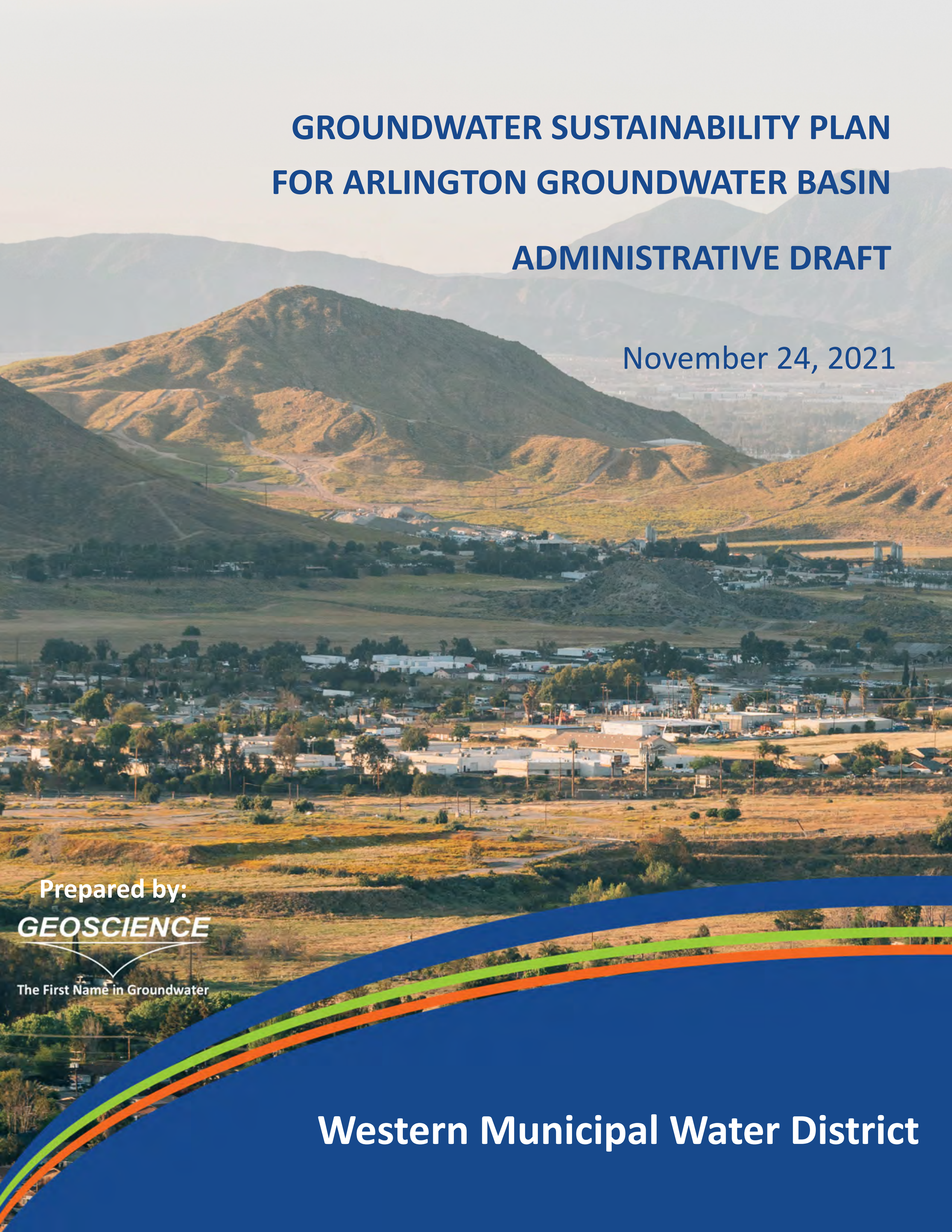

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

ADMINISTRATIVE DRAFT

November 24, 2021

Prepared by:

GEOSCIENCE

The First Name in Groundwater

Western Municipal Water District

THIS REPORT IS RENDERED TO WESTERN MUNICIPAL WATER DISTRICT AS OF THE DATE HEREOF, SOLELY FOR THEIR BENEFIT IN CONNECTION WITH ITS STATED PURPOSE AND MAY NOT BE RELIED ON BY ANY OTHER PERSON OR ENTITY OR BY THEM IN ANY OTHER CONTEXT. ALL CALCULATIONS WERE PERFORMED USING ACCEPTED PROFESSIONAL STANDARDS.

AS DATA IS UPDATED FROM TIME TO TIME, ANY RELIANCE ON THIS REPORT AT A FUTURE DATE SHOULD TAKE INTO ACCOUNT UPDATED DATA.

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GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

0.0 Executive Summary (§354.4(a))

0.1 Introduction

On September 16, 2014, Governor Jerry Brown signed into law a three-bill legislative package, composed of AB 1739, SB 1168, and SB 1319, collectively known as the Sustainable Groundwater Management Act (SGMA), providing California with a framework for sustainable groundwater management for the first time in its history. SGMA aims to ensure the reliability and quality of critical groundwater resources throughout the state. Recognizing that groundwater is most efficiently managed at the local level and each groundwater basin is different, the intent of SGMA is to facilitate and strengthen local control and management of groundwater basins. For groundwater basins designated as medium or high priority, SGMA requires the formation of a Groundwater Sustainability Agency (GSA), responsible for developing and implementing a Groundwater Sustainability Plan (GSP) that considers the interests of all beneficial uses and users of groundwater in the basin. SGMA also requires that these basins reach and maintain sustainability within 20 years following plan implementation.

Sustainable groundwater management is defined as the *"…management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results…"* (Water Code Section 10721 (v)). SGMA has identified six sustainability indicators which refer to effects caused by groundwater conditions occurring throughout a basin that, when significant and unreasonable, cause undesirable results (Water Code Section 10721(x)). These are:

- Reduction of Groundwater in Storage
- Chronic Lowering of Groundwater Levels
- Seawater Intrusion
- Degraded Water Quality
- Land Subsidence
- Depletion of Interconnected Surface Water

The Riverside-Arlington Groundwater Subbasin was designated as a very low priority basin under SGMA and therefore not requiring a GSP. However, Western Municipal Water District (Western) believes in good basin management and made the decision to continue the process of meeting with stakeholders and creating a plan for the basin. The Plan considers scientific data and local knowledge of the basin and describes basin conditions, including the geology of the basin and groundwater levels within it. The Plan also establishes sustainability goals for the basin and outlines steps and potential management actions to ensure sustainability.

The primary sections of the GSP include:

- **Executive Summary** provides a succinct summary of the contents of the GSP.
- **Section 1.0 – Introduction** provides an introduction to the GSP, including objectives of the GSP, agency information, and GSP organization.
- **Section 2.0 – Plan Area** describes the geographic setting, existing water resources planning and programs, relationship of the GSP to other general-plan documents within the basin area, and additional GSP components such as land use plans, well and project permitting processes, control of saline water, and current groundwater projects.
- **Section 3.0 – Basin Setting** describes the physical components of the Arlington Groundwater Basin and provides a hydrogeologic conceptual model for the understanding of groundwater conditions in the subbasin and development of groundwater budgets.
- **Section 4.0 – Sustainable Management Criteria** describes the sustainability goals set by the GSA, defines undesirable results (URs), minimum thresholds (MTs), measurable objectives (MOs), and interim milestones (IMs).
- **Section 5.0 – Monitoring Network** describes the monitoring network that will be used following plan implementation to improve data coverage in data gap areas, assess sustainability criteria, and evaluate impacts from proposed projects and management actions, and outlines monitoring protocols and field sampling procedures.
- **Section 6.0 – Projects and Management Actions** provides a framework to achieve the sustainability goal for the Arlington Basin by listing potential management actions and/or projects that may be utilized to ensure long-term sustainability, mitigate potential undesirable results, and potentially increase sustainable yield of the subbasin through additional or supplemental recharge.
- **Section 7.0 – Plan Implementation** describes the GSP implementation process, including estimated costs, sources of funding, a preliminary schedule, methodology for annual and five-year reporting, and how progress evaluations will be made over time.

0.2 Plan Area

0.2.1 General Setting and Jurisdictional Area

The Arlington Groundwater Subbasin, or Arlington Basin, is shown on Figure 0-1 below. Arlington Basin lies entirely within Riverside County and encompasses the southern section of Riverside-Arlington Groundwater Subbasin, classified as subbasin 8.2-03 by the California Department of Water Resources' (DWR) Bulletin 118-03 (DWR 2003), located outside both the North and South Riverside Basin boundaries. The Plan Area boundary dividing the Arlington and Riverside Basins is defined by the 1969 *Western Judgment Western Municipal Water District of Riverside County v. East San Bernardino County Water District*, County of Riverside Superior Court No. 78426 (1969). The Riverside-Arlington Groundwater Subbasin was designated as a very low priority basin under SGMA.

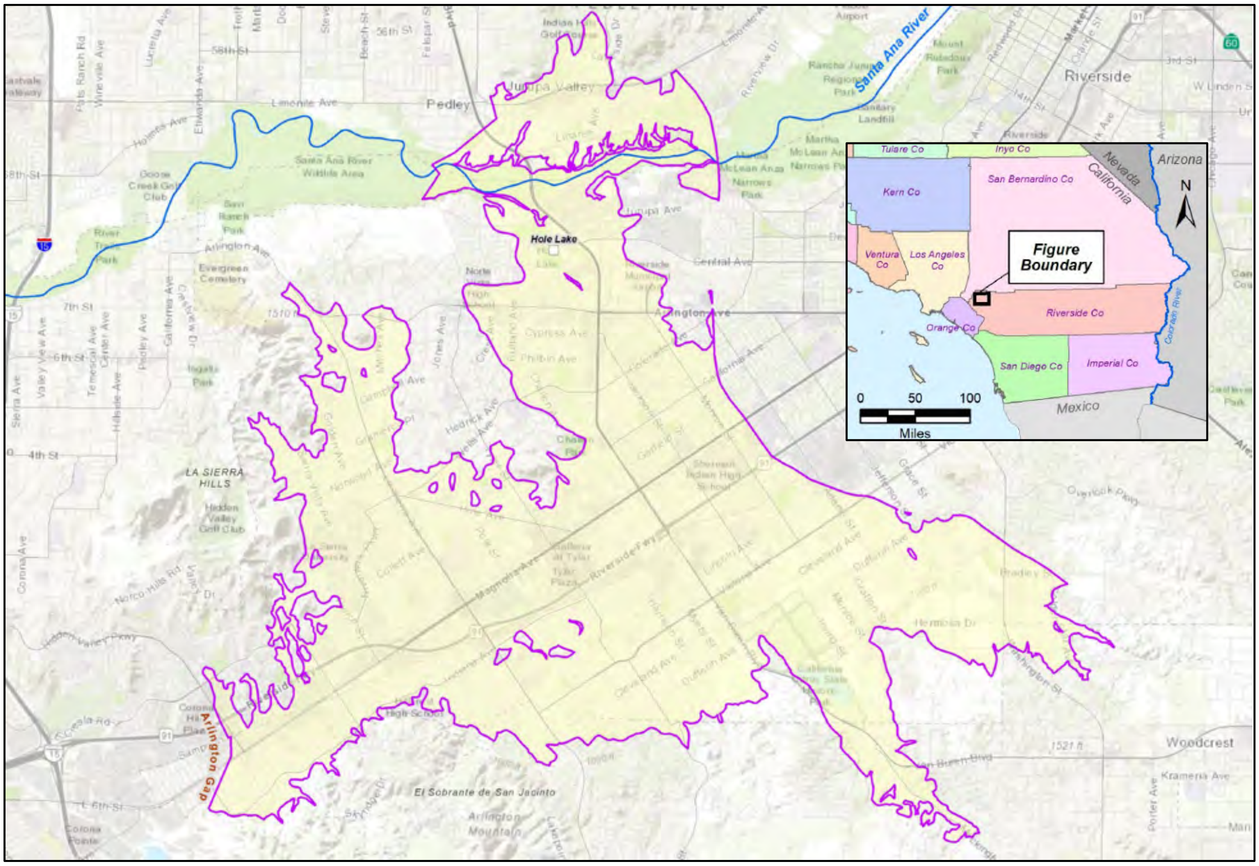

Figure 0-1. Arlington Basin

Water agencies serving the areas overlying the Plan Area include the City of Corona (Corona), Riverside Public Utilities (RPU), and Western Municipal Water District (Western). Home Gardens Country Water District (Home Gardens) is in the adjacent Temescal Basin past the southwestern boundary of the Arlington Basin. Riverside is the majority overlying municipality of the Arlington Basin, along with a small portion of Corona.

0.2.1.1 Land and Water Use

The four main categories of land use in the Plan Area are residential, commercial/ industrial/ public facilities, irrigated agriculture, and open space. Water supply needs in the Plan Area have shifted from being largely agricultural to largely urban over the latter half of the 20th century. Land use within Arlington Basin is approximately 45% residential, 21% commercial/ industrial/ public facilities, 21% irrigated agriculture, and 13% open space (SCAG 2015a). Citrus groves and wholesale nurseries predominantly compose the agricultural land use category. The majority of developed land is within the urban areas of the City of Riverside, Corona, and as scattered unincorporated areas within Riverside County.

The Arlington Basin has three primary water source types: groundwater (including groundwater from surrounding groundwater basins such as Rialto-Colton, Riverside, and Bunker Hill), imported water, and recycled water.

0.2.2 Water Resources Monitoring and Management Programs

Existing monitoring programs and networks in the Plan Area measure and record a variety of data used to understand the Arlington Basin and study natural and anthropogenic effects on the aquifer system. Groundwater level data are collected from wells in the basin and incorporated into regional groundwater level databases maintained by the Santa Ana Watershed Project Authority (SAWPA) and Western, including:

- Cooperative Well Measuring Program Database
- Santa Ana Basin Relational Information Network Application (SABRINA)
- Santa Ana Watershed Data Management System (SAWDMS)

Regulatory guidelines, planning recommendations, and other existing documents are currently used to manage Plan Area groundwater and the groundwater surrounding the Arlington Basin. These management programs and studies have been developed by multiple agencies and organizations for a variety of purposes and include:

- 1969 Western Judgment
- Santa Ana River Judgment
- Santa Ana Basin Water Quality Control Plan
- Western Integrated Regional Water Management Plan
- Santa Ana Watershed Integrated Regional Water Management Plan
- Metropolitan Water District of Southern California Integrated Water Resources Plan
- Arlington Basin Groundwater Management Plan

0.2.3 General Plan and Related Land Use Planning

Future land use within Arlington Basin is anticipated to be approximately 60% residential, 34% commercial/ industrial/ public facilities, 3% irrigated agriculture, and 3% open space. The Plan Area and the surrounding region are experiencing growth, and water demands are anticipated to increase as a result. While the majority of the Plan Area is developed for urban or agricultural use, projected growth will occur through infill throughout the basin. As competition for imported water supplies continues to become more intense and as drought, regulatory changes, and potential catastrophic failures threaten imported supplies, groundwater will continue to play a key role in creating a cost-effective and reliable water supply in the Plan Area through private production and operation of desalters for potable municipal use. The Plan Area also functions within a regional context where growth outside of the basin impacts the total water demand and changes in supplies outside the basin impact water availability in the basin; both changes in demand and changes in supply impact the demands placed on Plan Area groundwater.

0.2.4 Notice and Communication

Under the requirements of SGMA, GSAs must consider interests of all beneficial uses and users of groundwater when developing a GSP. As a result, the GSP development needs to consider effects to other stakeholder groups in or around the groundwater basin with overlapping interests. These interests include, but are not limited to, holders of overlying groundwater rights (including agriculture users and domestic well owners), public water systems, local land use planning agencies, environmental users, surface water users, federal government, California Native American tribes, and disadvantaged communities.

The development of a GSP is a collaborative process involving all interested stakeholders. Public input is critical to the success of the Arlington Basin GSP and was a key component of its development. Notification and communication activities for the development of this GSP were guided by the Communications and Engagement (C&E) Plan, which included stakeholder education, public workshops and comment periods, and email notifications.

0.3 Basin Setting

The Arlington Groundwater Basin is located within the Perris Block of the California Peninsular Ranges Province which separated from the San Gabriel Mountains and San Bernardino Basin on the northeast by the Cucamonga Fault Zone and San Jacinto Fault Zone, respectively and from the Los Angeles Basin (Chino Hills) and Santa Ana Mountains on the southwest unnamed structural feature and the Elsinore Fault Zone, respectively. Arlington Basin is one of the numerous major groundwater basins within the Santa Ana River (SAR) Watershed. The SAR Watershed encompasses approximately 2,800 square miles. Surface water and groundwater flow from topographic highs to the Pacific Ocean, however groundwater flow is highly controlled by the geology of the area. The SAR flows more than 100 miles to reach the Pacific Ocean and is the largest stream system in southern California (Kennedy 2008).

0.3.1 Hydrogeologic Conceptual Model

0.3.1.1 Sources of Inflow and Outflow

The Arlington Basin is supplied with groundwater by precipitation, infiltration of flow within unlined stream channels, percolation of irrigation over agricultural and native lands, and underflow from the Riverside Basin. Generally, groundwater flow in the Arlington Basin mimics the surface drainage patterns moving from areas of recharge in the north and south highlands towards the central axis of the basin eventually flowing southwesterly out of the basin through a bedrock constriction, known as the Arlington Gap or Narrows, into the Temescal Basin.

Groundwater discharge from the Arlington Basin occurs primarily as groundwater production from wells. Shallow groundwater discharge to surface water, ultimately resulting in outflow from the basin in stream channels, and sub-surface flow to the Temescal Basin at the Arlington Gap to the southwest are two other sources of groundwater discharge from the Arlington Basin. In the northeast channels recharged with groundwater ultimately discharge into Hole Lake.

0.3.1.2 Aquifer Systems

Unconsolidated alluvial sediments of the Arlington Basin, which represent the principal aquifer, are up to 250 ft thick in the center of the basin and are underlain by granitic bedrock, which is exposed in the bounding hills to the north and south. Groundwater is found approximately 30 feet below ground surface (bgs) in the center and westerly portion of Arlington Basin and roughly 40 feet bgs in the southeast. Although fracture zones in the bedrock may yield water, they are typically unable to sustain production as a result of inadequate storage capacity and are therefore not considered to be part of the groundwater basin.

0.3.2 Geologic Setting

The Arlington Groundwater Basin is located within the California Peninsular Ranges Province, characterized by a series of northwest trending valleys and mountain ranges, extending from the Los Angeles Basin to the tip of Baja California, formed by movement along the San Andreas Fault and associated faults. While the basin itself was formed through fault movement, there are no mapped structural features and no evidence of active faults within Arlington Basin.

Geologic formations found in the Arlington Basin (Figure 0-2) can be grouped into two broad categories:

- Crystalline bedrock, and
- Alluvial sediments consisting of unconsolidated weathered material from the surrounding hills and mountains.

