Maps 2015; Santa Barbara County 2010; Slade 1991

FIGURE 1

Montecito Groundwater Basin Map

MONTECITO GROUNDWATER RECHARGE FEASABILITY STUDY

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2 GROUNDWATER BASIN CHARACTERIZATION

This study will offer insight into the Basin's key characteristics as they relate to potential groundwater recharge. Key characteristics relating to groundwater recharge include: surface soil infiltration rates, depth to groundwater, horizontal and vertical barriers to groundwater flow, groundwater flow rates and the specific yield of the aquifer. All of these characteristics affect a basin's groundwater storage properties, and for recharge considerations, a basin's available storage capacity.

2.1 Available Storage Capacity

As used herein, the available storage capacity of a groundwater basin represents the volume of water that can be stored in the basin at a point in time. This differs from the total volume of water that can be held in underground storage by not including the amount of groundwater that is already in storage. A basin's available storage capacity is important when considering artificial recharge because it will fluctuate depending on the basin's total water in storage. The estimated available storage capacity can be used to evaluate the period of time in which groundwater recharge can take place to fill the available storage capacity. That is, of any given available storage capacity, there is a volume of water that can be supplied to utilize that available storage capacity, and a time period over which it can be recharged at a given recharge rate. A recharge rate is the rate at which water can enter the aquifer either by infiltration, in the case of a percolation basin, or by groundwater flow, in the case of injection well.

The concept of available storage capacity becomes somewhat more complicated when considering confined aquifers. Confined aquifers have groundwater that is isolated from the surface by impermeable geological material such as clay layers, and surface recharge by infiltration basins cannot generally be used to recharge the confined aquifer directly where the aquifer is confined. However, surface infiltration basins can recharge the aquifer where it becomes unconfined: an area that is generally referred to as the forebay. The Basin has aquifers that appear to be semi-confined and confined as well as unconfined aquifers. However, for recharge purposes, this study assumes no confining layer in the unsaturated zone between the surface and the aquifer in order to estimate the available storage capacity. But, before a specific site could be selected for surface infiltration basins, additional studies would be needed to verify that surface recharge to the aquifer is possible.

The available storage capacity is dependent on the specific yield of the aquifer material to be recharged, and the aquifer's available storage level or space (discussed below). The specific yield represents the ratio of the volume of water that can be drained by gravity from a saturated material to the total volume of that material, and expressed as a percentage of the total volume of the material. For example, an aquifer consisting of 100 acres with an available storage level of 10 feet (1,000 acre-feet, AF) and a specific yield of 5% could recharge 50 AF of water. Aquifer specific yield estimates are usually obtained from aquifer pumping tests and a large number of pumping tests could be needed to accurately characterize a basin's specific yield. For this study, specific yield estimates provided by Hoover (1980) and Slade (1992) provide a feasibility level estimate of the potential specific yield in each of the Basin's storage units as presented in Table 2.

Table 2
Area and Specific Yield Values

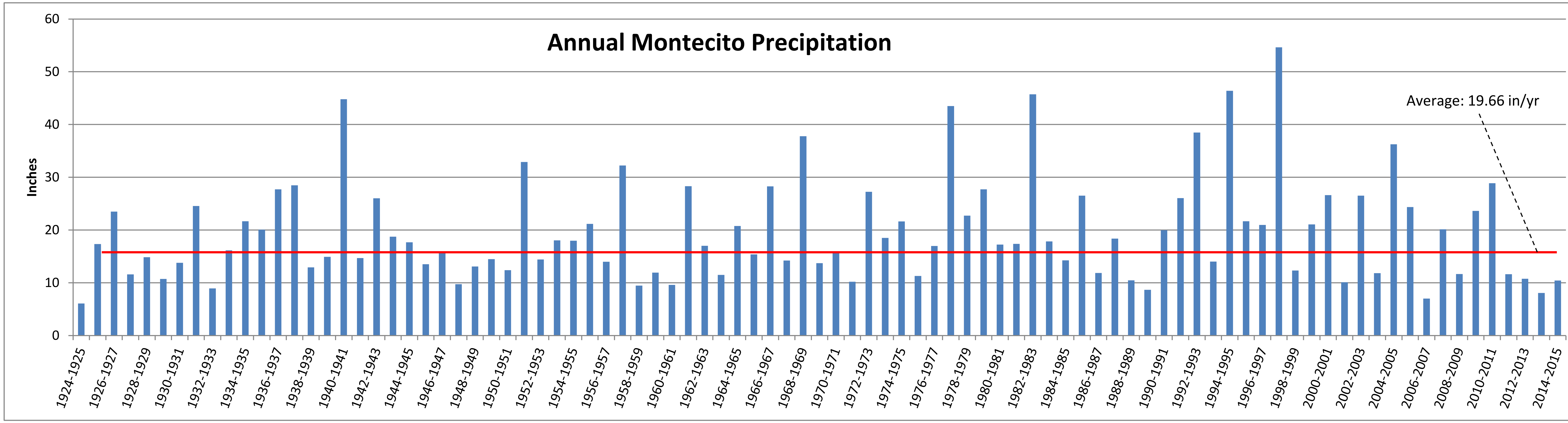
Area	Specific Yield (%)		Area (acres)
	Hoover (1980)	*Slade (1991)*	*Slade (1991)*
Storage Unit 1	4.5	3	2,040
Storage Unit 2	5	3	488
Storage Unit 3	7.4	3 to 9	1,040
Toro Canyon	6	5	247

2.1.1 Precipitation and Available Storage Capacity

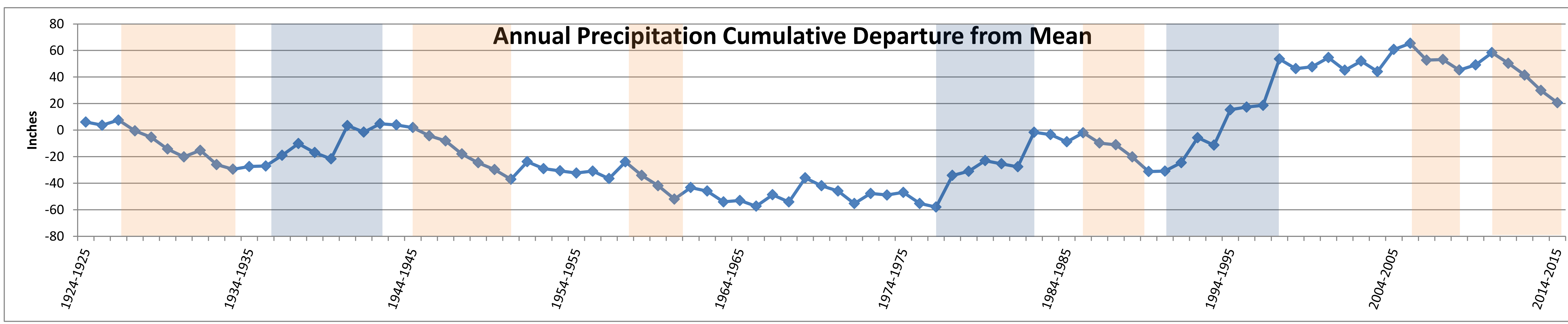
Natural precipitation directly impacts the Basin's available storage capacity. Recharge might be impractical during periods with high groundwater levels and normal or above normal precipitation. Recharge facilities could remain ideal for long periods of time if located where Basin recharge is limited by natural precipitation. To address which parts of the Basin could be recharged during a higher percentage of the time, groundwater levels were evaluated relative to natural precipitation. This analysis is similar to Slade's (1991) use of Montecito Water District (MWD) office rain gauge information from 1924-1925 to 1989-1990 to evaluate rainfall trends relative to hydrographs to estimate usable groundwater storage, but in the present study the available storage capacity and precipitation was considered. MWD provided annual rainfall data for the MWD District Office rain gauge from July 1924 through June 2015. The MWD office rain gauge is at an approximate elevation of 226 feet amsl (Figure 1). Figure 2 shows the inches of precipitation from water years 1924-1925 to 2014-2015 relative to the average of 19.7 inches. Figure 3 shows the cumulative departure from mean for the precipitation and is a better tool to evaluate precipitation trends.

The cumulative departure from mean plot shows that from 1936 to 1941, from 1977 to 1982, and from 1991 to 2005 were generally periods of above average precipitation and that from 1926 to 1933, 1943 to 1951, 1957 to 1960, 1983 to 1989, 2007 to 2009 and from 2012 to current were dry periods.

Figures 2 and 3 Hydrograph of Montecito Precipitation and Cumulative Departure from Mean Precipitation



Annual rainfall, in inches, measured at the Montecito Water District Office Rain Gauge, from water year 1924-1925 to 2014-2015.



Cumulative departure from the mean, in inches, measured at the Montecito Water District Office Rain Gauge, from water year 1924-1925 to 2014-2015. Cumulative departure from the mean is calculated by subtracting the long-term average (19.7 inches) from each year's annual rainfall and summing the differences cumulatively. It is used to assess long-term trends of drought or water surplus. The orange hatched areas indicate dry periods, the blue hatched areas indicate wet periods and the areas not hatched indicate normal or average periods of precipitation..

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The cumulative departure from mean plot was used with well hydrographs to help determine when recharge could likely be used in each of the Basin's storage units. Storage units in this study are those from Plate 2 of the Slade (1991) report (Figure 1).