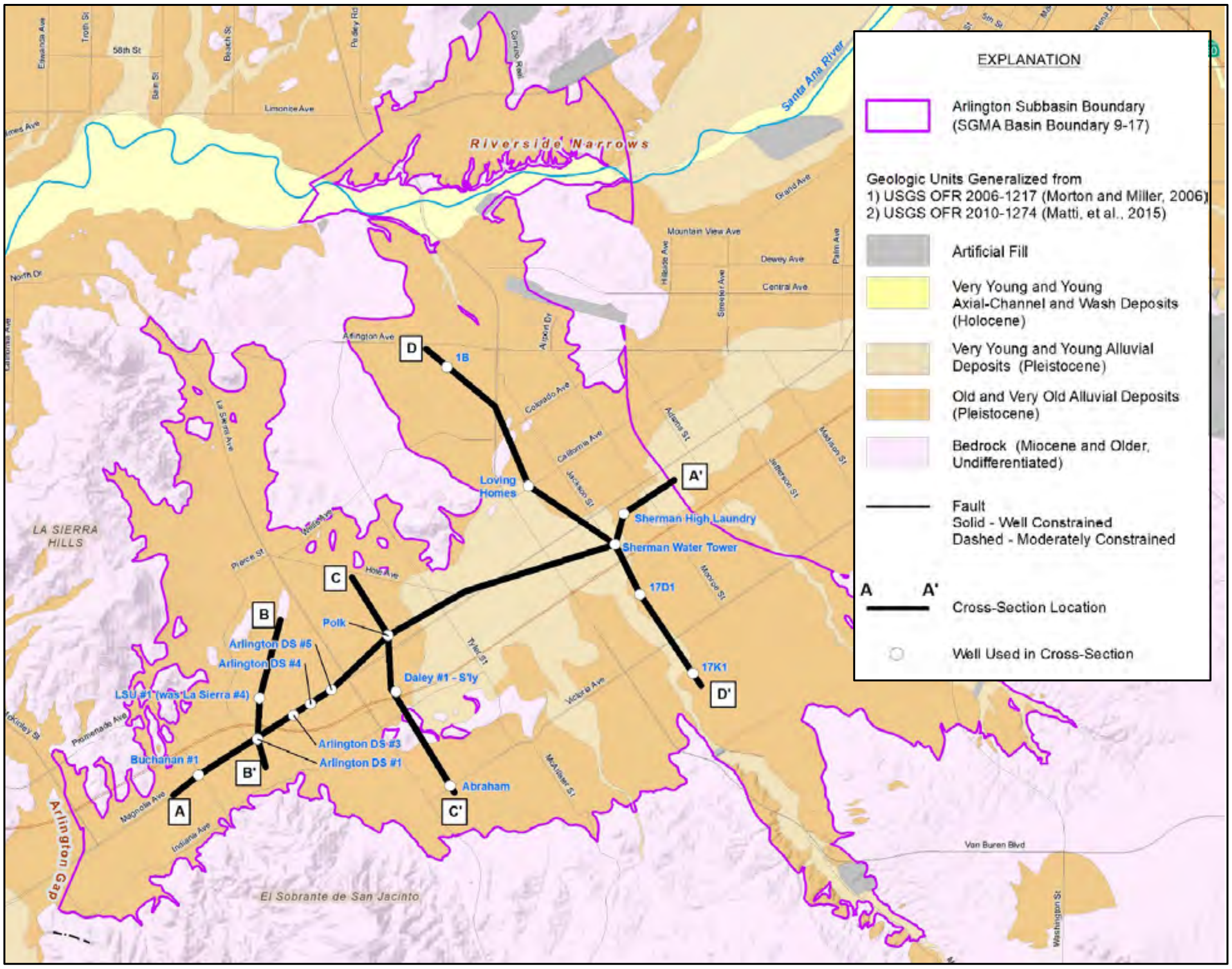

Figure 0-2. Surficial Geology

0.3.2.1 Basin Boundaries

Arlington Basin is bounded to the south by the granitic mountains of El Sobrante de San Jacinto, and to the north by the granitic La Sierra Hills. In the east a groundwater divide in the alluvium between Riverside and Arlington separates the area into two basins. Alluvial material comprising the groundwater basin is underlain by consolidated bedrock.

0.3.2.2 Climate

Arlington Basin is in a semi-arid region characterized by dry, hot summers and mild winters. Precipitation is concentrated within the winter months, with an average annual precipitation of approximately 10 inches per year (as measured at the Riverside County Flood Control and Water Conservation District (RCFCWCD) Station 179, which has the most reliable long-term precipitation record in the area).

0.3.3 Data Gaps

Data gaps include primarily the following items: groundwater gradient information and groundwater elevations between the Army 3 well and Hole Lake in the northern portion of the groundwater basin to better refine outflow in this portion of the basin. In addition, data to calculate groundwater gradient information and saturated thickness is lacking across the boundary between the Arlington basin and the Temescal Basin. Since outflow to or inflow from the Temescal Basin is a significant term in the water budget, instrumentation to mitigate this data gap is needed.

0.3.4 Current and Historical Groundwater Conditions

0.3.4.1 Groundwater Elevation

Arlington Basin groundwater levels are influenced primarily by groundwater production, and to a lesser degree by climate. Despite changes in land use and water demands, as increasing urbanization reduced the once dominant agriculture in the area, present day groundwater flow patterns remain similar to those in the early 1930s. Figure 0-3 shows water groundwater elevation contours from January 1933 Fall 2018 (representing the most current data set). The groundwater elevation contours represent lines of equal elevation on the groundwater surface. Groundwater flow occurs perpendicular (i.e., at 90°) to the elevation contours. As indicated by the figure, groundwater consistently flows towards the Arlington Gap in the main portion of the basin. Prior to 1933 and the introduction of imported water for agricultural irrigation, it is likely groundwater flow was opposite of present-day trends, heading towards Riverside Basin.

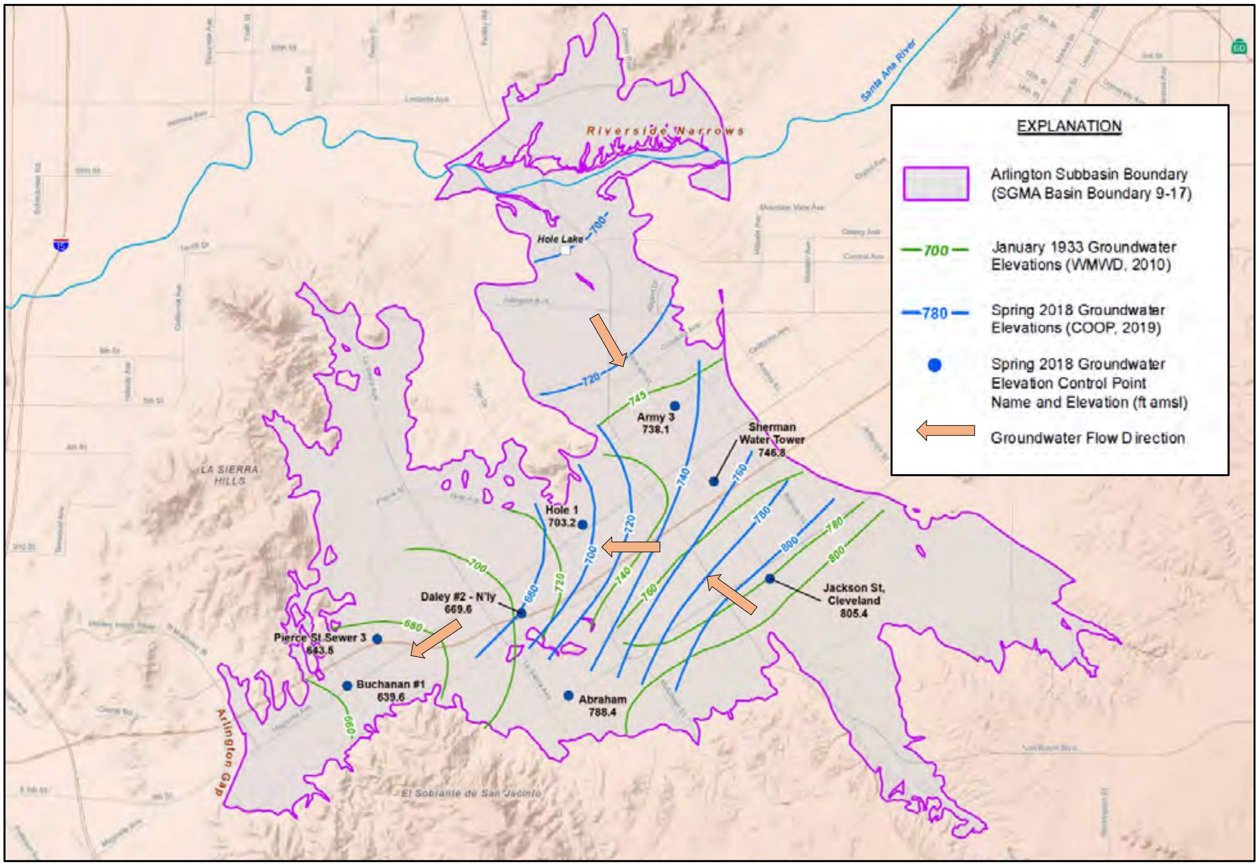

Figure 0-3. Arlington Basin Groundwater Elevation Contours and Groundwater Flow Direction

Hydrographs, or plots of water level measurements through time, were also assembled from available information. A typical hydrograph for Arlington Basin is shown on Figure 0-4. A few general trends can be discerned: 1) water levels increased from 1960 to 1980, 2) an overall decline in water levels occurred from 1980 through 2010, and 3) the rate at which water levels changed nearing the 2010 time period was reduced.

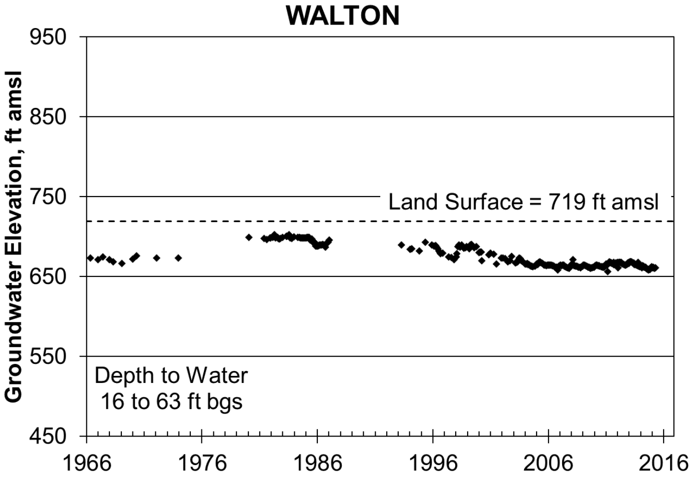

Figure 0-4. Typical Hydrograph for Arlington Basin

0.3.4.2 Groundwater Storage

Groundwater storage in Arlington Basin is computed from the top of bedrock of the aquifer to the top of the water table, using specific yield and specific storage in the lithologic model developed for the Integrated SAR Model. In 2016, the total groundwater in storage in Arlington Basin was estimated to be 63,200 acre-feet. The model was also used to evaluate change in groundwater storage. Groundwater level declines in Arlington Basin from 1966 through 2016 correspond to a decline in groundwater storage of approximately 360 acre-ft/yr.

0.3.4.3 Groundwater Quality

Groundwater quality in the Arlington Subbasin has historically been degraded by elevated concentrations of TDS, nitrate, and other contaminants from industrial sources. In 1990, the Arlington Desalter began operating to improve overall quality of local potable supplies and decrease subsurface outflow of poor-quality groundwater. The facility is currently supplied by five production wells, and efforts are ongoing to expand its overall capacity to provide additional local potable supplies.

0.3.4.3.1 Total Dissolved Solids (TDS)

TDS is a measure of salinity which accounts for all dissolved solids in water (as milligrams per liter [mg/L]) including organic and suspended solids and is commonly analyzed to determine general suitability for human consumption. A TDS concentration of 500 mg/L is the secondary standard for drinking water established by the U.S. EPA and State Water Resources Control Board. A TDS of greater than 1,000 mg/L is generally considered to be brackish water and not suitable as a potable supply without treatment or blending. Natural sources of TDS include interaction of groundwater with the soil, rock, and organic matter which compose an aquifer system. Human activities such as irrigation and agricultural practices which include application of synthetic fertilizers and manure are a common source of TDS. Also, effluent from wastewater treatment facilities and septic systems and other industrial processes can contribute to elevated TDS concentrations in water.

Current Ambient Water Quality (AWQ) for TDS in the Arlington Subbasin is 980 mg/L. Local concentrations ranges from 913 to 1,330 mg/L. The highest average TDS concentrations occur in the northern and western wells. Figure 0-5 below shows the distribution of TDS in the basin.

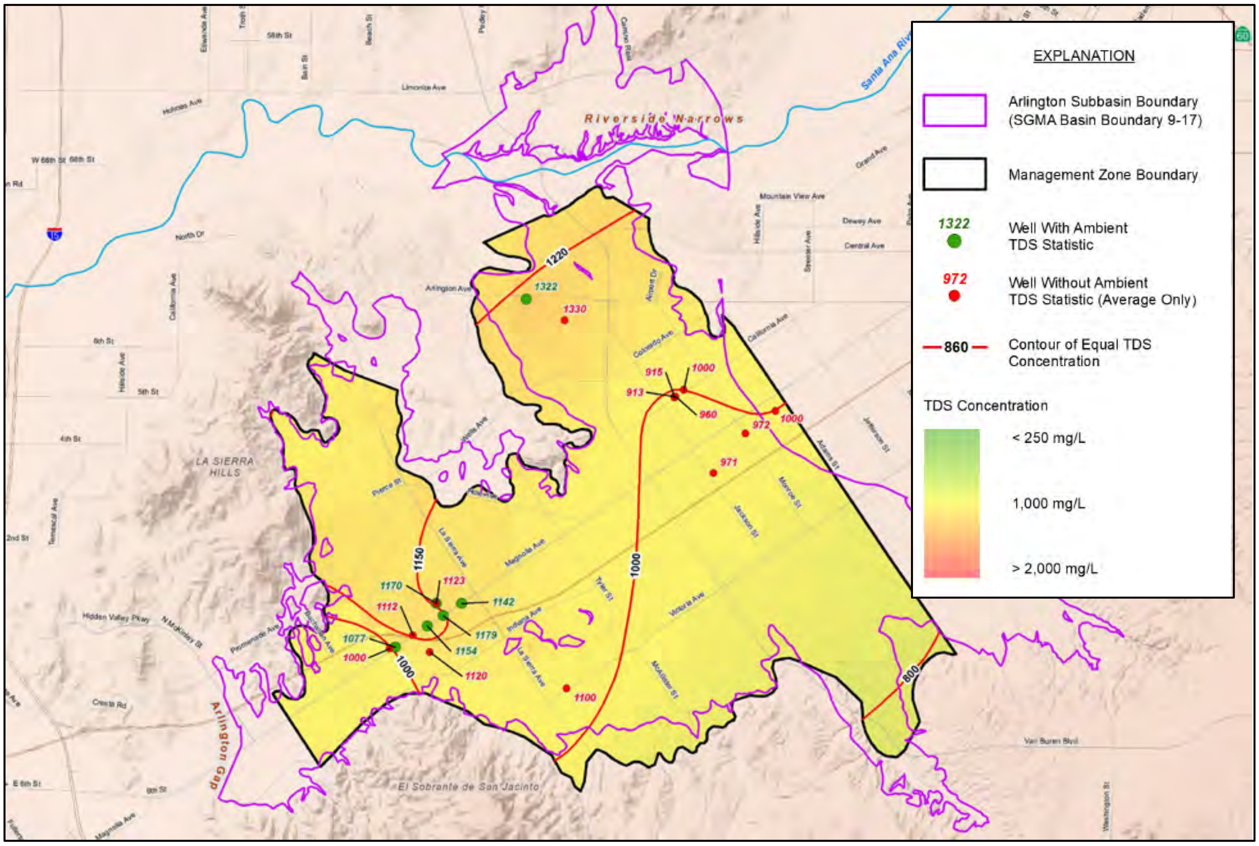

Figure 0-5. TDS Concentrations (2015)

0.3.4.3.2 Nitrate

Nitrate is commonly associated with the industrial process of manufacturing synthetic fertilizers and with agricultural activities, septic systems, confined animal facilities, and wastewater treatment facilities. However, nitrate in water can also be naturally occurring. Nitrate in drinking water is a health concern to both humans and animals, and the state has established an MCL of 10 mg/L (which is also the water quality objective for the Arlington Subbasin).

Average nitrate concentrations from 1996 through 2015 ranged from approximately 0.1 to 51 mg/L; however, concentration ranged from approximately 15 to 25 mg/L for most wells. The highest average nitrate concentrations occur in the eastern and western wells. Figure 0-6 below shows the distribution of nitrate in the Arlington Basin.

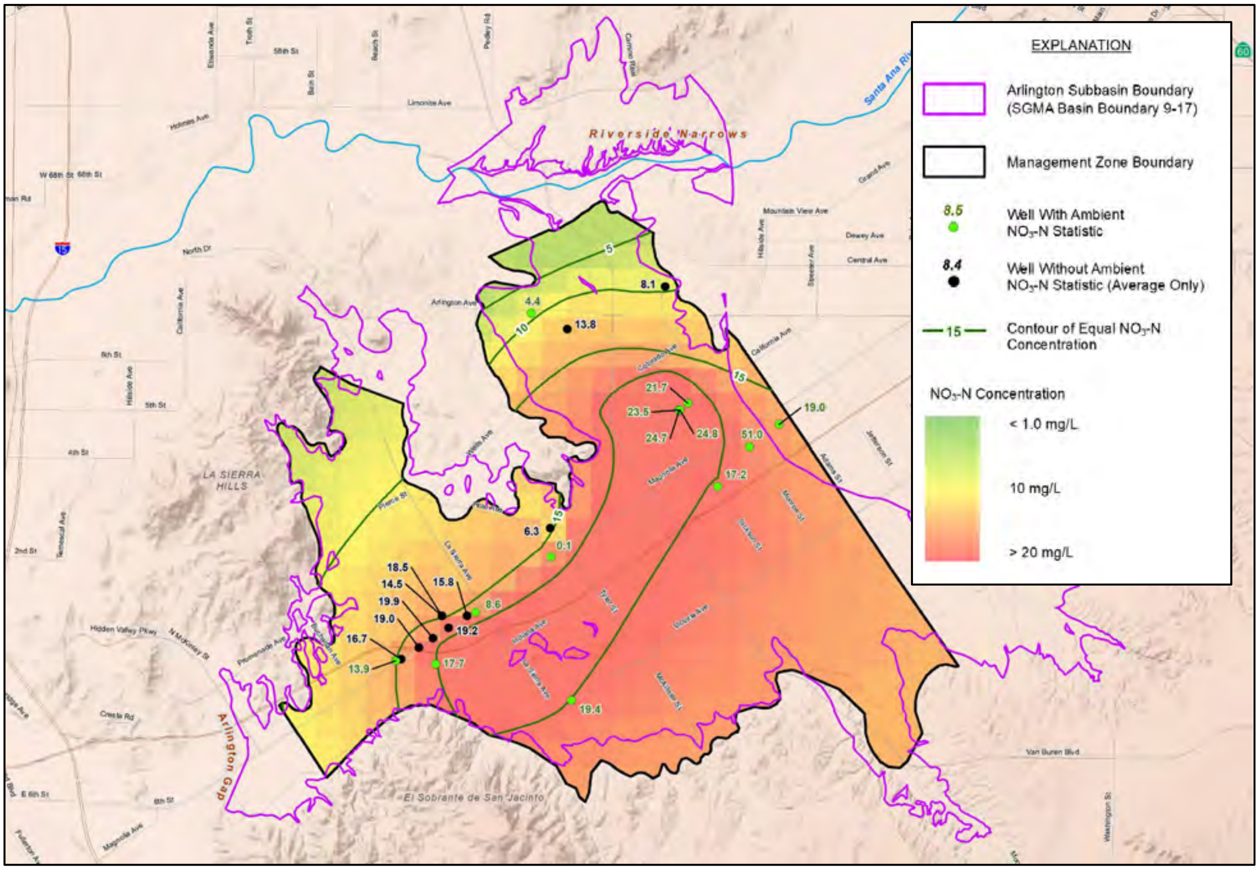

Figure 0-6. Nitrate (as N) Concentrations (2015)

0.3.4.3.3 Saline Water Intrusion

The Arlington Basin has no connection with the ocean, therefore is not susceptible to intrusion of seawater from pumping in the basin. However, the Arlington Basin has higher TDS than the Temescal and Riverside Basins which are in hydraulic connection with the Arlington Basin. Therefore, in this situation, the Arlington Basin groundwater is managed to minimize potential impacts of salinity on neighboring basins through operation of the Arlington Desalter. Maintaining control of salinity in the basin will require continued Arlington Basin groundwater monitoring and desalter operations.

0.3.4.3.4 Industrial Source Contaminants

The Arlington Basin has had numerous industrial operations within its boundaries that have affected groundwater quality. From these industrial operations there have been occurrences where contamination has been identified in the groundwater. There are currently multiple contaminated areas where cleanup efforts are ongoing within the Subbasin including, but not limited to, gas stations, car repair shops, dry cleaners, manufacturing operations, and the Riverside Municipal Airport. Figure 0-7 below presents sites related to water quality impacts within the Subbasin.

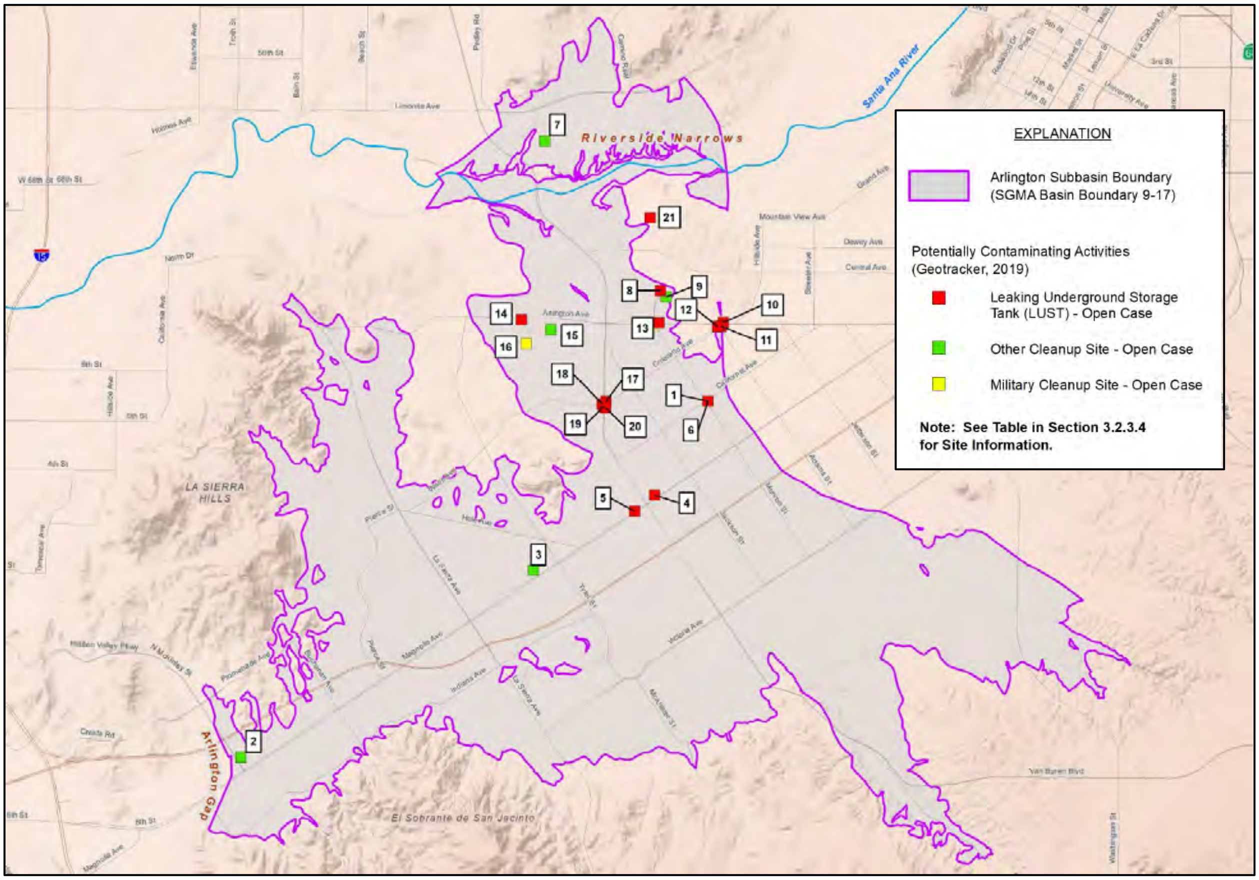

Figure 0-7. Potentially Contaminating Activities

0.3.4.4 Land Subsidence

Land subsidence is the loss of surface elevation due to removal of subsurface support, which can be caused by excessive groundwater pumping. There have been no historical measurements of subsidence and no identified instances of subsidence induced damage occurring in the Arlington Basin. Due to the composition of soils within Arlington Basin much of the basin is considered susceptible to subsidence. Currently there is no active subsidence monitoring program in the basin. Groundwater levels dropping below historical lows or the reporting of land subsidence within Arlington Basin will require additional land subsidence monitoring to be considered.

0.3.4.5 Groundwater-Surface Water Interactions

Although there are no major rivers in Arlington Basin, approximately three quarters of the total basin inflow is provided by boundary flow and recharge from both small watercourses within the basin and surrounding mountains. The Santa Ana River flows over an alluvial channel which directly overlies bedrock through the Arlington Basin. Therefore, there is no connection between the Santa Ana River and groundwater in the Arlington Basin except through fractures in the underlying granitic bedrock. The Arlington Channel, La Sierra Channel, and Arizona Channel are partially lined channels with sections composed of soils allowing water to soak into the ground and recharge underlying groundwater. Shallow groundwater can also discharge to surface water resulting in outflow from the basin in stream channels. In the northeast unlined channels recharged with groundwater have historically discharged into Hole Lake.

0.3.5 Water Budget Information

The Integrated SAR model was used to prepare the historical water budget for the historical period from 1966 -2016. The Integrated SAR model integrated five existing groundwater models in the Upper Santa Ana Valley Groundwater Basin into one groundwater model encompassing the entire basin. The five groundwater models include Yucaipa Basin, SBBA, Rialto-Colton Basin, Riverside-Arlington Basin, and Chino Basin models. For the existing Riverside-Arlington Basin model to be integrated the boundary conditions and other model features had to be transferred to a different orientation and cell size to match that of the Integrated SAR model. The model recharge and discharge terms were also updated monthly from January 2008 through December 2016 to create a data set that covered the entire Integrated SAR model calibration period, as previously the calibration period went from January 1965 through December 2007.

0.3.5.1 Historical Water Budget

The historical water budget for Arlington basin was provided by the Integrated SAR model over the calibration period from 1966-2016. The average value for each component of the water budget is presented in Figure 0-8 below. Historically, groundwater pumping makes up 5,820 af/yr of the total discharge from the groundwater basin. Underflow outflow to Temescal Basin makes up an average of 1,240 af/yr.

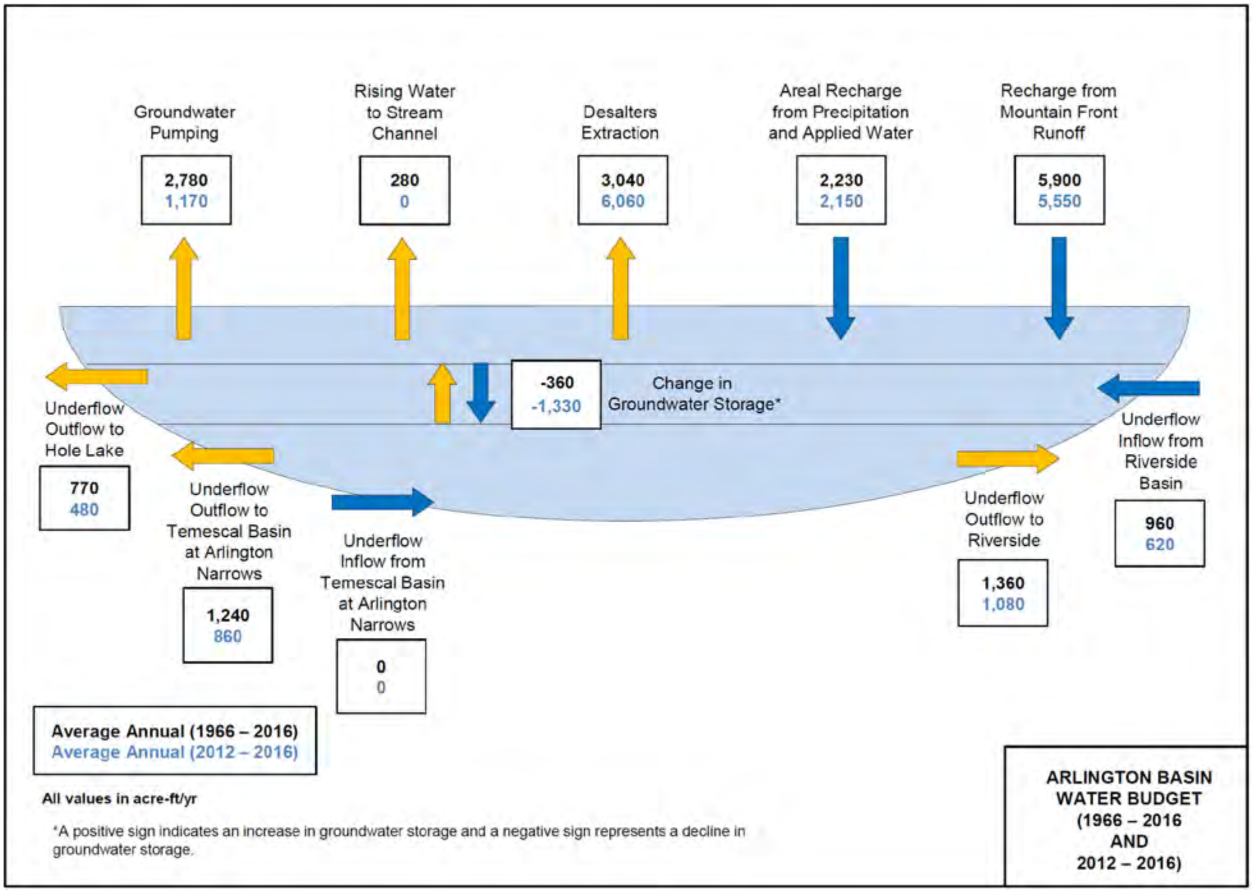

Figure 0-8. Historical and Current Water Budgets for Arlington Basin

0.3.5.2 Current Water Budget

The current water budget for Arlington Basin was evaluated for the period from 2012 through 2016 (i.e., last five years). Average annual inflows and outflows are also presented on Figure 0-8 above. Average groundwater pumping from all sources is 7,230 af/yr. This value is higher than the long-term historical average. The Arlington Desalter pumps an average of 6,060 af/yr during this period.

0.3.5.3 Sustainable Yield

The sustainable yield of the basin is the maximum amount that can be withdrawn annually from a groundwater supply without causing an undesirable result. For Arlington Basin, the sustainable yield was estimated over the historical period from 1966 through 2016 and assumed to be the sum of long-term groundwater pumping minus any decrease in groundwater storage over the same period. Groundwater pumping over the period from 1966 -2016 averaged 5,820 af/yr. Subtracting the long-term change in groundwater storage (360 af/yr), the sustainable yield would be estimated to be approximately 5,460 af/yr for average historical conditions, which is lower than the previous estimate of 6,000 af/yr for normal conditions made by earlier investigators. However, one of the desired results of Arlington Desalter operation is to reduce underflow of higher nitrate and TDS water to Temescal Basin (WRIME and WMWD 2012). Based on the results of the Integrated SAR calibrated model, Arlington Desalter operation reduces underflow outflow to an average of 860 af/yr from 1,240 af/yr over the simulation period. Excluding the difference in underflow outflow to Temescal, assuming operation of the Arlington Desalter, the sustainable yield is estimated to be approximately 5,840 af/yr.

0.3.5.4 Projected Water Budget

The historical and current water budgets are based on land use conditions an annual water demand pumping under the historical conditions for the period in question (1966 through 2016 for historical and 2012 through 2016 for current). The projected water budget accounted for water demands based on long-term water supply planning by basin stakeholders. Section 0-6 provides a discussion of potential Projects and Management Actions to achieve and maintain long-term stability of groundwater levels and water quality in the Arlington Basin. Proposed recharge activities at Victoria Spreading Basin were evaluated to support continued operation within the current sustainable yield of the groundwater basin and/or increase the sustainable yield through the addition of new water supplies. Initial modeling indicates that artificial recharge at Victoria Basin could provide the additional amount of groundwater recharge:

Table 0-1. Recharge Activities at Victoria Spreading Basin

Recharge Activity at Victoria Basin	**Additional Groundwater Recharge**	**Anticipated Change in Groundwater Storage Compared to Baseline**
	[acre-ft/yr]	
Stormwater Recharge	440	220
Recycled Water Recharge	340	190
Recharge of Groundwater from Riverside South	1,280	620

Recharge Activity at Victoria Basin	Additional Groundwater Recharge	Anticipated Change in Groundwater Storage Compared to Baseline
	[acre-ft/yr]	
Combined Recharge (Stormwater + Recycled Water + Riv-S Groundwater)	1,280	620

Note:
acre-ft/yr – acre-feet per year

Due to the increased groundwater recharge as a result of proposed spreading activities, sustainable yield of the Arlington Basin is anticipated to increase as well. The addition of other projects may also increase the sustainable yield of the basin.

0.4 Sustainable Management Criteria

Sustainable Groundwater Management is defined as the "…management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results…" (Water Code Section 10721 (v)). A GSP must also develop quantitative sustainability criteria that allow a GSA to define, measure, and track sustainable management for the sustainability indicators introduced in Section 0.1. However, based on the conceptual model, seawater intrusion and subsidence are not likely to occur. Therefore, these two conditions will be discussed only briefly in the sections below.

Sustainability criteria include the following:

- Undesirable Result (UR) – significant and unreasonable conditions for any of the six sustainability indicators.
- Minimum Threshold (MT) – numeric value used to define undesirable results for each sustainability indicator.
- Measurable Objective (MO) – specific, quantifiable goal to track the performance of sustainable management.
- Interim Milestone (IM) – target value representing measurable groundwater conditions, in increments of five years, set by the GSA as part of the GSP.

These sustainability criteria form the framework to define sustainable management particular to the basin and delineate between sustainable and unsustainable groundwater conditions based on current and proposed use. In addition, these criteria allow for real-time and consistent tracking of groundwater conditions to show progress towards sustainability, provide early identification of potential problems as they might arise, and allow for timely appropriate decisions to be made regarding additional or modified management actions.

0.4.1 Sustainability Goal

The sustainability goal for the Arlington Basin is to manage and preserve its groundwater resource as a sustainable water supply. To the greatest extent possible, the goal is to preserve historic operations of beneficial use in the basin as well as allow for future planned uses as conceived by the GSA and basin stakeholders. The sustainability goal will be accomplished by achieving the following objectives:

- Operate the Arlington Basin groundwater resource within the sustainable yield.
- Implement projects and management actions to reduce Arlington Basin groundwater demands, increase reuse of current supplies, obtain supplemental water supplies, and mitigate undesirable results.
- Monitor the Arlington Basin actively and thoroughly and adaptively manage projects and management actions to ensure the GSP is effective and undesirable results are avoided.

0.4.2 Approach to Sustainability Indicators

The approach to assess sustainability indicators and set the sustainability criteria began by qualitatively defining undesirable results based on a simple understanding that an undesirable result is something that cannot be allowed to happen since it would have a potentially unmitigable impact on beneficial users.

The monitoring of groundwater levels is directly tied to management of the volume of groundwater storage, so sustainability goals for managing groundwater levels are considered with groundwater storage goals. In addition, while there are no natural steam drainages in the Arlington Basin, there is some contribution of surface water flow to the Santa Ana River via Hole Lake.

0.4.3 Summary of Sustainable Management Criteria

The Minimum Threshold (MT) for:

- Chronic lowering of groundwater levels is defined at designated Key Wells by historical groundwater water levels and the elevation of the top of the well screens for the five known basin pumpers. Undesirable results are indicated when two consecutive exceedances occur in each of two consecutive years, in 50 percent or more of the Key Wells. The Measurable Objective (MO) is to maintain groundwater levels above the MTs and within the historical operating range.
- Reduction of storage is fulfilled by the MT for groundwater levels as a proxy. The MO for storage is also fulfilled by the MT for groundwater levels, which maintains groundwater levels within the operating range to protect operations of municipal wells in the basin and provide for a minimum five-year supply of groundwater.
- Degradation of water quality addresses TDS and nitrate. The MTs for TDS and nitrate are defined as the ambient groundwater quality. The MOs for both TDS and nitrate are defined as maintaining or reducing the percentage of wells with median concentrations exceeding the MTs.
- Depletion of interconnected surface water cannot be established based on the current available data. The MT for depletion of interconnected surface water with specific reference to Hole Lake will be reviewed for the 5-year update when additional data are collected and analyzed.

- Land subsidence is not of concern for the Arlington Basin due to a lack of significant thickness of compressible fine-grained sediments and the overall shallow character of the alluvial basin.
- Sea water intrusion in the Arlington Basin is also not thought to be a threat given the distance from the ocean and seawater intrusion efforts in between.

0.5 Monitoring Network

Groundwater monitoring is key to SGMA compliance as it provides the basis to evaluate groundwater level trends for sustainability and can be used to demonstrate measured progress toward achieving sustainability goals through implementation of the GSP. During development of the GSP, available well information was reviewed to identify wells in the groundwater basin that would provide a good foundation for characterizing current groundwater conditions and which could be used for future, ongoing monitoring after GSP implementation. Presently, groundwater level data are collected from wells in the basin and incorporated into regional groundwater level databases maintained by the Santa Ana Watershed Project Authority (SAWPA) and Western.

15 existing wells were identified that were available for the GSP monitoring (Figure 0-9). These include pumping wells owned and operated by Western and other public/private operations. After implementation of the GSP, the monitoring network will continue to provide representative data to evaluate GSP sustainability indicators and objectives, including groundwater levels, groundwater storage, water quality, land subsidence, and depletions in interconnected surface water, in accordance with the specific sustainability goals established by the GSA. A periodic re-evaluation of the representative monitoring sites will be conducted as data are collected and analyzed.

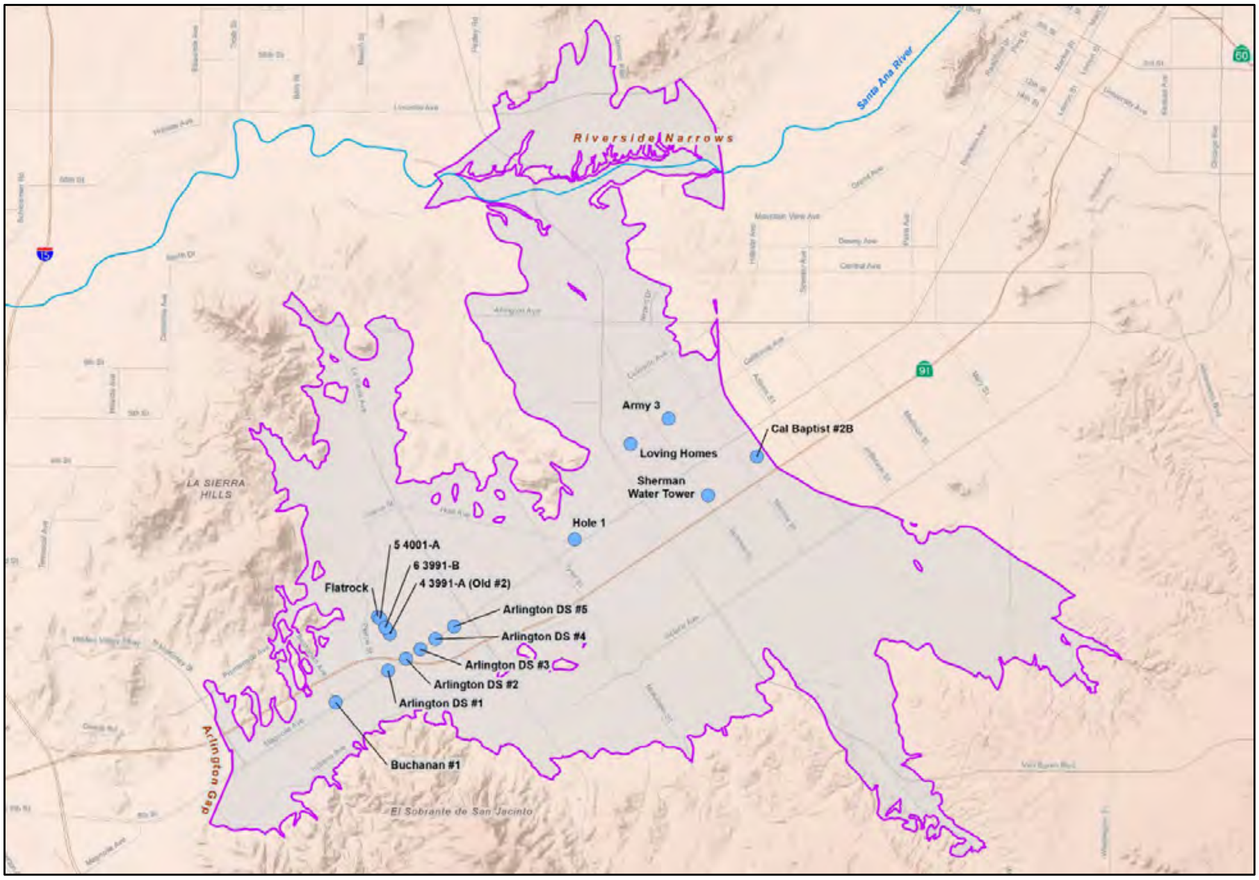

Figure 0-9. Arlington GSP Monitoring Network Wells

0.5.1 Groundwater Level and Groundwater Quality Monitoring Plan

Arlington Basin has been managing its groundwater for over 30 years. The continued use of existing water level and water quality monitoring programs and databases provides sufficient data from the basin to establish current (ambient) conditions for basin characterization and demonstrate short term, seasonal, and long-term trends in groundwater and any related surface water conditions. The data collected from the monitoring effort will allow the GSA to demonstrate measured progress toward achieving the sustainability goals set forth in the GSP and inform management decisions.

Presently, groundwater level monitoring is performed by Western and SAWPA personnel. Groundwater levels are measured at least twice a year, in spring and fall, and incorporated into regional groundwater level databases maintained by SAWPA and Western. Groundwater quality monitoring will not be conducted by the GSA. However, the GSA will obtain the ambient groundwater quality analysis prepared by SAWPA triennially. Although sampling will be performed by Western and others, any updates to the monitoring network (refinement of monitoring location, inclusion of additional monitoring location(s), etc.) will be discussed in the five-year update report. Groundwater Level and Groundwater Quality Monitoring Plan for this GSP will involves assimilating data from the current monitoring programs to use to evaluate the sustainability annually for the 5-year reporting.