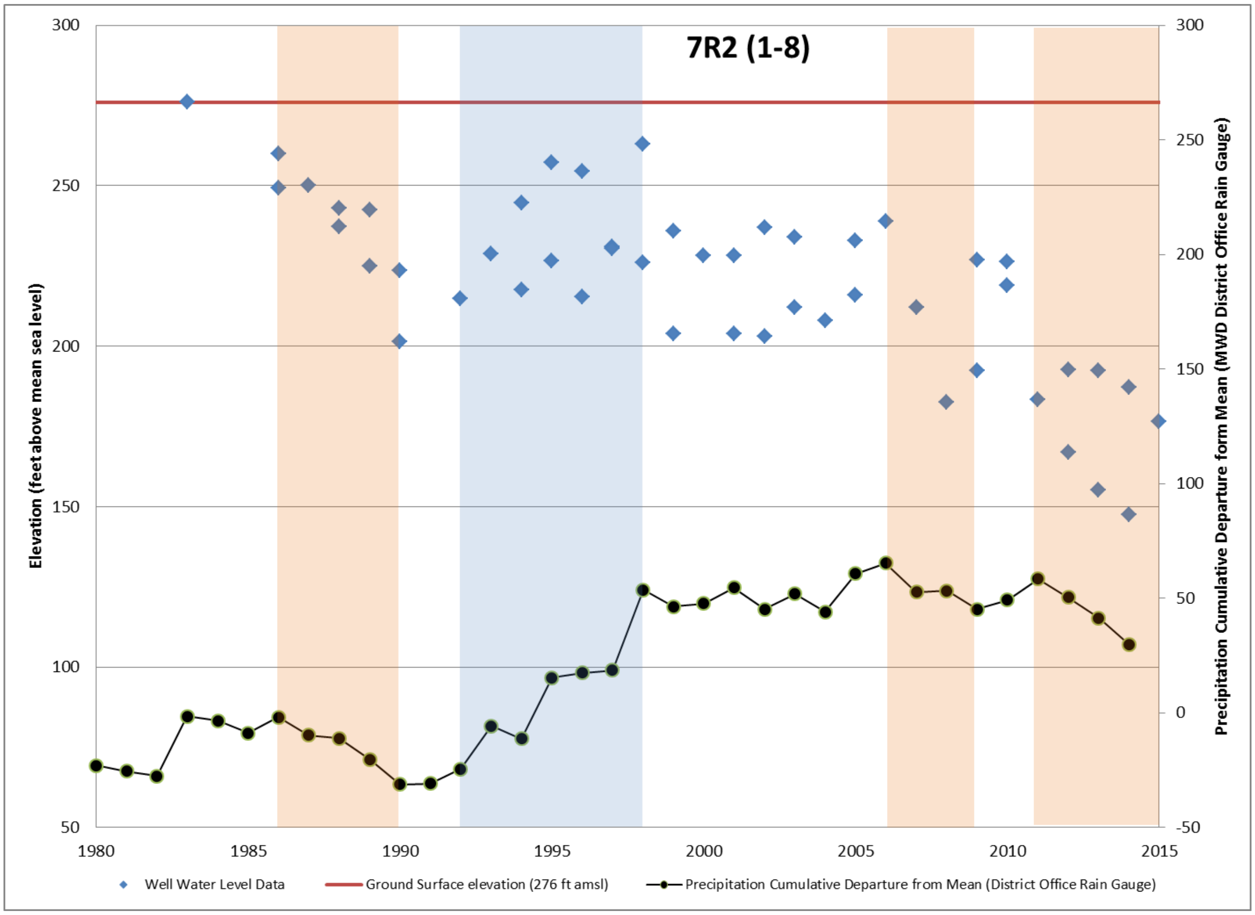
2.1.2 Storage Unit 1 Recharge Potential

Several hydrographs and cumulative departure from mean plots were constructed to evaluate the available storage levels during historical periods in Storage Unit 1. Figures 4 through 8 show groundwater levels in wells located along the southern part of Storage Unit 1 and generally have similar patterns. The drought period ending in about 1991 shows varying degrees of impact to groundwater levels in Storage Unit 1 with the hydrographs showing declines in groundwater levels that indicate an available storage level from about 20 feet (Figure 5) to about 100 feet (Figure 8) compared to their average baseline groundwater levels. Generally, the groundwater level declines during this 5-year period from 1988 to 1993 were about 50 feet (Figures 4, 6 and 7).

Groundwater levels returned to average baseline conditions in about 1993 and indicate that there would be no available storage level in Storage Unit 1 for approximately 13 years until about 2006 when groundwater levels again showed a decline due to the most recent drought. Groundwater condition in Storage Unit 1 currently shows groundwater level declines similar to those of the 1991 drought and indicate an available storage level of about 50 feet.

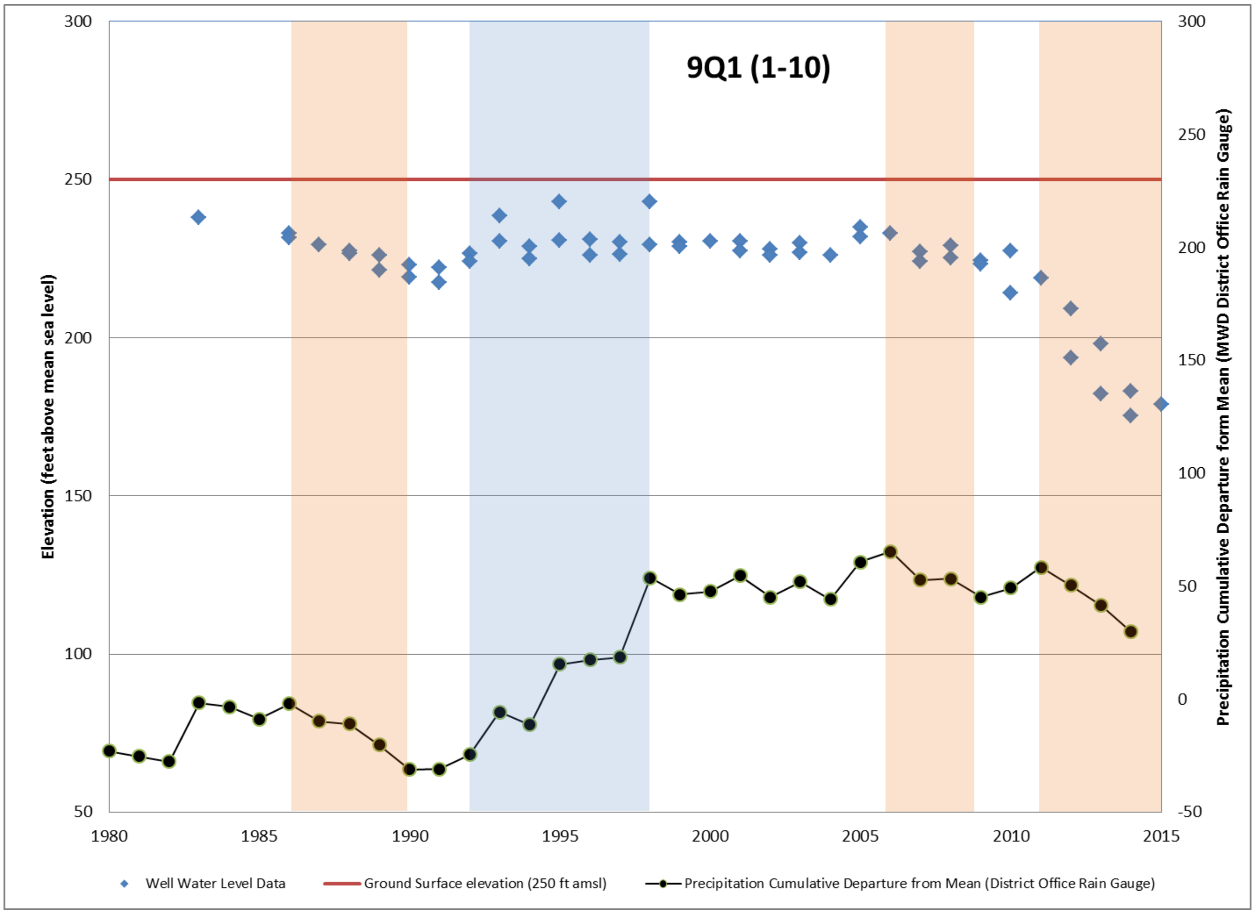
Using an available storage level of 50 feet (current conditions) and the specific yield estimates provided by Slade (1991) of 3% and 4.5% by Hoover (1980, Table 2), the available storage capacity in Storage Unit 1 would be from 1.5 feet to 2.25 feet of water per acre. If Storage Unit 1 showed a similar groundwater available storage level of 50 feet over its' entire area, estimated by Slade (1991, Table 4) at 2,040 acres, the total available storage capacity for Storage Unit 1 would be from about 3,060 AF to 4,590 AF. This estimate assumes that the entire 2,040 acres has available storage capacity based on the available storage level, which could be an over estimate. Many more groundwater levels would be needed to make a more precise estimate. This assumption is used for the storage unit calculation below as well.

Figure 4 Storage Unit 1 Well 1-8



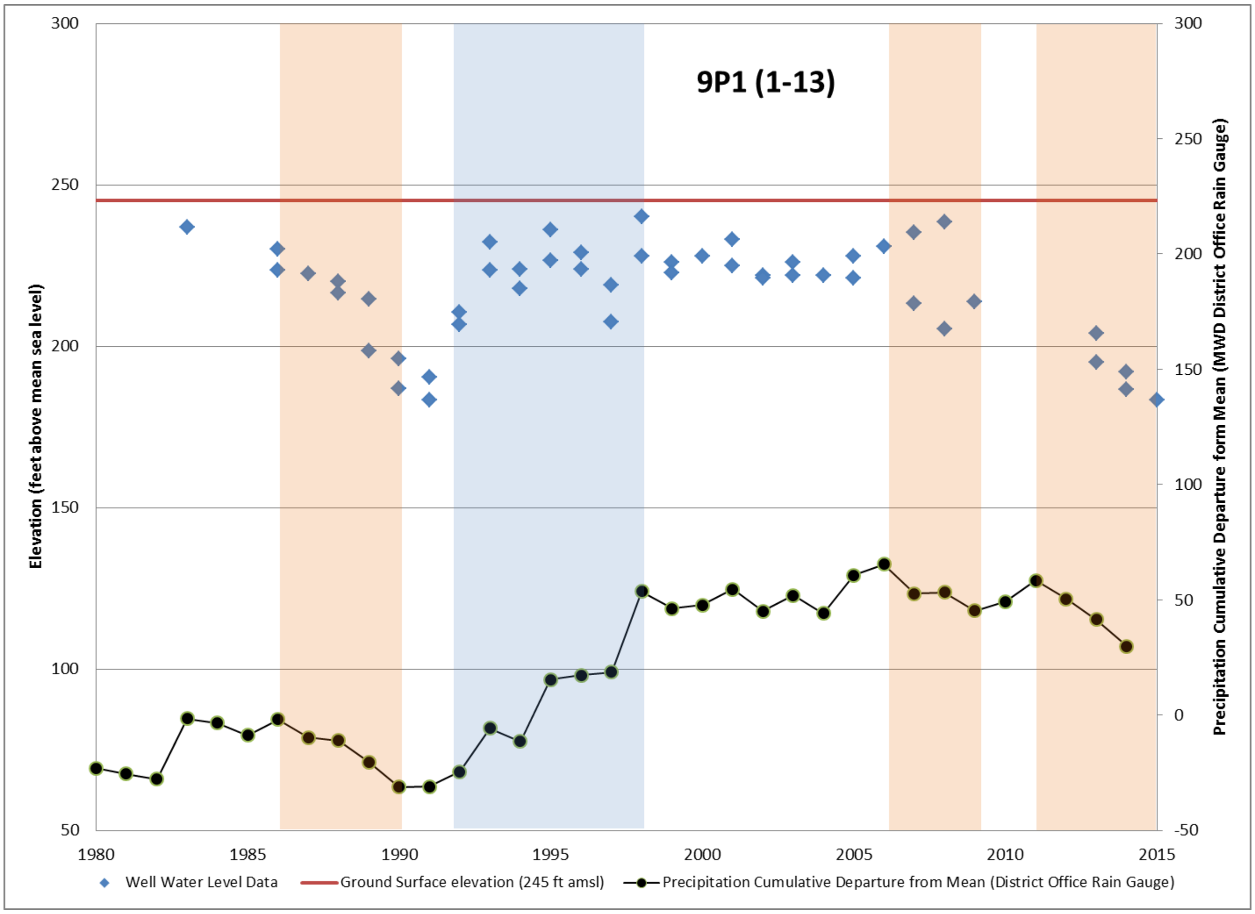
Elevation of groundwater in feet AMSL (blue diamonds) is shown over time. The available storage capacity of an aquifer is directly related to the distance between the water table and the ground surface (shown in red at top of graph).The precipitation cumulative departure from the mean in inches (black circles, on the right hand axis), and color-coded bars to indicated multi-year precipitation trends (blue for higher-than-average rainfall; red for lower-than-average rainfall), are shown to provide long term water supply context.