0.6 Projects and Management Actions

The projects and management actions described in this section provide the framework to achieve the sustainability goal for the Arlington Groundwater Basin. Each project and management action will be considered during the GSP implementation, however not all will be needed for Arlington to reach its sustainability goal. Current and impending projects and management actions are expected to continue so long as assistance to achieve the Arlington Basin sustainability goal is provided. Implementation of select projects and management actions, active monitoring of the Arlington Basin, and adaptive management of the projects and management actions are intended to:

- Reduce Arlington Basin groundwater demands,
- Increase reuse of current supplies,
- Obtain supplemental water supplies, and
- Mitigate undesirable results.

Projects presented in this GSP utilize infrastructure, either new or requiring improvements, to utilize current water sources more efficiently and increase the availability of new water supplies for the Arlington Groundwater Basin. Proposed projects include:

- Stormwater Capture and Spreading: currently planned for Victoria Basin as the spreading facilities will allow infiltration of storm flows into the Arlington Basin aquifers.
- Groundwater Replenishment and Reuse: includes use of treated effluent from Riverside Regional Water Quality Control Plant (RWQCP) and the Western Riverside County Regional Wastewater Authority (WRCWRA) Treatment Plant through
  - Artificial Recharge using Recycled Water at Victoria Basin, and/or
  - Irrigation with Recycled Water
- Aquifer Storage and Recovery (ASR) or Managed Aquifer Recharge: involves the recharge of stormwater, recycled water, and groundwater pumped from the Riverside Basin at Victoria Basin.

The Integrated SAR Model was used to evaluate the effects of these three proposed projects and cumulative projects on groundwater levels and groundwater storage in the basin, specifically in regard to achieving MTs and MOs. The modeling results indicate that an ASR/Managed Aquifer Recharge project making use of surface water, recycled water, and groundwater pumped from Riverside Basin would increase groundwater storage and provide supplemental water supplies during droughts and bring the water balance of Arlington Basin into sustainability, with a slightly net positive change in groundwater storage. The largest increases in groundwater level from groundwater recharge at Victoria Basin (nearly 20 feet by the end of the 25-year simulation period – see Figure 0-10 below) is anticipated in the vicinity of the Arlington Desalter wells, as recharged water buoys water levels in this area. Once the ASR/Managed Aquifer Recharge project is implemented, benefits would be evaluated using the groundwater monitoring well network by comparing groundwater levels and groundwater quality against past observations. Continuous management would be needed to prevent excess groundwater extractions which could result in the drop of sustainability indicators below minimum thresholds.

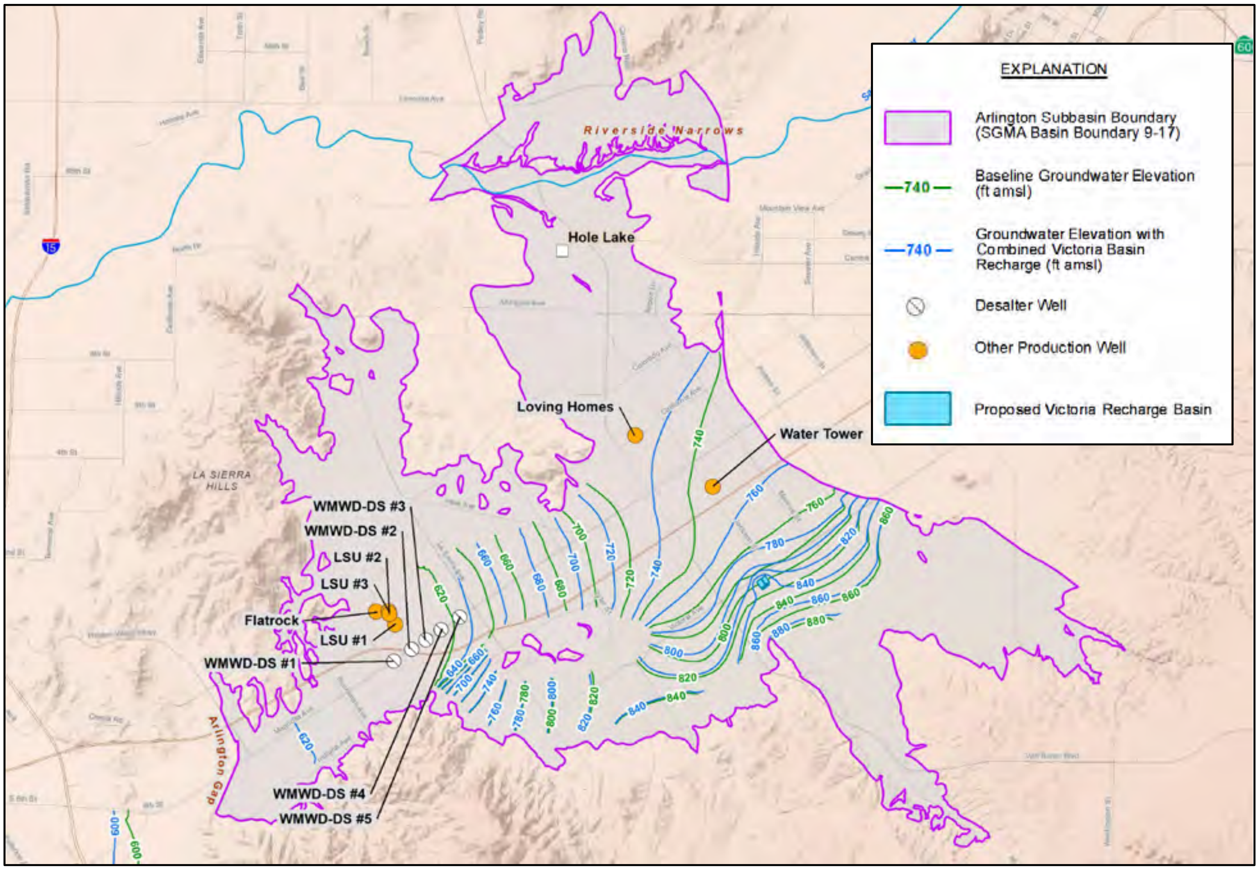

Figure 0-10. Model-Simulated Water Level Contours after 25 Years of Recharge at Victoria Basin

0.6.1 Additional Potential Projects and Management Actions

If monitoring indicates additional action other than recharge activities at Victoria Basin is necessary, the GSA will research the feasibility of implementing supplementary management actions and/or projects. Proposed projects will be prioritized by considering potential cost, available funding, and anticipated benefits to groundwater levels, storage, water quality, and/or interconnected surface water. Potential additional projects and management actions include:

- Metering infrastructure to track deliveries and/or pumping.
- Decreased evapotranspiration through the removal of invasive or nonnative riparian vegetation.
- Ongoing monitoring of groundwater levels and water quality to evaluate progress towards the Arlington Basin sustainability goal.
- Collection of pumping records, including the registration of all groundwater extraction facilities (except de minimis users).
- Water transfers/in-lieu groundwater recharge to replace groundwater pumping and provide passive recharge through the delivery of excess imported water.
- Water conservation activities such as community outreach, residential indoor and outdoor rebate programs, turf replacement, Qualified Water Efficient Landscaper Program (QWEL), code requirements such as gray water systems and rainwater collection systems, increased irrigation

efficiency, low impact development standards for new or retrofitted construction, and the imposition of SGMA or other available fees to encourage increased conservation.
- Redistribution of pumping to provide more uniform drawdown throughout the basin.
- Adaptive management of the groundwater basin so as to react to changing conditions and redirect efforts to achieve sustainability goals more effectively.
- Conjunctive use to ensure coordinated use of surface water and groundwater resources.
- Basin-wide economic analysis to conduct a cost/benefit analysis of proposed projects and management actions.
- Groundwater pumping curtailment and/or restrictions as a last resort effort to maintain sustainability.

0.7 Plan Implementation

During the first years of GSP Implementation, the primary functions will include data collection, through continued monitoring, and evaluation utilizing interim milestones to assess the progress towards sustainability, and ultimately achieving and maintaining sustainability goals. Required reporting will be conducted, along with communication to stakeholders and the public, during the on-going progress to sustainability. The Arlington Basin GSA will hire consultants, negotiate agreements with agencies, and/or hire staff to implement the monitoring and reporting functions.

0.7.1 Monitoring

Monitoring of the five sustainability criteria will be the center of GSP implementation in order to develop the necessary data to evaluate progress. Groundwater elevation data and groundwater quality data has been collected for many years in the Arlington Basin and will form the backbone for these efforts moving forward.

0.7.2 Reporting

SGMA regulations require all reports comply with DWR submittal requirements and be published by DWR, along with all transmittals signed by an authorized party. Data will be organized and made available to the public to document basin conditions relative to the sustainable management criteria. At a minimum, the following reports will be prepared:

- Annual reports to provide monitoring and total groundwater use data to DWR, compare monitoring data to the sustainable management criteria, and adaptively manage actions and projects implemented to achieve sustainability.
- Five-year GSP update reports to assess whether it is achieving the sustainability goal in the basin. The assessment will include a description of significant new information that has been made available since GSP adoption or amendment, whether new information or understanding warrants changes to any aspect of the plan, and documentation of any projects or management actions that are being implemented.
- GSP Periodic Evaluations and Amendments to address proposed sustainability goals for interconnected surface water and update water budgets as additional data becomes available.

Updates may incorporate additional monitoring data, update the sustainable management criteria, document any projects or management actions that are being implemented, and/or identify adaptive management activities.

0.7.3 Public Outreach

The Arlington Basin GSA will routinely provide information to the public about GSP implementation, progress towards sustainability, and the need to use groundwater efficiently. The Arlington Basin GSA website will be maintained as a communication tool for posting data, reports, and meeting information.

0.7.4 Estimation of GSP Implementation Costs

The cost to implement the GSP consist of administrative costs, technical costs, and reporting costs. Estimated costs are provided in Table 0-2 below. No fees will be collected by the Arlington Basin GSA for any of the currently planned projects. Additional funding, grants and loans, will be pursued to help pay for future project costs. If and when funding is secured, costs will be adjusted to reflect any updates or changes.

Table 0-2

Estimated Planning-Level Costs for First Five Years of Implementation

GSP Implementation Activity		Description	Estimated Cost	Cost Unit	Anticipated Timeframe
1.0	GSP Implementation and GSA Management				
1.1	GSA Administration and Legal Support	Update Agreements, Routine Operating Costs (Salaries, Office Space, Equipment, etc.), Update Website and Legal Support	$20,000	Annual	2022-2026
1.2	Stakeholder and Board Engagement	Stakeholder Outreach Costs and GSA Board Engagement Costs	$2,500	Annual	2022-2026
1.3	Public Outreach	Public Outreach Costs	$2,000	Annual	2022-2026
1.4	Water Conservation	Costs included in Public Outreach			2022-2026
1.5	GSP Implementation Program Management	Program Management Costs for GSP Implementation	$5,000	Annual	2022-2026
1.6	Monitoring Program with Data Management	Monitoring Program including Groundwater Levels and Groundwater Quality Monitoring	$12,000	Annual	2022-2026
1.7	Annual Reporting	Data Collection, Analysis, and Reporting - One year	$25,000	Annual	2022-2026
1.8	Five-Year GSP Update	Data Collection, Analysis, and Reporting - GSP Update	$75,000	Every 5 Years	2027
2.0	Projects and Management Actions				
2.1	Installation of Monitoring Wells	Two Additional New Monitoring Wells	$500,000	First 2 Years	2022-2024
2.2	Aquifer Storage and Recovery or Managed Aquifer Recharge*	Victoria Basins Recharge Project‡ Current Costs Represent Previous Expenditures for Feasibility, Construction, and Testing of Recharge Capacity for Victoria Basins.	$10 M	Completed	2018-2022
2.3	Water Transfer Recharge	Pump Water from Riverside South Groundwater Basin to Victoria Basins for Recharge into the Arlington Basin. Costs include New Well, Equipping, and Infrastructure to Riverside Canal.	$4M	First 5 Years	2022-2026
2.4	Recycled Water Recharge	Studies and Title 22 Permitting for Recharge of Recycled Water to Victoria Basins. Costs include Infrastructure to Transfer Recycled Water to Victoria Basins.	$1M	First 5 Years	2022-2026
2.5	Metering Infrastructure	Outreach and Equipment to De Minimis Pumpers. Voluntary Involvement in Metering Program.	$5,000	First 5 Years	2022-2026

Notes:

* Includes Stormwater Capture and Spreading, and Artificial Recharge with Recycled Water

‡The Victoria Basins Recharge Project is currently well along in the development phase and in position for stormwater capture. Future sources considered are recycled water and water transfers from Riverside Basin.

1.0 Introduction (§354.2)

On September 16, 2014, Governor Jerry Brown signed into law a three-bill legislative package, composed of AB 1739, SB 1168, and SB 1319, collectively known as the Sustainable Groundwater Management Act (SGMA), providing California with a framework for sustainable groundwater management for the first time in its history. SGMA aims to ensure the reliability and quality of critical groundwater resources throughout the state. Recognizing that groundwater is most efficiently managed at the local level and each groundwater basin is different, the intent of SGMA is to facilitate and strengthen local control and management of groundwater basins. For groundwater basins designated as medium or high priority, SGMA requires the formation of a Groundwater Sustainability Agency (GSA), responsible for developing and implementing a Groundwater Sustainability Plan (GSP) that considers the interests of all beneficial uses and users of groundwater in the basin. SGMA also requires that these basins reach and maintain sustainability within 20 years following plan implementation.

1.1 GSP Objectives

The Riverside-Arlington Groundwater Subbasin was designated as a very low priority basin under SGMA and therefore not requiring a GSP. However, Western Municipal Water District (Western) believes in good basin management and made the decision to continue the process of meeting with stakeholders and creating a plan for the basin. The Plan considers scientific data and local knowledge of the basin and describes basin conditions, including the geology of the basin and groundwater levels within it. The Plan also establishes sustainability goals for the basin and outlines steps and potential management actions to ensure sustainability.

1.2 GSP Organization and Preparation Checklist

Organization of this GSP generally follows the outline provided by the California Department of Water Resources (DWR). A description of each section is provided below. The SGMA regulation relevant to each subsection is specified in parentheses at the end of each sub-heading and a complete checklist is included as Appendix 1a.

- **Executive Summary** provides a succinct summary of the contents of the GSP.
- **Section 1.0 – Introduction** introduces the GSP, including objectives of the GSP, agency information, and GSP organization.
- **Section 2.0 – Plan Area** describes the geographic setting, existing water resources planning and programs, relationship of the GSP to other general-plan documents within the basin area, and additional GSP components such as land use plans, well and project permitting processes, control of saline water, and current groundwater projects.
- **Section 3.0 – Basin Setting** describes the physical components of the Arlington Groundwater Basin and provides a hydrogeologic conceptual model for the understanding of groundwater conditions in the subbasin and development of groundwater budgets.
- **Section 4.0 – Sustainable Management Criteria** describes the sustainability goals set by the GSA, defines undesirable results (URs), minimum thresholds (MTs), measurable objectives (MOs), and interim milestones (IMs).

- **Section 5.0 – Monitoring Network** describes the monitoring network that will be used following plan implementation to improve data coverage in data gap areas, assess sustainability criteria, and evaluate impacts from proposed projects and management actions, and outlines monitoring protocols and field sampling procedures.
- **Section 6.0 – Projects and Management Actions** provides a framework to achieve the sustainability goal for the Arlington Basin by listing potential management actions and/or projects that may be utilized to ensure long-term sustainability, mitigate potential undesirable results, and potentially increase sustainable yield of the subbasin through additional or supplemental recharge.
- **Section 7.0 – Plan Implementation** describes the GSP implementation process, including estimated costs, sources of funding, a preliminary schedule, methodology for annual and five-year reporting, and how progress evaluations will be made over time.

1.3 Agency Information (§354.6)

1.3.1 Mailing Address (§354.6(a))

Western Municipal Water District
14205 Meridian Pkwy
Riverside, CA 92518

1.3.2 Organization and Management Structure (§354.6(b), (c))

Western Municipal Water District (Western) has been designated as the GSA for the Arlington Basin.

Contact: Ryan Shaw, Director of Water Resources
Address: 14205 Meridian Pkwy, Riverside, CA 92518
Phone: (951) 571-7104
Email: rshaw@wmwd.com

Western is a public agency providing water, wastewater (sewer), and recycled water services to nearly 1 million people, both wholesale and retail customers, across 527-square miles in western Riverside County. Western's five-member board of directors comprise the governing body of Western. The Board of Directors are responsible to the members of the public of their respective division, and to the general public within the Western service area, for the proper conduct of Western affairs. Directors are elected to four-year terms by the registered voters in five geographic divisions. Divisions are apportioned by population. The five Director's terms are staggered to ensure continuity. While they do not have to be Western retail water customers, Directors must reside within their division.

To help with the creation of the Arlington Basin GSP, DWR awarded Western $130,000 in grant funding from the Proposition 1 Sustainable Groundwater Planning Grant Program. Additional information on costs associated with plan implementation is provided in Section 7.0.

1.3.3 Legal Authority of the GSA (§354.6(d))

Western, as GSA for the Arlington Basin, is authorized to manage groundwater per Water Code §10721(n) and SGMA throughout the Arlington Groundwater Basin.

2.0 Plan Area (§354.8)

The description of the Plan Area for Arlington Basin includes:

- General Physical Setting and Jurisdictional Areas,
- Existing Monitoring and Management Programs,
- Applicable Land Use Plans, and
- Other GSP Elements such as Well and Project Permitting Processes, Control of Saline Water, and Groundwater Projects

The Sustainable Groundwater Management Act (SGMA) regulation relevant to each subsection is specified in the parentheses at the end of each sub-heading.

2.1 General Setting and Jurisdictional Area (§354.8(a),(b))

The Arlington Basin Groundwater Sustainability Area (GSA) boundary is shown on Figure 2-1. However, the Plan Area that this Groundwater Sustainability Plan (GSP) applies to is the actual Arlington Basin, or Arlington Basin. The Arlington Basin is an alluvial filled valley located within the Perris Block of the northern Peninsular Ranges, approximately 17,053 acres in size (Figure 2-1). Ancient river and stream incision into the granitic bedrock plateau of the Perris Block likely created the narrow, moderately shallow valley within which the Arlington Basin exists (WRIME and Western 2012). Pleistocene to late Holocene aged alluvium later filled the valley, becoming the groundwater reservoir for the basin (Morton 2004).

Figure 2-1 shows the granitic La Sierra Hills to the north of Arlington Basin and the granitic mountains of El Sobrante de San Jacinto to the south, which act as boundaries to the Arlington Basin (WRIME and Western 2012). A groundwater divide, in the form of a relatively flattened mound of groundwater, exists to the east – dividing the Arlington and Riverside Basins (Eckis 1934). Groundwater flows into the Arlington Basin southwestward away from the divide. Northward from the divide, groundwater flows into the Riverside Basin towards the Santa Ana River (Wildermuth 2008). For the most part, the Santa Ana River flows just outside of and north of the Arlington Basin. To the southwest, the Arlington Basin - Temescal Basin boundary is drawn within a bedrock constriction (Eckis 1934). Although a basin boundary, groundwater flows into the Temescal Basin from the Arlington Basin at this bedrock constriction (Wildermuth 2008). The Chino Basin is also located northwest of the Plan Area.

The Arlington Basin Plan Area is entirely within Riverside County and encompasses the southern section of Riverside-Arlington Groundwater Subbasin, classified as subbasin 8.2-03 by the California Department of Water Resources' (DWR) Bulletin 118-03 (DWR 2003), located outside both the North and South Riverside Basin boundaries (see Figure 2-2). The Plan Area boundary dividing the Arlington and Riverside Basins is defined by the 1969 *Western Judgment Western Municipal Water District of Riverside County v. East San Bernardino County Water District*, County of Riverside Superior Court No. 78426 (1969). The Riverside-Arlington Groundwater Subbasin was designated as a very low priority basin under SGMA.

Section 3.0 – Basin Setting describes the hydrologic connection between Arlington Basin and adjacent basins and subbasins with existing technical data. Section 7.0 – Plan Implementation provides the details for collaboration with local agencies and relevant GSAs within surrounding basins. Relevant information on surrounding hydrologically connected watersheds is also provided within this GSP due to their importance as sources of inflow and outflow to the Plan Area. Care will be taken to distinguish the Arlington Basin Plan Area elements with that of the surrounding watershed areas.

Water agencies serving the areas overlying the Plan Area include the City of Corona (Corona), Riverside Public Utilities (RPU), and Western Municipal Water District (Western). Home Gardens Country Water District (Home Gardens) is in the adjacent Temescal Basin past the southwestern boundary of the Arlington Basin. Figure 2-3 shows the jurisdictional boundaries of these water agencies while Figure 2-4 shows municipalities and special lands within the Plan Area. Riverside is the majority overlying municipality of the Arlington Basin, along with a small portion of Corona (see Figure 2-4).

California protected areas within the Plan Area include the Hidden Valley Wildlife Area and Santa Ana River Wildlife Area along the Santa Ana River Trail and Parkway. The Santa Ana Trail and Parkway was developed by the Santa Ana River Conservancy Program, which is part of the Coastal Conservancy. In 2014, California state legislature created the Santa Ana River Conservancy Program to address the Santa Ana River resource and recreational goals of the Santa Ana River region (Senate Bill 1390). The Coastal Conservancy is a non-regulatory State agency that supports projects that protect coastal resources and increase opportunities for the public to enjoy California's coastal and wildlife areas. California Citrus State Historical Park is also located in the southeastern portion of the Plan Area and represents a State historic and cultural area (Figure 2-4).

2.1.1 General Land Use Characteristics

2012 land use within the GSA boundary was obtained from Southern California Association of Governments (SCAG 2015a) and is shown on Figure 2-5. This 2012 land use is used to illustrate existing land use conditions as it is the most recent SCAG publication available (SCAG updates occur approximately every five years). The four main categories of land use in the Plan Area are residential, commercial/ industrial/ public facilities, irrigated agriculture, and open space. Water supply needs in the Plan Area have shifted from being largely agricultural to largely urban over the latter half of the 20th century. Land use within Arlington Basin is approximately 45% residential, 21% commercial/ industrial/ public facilities, 21% irrigated agriculture, and 13% open space (SCAG 2015a). Citrus groves and wholesale nurseries predominantly compose the agricultural land use category. The majority of developed land is within the urban areas of the City of Riverside, Corona, and as scattered unincorporated areas within Riverside County.

2.1.2 Water Source Types and Water Use Sectors

Creating sustainable groundwater management in the Arlington Basin requires the efficient use of all the available water source types utilized by the Plan Area. While the Plan Area groundwater provides only a small portion of the water supplies needed in the Arlington Basin, it is recognized as a reliable local water source important to the sustainability of the region. The Arlington Basin has three primary water source types: groundwater (including groundwater from surrounding groundwater basins such as Rialto-Colton, Riverside, and Bunker Hill), imported water, and recycled water.

An overview of the three primary water source types is provided below. Section 3.0 – Basin Setting further describes water uses in relation to the Arlington Basin water budget. Section 6.0 – Projects and Management Actions provides additional information on future water use availability and feasibility.

2.1.2.1 Groundwater

Groundwater is produced in the Plan Area for use within and outside of the basin. Groundwater produced from the alluvial sediments in the Plan Area provides an important source of water for Western's Arlington Desalter and meets all, or a portion, of private groundwater producer demands within the basin. Private groundwater producers pump groundwater for irrigation, agricultural needs, and other uses. Western's Arlington Desalter produces groundwater for delivery outside of the Plan Area. Groundwater wells within the Plan area are shown on Figure 2-6.

Bedford, Bunker Hill, Coldwater, Rialto-Colton, Riverside, and Temescal Basin's groundwater is also used to meet demands in the Plan Area. Beside Western's Arlington Desalter, the only other water purveyor with a significant portion of its service area within the Plan Area is RPU, with approximately 27% of its service area within the Arlington Basin. All RPU's water supply comes from other groundwater produced outside the Plan Area.

2.1.2.2 Imported Water

Western is a wholesale purchaser of imported water from the State Water Project (SWP) and, to a smaller extent, the Colorado River Aqueduct. Imported water is used by Western to meet retail demands within the Arlington Basin as well as retail and wholesale demands outside of the Plan Area. Untreated imported water is delivered directly to retail agencies while all other imported water is treated at the Mills Filtration Plant.

2.1.2.3 Recycled Water

Wastewater in the Plan Area is treated at the Riverside Regional Water Quality Control Plant (RWQCP) and the Western Riverside County Regional Wastewater Authority (WRCWRA) Treatment Plant (TP). The Riverside RWQCP effluent requires tertiary treatment with filters and disinfection due to effluent use for water contact recreation. The effluent quality standard is equivalent to the Title 22 requirements for recycled water. The WRCWRA effluent is currently only recycled for direct reuse on the plant site. RWQCP supplies recycled water to the northern part of the Plan Area, near the boundary with the Riverside Basin. RWQCP customers include the Toro Manufacturing Company, Van Buren Golf Center, and Van Buren Urban Forest (Jones & Stokes 2006).

Potential future uses of recycled water in the Plan Area is discussed in Section 6.0 – Projects and Management Actions.

2.2 Water Resources Monitoring and Management Programs (§354.8(c),(d),(e))

2.2.1 Existing Monitoring Programs and Networks

Existing monitoring programs and networks in the Plan Area measure and record a variety of data used to understand the Arlington Basin and study natural and anthropogenic effects on the aquifer system. This section provides a description of the existing monitoring programs and networks utilized in the Plan Area. The assessment of the existing monitoring networks and programs adherence with the DWR's GSP Regulations is described in Section 5 – Monitoring Network.

2.2.1.1 Groundwater Monitoring

Within the Plan Area, groundwater levels, groundwater production, and groundwater quality are currently monitored. However, there is currently no active subsidence monitoring program due to the absence of past instances of subsidence induced damage. Given the geologic and hydrogeologic conditions that exist in the area, it is unlikely that subsidence will occur in the Arlington Basin. The geologic and hydrogeologic conditions are described in Section 3.0 – Basin Setting.

2.2.1.1.1 Groundwater Level Monitoring

Groundwater level data are collected from wells in the basin and incorporated into regional groundwater level databases maintained by the Santa Ana Watershed Project Authority (SAWPA) and Western. The details of these databases, as described by Western, are as follows:

- *Cooperative Well Measuring Program Database* - Maintained by Western, this database includes data from 74 cooperating agencies and firms and their nearly 4,500 wells in the Upper Santa Ana, San Jacinto, and Santa Margarita Watersheds. Groundwater level data in this database are available from 1993 to present and include fall and spring measurements. Data are available in various other formats under the Cooperative Well Measuring Program from 1964 to present.
- *Santa Ana Basin Relational Information Network Application (SABRINA) Database* - Maintained by SAWPA, this database contains monitoring data for 10,000 wells in the Santa Ana River Watershed and surrounding areas. Groundwater level data are available from 1904 to 2003. The SABRINA database is used to share groundwater monitoring data between agencies for groundwater management and geographic information system analysis.
- *Santa Ana Watershed Data Management System (SAWDMS)* - Maintained by SAWPA, this database covers most of the Santa Ana River Watershed with groundwater level data available from the 1910 to present. The SAWDMS contains over 765,000 records related to approximately 6,600 wells in the Santa Ana Watershed and appurtenant groundwater basins. The SAWDMS is used primarily to reflect and store the triennial reports on water quality and water levels (Cozad 1998; S. Mains, pers. comm., February 4, 2009; M. Norton, pers. comm, October 12, 2011).[1]

It should be noted that the two SAWPA databases described above have been combined into one database.

2.2.1.1.2 Groundwater Production Monitoring

As part of the Annual Notices of Groundwater Extraction and Diversion Program, groundwater production within the Plan Area is recorded and submitted to the California State Water Resources Control Board (SWRCB). In 2005, Western, along with other local agencies, was given authority by SWRCB to continue this program for the Arlington Basin and surrounding watersheds. Groundwater production submissions are made in compliance with Water Code Sections 4999 et seq. and compiled into annual Water Extraction Reports by the cooperating agencies. Filings are required when more than 25 acre-feet of groundwater is

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[1] Western (Western Municipal Water District), 2012. Arlington Basin Groundwater Management Plan: 2-20

extracted from wells in Riverside, San Bernardino, Los Angeles, or Ventura Counties. Few exceptions are made. In 2009, total groundwater production from production wells in the Plan Area was 8,603 acre-feet (WRIME and Western 2012).

2.2.1.1.3 Groundwater Quality Monitoring

Groundwater quality within the Plan Area is continuously monitored to meet the California Department of Public Health's (CDPH's) requirements specified in Title 22 of the California Code of Regulations. All active municipal production wells must comply with CDPH's requirements. Groundwater quality data are collected through many different programs at the local, state, and national levels. An evaluation of data from the groundwater quality monitoring programs described below is provided in Section 3.0 – Basin Setting.

SAWPA Ambient Water Quality Recomputation Project for the Santa Ana River Basin

The Plan Area groundwater quality is poor, particularly with respect to ambient water quality related to TDS and nitrate as nitrogen. SAWPA currently maintains an ambient groundwater quality monitoring program for TDS and nitrate (as nitrogen) and provides point statistics by management zone. The management zones distinguish unique groundwater units based on groundwater flow and water quality with boundaries placed along distinct groundwater flow systems and impermeable barriers to groundwater flow (Wildermuth 2000).

California Department of Toxic Substances Control (DTSC)

In addition to poor ambient water quality, contamination from point sources can also remove production wells from service by introducing and spreading contaminates within an aquifer system. The DTSC protects California's people and environment from toxic substances through the restoration of contaminated resources, enforcement of hazardous waste laws, reduction of hazardous waste generation, and encouragement to manufacture chemically safer products. The Envirostor database provides cleanup tracking, access to permitting, and enforcement and investigation efforts. Based on a search of DTSC's Envirostor database, there is one site with action required that is potentially affecting the aquifer system: Camp Anza. Camp Anza was used to train and supply troops for embarkment to the Far East Theatre of Operations during WWII and had hundreds of buildings, 59 petroleum fuel oil storage tanks, and a railroad spur. Camp Anza encompassed 1,240 acres and was a training location for chemical weapons, utilizing tear and chlorine gases. The Santa Ana Regional Water Quality Control Board is the lead agency for the cleanup of Camp Anza (Envirostor ID: 33970009), which includes potential contaminants of explosives (UXO, MEC) and chlorine. The site is located off Arlington Ave, west of Van Buren Boulevard in Riverside, California. A preliminary assessment report is due December 2019.

Environmental Protection Agency (EPA)

The EPA works to protect human health and the environment at the Federal level. The EPA develops and enforces regulations, studies environmental issues, and provides tools to advance environmental education, among many other responsibilities. Continued close coordination with regulatory agencies, like the EPA, protect not only aquifer systems but also surface waters, the land we live on, and the air we breathe.

2.2.1.2 Subsidence Monitoring

There is currently no active subsidence monitoring program in the Plan Area since no measurements of historical subsidence are available and no instances of subsidence induced damage have been identified. Land subsidence monitoring will likely not be considered in the future due the nature of the aquifer systems in the basin.

2.2.1.3 Climate Monitoring

Weather monitoring stations can provide a range of invaluable data, including the precipitation data used to determine a Basin water budget. With an accurate water budget, a strategic plan for the Basin's future water supply needs and steps to prepare for drought conditions may be created.

The primary weather station used to calculate mean annual rainfall for the Arlington Basin is Station 179. Station 179 is just north of the Plan Area. The Riverside County Flood Control and Water Conservation District collects daily precipitation data at this and several other stations. The data record for Station 179 extends as far back as 1881 and continues to the present day.

2.2.2 Existing Management Programs and Studies

Regulatory guidelines, planning recommendations, and other existing documents are currently used to manage Plan Area groundwater and the groundwater surrounding the Arlington Basin. These management programs and studies have been developed by multiple agencies and organizations for a variety of purposes. This section summarizes the most relevant groundwater management programs and studies in the Arlington Basin Plan Area.

2.2.2.1 1969 Western Judgment

The Arlington Basin is included in the adjudication finalized by the Western Judgment. The northern boundary of the Arlington Basin forms the southern boundary of the Riverside Basin, which is included in the Western Judgment.

For complete details of the Judgment, review *Western Municipal Water District of Riverside County v. East San Bernardino County Water District*, County of Riverside Superior Court No. 78426 (*Western* 1969).

2.2.2.2 Santa Ana River Judgment

On October 18, 1963, the Orange County Water District (OCWD) filed a complaint seeking an adjudication of water rights against nearly all water users within the Santa Ana River Watershed in the area tributary to Prado Dam. The San Jacinto Watershed was excluded as it is tributary to Lake Elsinore. The Santa Ana River Judgment provides a regional intrabasin allocation of the Santa Ana River System surface flow as a solution to the declaration of rights of water users in the Lower Area of the Santa Ana River Basin, downstream of Prado Dam, against those in the Upper Area tributary to the Prado Dam (Orange 1969). Western, along with Valley District and Inland Empire Utilities Agency, represent the Upper Area interests requiring implementation of a water management plan in compliance with the Judgment. OCWD represents all lower basin entities located within Orange County downstream of Prado Dam.

The court appointed a five-member Watermaster committee to submit an annual report analyzing basic hydrologic and water quality data. For both Riverside Narrows and Prado Dam, total dissolved solids (TDS) at Riverside Narrows, TDS at Prado, and the relationships between electrical conductivity and TDS concentrations are determined. Also calculated at both locations is the base flow, amount of non-tributary flow (flow to be excluded from base flow), adjusted base flow, amount of storm flow, cumulative credits or debits to Upper Area parties, and minimum required base flow for the following water year.

For complete details of the Judgment, review *Orange County Water District vs. City of Chino et al.*, County of Orange Superior Court No. 117628 (*Orange* 1969).

2.2.2.3 Santa Ana Basin Water Quality Control Plan

The 1995 Water Quality Control Plan for the Santa Ana Basin (Basin Plan) was developed by the Santa Ana Regional Water Quality Control Board (RWQCB 2016) and has since been updated in February 2008, June 2011, and February 2016. The Basin Plan was created singularly for the Santa Ana Basin to protect and improve, where possible, the quality of waters within the basin, which includes the upper and lower Santa Ana River Watersheds, the San Jacinto River Watershed, and several other small drainage areas. The Basin Plan includes:

- Current regional water quality differences and conditions,
- Beneficial uses of regional groundwater and surface water,
- Local water quality conditions and concerns,
- Statements of water quality goals and policies,
- Established water quality standards for regional groundwater and surface water,
- Discussions of solutions, and
- An implementation plan to achieve and maintain regional water quality standards (RWQCB 2016).

The Basin Plan incorporates a TDS and Nitrogen Management Plan for the Santa Ana Region. The Arlington Management Zone covers the bulk of the Plan Area, with a smaller portion covered by Riverside-D, Riverside A, Chino South, and Temescal Management Zones, as shown on Figure 2-7. The boundaries delineating the management zones reflect groundwater basin boundaries providing “hydrologically-distinct groundwater units from a groundwater flow and water quality perspective” (Wildermuth 2000). The boundary between Riverside D and Arlington Management Zones is based on a variable groundwater divide dependent on recharge and extraction in the area.

A point statistical method was developed to use nitrate as nitrogen (N) and TDS to: 1) evaluate the status of water quality, 2) to compare sub-basin concentrations, and 3) trigger management actions (RWQCB 2016; Wildermuth 2011). Point statistics were used to calculate for each Management Zone:

- Historical ambient water quality conditions represented by 1954 through 1973,
- 1997 Current ambient water quality conditions represented by 1978 through 1997,
- 2003 Current ambient water quality conditions represented by 1984 through 2003,
- 2006 Current ambient water quality conditions represented by 1987 through 2006, and
- 2009 Current ambient water quality conditions represented by 1990 through 2009.

The TDS and nitrate as N water quality objectives are based on the historical ambient water quality conditions represented from 1954 through 1973. For the Arlington Basin Management Zone, Basin Plan

Objectives are 10 mg/L for nitrate as N and 980 mg/L for TDS. Additional discussion on water quality in the Plan Area and surrounding management zones is provided in Section 3.0 – Basin Setting.

The RWQCB's principal means of achieving the water quality objectives is by regulating the quality of wastewater discharge that may impact surface and groundwater quality. The RWQCB regulates wastewater discharge with National Pollutant Discharge Elimination System permits, waste discharge requirements, water reclamation requirements, water quality certification, and waste discharge prohibition. The RWQCB, with recommendations from the CDPH, issue permits for groundwater recharge involving recycled water.

2.2.2.4 Western Integrated Regional Water Management Plan

The Western Integrated Regional Water Management Plan (IRWMP) identifies and evaluates water management strategies while also attending to local and regional water quality issues. With rapid growth and increased future demands, Western requires long-range water supply planning to meet current and future water supply reliability needs. In the IRWMP, approximately 90 loosely defined projects are identified by Western's member agencies and stakeholders (Kennedy 2008).

The projects were scrutinized, refined, and categorized based on project effectiveness, support of water management strategies, project commitment, and other criteria addressing disadvantaged communities being served and benefits provided. The projects were separated into three categories: Ready-Regional, Ready-Local, and Future Planning. Of the approximately 90 projects, five regional projects and two local projects are classified as Ready. Projects under the Ready categories have enough funding or planning progress for implementation within the next three years to occur. Projects grouped into the Future Planning category require more funding to proceed or are at a conceptual level of the planning process (Kennedy 2008).

Ready Projects of particular interest to the Plan Area include:

- Regional
  - Riverside Pump Station #1 (Raub Regional Emergency Supply Project)
  - Riverside-Corona Feeder – Central Reach
  - Riverside-Corona Feeder – Southern Reach
  - Riverside/Arlington Groundwater Basin Model
  - Western Water Use Efficiency Master Plan
- Local
  - Arlington Desalter expansion of 3.6 million gallons per day
  - City of Riverside system interconnections (WRIME and Western 2012)

2.2.2.5 Santa Ana Watershed Integrated Regional Water Management Plan

In 2009, SAWPA and numerous stakeholders collaborated to create the IRWMP "One Water One Watershed" (OWOW) for the Santa Ana Watershed, which includes the Arlington Basin. OWOW was created to solve regional-scale water problems with the participation of all water interests in the planning process. Identified in the OWOW were the following critical threats to water resources in the Santa Ana Watershed:

- Reduced water supplies:
    - Imported from the Colorado River
    - Due to Sacramento-San Joaquin Delta vulnerability
- Hydrology and groundwater recharge disturbance due to population growth and development
- Increasing water needs in the region

The OWOW goal for the Santa Ana Watershed is to become drought-proofed and salt-balanced with economic and environmental viability. The first step in reaching this goal was determining the major needs of the watershed by cooperative planning. Addressing the major needs of the Santa Ana Watershed requires planning to 1) increase storage, 2) recycle water, 3) desalinate groundwater, 4) consider stormwater as a water supply, and 5) develop risk-based water quality improvements.

The first project evaluation has been completed for the OWOW Plan. Projects at the regional scale that are multi-benefit and jurisdictional were established to meet the needs of the region. The OWOW Plan is now in the middle of being updated. To help achieve the OWOW goal for the Santa Ana Watershed, supplementary system-wide integrated projects will be established and added to the OWOW Plan.

2.2.2.6 Metropolitan Water District of Southern California Integrated Water Resources Plan

The Metropolitan Water District of Southern California (Metropolitan) developed an integrated water resources plan (IRP) to help achieve a future reliable regional water supply. The original IRP, developed in 1996, involved a two-phase process of over two and a half years to determine regional targets for the development of diverse water supply resources. These water resources include conservation, water received from regional storage, water purchased through water transfers, and water from local, SWP, and the Colorado River Aqueduct water supplies.

Phase 1 of the IRP required data collection analysis and decision-making. During Phase 1, resource options were identified, water demands were projected for the future, reliability targets for the region were calculated, and resource management as well as business principles were defined. Design for a preferred source water mix occurred in Phase 2, along with the review of management efforts from coordinated local water agencies.

Metropolitan's IRP was updated in 2004, 2010, and again in 2015. Western's Arlington Desalter Expansion is the local project identified in the Plan Area, as Metropolitan is supportive of efficient management and use of local water resources (Metropolitan 2004). The 2010 and 2015 IRPs focus on meeting future water needs by expanding local supply development while maintaining the reliability of traditional imported supplies from Northern California and the Colorado River. Reduced demand through conservation and water use efficiency initiatives continues to be an important factor in the IRP's strategy for achieving reliable regional water supply (Metropolitan 2015).

2.2.2.7 Arlington Basin Groundwater Management Plan

The Arlington Basin Groundwater Management Plan (GWMP) provides a sustainable management structure and operation for the Arlington Groundwater Basin to ensure reliable long-term supply for all stakeholders in the basin (WRIME and Western 2012). The development of the GWMP was directed by the Arlington Basin GWMP Advisory Committee, composed of water agency representatives. The GWMP purpose is to:

- Inform the public on the challenges and opportunities presented by groundwater and overall importance of groundwater to the Arlington Basin,
- Develop consensus among stakeholders on issues and solutions related to groundwater,
- Build relationships between Arlington Basin stakeholders and local, state, and federal agencies, and
- Define actions for developing projects and management programs to ensure long-term sustainability of groundwater resources in the Arlington Basin.

The Riverside-Arlington Groundwater Flow model is a saturated groundwater flow model that was developed to assist in the development of the GWMP (WRIME 2011). Simulating impacts and benefits on the groundwater basin by the various programs, projects, and existing operations helps ensure that future groundwater planning efforts are designed to meet the goal of the GWMP. To support the GWMP goal, an overall groundwater strategy for the Arlington Basin is presented in three parts: Basin Management Objectives (BMOs), Elements, and Implementations.