Figure 5 Storage Unit 1 Well 1-10



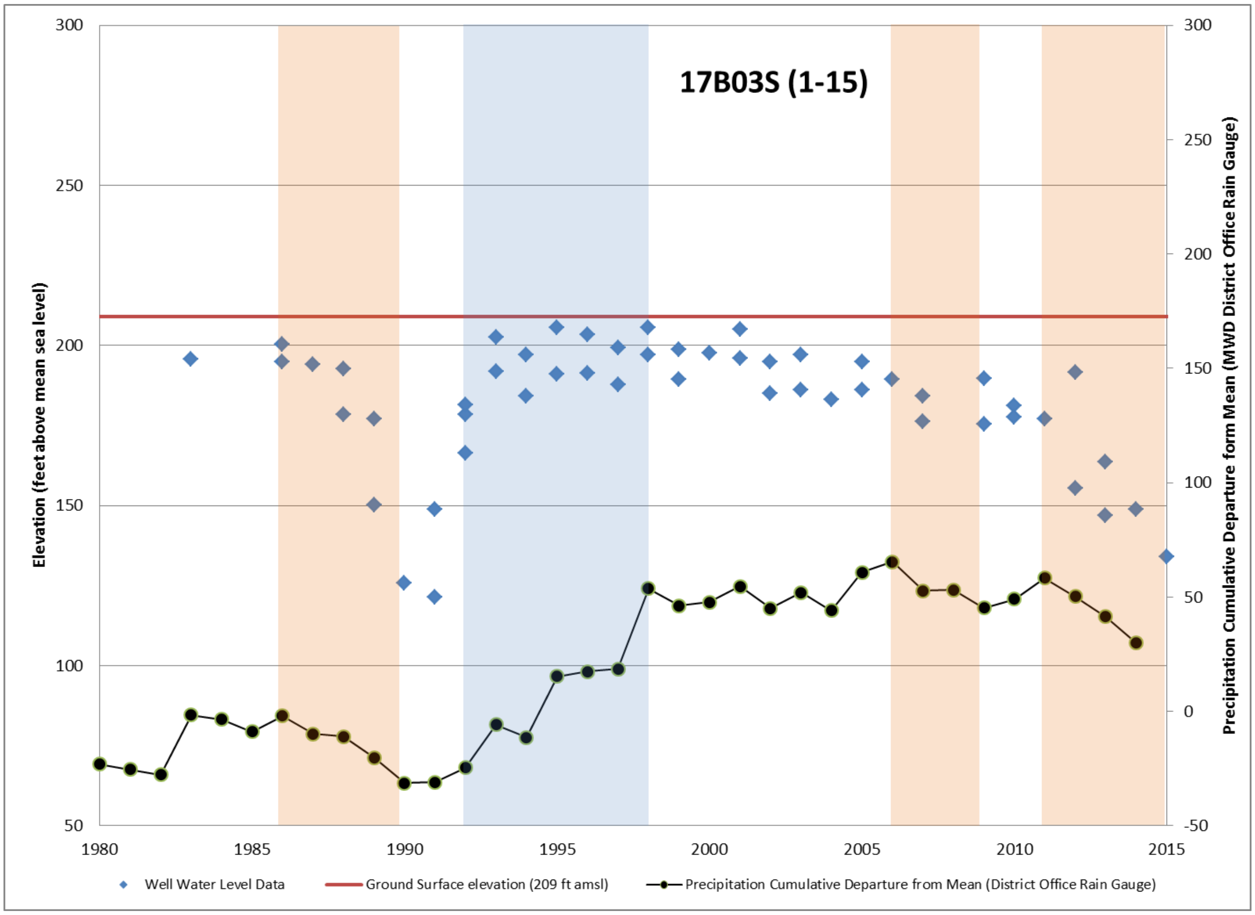
Elevation of groundwater in feet AMSL (blue diamonds) is shown over time. The available storage capacity of an aquifer is directly related to the distance between the water table and the ground surface (shown in red at top of graph).The precipitation cumulative departure from the mean in inches (black circles, on the right hand axis), and color-coded bars to indicated multi-year precipitation trends (blue for higher-than-average rainfall; red for lower-than-average rainfall), are shown to provide long term water supply context.

Figure 6 Storage Unit 1 Well 1-13



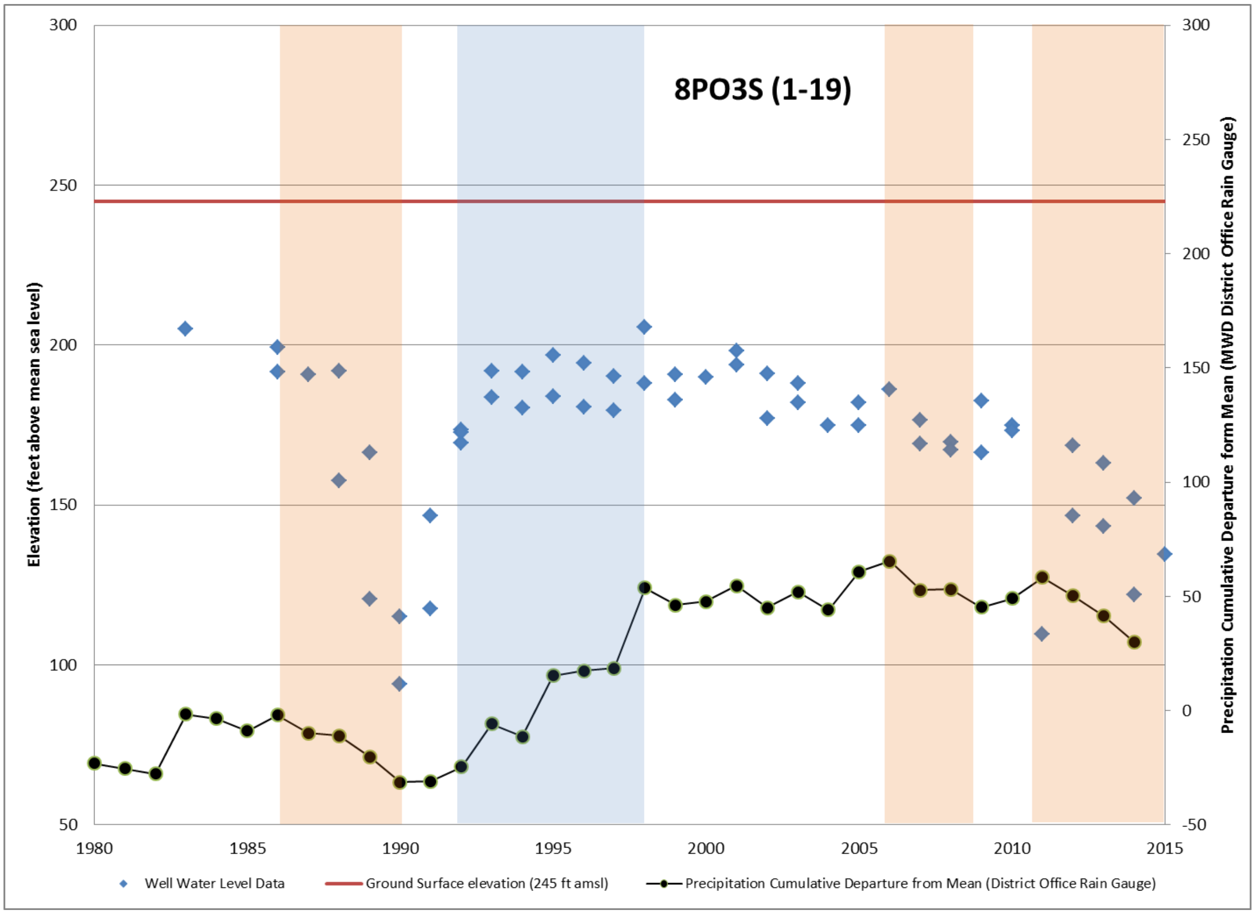
Elevation of groundwater in feet AMSL (blue diamonds) is shown over time. The available storage capacity of an aquifer is directly related to the distance between the water table and the ground surface (shown in red at top of graph).The precipitation cumulative departure from the mean in inches (black circles, on the right hand axis), and color-coded bars to indicated multi-year precipitation trends (blue for higher-than-average rainfall; red for lower-than-average rainfall), are shown to provide long term water supply context.

Figure 7 Storage Unit 1 Well 1-15



Elevation of groundwater in feet AMSL (blue diamonds) is shown over time. The available storage capacity of an aquifer is directly related to the distance between the water table and the ground surface (shown in red at top of graph).The precipitation cumulative departure from the mean in inches (black circles, on the right hand axis), and color-coded bars to indicated multi-year precipitation trends (blue for higher-than-average rainfall; red for lower-than-average rainfall), are shown to provide long term water supply context.

Figure 8 Storage Unit 1 Well 19



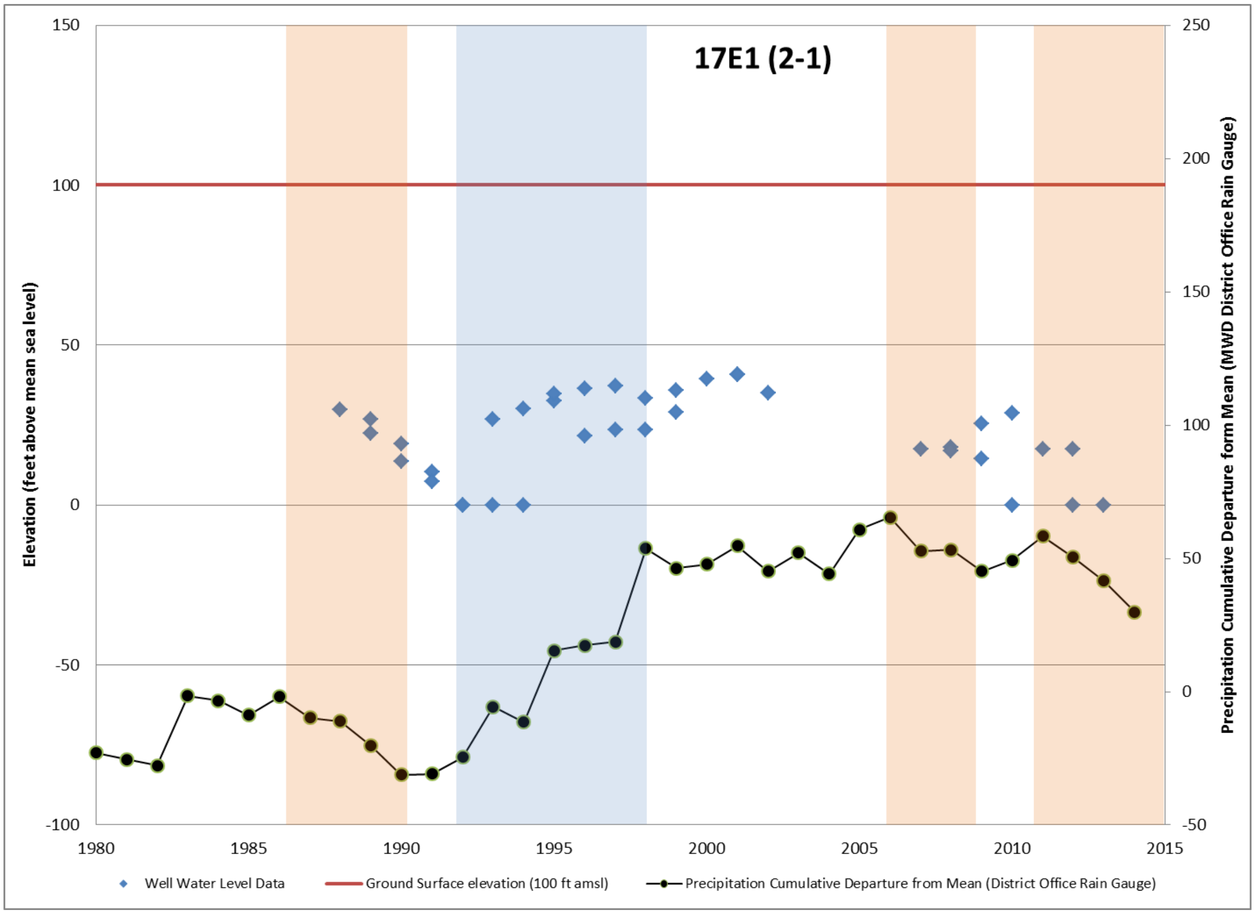
Elevation of groundwater in feet AMSL (blue diamonds) is shown over time. The available storage capacity of an aquifer is directly related to the distance between the water table and the ground surface (shown in red at top of graph).The precipitation cumulative departure from the mean in inches (black circles, on the right hand axis), and color-coded bars to indicated multi-year precipitation trends (blue for higher-than-average rainfall; red for lower-than-average rainfall), are shown to provide long term water supply context.

2.1.3 Storage Unit 2 Recharge Potential

Limited well data in Storage Unit 2 makes estimates of the available storage capacity difficult. Only well 17E1 (2-1) shown on Figure 9 could be used to estimate the available storage capacity of Storage Unit 2. Wells 17E3 and 17E4 (2-2 and 2-3), which have data available, are located along the western bedrock contact near Camino Viejo Road and do not show groundwater levels declines. These wells show only near surface static groundwater conditions with no available groundwater storage space.

Well 17E1 (2-1, Figure 9) shows an available storage level from 20 to 30 feet during the 1991 and current drought. Thus, using the specific yield values for Storage Unit 2, which range from 3% and 5% and an area of 488 acres (Slade, 1991, Table 2), the available storage capacity would range from 290 to 732 AF. This range was estimated using the minimum specific yield (3%) and available storage level (20 feet) and the maximum specific yield (5%) and available storage level (30 feet) for the entire area of 488 acres.

Figure 9 Storage Unit 2 Well 2-1



Elevation of groundwater in feet AMSL (blue diamonds) is shown over time. The available storage capacity of an aquifer is directly related to the distance between the water table and the ground surface (shown in red at top of graph).The precipitation cumulative departure from the mean in inches (black circles, on the right hand axis), and color-coded bars to indicated multi-year precipitation trends (blue for higher-than-average rainfall; red for lower-than-average rainfall), are shown to provide long term water supply context.

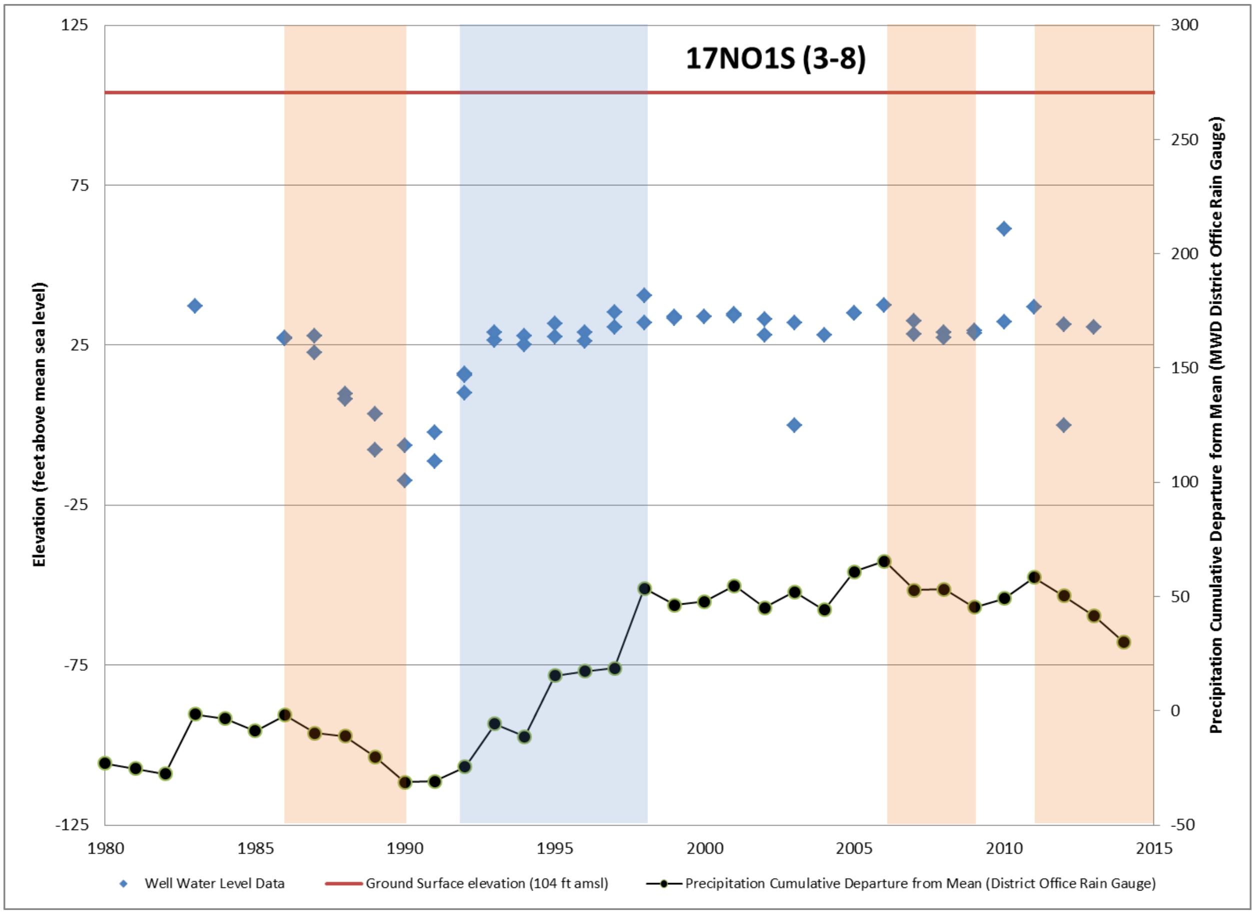
2.1.4 Storage Unit 3 Recharge Potential

Storage Unit 3 is bounded to the south by the Pacific Ocean (Figure 1). Hoover (1980) indicates that Unit 3 is apparently sealed off from seawater in the deeper aquifers by an offshore fault, but open to the sea in the shallow aquifers. From Hoover's (1980) analysis of water quality data and electrical logs, he concludes that the shallow zone of poor water quality is generally less than 50 feet deep and that a deeper zone of poor water quality could be due to connate water trapped by movement of the offshore fault.

Hydrographs and cumulative departure from mean plots for Storage Unit 3 are shown in Figures 10 through 14 and do not show a consistent trend in groundwater pattern. Well 17N1 (3-8, Figure 10) does not show a declining groundwater trend related to the current drought, although the well, like the other three wells in Storage Unit 3, clearly shows a decline for the drought ending in 1991. Well 16N1 (3-15, Figure 13) does show a current drought groundwater level decline, but only since about 2013, whereas wells 17K2 (3-10, Figure 11) and 17Q2 (3-13, Figure 12) show trends that resemble wells in Storage Unit 1, but with less declines in groundwater levels during the drought periods. In Storage Unit 1, the groundwater declines for the current drought are similar to those of the 1991 drought at about 50 feet; however, in Storage Unit 3, the declines for the current drought are less or equal to those for the 1991 drought at about 20 feet.