The BMOs are quantifiable, adaptive, objectives with defined monitoring, reporting, and responses. The following four BMOs are described in the GWMP: 1) maintain acceptable groundwater levels, 2) maintain or improve groundwater quality, 3) implement land subsidence monitoring, and 4) manage the interaction of surface water and groundwater for the maintenance of groundwater and surface water quantity and quality. The Elements of the GWMP describe the actions to achieve the BMOs and GWMP goals. The GWMP Elements are also grouped into four broad categories: groundwater volume, groundwater quality, monitoring and management, and coordinated planning.

Finally, the Implementation portion of the GWMP requires the execution of the actions described in the Element section. The Plan Implementation section describes a sample of individual opportunities, programs, and projects that will support the GWMP Elements, meet the BMOs, and reach the overall GWMP goal for the Arlington Basin. A description of the development of governance structure, dispute resolution, financing plan, and a GWMP Implementation schedule is provided.

2.3 General Plan and Related Plan Land Use Planning (§354.8(f))

2.3.1 General Plan

In addition to current land use (Section 2.1.1), General Plan land use was also available through SCAG (2015b; see Figure 2-8). SCAG’s 2012 general plan land use and zoning data was developed for the 2016 Regional Transportation Plan/Sustainable Communities Strategy to aid in forecasting land supply and to be used as a planning tool. The dataset is parcel-based and was reviewed by local jurisdiction staffs during the SCAG's Local Input Process. Future land use within Arlington Basin is anticipated to be approximately 60% residential, 34% commercial/ industrial/ public facilities, 3% irrigated agriculture, and 3% open space.

2.3.2 Future Water Demand and Supply

The Plan Area and the surrounding region are experiencing growth, and water demands are anticipated to increase as a result. While the majority of the Plan Area is developed for urban or agricultural use, projected growth will occur through infill throughout the basin. As competition for imported water supplies continues to become more intense and as drought, regulatory changes, and potential catastrophic failures threaten imported supplies, groundwater will continue to play a key role in creating a cost-effective and reliable water supply in the Plan Area through private production and operation of desalters for potable municipal use.

Groundwater management is the planned and coordinated local effort of sustaining the groundwater basin in order to meet future water supply needs. The GSP outlines necessary procedures to manage the basin through varying hydrologic conditions as well as planned extractions and recharge activities. The basin management approach outlined in this GSP will work towards:

- Maintaining a sustainable, high quality water supply for agricultural, environmental, and municipal uses;
- Preventing unacceptable declines in groundwater levels;
- Maintaining groundwater levels to assure an adequate and affordable water supply;
- Establishing mutually acceptable quantitative limitations on groundwater extractions to limit adverse impacts;
- Protecting groundwater quality; and
- Facilitating groundwater replenishment and cooperative management projects.

The Plan Area also functions within a regional context where growth outside of the basin impacts the total water demand and changes in supplies outside the basin impact water availability in the basin; both changes in demand and changes in supply impact the demands placed on Plan Area groundwater.

2.3.3 Well Permitting Policies and Procedures

The Riverside County Community Health Agency’s Department of Environmental Health (DEH) issues all well destruction permits as well as permits for all new water well construction in the basin including, but not limited to, community water supply wells, agricultural wells, extraction wells, monitoring wells, and driven wells.

Once the permit is filled out with the required information, it can be emailed to ecp@rivco.org or dropped off in-person at one of the County of Riverside Department of Health’s offices. Permit fees can be mailed in, brought in-person, or credit card payments may be provided over the phone for an additional processing fee.

Water well application:
http://www.rivcoeh.org/Portals/0/documents/forms/landuse/Water%20Well%20Application%20(EPO-90).pdf?ver=2018-11-20-105004-230

Monitoring well application:
http://www.rivcoeh.org/Portals/0/documents/forms/ECP/Monitoring%20Well%20Application%20(EPO-243)%20Fillable.pdf?ver=2019-01-04-150014-677

2.4 Additional GSP Elements (§354.8(g))

2.4.1 Control of Saline Water Intrusion

The surrounding Temescal and Riverside Basins have lower TDS, thus higher quality groundwater, than Arlington Basin (Wildermuth 2011). In this situation, management of the Arlington Basin groundwater to minimize potential impacts on neighboring basins is required to control saline water intrusion. The flow of Arlington Basin's lower quality groundwater to the surrounding basins is minimized by reducing the groundwater levels within Arlington Basin. Also, the Arlington Desalter exports groundwater, after salt removal, while natural and artificial recharge to the Arlington Basin occurs. The cycling of groundwater into and out of the basin may improve the overall groundwater quality if recharged water entering the basin is of a higher quality. Maintaining control of saline water intrusion will require continued Arlington Basin groundwater monitoring and desalter operations.

2.4.2 Wellhead Protection and Recharge Areas

The whole of Arlington Basin is a recharge source with the amount of existing recharge controlled largely by land use and soil conditions. Continued protection is required to maintain high quality recharge and potentially enhance recharge quantity. The most important recharge sources in the basin are small watercourses and boundary flows from the neighboring mountains. Unlined channels composed of soils that best allow water to soak into the ground are regarded as the highest priority recharge preservation areas. Although Arlington Basin groundwater is not used as a potable source in the Plan Area, it is utilized as a non-potable source. To protect the Arlington Basin groundwater quality into the future, all land uses threatening the quality must be identified and future land decisions should consider all long-term effects on groundwater quality.

2.4.3 Migration of Contaminated Groundwater

The regulation of contaminated groundwater flow is critical for protecting groundwater currently in use within the Plan Area. A better understanding of contaminated sites and improved cleanup efforts results from the coordination of local regulatory agencies and open sharing of information on the basin groundwater system, contamination site, and wells within the Arlington Basin. Advances in treatment technologies also have the potential to transform contaminated groundwater into a renewed source of potable or non-potable groundwater.

2.4.4 Well Abandonment and Well Destruction Program

Preventing the migration and introduction of surface contaminants to the connected aquifer system by an existing abandoned or incorrectly constructed well requires proper destruction of the well. In Arlington Basin, the Riverside County Community Health Agency's DEH administers all well destructions. Procedures for proper well destruction are provided in the California Well Standards, Bulletin 74-90 (DWR 1990).

2.4.5 Well Construction Policies

The DEH issues permits for all water well construction in the basin. Inspections take place during several stages of well construction to ensure all standards listed in the California Well Standards, Bulletin 74-90 (DWR 1990), are met. Once installation is complete, all drinking water wells are evaluated to confirm compliance with minimum drinking water standards. A clearance letter authorizing use is issued to the homeowner once the water well is found to be in compliance, after construction is finalized. Upon request, bacterial and chemical water sampling can be provided.

2.4.6 Groundwater Contamination Cleanup, Recharge, Storage, Conservation, Water Recycling, and Extraction Projects

Properly designed and executed future projects will help the Arlington Basin reach water quantity, quality, and subsidence objectives. A summary of the project(s) for each category is provided below.

- Groundwater Contamination Cleanup:
    - Point-source (e.g., leaking underground tank) contamination has a potential responsible party with which the regulatory agencies and other surrounding agencies and municipalities will coordinate with during cleanup activities. Point-source cleanup aims to transform the contaminated area to a renewed water supply source. The regulatory agencies will conduct the cleanup activities with the potentially responsible party, who will be requested to pay for the impacts to the water system.
    - Non-point source (e.g., nitrate and TDS) contamination in the Arlington Basin will require desalter wells to help cleanup and control saline water intrusion.
- Recharge:
    - Storm, surface, recycled, and imported water can all be types of recharge to the basin. Projects will provide groundwater recharge that is beneficial to both water quality and quantity. Additional facilities to capture recharged water are not expected to be needed or constructed.
- Storage:
    - Only construction of additional small-scale water harvesting, and detention basins are anticipated in the Plan Area.
- Conservation:
    - Water demand management in the Arlington Basin relies heavily on conservation. Western and RPU have signed the Memorandum of Understanding of the California Urban Water Conservation Council and actively engage in and are committed to implementing best management measures. Metropolitan’s “Save Water – Save a Buck” conservation incentive program is currently implemented by the Arlington Basin’s agencies and water-efficient landscape outreach has been an active focus for Western.
    - Further support is needed for outreach programs to promote conservation through use of innovative technologies, conservation in both urban and agricultural areas, and educational programs to promote protection of groundwater quality. Dry wells and gray water system installations, when applicable, should be continuously encouraged – particularly in new developments – as well as the installation of cisterns and infiltrators to capture rainwater from rooftops during drier months and help control flooding during heavy storms.
- Water Recycling:

  - Riverside RWQCP and the Western Riverside County Regional Wastewater TP are the two tertiary treatment plants that can provide recycled water in the Plan Area. Regional cooperation can minimize costs related to recycled water system development while plant operator and water purveyor partnerships can increase the area surrounding the plants allowed to utilize recycled water. A balance of recycled water usage and the Santa Ana River in-stream flow must be reached, as per the Santa Ana River Judgment.
  - Potential users of recycled water are identified based on conveyance costs, water quality and volume needs, as well as overall timing. Exploration of increased uses of Riverside RWQCP's non-potable groundwater is provided in the City of Riverside's Recycled Water Master Plan and includes examples like expanding existing distribution systems or exchanges with the Gage Canal Company.
- Extraction:
  - Construction of additional groundwater extraction wells to meet future demands is expected. To reduce the impact of increased extraction, groundwater modeling for larger wells will be performed during planning stages and, when feasible, new extraction wells will be paired with recharge facilities.

2.4.7 Efficient Water Management Policies

Water conservation is a key part of water demand management and efficient use of water in the basin. RPU and Western are signatories to the Memorandum of Understanding of the California Urban Water Conservation Council and participate in demand-side management measures. These agencies have committed to implement best management practices to reduce water demand. Basin agencies also participate in Metropolitan's "Save Water – Save a Buck" water conservation incentive program. Western has been especially active in developing outreach for water-efficient landscapes.

2.4.8 Relationships with State and Federal Regulatory Agencies

The Riverside-Arlington Subbasin GSA has been established to create this formal GSP for the Arlington Basin. The GSP and related reports and documents will be submitted to DWR. Continued coordination and cultivation of new connections with federal and state agencies is crucial for the continued sustainable management of Arlington Basin's groundwater. Federal and state agencies provide grant funding and loans, information, and services related to monitoring, water rights, and contamination sites.

The development of working relationships with the following federal and state regulatory agencies should continue to be pursued:

- Federal
  - Environmental Protection Agency (EPA)
  - United States Geological Survey (USGS)
- State
  - Department of Public Health (DPH)
  - Department of Toxic Substances Control (DTSC)
  - Department of Water Resources (DWR)

  - Regional Water Quality Control Board (RWQCB)
  - State Water Resources Control Board (SWRCB)

2.4.9 Land Use Plans and Efforts to Coordinate with Land Use Planning Agencies to Assess Activities that Potentially Create Risks to Groundwater Quality or Quantity

Areas of recharge and wells that act as conduits to aquifers have a larger susceptibility of becoming contaminated from surface pollution. There are certain land uses and activities that have a greater potential to impact groundwater quality and should therefore be minimized in these higher at-risk areas. This strategy requires coordinated planning between stakeholders and land use planning agencies with access to well location maps, groundwater production maps, and updated soil properties to assist in planning decisions.

Environmental impact reports should be continuously monitored and commented on to help ensure the protection of groundwater resources. Water agency involvement in land use planning will also increase with the development of water supply assessments and documents describing a water supply's sufficiency based on several hydrogeologic and economic factors. Limiting contamination risk is a more viable strategy than relying on mitigation after land uses are already in place.

2.4.10 Impacts on Groundwater Dependent Ecosystems

The only groundwater dependent ecosystems in the Plan Area are located along the Santa Ana River in the northern part of Arlington Basin. However, since the Santa Ana River flows over shallow bedrock at this location, the aquifer material is very thin. As such, there is very little interaction between the Santa Ana River and the Arlington Basin. Pumping within the Plan Area is not anticipated to affect streamflow in the Santa Ana River, nor is flow from the Santa Ana River anticipated to contribute any appreciable recharge to the Arlington Basin.

2.5 Notice and Communication (§354.10)

Under the requirements of SGMA, GSAs must consider interests of all beneficial uses and users of groundwater when developing a GSP. As a result, the GSP development needs to consider effects to other stakeholder groups in or around the groundwater basin with overlapping interests. These interests include, but are not limited to, holders of overlying groundwater rights (including agriculture users and domestic well owners), public water systems, local land use planning agencies, environmental users, surface water users, federal government, California Native American tribes, and disadvantaged communities.

The development of a GSP is a collaborative process involving all interested stakeholders. Public input is critical to the success of the Arlington Basin GSP and was a key component of its development. Notification and communication activities for the development of this GSP were guided by the Communications and Engagement (C&E) Plan (Appendix 2a). The following tactics were implemented throughout the development of the GSP:

- **Stakeholder education:** included educational content to inform stakeholders about what groundwater is, the requirements of SGMA, why sustainable management of groundwater is important in the Arlington Basin, and how they can get involved in the GSP development.

- **Project webpage:** maintained under the Western website, the project webpage contains project information and resources, opportunities to get involved, resources, commonly asked questions, and contact information. Available at: https://wmwd.com/530/Arlington-Basin-Groundwater-Sustainabili
- **Virtual public workshops:** held remotely due to COVID-19, these workshops gave stakeholders the opportunity to share their perceptions, opinions and ideas to inform key GSP decisions.
- **Stakeholder public comment period:** the project team opened a public comment period for a minimum of 30 days to allow public to review and comment on the draft GSP.
- **Western Executive Team and Board updates:** regular monthly project updates to the Western Executive Team and relevant board committees.
- **Project email list:** to receive periodic updates and reminders of upcoming opportunities to participate throughout the plan development.

Public meetings and workshops included:

- April 1, 2019: Project Kickoff Meeting
- July 30, 2020: Workshop No. 1 - Building a shared vision for a "sustainable Arlington Basin"
- August 27, 2020: Workshop No. 2 - Getting to sustainability
- April 7, 2021: Virtual Workshop No. 3 - Review of draft sustainability goals
- November 23, 2021: Virtual Workshop No. 4 - Project and management actions

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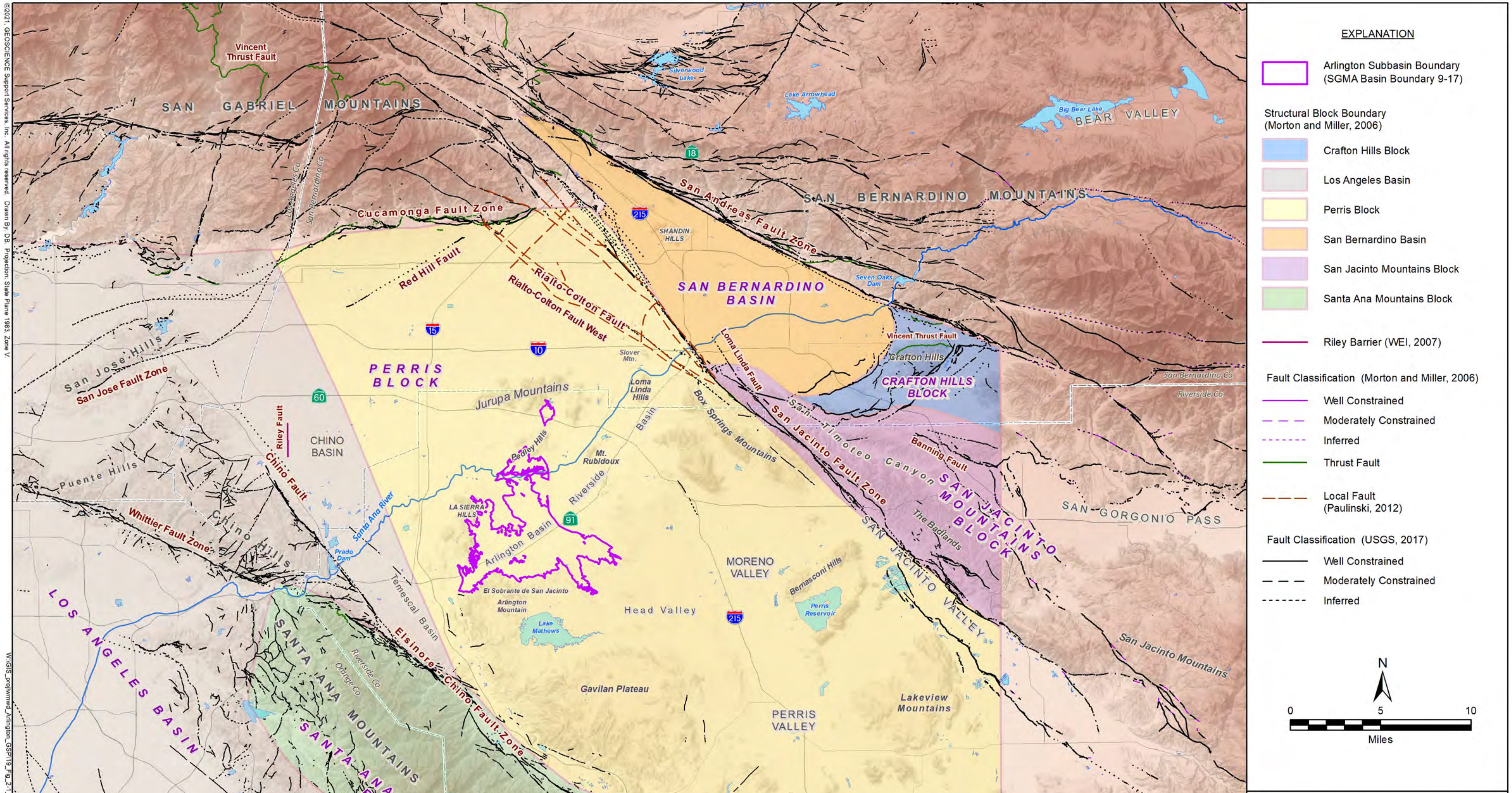
Drawn By: DB. Projection: State Plane 1983, Zone V.