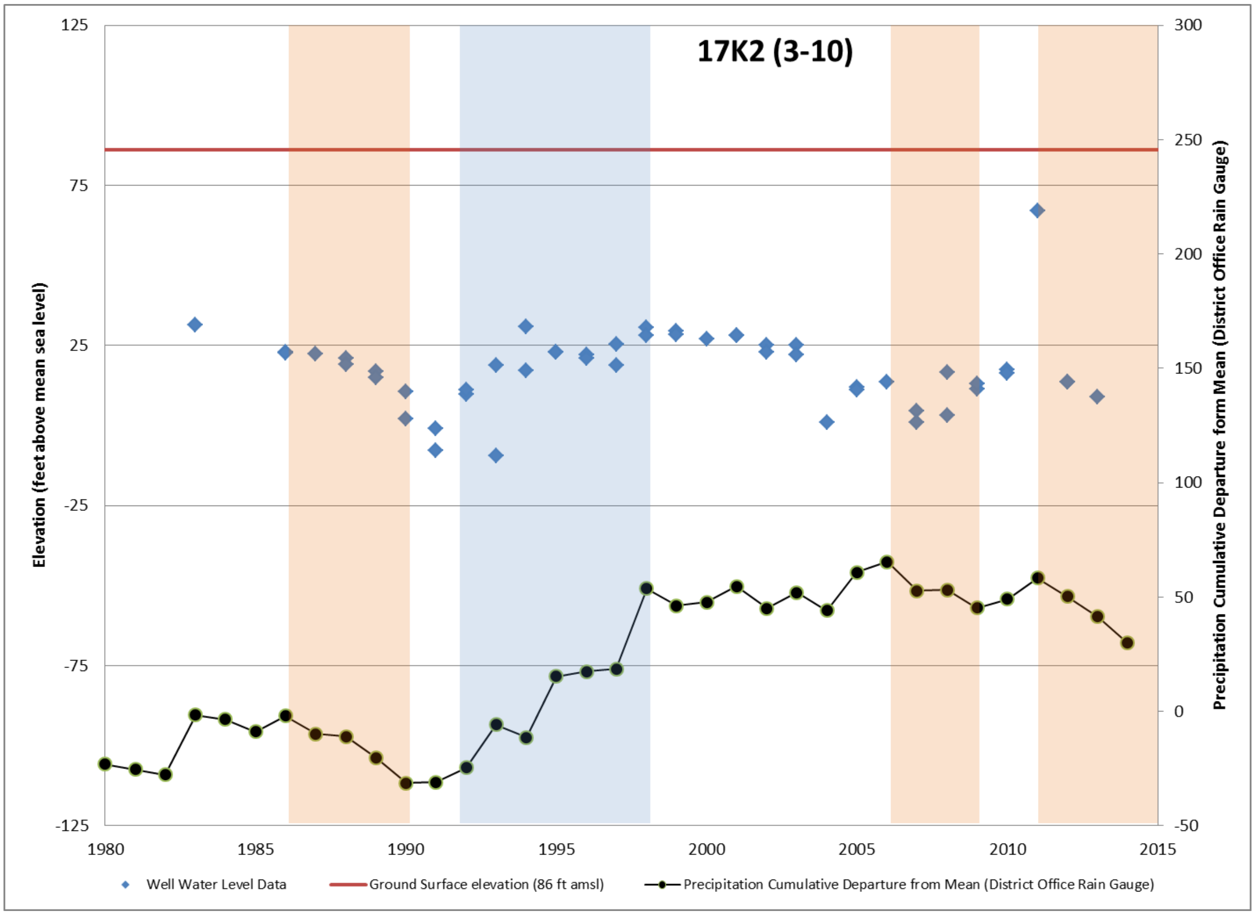
Using an available storage level of 20 feet (current conditions) and the specific yield estimates provided by Slade (1992) of 6% (average of 3% and 9%) and 7.4% by Hoover (1980, Table 2), the available storage capacity in Storage Unit 3 would be from 1.2 feet to 1.5 feet of water per acre. Using 20 feet for the entire area, estimated by Slade (1991, Table 4) at 1,040 acres, the total available storage capacity for Storage Unit 3 would be from about 1,250 AF to 1,560 AF.

Figure 10 Storage Unit 3 Well 3-8



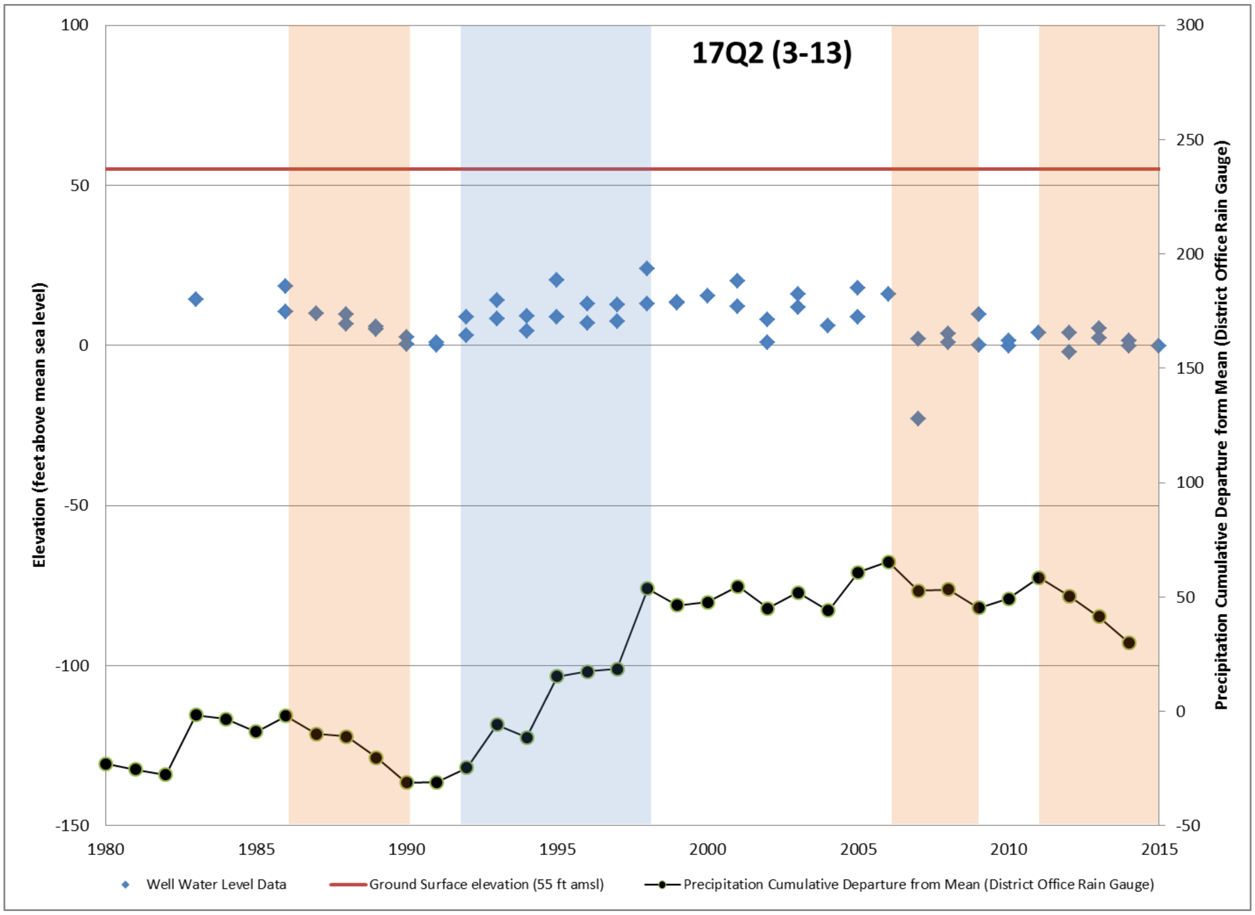
Elevation of groundwater in feet AMSL (blue diamonds) is shown over time. The available storage capacity of an aquifer is directly related to the distance between the water table and the ground surface (shown in red at top of graph).The precipitation cumulative departure from the mean in inches (black circles, on the right hand axis), and color-coded bars to indicated multi-year precipitation trends (blue for higher-than-average rainfall; red for lower-than-average rainfall), are shown to provide long term water supply context.

Figure 11 Storage Unit 3 Well 3-10



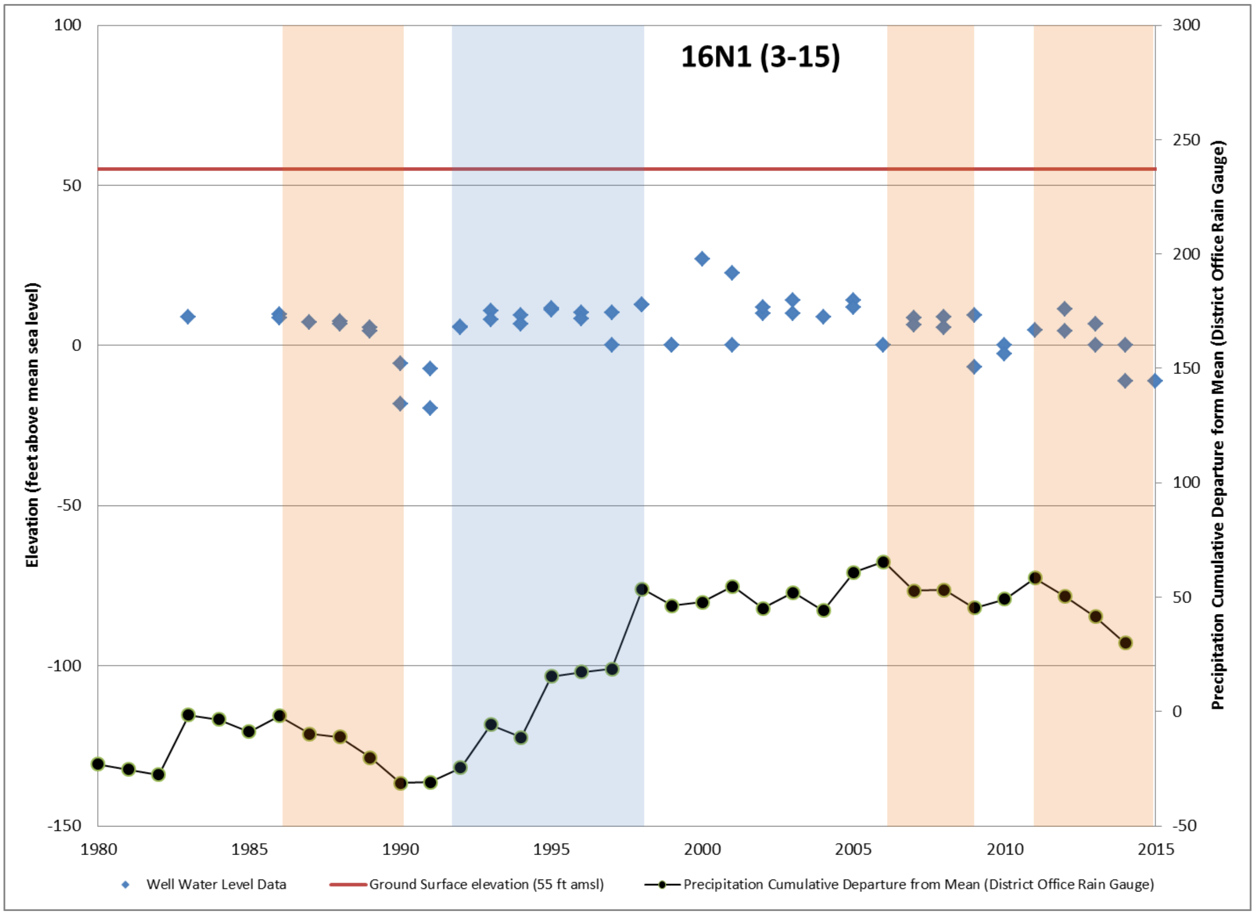
Elevation of groundwater in feet AMSL (blue diamonds) is shown over time. The available storage capacity of an aquifer is directly related to the distance between the water table and the ground surface (shown in red at top of graph).The precipitation cumulative departure from the mean in inches (black circles, on the right hand axis), and color-coded bars to indicated multi-year precipitation trends (blue for higher-than-average rainfall; red for lower-than-average rainfall), are shown to provide long term water supply context.

Figure 12 Storage Unit 3 Well 3-13



Elevation of groundwater in feet AMSL (blue diamonds) is shown over time. The available storage capacity of an aquifer is directly related to the distance between the water table and the ground surface (shown in red at top of graph).The precipitation cumulative departure from the mean in inches (black circles, on the right hand axis), and color-coded bars to indicated multi-year precipitation trends (blue for higher-than-average rainfall; red for lower-than-average rainfall), are shown to provide long term water supply context

Figure 13 Storage Unit 3 Well 3-15

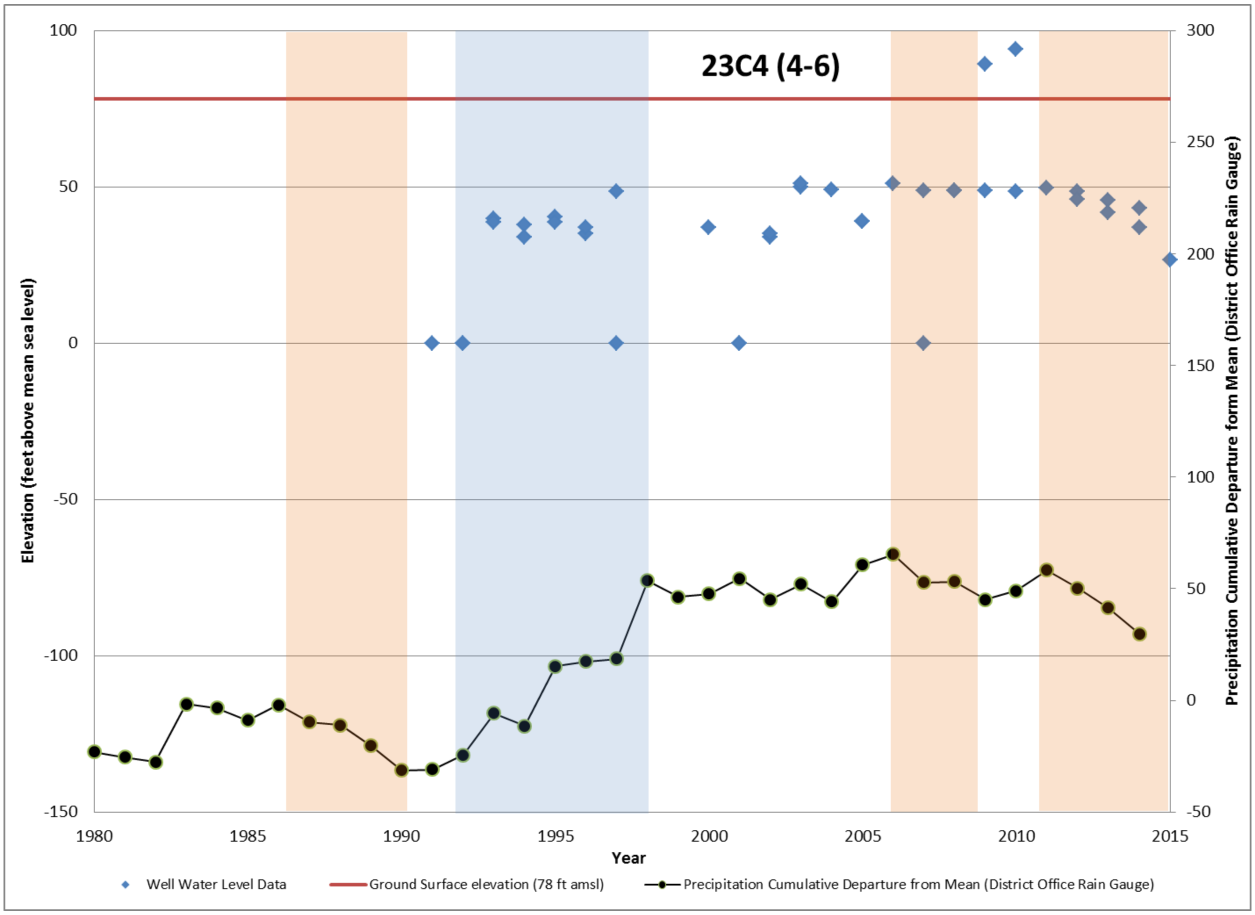


Elevation of groundwater in feet AMSL (blue diamonds) is shown over time. The available storage capacity of an aquifer is directly related to the distance between the water table and the ground surface (shown in red at top of graph).The precipitation cumulative departure from the mean in inches (black circles, on the right hand axis), and color-coded bars to indicated multi-year precipitation trends (blue for higher-than-average rainfall; red for lower-than-average rainfall), are shown to provide long term water supply context.

2.1.5 Toro Canyon Recharge Potential

Well 23C4 (4-6, Figure 14) shows that the groundwater levels in the Toro Canyon Storage Unit are currently about 20 feet lower than typical levels. During the 1991 drought period the well was perhaps 80 feet lower than typical levels. Slade (1991) has calculated the storage unit area (TC-A and TC-B, Slade's Plate 2) to be 347 acres. Assuming a storage level availability of 20 feet, and a specific yield estimate of 5% and 6% (Table 2), the potential available storage capacity in the Toto Canyon Unit would be from about 350 AF to 420 AF.

Figure 14 Toro Canyon Well 4-6



Elevation of groundwater in feet AMSL (blue diamonds) is shown over time. The available storage capacity of an aquifer is directly related to the distance between the water table and the ground surface (shown in red at top of graph).The precipitation cumulative departure from the mean in inches (black circles, on the right hand axis), and color-coded bars to indicated multi-year precipitation trends (blue for higher-than-average rainfall; red for lower-than-average rainfall), are shown to provide long term water supply context.2.

2.2 Seawater Intrusion

Using injected advanced treated wastewater to mitigate seawater intrusion could be more seriously considered with further evaluation by geological and economic feasibility studies. The utilization of potable water and/or advanced treated wastewater for this purpose is not new and has been practiced successfully for decades in many areas. The Orange County Water Agency and the Replenishment District of Southern California operate the Dominguez Gap Barrier Project, the West Coast Basin Barrier Project, and the Alamitos Barrier Project in Los Angeles County. These three existing seawater barrier projects inject purchased imported water and advanced reclaimed water to prevent seawater intrusion. The seawater barriers use a series of injection wells positioned like a dam between the ocean and the groundwater aquifer. The wells inject water along the barrier to ensure that the groundwater water level near the ocean stays high enough to keep the seawater from seeping into the aquifer. In the Los Angeles area, a combination of high quality recycled water and imported water is injected and a large number of observation wells are used to monitor water surface elevations and groundwater chloride levels.

While it is important to note that seawater intrusion has not been identified in any parts of Storage Unit 3 to date, Hoover (1980) did identify seawater intrusion as a potential problem in the Basin due to the shallow groundwater aquifers being open to the ocean. Hoover's (1980) Plates 13 through 16 show brackish water occurring as shallow and deep zones near the Rincon Creek Thrust and suggests that the deeper zone is likely connate groundwater trapped along the Rincon Creek Thrust. The thickness of the deeper zone is unknown; however, Hoover (1980) reports that e-logs available at the time suggest that the shallow zone is probably about 50 feet thick and of limited extent only occurring near the ocean.

Given the limited information available on the Basin's current seawater intrusion status, groundwater quality, and hydrogeology, it is in not possible to provide any reliable estimate on the feasibility of using injected advanced treated wastewater to mitigate seawater intrusion. A study similar to that being conducted by the Santa Barbara City Water Resources Division (SBCWRD) would identify seawater intrusion problems and, if needed, help identify potential seawater intrusion mitigation measures. The SBCWRD project will update their Multiple Objective Optimization Model and add a 3-dimensional water quality component to accurately assess seawater intrusion. Their goal is to conduct a new modeling effort in Santa Barbara Storage Basin 1 to accurately evaluate seawater intrusion, and to guide future placement of new wells in the basin, assist in scheduling well operation to minimize intrusion, and provide the ability to estimate the benefits of groundwater recharge for basin replenishment and creating barriers to seawater intrusion. A similar study could be considered for the Basin's Storage Unit 3 and the Toro Canyon area.

2.3 Additional Recharge Considerations

The recycled municipal wastewater contribution, limited available storage capacity, and groundwater retention times must be considered when determining feasibility of artificial recharge.

2.3.1 Recycled Municipal Wastewater Contribution

Additional considerations that could affect the feasibility of using wastewater for recharge projects, also referred to as Groundwater Replenishment Reuse Projects (GRRPs) by the DDW, are the amount of recycled water that may be used for a recharge project. The initial maximum Recycled Municipal Wastewater Contribution (RWC) is not to exceed 20%, or an alternative initial RWC approved by the DDW. An alternative initial RWC up to 100% may be approved based on, but not limited to, DDW's review of the engineering report, the information obtained as a result of the public hearing(s), and a project sponsor's demonstration that the treatment processes preceding the soil-aquifer treatment process will reliably achieve total organic carbon (TOC) concentrations no greater than 0.5 mg/L divided by the proposed initial RWC. For example, the treated TOC concentration could only be 2.5 mg/L if the RWC is 20% (0.5 mg/L/0.20 = 0.25 mg/L).

2.3.2 Available Storage Capacity Limitations

A clear understanding of potential risks associated with groundwater recharge impacts should also be considered. As indicated above, a general rule for groundwater levels within a basin are that they should not be encouraged to rise to levels at which liquefaction or other groundwater problems could become an issue to the recharging agency. Specific constraints on groundwater levels depend on site geotechnical data and on the seismic susceptibility of the recharge area. The California Geological Survey (CSG, 2004) states that for areas with limited or no geotechnical data, seismic susceptibility zones may be identified by geologic criteria. Liquefaction can occur in areas containing soil deposits of late Holocene age (i.e., current river channels and their historic floodplains, marshes, and estuaries), where earthquake Magnitude 7.5-weighted peak acceleration that has a 10 percent probability of being exceeded in 50 years is greater than or equal to 0.10 g (gravitational constant) and the water table is less than 40 feet below ground surface (bgs).