ARLINGTON BASIN SETTING

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Nov-21

WESTERN MUNICIPAL WATER DISTRICT

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FIGURE 2-1

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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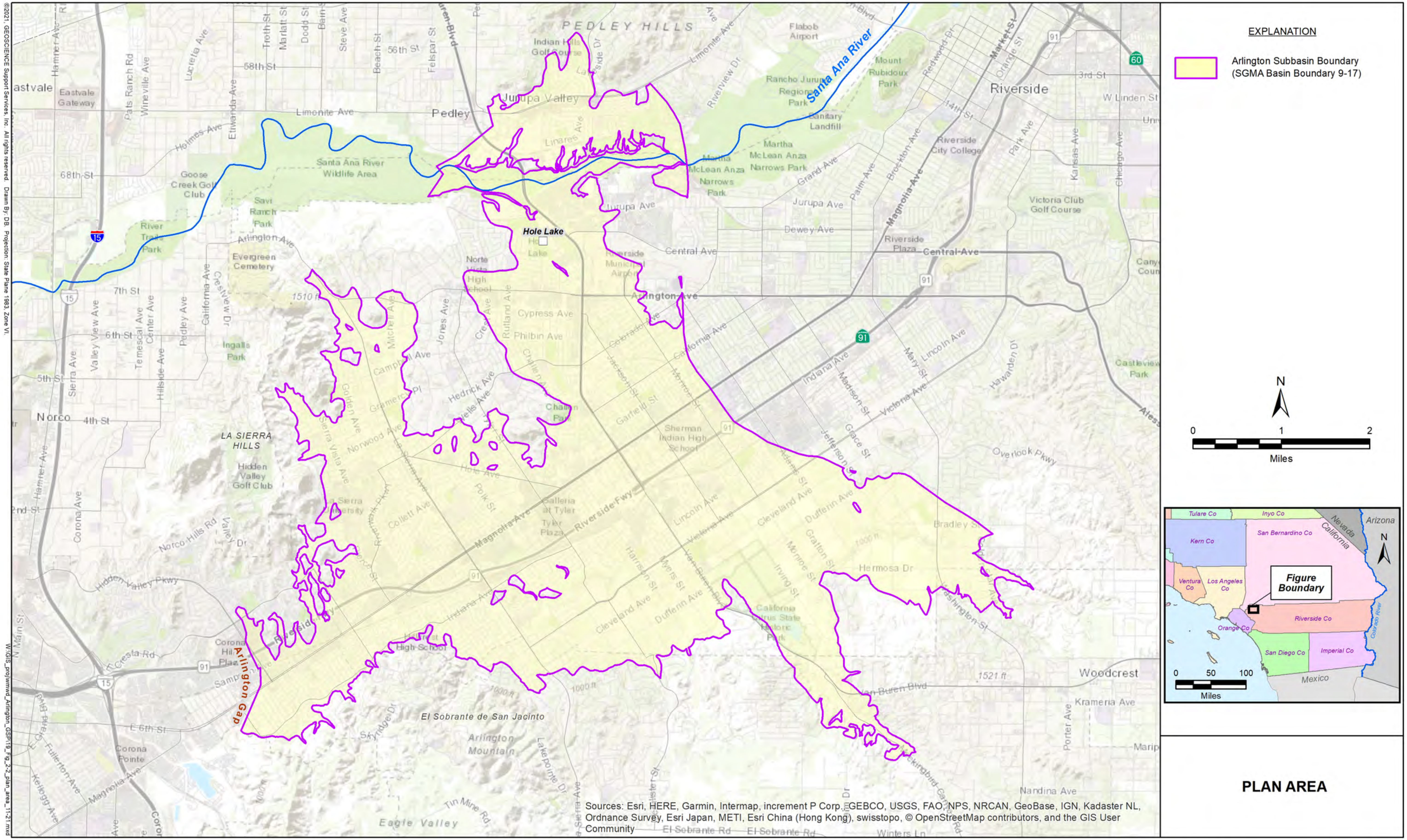

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

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PLAN AREA

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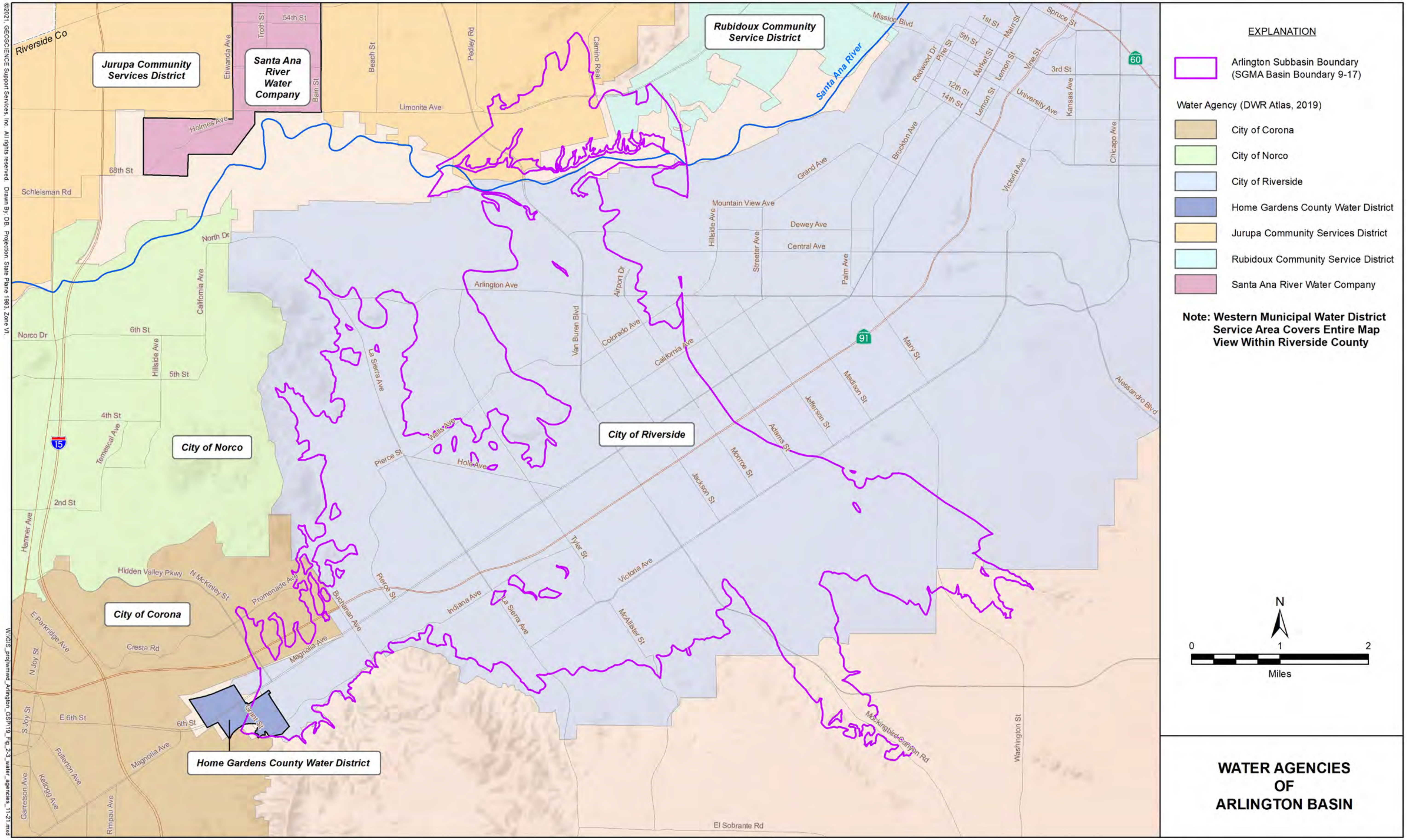
FIGURE 2-2

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

GEOSCIENCE



Note: Western Municipal Water District Service Area Covers Entire Map View Within Riverside County

WATER AGENCIES OF ARLINGTON BASIN

Nov-21

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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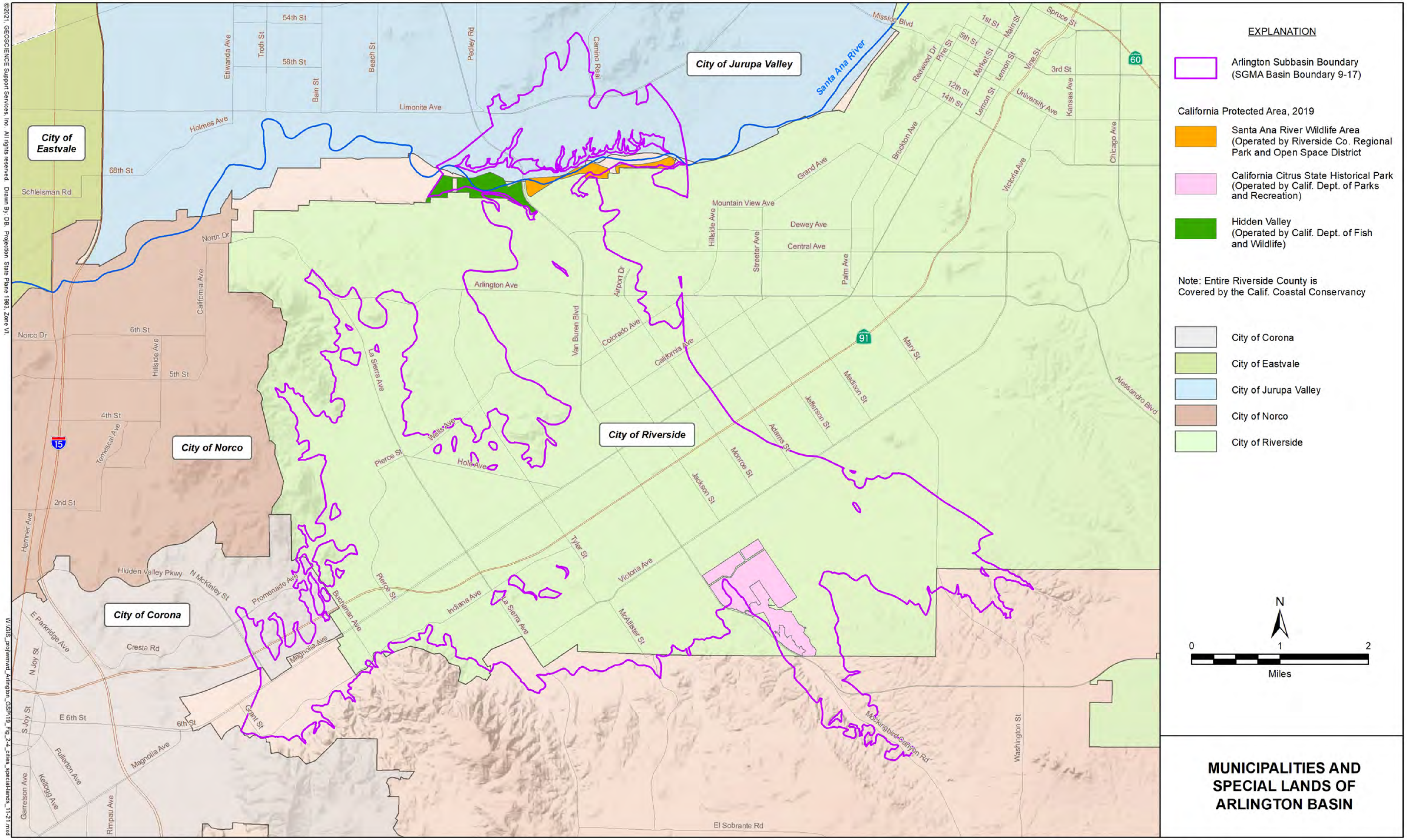
FIGURE 2-3

GEOSCIENCE



MUNICIPALITIES AND SPECIAL LANDS OF ARLINGTON BASIN

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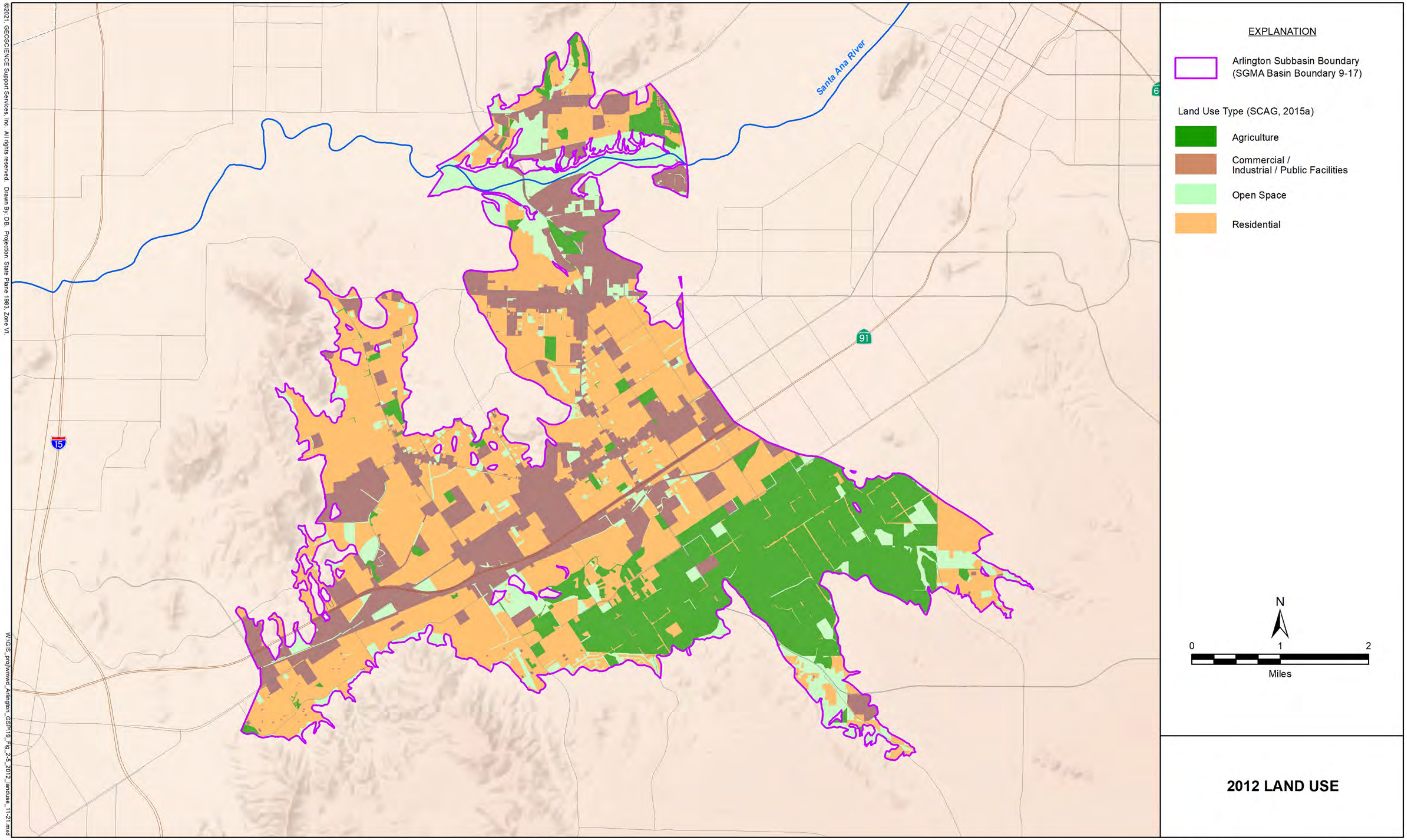
FIGURE 2-4



2012 LAND USE

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FIGURE 2-5

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WELL DISTRIBUTION

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WESTERN MUNICIPAL WATER DISTRICT

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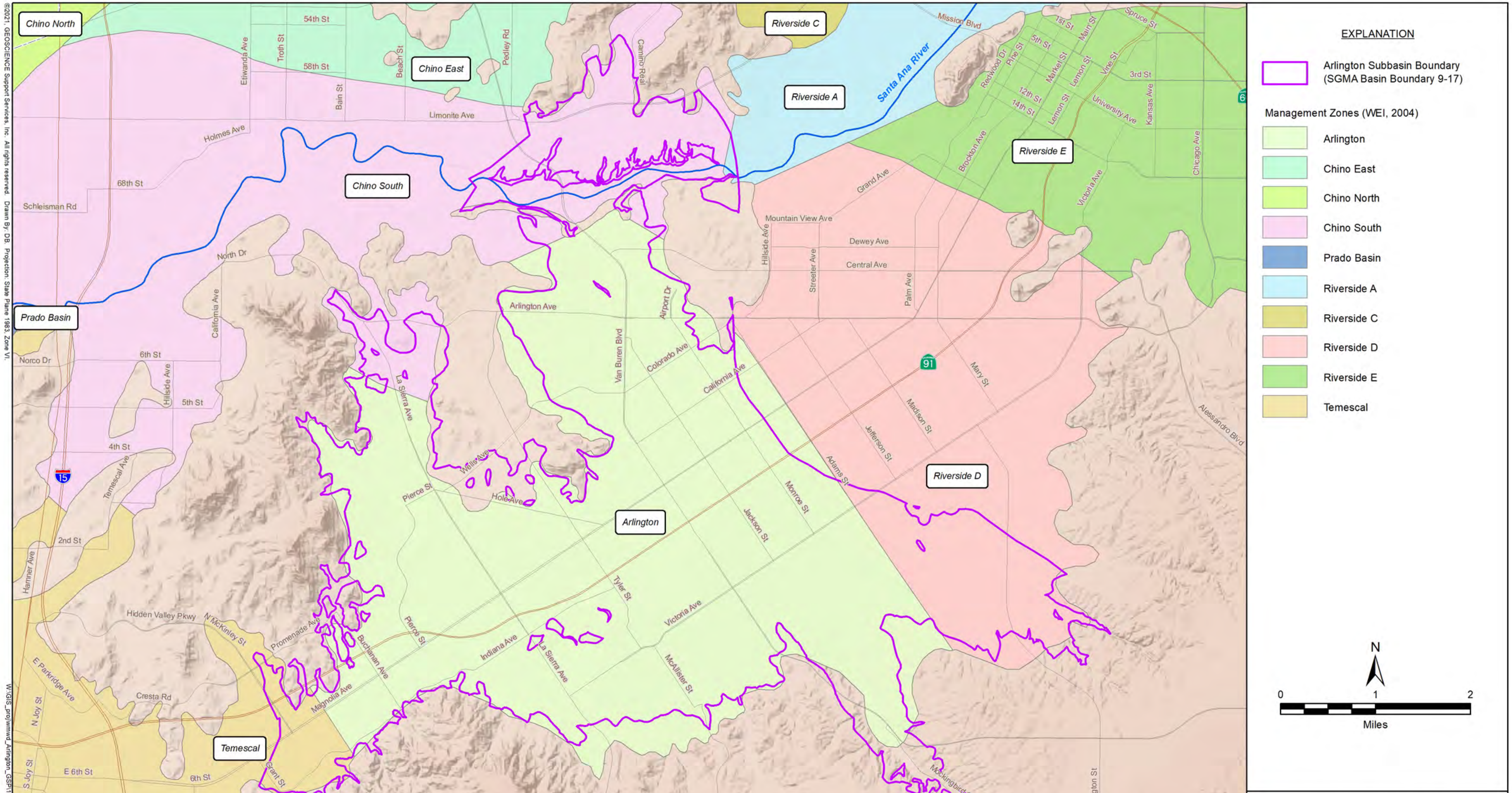
FIGURE 2-6

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

GEOSCIENCE



MANAGEMENT ZONES
OF
ARLINGTON BASIN

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WESTERN MUNICIPAL WATER DISTRICT

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FIGURE 2-7

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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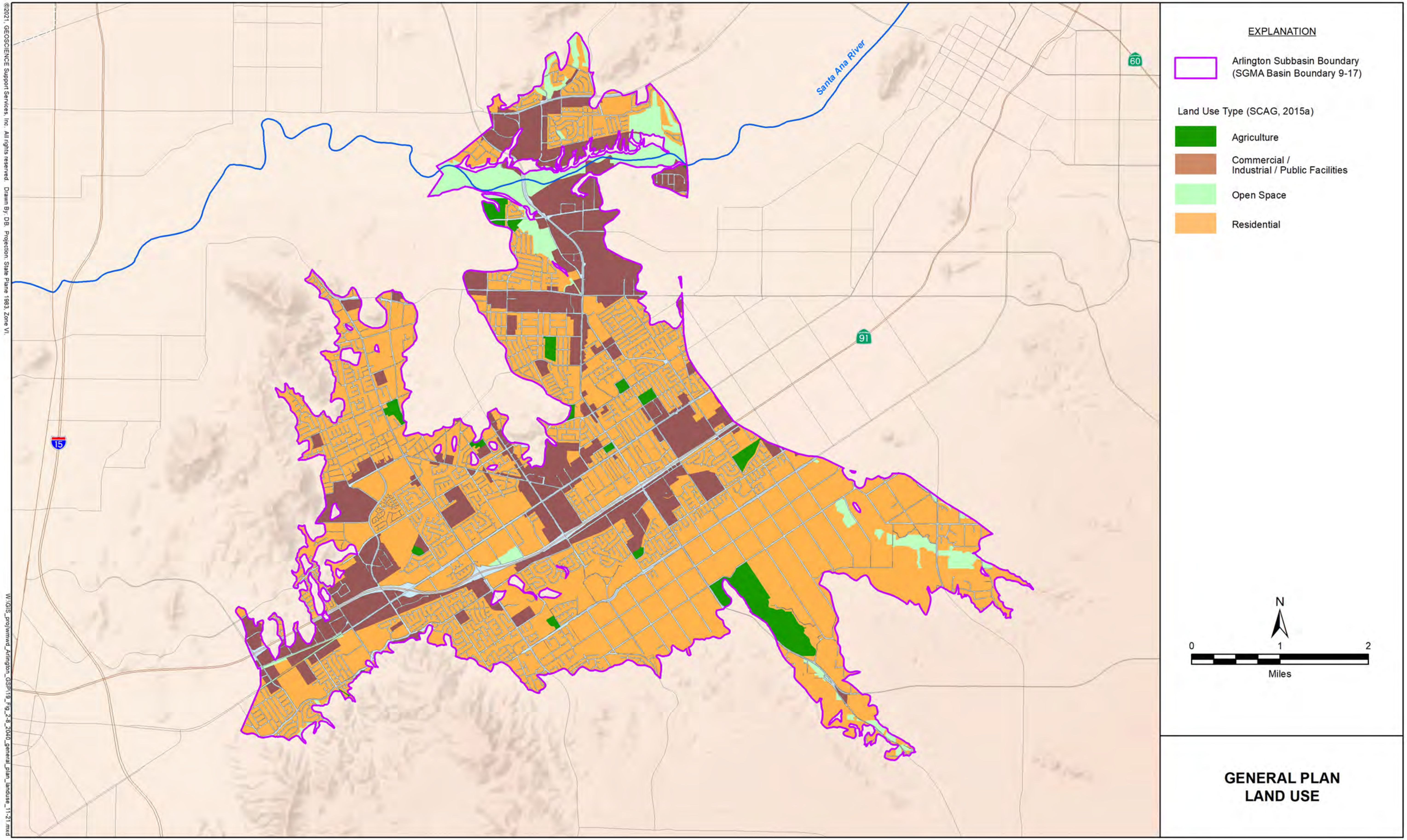

GENERAL PLAN LAND USE

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Nov-21

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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FIGURE 2-8

GEOSCIENCE

3.0 Basin Setting (§354.12)

The Arlington Groundwater Basin is located within the Perris Block of the California Peninsular Ranges Province which separated from the San Gabriel Mountains and San Bernardino Basin on the northeast by the Cucamonga Fault Zone and San Jacinto Fault Zone, respectively and from the Los Angeles Basin (Chino Hills) and Santa Ana Mountains on the southwest unnamed structural feature and the Elsinore Fault Zone, respectively (see Figure 3-1). The Peninsular Ranges Province is characterized by a series of northwest trending valleys and mountain ranges, extending from the Los Angeles Basin to the tip of Baja California, formed by faults branching from the San Andreas Fault (CGS 2002, WRIME and Western 2012). Arlington Basin is one of the numerous major groundwater basins within the Santa Ana River (SAR) Watershed. The SAR Watershed encompasses approximately 2,800 square miles. Surface water and groundwater flow from topographic highs to the Pacific Ocean, however groundwater flow is highly controlled by the geology of the area. The SAR flows more than 100 miles to reach the Pacific Ocean and is the largest stream system in southern California (Kennedy 2008).