Typically, to avoid the need for potentially basin-wide detailed geotechnical drilling studies for potential recharge projects, a worst case of 40 feet below ground surface is assumed for the entire groundwater basin, and an additional 10 feet is generally added to provide for extra safety – i.e., a recharging agency would cease artificial recharge when water levels rise to within 50 feet of the ground surface. In basins with shallow groundwater, limiting groundwater levels to depths greater than 50 feet bgs can significantly reduce the basin's available storage capacity, so detailed geotechnical studies might be needed even for soil deposits older than late Holocene age. The near surface deposits in the Basin range from Pleistocene to Holocene in age.

As noted above, groundwater levels in each of the Storage Units show groundwater levels that are generally closer to the surface than 50 feet. A review of Figures 4 through 14 shows that only Storage Unit 2 Well 2-1 (also known as 17-E1; Figure 9) would allow for limited recharge before the groundwater level would rise to within 50 feet of the surface. Thus, artificially raising groundwater levels by recharge could pose potential increased risk of adverse impacts such as liquefaction, increased surface flooding, ground saturation problems, and increased storm water runoff. These impacts, and even natural impacts associated with storm water and natural precipitation, could be perceived as caused or heightened by a decrease in storm water infiltration resulting from the loss of the available storage capacity by artificial recharge.

For this study, because historical groundwater levels in most wells in the Basin are less than 50 feet below the ground surface elevation, available storage level refers to the elevation difference between a well's drought groundwater level and the well's average historical water level. Figure 1 shows the depth to groundwater for the spring 2015 well measurements in Figures 4 through 14.

Other factors that can limit a basin's available storage capacity include the presence of horizontal and vertical barriers to groundwater flow, such as clay layers or faults, and shallow groundwater, which mounds or rises to the surface or near the surface. Additionally, horizontal and vertical barriers can significantly reduce infiltration rates for recharge basins and groundwater flows from injection wells. Thus, potential recharge projects need to consider proximity to adjacent faults and the permeability of the unsaturated zone material before recharge site selection.

2.3.3 Groundwater Retention Times (Groundwater Travel Distance Considerations)

A minimum two months groundwater retention time is required for recharge projects using infiltration basins and advanced treated recycled water. Retention time is also referred to as Response Retention Time by the DDW, and is currently required for all recycled municipal wastewater projects to provide sufficient response time to identify treatment failures and implement actions necessary for the protection of public health. The calculation of the response retention time required must be approved by the DDW and is based on an engineering report conducted utilizing one of the methods in Table 3.

Table 3
Calculation of Retention Time

Method Used to Estimate Retention Time	Response Time Credit Per Month
Tracer Study utilizing an added tracer. [1]	1.0 month
Tracer study utilizing an intrinsic tracer. [1]	0.67 months
Numerical modeling consisting of calibrated finite element of finite difference models using validated and verified computer code used for simulating groundwater flow.	0.50 months
Analytical modeling using existing academically-accepted equations such as Darcy's law to estimate groundwater flow conditions based on simplifying aquifer assumptions	0.25 months

1 The retention time shall be the time representing the difference from when the water with the tracer is applied at the GRRP to when either; 2% of the initially introduced tracer concentration has reached the downgradient monitoring point, or 10% of the peak tracer unit value observed at the downgradient monitoring point reaches the monitoring point.

There is limited data available on the Basin's aquifer properties. However, sufficient well pumping tests are available to make a general estimate of the two, four, six and eight-month retention time. The retention time can be represented as the travel distance from a recharge basin to a nearby production well for a specified time, or by the travel distance from a production well in any direction. The latter allows for estimating where recycled water recharge basins could be placed without well impacts. The estimated distance from extraction wells maintaining an eight-month retention time as required in Table 3 (Analytical Method) utilized the following average groundwater velocity equation calculation:

Average Groundwater velocity (G_v) = (hydraulic conductivity (*K*) times the hydraulic gradient (*i*)) divided by the effective porosity (assumed to approximate specific yield (S_y))

Where:

- K, the hydraulic conductivity, was estimated using the well pumping test results included in Table 4,
- *i*, the hydraulic gradient, was estimated using the steepest hydraulic gradient from groundwater level contours mapped by Slade (1991) on Plate 4 (200 feet in 2500 feet), and
- S_y, the lower specific yield estimate in Table 2 of 3%

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Table 4
Basin Pumping Test Results and Horizontal Conductivity

Well	Well Number	Storage Unit	Test Pumping Rate (GPM)	Date	Report	T (gallons/day/ft)*	Well Depth+ (feet)	Horizontal Conductivity (K) (feet/day)	Used in Average	Average K (feet/day)
Birnam Wood Golf Club Wells #6**	NA	1	25	March 2009	Michael Hoover	33,000	55	80.2	No	1.2
Birnam Wood Golf Club Wells #8	1-3	1	20	March 2009	Michael Hoover	406	165	0.3	Yes	
Birnam Wood Wells #4**	NA	1	100	July 1999	Hoover & Associates	18,857	22.5	112.0	No	
EVR Well #7	NA	1	54	August 1990	Hoover & Associates	1,650	150	1.5	Yes	
Las Entradas Well #2	NA	1	300	1983	William Anikouchine	1,863	490	0.5	Yes	
Las Fuentes Well	1-53	1	50	September 2011	Adam Simmons	322	700	0.1	Yes	
Office Well #2	1-19	1	100	May 1982	Hoover & Associates	1,148	400	0.4	Yes	
Seaview MWC Wells	1-51	1	NA	April 1982	Hoover & Associates	7,000	200	4.7	Yes	
Amapola Well	3-22	3	250	December 1978	Richard Slade	9,000	620	1.9	Yes	1.2
Benon Well	NA	3	113	May 1990	Richard Slade	1,863	490	0.5	Yes	
Boeseke Well #2	NA	3	200	January 1985	Hoover & Associates	1,737	500	0.5	Yes	
Ennisbrook Well #2	3-25	3	100	April 1989	Hoover & Associates	3,771	500	1.0	Yes	
Ennisbrook Well #3	NA	3	100	April 1989	Hoover & Associates	3,300	320	1.4	Yes	
Montecito Meadows #1 (Amapola)	NA	3	73	December 1978	Donald Weaver	11,000	NA	NA	No	
Montecito Valley Ranch #1	NA	3	200	May 1990	Richard Slade	6,200	490	1.7	Yes	
Morgan Well #2	3-23	3	150	May 1990	Richard Slade	6,100	435	1.9	Yes	
Morgan Well #2	3-23	3	150	November 1985	Rick Hoffman & Associates	6,092	435	1.9	Yes	
Paden Well #2	3-12a	3	200	May 2012	Adam Simmons	880	650	0.2	Yes	
Edgewood Well #3	4-6	TC	150	May 2012	Adam Simmons	2,200	304	1.0	Yes	1.0

* if both drawdown and recovery T values were provided the high value was used.
+ assumed aquifer thickness
** Not included in calculation of average horizontal conductivity due to unusually high T and shallow well depth

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Based on these calculations, the average groundwater velocity would suggest an estimated distance from extraction wells for a two, four, six, and eight-month retention time of 192 feet, 384 feet, 576 feet, and 768 feet, respectively. These results are presented in Table 5. These distances are generally low for average groundwater velocity, but reflect the low hydraulic conductivity estimated from the pumping tests (1.2 feet/day) and the low specific yield of the aquifer of 3%. These distances would be even shorter using a lower hydraulic gradient. Results for the 8-month retention time of 768 feet is presented graphically in Figure 15 using known well locations and a diameter of 1,536 feet for each well. However, there are more wells in the Basin than those shown on Figure 15 for which well locations have not been provided for in this study.

Table 5
Groundwater Distances Traveled for Different Groundwater Retention Times

2-month	4-month	6-month	8-month
192 feet	384 feet	576 feet	768 feet

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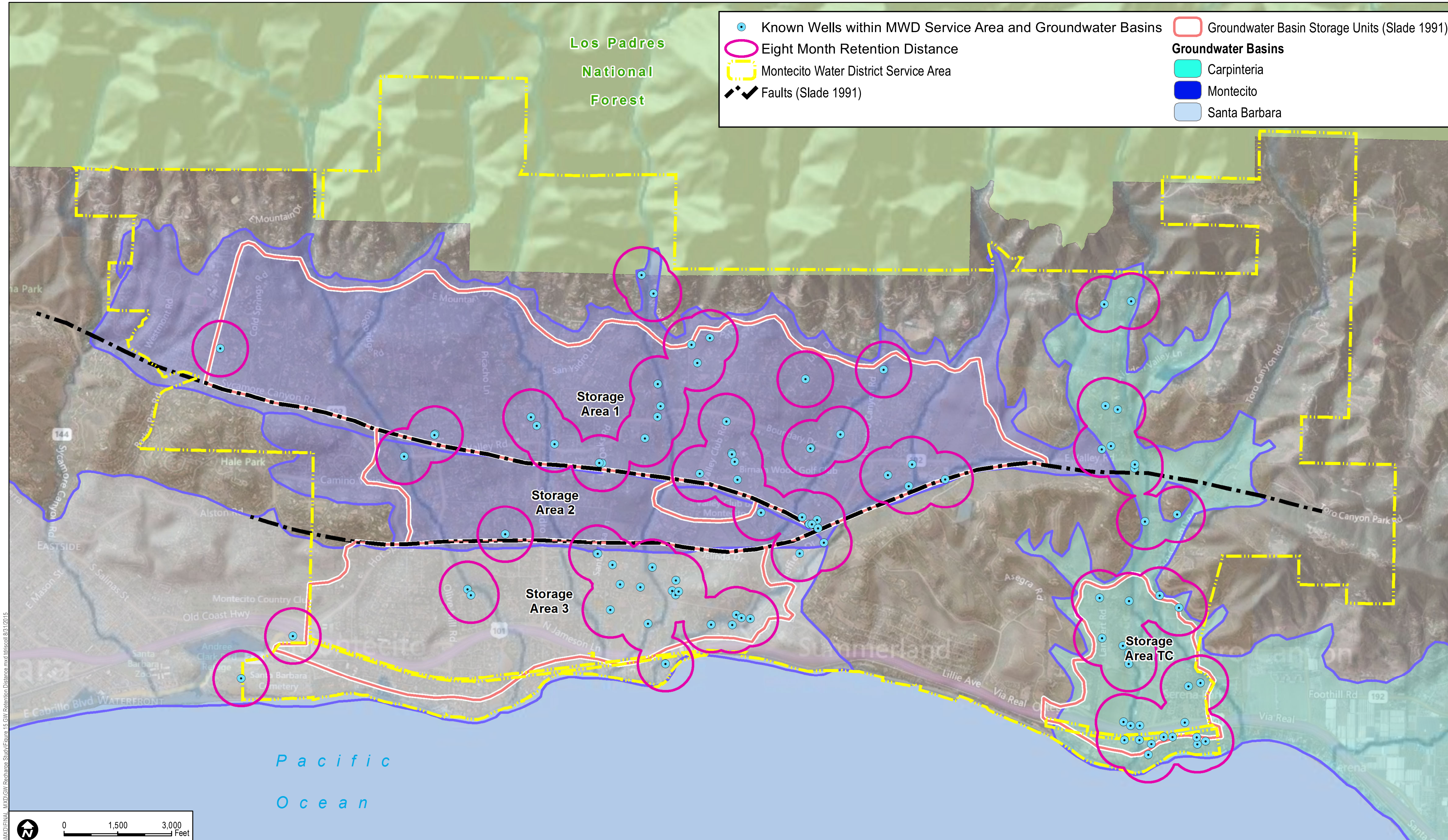

DUDEK

SEPTEMBER 2015

SOURCE: BING Maps 2015; Santa Barbara County 2010; Slade 1991

FIGURE 15

Potential Groundwater Retention Distance Based On Retention Time

MONTECITO GROUNDWATER RECHARGE FEASABILITY STUDY

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3 CONCLUSIONS

This Study considered opportunities and constraints for using advanced treated wastewater and imported water to recharge the Montecito Groundwater Basin by injection wells and percolation basins. This section presents a summary of these opportunities and constraints related to the groundwater recharge.

Artificial groundwater recharge is most successful when a large amount of storage capacity is available at all times. This situation is common for groundwater basins where overdraft has lowered groundwater levels to a point where they do not recover naturally during prolonged wet periods.

Basins are considered unsuitable for artificial recharge if the available storage capacity of the basin is limited by natural recharge under average or normal precipitation conditions. If artificial recharge were attempted in an unsuitable basin, it is possible that the injected water could effectively displace future natural recharge. This is undesirable not just because of the lost value of naturally recharged groundwater, but also because, if the water table rises excessively, a recharging agency could risk adverse impacts due to liquefaction, increased surface flooding, ground saturation problems, and increased storm water runoff. These potential impacts will need to be addressed by a California Environmental Quality Act (CEQA) analysis conducted to evaluate basin impacts associated with any artificial recharge project.

A review of historical precipitation and groundwater levels suggests that the Basin has a limited amount of available storage capacity even during periods of drought. The data indicates that from about 1989 to 1993 the Basin had some available storage capacity in Storage Unit 1, Storage Unit 2, and Toro Canyon. The Basin in 1991 had between 4,950 and 7,300 AF of available storage capacity (Table 6). However, this period from 1989 to 1993 began years after the onset of the relevant drought period. Based on precipitation records, it appears that the region experienced a drought from 1985 to 1991 (Figures 2 and 3).

Table 6
Available Storage Capacity during the 1991 Drought

Storage Unit	1991 Drought	
	Minimum (AF)	*Maximum (AF)*
Storage Unit 1	3,060	4,590
Storage Unit 2	290	732
Storage Unit 3	1,250	1,560
Toro Canyon Unit	350	420
Total	**4,950**	**7,302**

The current drought period started in about 2007 (Figures 2 and 3), but the majority of the currently-available storage capacity only became available starting in about 2011 (Figures 4 through 14). Thus, it can be hypothesized that the Basin must experience drought conditions for between 4 and 8 years before storage capacity becomes available for artificial recharge under current pumping demands. Figures 2 and 3 indicate that during the 91 year period of record, precipitation generally ranged near normal with 6 identified extended dry periods, suggesting that there was likely limited available storage capacity in the Basin during much of the period.

Based on the available data, the limiting factor for a recharge program with advanced treated recycled water is the quantity of available storage capacity. Available storage capacity in the basin is seriously limited during periods of normal or above average precipitation. This study also shows that although some historical periods with significant available storage capacity have been recorded (i.e., the period from 1989 to 1993), these periods only follow extended periods of drought (i.e., the drought that began in 1985 and ended in 1991).

Artificial recharge by infiltration basins is usually preferable over injection wells due to lower initial capital and operating cost and to recharge efficacy. As a general rule injection wells can inject about one-half of their production rates and require significantly more maintenance than do regular production wells. Exceptions to this preference include areas where aquifers are confined and surface recharge cannot directly recharge the aquifer, or where land costs and availability limit surface basins. If imported water recharge by surface basins is considered, then the addition of recycled water should naturally be considered. However, recycled water recharge only by infiltration basins may not be possible due to initial maximum RWC limitations.

Currently, except to limit seawater intrusion, the direct injection of advanced treated recycled water for reuse has not been implemented anywhere in California. This is due to the highly detailed hydrogeological studies required to insure compliance with the (SWRCB recycled water regulations (Table 1), the extensive groundwater monitoring requirements, and the public's perception of recycled water reuse.

Hydrogeologic units 1 and 3 have the greatest amount of storage capacity in drought conditions, but these units also contain a high density of water supply wells making it very difficult to find a location for artificial recharge infiltration basin(s) or injection well(s) that could comply with SWRCB mandated subsurface travel times for advanced treated recycled water.

The direct injection of advanced treated recycled water to limit seawater intrusion could be further investigated by additional studies, but any additional studies should include evaluating how much additional groundwater could be extracted from Storage Unit 3 in the context of a seawater intrusion barrier program. From the limited hydrogeological information on Unit 3, seawater intrusion to the deeper aquifer may not be occurring due to the aquifer being sealed off by an offshore fault. If seawater intrusion is limited to the upper 50 feet as suggested by Hoover (1980), injection of advanced treated recycled water to limit seawater intrusion might not even be feasible. The seawater barrier would need to be designed to allow adequate groundwater travel time of the treated water before being recovered by production wells. This would suggest that the seawater intrusion barrier, which would consist of a system of injection wells, monitoring wells, and recycled water distribution pipelines, would likely need to be constructed near the coastline.

To evaluate the feasibility of using advanced treated recycled water to limit seawater intrusion, exploration boreholes would need to be drilled along the coastline of Unit 3 to determine the depth and water quality of the aquifers. Pumping tests would need to be conducted on the exploration boreholes to estimate the hydraulic conductivity of the aquifers to determine the groundwater travel time of the injected water, and where monitoring wells would need to be located to insure SWRCB compliance.

If the results of the exploration boreholes and testing suggest that advanced treated recycled water is still feasible, groundwater modeling will need to be used to evaluate the recharge plan and help determine the distance that monitoring wells are to be located from the injections wells. Construction of a test injection well and two monitoring wells will then be needed and a tracer study conducted to prove the groundwater retention time.

With the data collected from these studies, a project CEQA analysis can be done to identify potential environmental impacts. This will likely require development of an Environmental Impact Report (EIR).

4 REFERENCES

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Appendix B: Financial Plan Detail

Staffing Expenses

	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Salaries	$ 237,000	$ 242,143	$ 247,397	$ 252,766	$ 258,251
Employee Benefits	94,800	100,488	106,517	112,908	119,683
Vehicles/Fuel	36,500	1,545	1,591	1,639	1,688
Total Staffing	**$ 368,300**	**$ 344,176**	**$ 355,506**	**$ 367,313**	**$ 379,622**

Professional Services Expenses

	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Legal					
General Legal	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000
Special Legal	25,000	25,000	25,000	25,000	25,000
Professional Engineering					
Original GSP Scope (less Basin Numerical Model)	154,841	154,841	50,000	50,000	50,000
Basin Numerical Model (Grant Component #4)	150,400	0	0	0	0
Total Professional Services	**$ 380,241**	**$ 229,841**	**$ 125,000**	**$ 125,000**	**$ 125,000**

GSP Expenses

	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
1. Grant Agreement Admin	$ 35,200	$ 35,200	$ 35,200	$ 0	$ 0
2. GSP Development			(Above in Professional Services)		
3. Sea Water Intrusion Monitoring	149,144	15,000	15,000	53,960	53,960
4. Basin Numerical Model - Dudek			(Above in Professional Services)		
5. Private Well Metering Pilot	99,648	99,648	25,000	13,800	13,800
6. Surface Water Flow Gage Installation	80,250	80,250	25,000	7,400	7,400
7. Monitoring Well Construction	647,317	15,000	15,000	18,980	18,980
8 5-year GSP update (funded over 5 years)	0	0	0	40,000	40,000
Total GSP	**$ 1,011,559**	**$ 245,098**	**$ 115,200**	**$ 134,140**	**$ 134,140**

Administrative Expenses

	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Office Space	$ 36,000	$ 37,080	$ 38,192	$ 39,338	$ 40,518
Utilities (Power, Office Phone, Cell Phone, Internet)	4,200	4,368	4,543	4,724	4,913
Communications, Outreach, Mailings	11,500	11,845	12,200	12,566	12,943
Supplies, Copier	5,000	500	515	530	546
Computers	2,000	500	515	530	546
General Liability Insurance	25,000	25,750	26,523	27,318	28,138
Miscellaneous	1,800	1,854	1,910	1,967	2,026
Total Administrative	**$ 85,500**	**$ 81,897**	**$ 84,398**	**$ 86,975**	**$ 89,631**

Other Expenses

	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Reimbursement of MWD's past GSA Expenses	$ 280,638	$ 280,638	$ 280,638	$ 0	$ 0
Board Member Compensation	7,260	7,480	7,700	7,700	7,700
Staff/Board Travel (incl conf fees, mileage, hotel, meals)	7,500	7,500	7,500	7,725	7,957
Total Other	**$ 295,398**	**$ 295,618**	**$ 295,838**	**$ 15,425**	**$ 15,657**

GSP Development Cost Reconciliation

	Expenses April 2019-June 2020	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
1. Grant Agreement Admin	$ 4,400	$ 35,200	$ 35,200	$ 0	$ 0	$ 0
2. GSP Development (from Professional Services Cost Center)	334,557	154,841	154,841	0	0	0
3. Sea Water Intrusion Monitoring	19,560	149,144	15,000	0	0	0
4. Basin Numerical Model - Dudek (from Professional Services Cost Center)	17,000	150,400	0	0	0	0
5. Private Well Metering Pilot	14,260	99,648	99,648	0	0	0
6. Surface Water Flow Gage Installation	13,600	80,250	80,250	0	0	0
7. Monitoring Well Construction	45,000	647,317	15,000	0	0	0
8 5-year GSP update (funded over 5 years)	0	0	0	0	0	0
Variance between GSP Total and Estimates	4,491	0	0	0	0	0
Total GSP	**$ 452,868**	**$ 1,316,800**	**$ 399,939**	**$ 0**	**$ 0**	**$ 0**