3.1 Hydrogeologic Conceptual Model (§354.14(a),(b),(c),(d); §354.16; §354.18)

3.1.1 Sources of Inflow and Outflow (Recharge and Discharge)

The Arlington Basin is supplied with groundwater by precipitation, infiltration of flow within unlined stream channels, percolation of irrigation over agricultural and native lands, and underflow from the Riverside Basin (Eckis 1934). Generally, groundwater flow in the Arlington Basin mimics the surface drainage patterns moving from areas of recharge in the north and south highlands towards the central axis of the basin eventually flowing southwesterly out of the basin through a bedrock constriction, known as the Arlington Gap or Narrows (see Figure 3-2), into the Temescal Basin (Wildermuth 2008, Eckis 1934). At the Arlington – Riverside Basin boundary groundwater flows southwestwardly away from the underlying groundwater divide into Arlington Basin. The most important recharge sources in the basin are small watercourses and boundary flows from the neighboring mountains (WRIME and Western 2012).

Groundwater discharge from the Arlington Basin occurs primarily as groundwater production from wells. Shallow groundwater discharge to surface water, ultimately resulting in outflow from the basin in stream channels, and sub-surface flow to the Temescal Basin at the Arlington Gap to the southwest are two other sources of groundwater discharge from the Arlington Basin (Wildermuth 2008). In the northeast channels recharged with groundwater ultimately discharge into Hole Lake (Eckis 1934). Groundwater is produced from the Pleistocene to late Holocene aged alluvium sediments in the Plan Area.

3.1.1.1 Watershed

The SAR Watershed covers a total area of approximately 2,800 square miles. The geology of the SAR Watershed is the result of historical seismic activity, of which many fault systems are still active today. The prominent feature of the watershed is the northwesterly trending San Andreas fault zone at the base of the San Bernardino Mountains. The highest elevations of the watershed include the San Bernardino Mountains, San Gabriel Mountains, San Jacinto Mountains, Santa Ana Mountains, and the Chino Hills with primary slope direction from northeast to southwest. The San Jacinto fault zone and Elsinore fault zone are two other major fault structures within the SAR Watershed (Kennedy 2008).

Surface water and groundwater flow from topographic highs to the Coastal Plain before entering the Pacific Ocean. The SAR is the largest stream system in southern California, flowing more than 100 miles to the Pacific Ocean from the San Bernardino Mountains. The SAR flows perennially from the City of San Bernardino to the City of Riverside. Groundwater flow in the watershed is highly controlled by the underlying geology but generally flows in the same direction as surface water. Figure 3-3 shows the Arlington Basin Watershed.

3.1.1.2 Intermittent Streams and Springs

Minor intermittent streams and flood control channels are distributed throughout Arlington Basin and are ultimately tributary to the Santa Ana River (Wildermuth 2008). Riverside County Flood Control and Water Conservation District (RCFCWCD) operates the partially lined Arlington, La Sierra, and Arizona flood control channels (WRIME and Western 2012). There are no perennial (year-round) streams in Arlington Basin. The drainage map for Arlington Basin, including intermittent surface water flow in ephemeral streams, pipelines, and canals is shown in Figure 3-4.

In general, surface water flow is dictated by the intensity and duration of precipitation, surrounding topography, rock and soil type present, and vegetation cover. Overland flow generally occurs when the volume of precipitation exceeds the infiltration capacity of the soil it falls upon. Infiltrating precipitation into underlying soils provides some groundwater recharge. The volume of precipitation is reduced as it is intercepted, retained, and transpired back to the atmosphere by vegetation. Evaporation is another naturally occurring mechanism that returns precipitation to the atmosphere.

Spring water refers to any natural discharge of water from rock or soil defined as “water derived from an underground formation from which water flows naturally to the surface of the earth” at an identified location (CH2M 2011). Although Arlington Basin has had historically high-water levels, in large part due to return from irrigation waters, there are no naturally occurring springs or wet areas associated with springs in the basin.

3.1.1.3 Aquifer Systems and Hydrostratigraphy

The alluvial sediments of the Arlington Basin are underlain by granitic Basement Complex like the bounding hills to the north and south, forming a rock-bounded trough overlain with gravel, sand, silt, and clay up to 250 feet (ft) in the center of the basin. Based on available geologic and geophysical data, the stratigraphy of the Arlington Basin is separated into two naturally occurring divisions: the water-bearing sediments, which comprise the groundwater reservoir and are composed of alluvial deposits (see Figure 3-5), and the consolidated bedrock, which encloses the groundwater reservoirs with impermeable formations (Eckis 1934). Groundwater is generally unconfined and found primarily in the Quaternary Period alluvial deposits. There is no data to support a multi-layer aquifer system within Arlington Basin (Wildermuth 2008).

The consolidated bedrock underlying Arlington Basin are composed of Middle Cretaceous aged intrusive crystalline igneous rocks and Paleozoic to Mesozoic metamorphic basement complex (Larsen et al. 1958). Although fracture zones in the bedrock may yield water, they are typically unable to sustain production as a result of inadequate storage capacity. Weathering and erosion of the surrounding bedrock hills, as well as the Santa Ana River and its tributaries, provided sediment sources for the alluvial fill in the Arlington Basin (Eckis 1934, Wildermuth 2008).

From early Pleistocene to present day sediment deposits have been erode, transported, and deposited on top of the consolidated bedrock in Arlington Basin. The water-bearing sediments are interbedded, discontinuous layers of gravel, sand, silt, and clay (Wildermuth 2008). At the center of Arlington Basin, the alluvial sediments are over 200 ft thick pinching out along the northern and southern basin boundaries where ground surface contacts the consolidated bedrock forming the bounding hills. Groundwater is approximately 30 ft below ground surface (bgs) in the center and westerly portion of Arlington Basin and roughly 40 ft bgs in the southeast (WRIME and Western 2012).

Production wells supplying The Arlington Desalter were test-pumped at a capacity over 2,200 gallons per minute (gpm) while minor production in the Arlington Basin is between 500 to 1,500 gpm (WRIME and Western 2012). High specific capacities of many wells in the basin, 60 to 100 gpm/ft-drawdown, coupled with the relatively thin (less than 200 ft) saturated zone indicates high hydraulic conductivity within the saturated sediments.

3.1.2 Geologic Setting (§354.14(d))

The Arlington Groundwater Basin is located within Riverside County, California, which is a part of the California Peninsular Ranges Province (see Figure 3-1). The Peninsular Ranges Province is characterized by a series of northwest trending valleys and mountain ranges, extending from the Los Angeles Basin to the tip of Baja California, formed by faults branching from the San Andreas Fault (CGS 2002, WRIME and Western 2012). Arlington Basin is a part of the Perris Block of the northern Peninsular Ranges. The Peninsular Range Batholith, what would become the underlying consolidated bedrock for Arlington Basin, was emplaced during the Cretaceous Period with the subduction of the Farallon Plate. During the Cenozoic Period, as the San Andreas Fault jumped inland, mountain-building activity rapidly accelerated and most of the modern Peninsular Ranges were uplifted, with granitic rocks intruding the older metamorphic rocks (Bordelon 2012, CGS 2002). The Peninsular Ranges sit on the western side of the San Andreas Fault and are moving slowly northward toward Alaska.

3.1.2.1 Structural Geology

The geologic structure in Arlington Basin, as well as the Peninsular Range Province in general, is the result of two main geologic events. Initially, Paleozoic sediments were deposited on Archean cratonal crust during a relatively quiet geologic time period. During the Cretaceous Period, intrusive rocks were emplaced resulting in folding and metamorphism of some of the older rocks into which they intruded. The second and most dominating event was the Cenozoic plate margin change resulting in the present-day San Andreas Fault. The modern Peninsular Ranges were formed during this period of accelerated mountain building (Bordelon 2012, CGS 2002).

Although the mountain ranges and valleys of the Peninsular Range Province are formed by faults branching from the San Andreas Fault, there are no mapped structural features and no evidence of active faults within Arlington Basin (Eckis 1934, Wildermuth 2008).

3.1.2.2 Geologic Units

Geologic formations found in the Arlington Basin can be grouped into two broad categories:

1. Bedrock consisting of plutonic, volcanic units, and metamorphic rock of the highland areas, and
2. Cenozoic alluvial sediments weathering from the flanks of the surrounding hills and mountains (Morton 2004).

A brief description of the geologic units present in the study area is presented below. A geologic map of Arlington Basin and the surrounding area is shown in Figure 3-5. Geologic cross-section locations are shown on Figure 3-5 and displayed on Figures 3-6 through 3-9 are borehole lithology, resistivity log data, well screen intervals, specific capacities, and water levels included on the cross-section figures.

3.1.2.2.1 Cenozoic Alluvium

Sediments eroding from uplifted igneous bedrock were deposited as alluvium on the flanks of the hills and mountains, and over time, have largely filled the valleys between the mountain ranges in the Peninsular Ranges Province. From Pleistocene to late Holocene, weathered and eroded sediment deposits and paleo Santa Ana River, and its tributaries, deposits have collected in Arlington Basin to create the current groundwater aquifer. The water-bearing sediments are interbedded, discontinuous layers of gravel, sand, silt, and clay (Eckis 1934, Wildermuth 2008).

At the center of Arlington Basin, the alluvial sediments are over 200 ft thick pinching out along the northern and southern basin boundaries, where the ground surface contacts the consolidated bedrock of the basin bounding hills and mountains. Nearly all groundwater in the basin is stored in typically less than 200 ft of these alluvial sediments, with saturation up to around 50 ft bgs (see Figures 3-6 to 3-9). The upper 50 ft of alluvial deposits are characterized as having a large percentage of clay while the deeper deposits of Arlington Basin have considerable sand and little clay. The saturated alluvium sediments are typically composed of coarser grains, sand, and gravel layers (Eckis 1934, Wildermuth 2008).

3.1.2.2.2 Mesozoic Volcanics and Metamorphic Rock

The basement complex consists of deformed, recrystallized metamorphic rocks and intrusive masses of granitic and related igneous rocks. The invasive granitic rocks make up most of the basement complex and were emplaced during the late Middle Cretaceous, about 110 million years ago. These mafic to silicic plutonic rocks were subsequently uplifted, eroded, and presently make up the uplands of the Perris Block of the Peninsular Range Basins. Common to most of the Peninsular Ranges batholith is the northwest strike of planar structures. Metamorphic schist of late Mesozoic age is located in the southern part of Arlington Basin. To the north possibly older scattered exposures of amphibolite grade biotite schist, impure quartzite, marble, and skarn occur (Morton 2004).

3.1.2.3 Surficial Geology

Traditional geologic mapping often does not provide details on erosional surfaces and deposits. These deposits can serve as important conduits of precipitation for enhancing infiltration and groundwater recharge. A surficial geology map of the San Bernardino and Santa Ana 30x60 minute quadrangle, California was prepared by Morton and Miller (2006). This map covers a western portion of Riverside

County, including all of Arlington Basin, nearly all of Orange County, and a minor southwesterly section of San Bernardino County. A portion of the surficial mapping covering the Arlington Basin is shown on Figure 3-5. Morton and Miller (2006) map three types of erosional deposits within Arlington Basin: very old alluvial valley deposits (middle to early Pleistocene), old alluvial fan deposits (late to middle Pleistocene), and young alluvial fan deposits (Holocene to late Pleistocene). Definitions of these deposits are as follows:

- Very old alluvial valley deposits – moderate to well-consolidation, highly eroded clay, silt, sand, and gravel along stream valleys and alluvial flats of larger rivers that are generally uplifted and deformed;
- Old alluvial fan deposits – slight to moderate consolidation, moderately eroded boulder, cobble, gravel, sand, and silt deposits from a confined valley or canyon;
- Young alluvial fan deposits – slight to unconsolidated, eroded to slightly eroded boulder, cobble gravel, sand, and silt deposits from a confined valley or canyon (CGS 2012).

3.1.2.4 Soils

The amount of water that infiltrates to groundwater is impacted by surface soils. The United States Department of Agriculture Natural Resources Conservation Service uses the soil classification, hydrologic soil group, to estimate the amount of infiltration that can be expected from specific soil types. Soils are grouped into four categories, A to D, under the hydrologic soil group. Group A has the highest infiltration rates and Group D has the lowest. The four hydrologic soil groups are characterized in Table 3-1 below.

Table 3-1. Characteristics of Hydrologic Soil Groups

Soil Group	Characteristics
Group A	Sandy, loamy sand, or sandy loam, low runoff potential and high infiltration rate. Primarily deep, well drained soils with high sand or gravel content.
Group B	Silt loam or loam, moderate infiltration rate when thoroughly wetted. Mostly deep to moderately deep, well drained soils with moderate to low sand content.
Group C	Sandy clay loam, low infiltration rates when thoroughly wetted. Fine to moderately fine texture, often with layers that block downward movement of water.
Group D	Clay loam, silty clay loam, sandy clay, silty clay, or clay. Very fine texture with high runoff potential and low infiltration rates. Often very shallow, over bedrock or high-water table.

Figure 3-10 provides a map of the hydrologic soil groups within Arlington Basin. The basin is dominated with Group B soils and has few Group A soils. Along the southwest-northeast basin axis is largely Group B soils while southeast of Highway 91 is a mix of Group B and C soils. Group D soils are limited to the northwestern portion of the basin.

3.1.3 Basin Boundaries

Arlington Basin is bounded to the south by the granitic mountains of El Sobrante de San Jacinto, and to the north by the granitic La Sierra Hills (see Figure 3-1 and Figure 3-5). In the east a groundwater divide in the alluvium between Riverside and Arlington separates the area into two basins. Groundwater flows into the Arlington Basin southwestward away from the divide. To the southwest, the Arlington Basin – Temescal Basin boundary is drawn through the alluvium at a bedrock constriction, known as the Arlington Gap or Narrows (Eckis 1934, WRIME and Western 2012).

3.1.3.1 Basin Bottom

The consolidated bedrock underlying Arlington Basin is composed of Middle Cretaceous aged intrusive crystalline igneous rocks and Paleozoic to Mesozoic metamorphic basement complex (Larsen et al. 1958). The Arlington Basin bedrock floor is made up of rocks like those forming the mountains and hills around the basin. Figure 3-11 shows a bedrock contour map of Arlington Basin, a narrow southwest trending trough with equal elevation contour lines depicting the contact between the overlying alluvium and bedrock base. The contours were based on well driller's reported lithologic descriptions and identified bedrock 'signatures' in borehole geophysical logs, specifically resistivity logs (Wildermuth 2008).

3.1.3.2 Topography and Geomorphology

Figure 3-5 shows the granitic La Sierra Hills to the north and the granitic mountains of El Sobrante de San Jacinto to the south, which act as boundaries to the Arlington Basin (WRIME and Western 2012). In the east a groundwater divide in the alluvium between Riverside and Arlington separates the area into two basins. Groundwater flows into the Arlington Basin southwestward away from the divide (Eckis 1934, WRIME and Western 2012). There are no major water bodies within Arlington Basin. To the southwest, the Arlington Basin - Temescal Basin boundary is drawn within a bedrock constriction, known as the Arlington Gap (Eckis 1934). Although a basin boundary, groundwater flows into the Temescal Basin from the Arlington Basin at this bedrock constriction (Wildermuth 2008).

El Sobrante de San Jacinto are the highest mountains surrounding Arlington Basin with a peak elevation of approximately 10,804 ft at Mt. San Jacinto (Kennedy 2008). To the north, La Sierra Hills peaks range in elevation from 1,000 to 1,500 ft. Generally, Arlington Basin slopes southwest toward the Arlington Gap starting from an elevation of roughly 900 ft North American Vertical Datum of 1988 (NAVD88) and ending at an elevation of approximately 700 ft NAVD88 at the Arlington Gap. At the Arlington Gap surface water drainage and groundwater flow from Arlington Basin, enter Temescal Basin, and then flow through the Coastal Plain of Orange County to the Pacific Ocean.

Numerous alluvial fan surfaces near the mountain and hill fronts are early Pleistocene to Holocene in age CGS 2012). The fan surfaces do not exhibit any identified fault scarps or lineaments suggesting that faulting has not occurred locally since their deposition. There is also no noticeable effect on groundwater by underlying faults, making it probable that faults in the alluvium do not cross through Arlington Basin.

3.1.3.3 Vegetation

A generalized map of vegetation in the Arlington Basin is shown on Figure 3-12. The map shows that that much of the Arlington Basin is urbanized with cropland, orchard, vineyards located primarily to the southeast of Victoria Avenue.

3.1.4 Climate

Arlington Basin is in a semi-arid region characterized by dry, hot summers and mild winters. Precipitation is concentrated within the winter months. This climate results in significantly higher water demands in the summer than in the winter (WRIME and Western 2012). Precipitation and temperature are described in greater detail below in Sections 3.1.4.1 and 3.1.4.2.

3.1.4.1 Precipitation

The primary weather station used to calculate mean annual rainfall for the Arlington Basin is Station 179. Station 179 is just north of the Plan Area in the City of Riverside located at Fire Station #3 on Riverside Avenue. The RCFCWCD collects daily precipitation data at this station with records extending as far back as 1881. The high-quality data collected at Station 179 is considered a reliable long period record of precipitation for the surrounding area. Shown on Figure 3-13 is the annual average precipitation and the cumulative departure from the annual average for the period of record for the 44-year period between 1975 and 2019 at Station 179. Plotting the cumulative departure from annual average precipitation graphically shows the accumulation of departure in annual total precipitation from the average value for each year. Therefore, a rising cumulative departure line represents wetter-than-normal conditions while a line trending downward represents drier-than-normal conditions. The average annual precipitation from 1975 to 2019, is 10.08 inches slightly drier than that reported in the Groundwater Management Plan for the years 1880 through 2009 at 10.5 inches (WRIME and Western 2012).

Figure 3-13 indicates an overall extended dry period from 1999 through the present time. Although wet and dry periods vary in duration and intensity, they can affect the water supplies and demands of groundwater basins to a great extent. Dry periods reduce recharge and associated surface water flows, while wet periods have the opposite effect, increasing recharge to the basin. Demand is also impacted by precipitation, with increased demands due to evapotranspiration during dry periods (WRIME and Western 2012). Figure 3-14 shows the long-term average monthly precipitation at Station 179 for the years 1975 through 2019. Most precipitation occurs during the mild winters, from November through April.

3.1.4.2 Temperature

Air temperature in Arlington Basin, like most places, reaches highs in the summer and lows in the winter. Average minimum and maximum monthly winter temperatures for the Arlington Basin area are 44^{o}F and 70^{o}F, respectively. Average monthly temperatures in the summer can reach highs over 90^{o}F. The average minimum monthly summer temperature for the basin area is 57^{o}F, while the average maximum is 88^{o}F. Weather Station 179, described above in Section 3.1.4.1 – Precipitation, records daily air temperature as well as precipitation. Although located outside Arlington Basin the data collected at Station 179 is considered a reliable long period record of air temperature for the surrounding areas.

Average monthly temperature and reference evapotranspiration data are shown in Table 3-2 below for the period of record from July 1948 to December 2008. Evapotranspiration increases in the summer months and decreases in the winter months, corresponding to recorded air temperature trends.

Table 3-2. Average Monthly Temperature and Reference Evapotranspiration (1948 to 2008)

Parameter	Month												Annual
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Average Maximum Temperature (°F)*	67.2	68.0	71.1	75.7	80.6	86.9	93.5	94.6	90.7	82.6	71.4	67.4	79.4
Average Minimum Temperature (°F)*	42.6	44.2	46.2	49.3	53.9	57.4	61.6	62.3	59.3	53.4	45.1	42.1	51.6
Average Reference Evapotranspiration (inches)‡	2.49	2.92	4.40	5.46	6.19	6.80	7.36	6.84	5.48	4.01	2.88	2.31	4.76

Notes:
*Source: WRRC 2019. Riverside Citrus Experiment Station. Period of record 1948 – 2010.
‡Source: CIMIS 2019. 44 U.C. Riverside. Period of record June 1985 – November 2019

3.1.5 Data Gaps

Data gaps include primarily the following items: groundwater gradient information and groundwater elevations between the Army 3 well and Hole Lake in the northern portion of the groundwater basin. The addition of this information would better refine outflow in this portion of the basin. In addition, data to calculate groundwater gradient information and saturated thickness is lacking across the boundary between the Arlington Basin and the Temescal Basin. Since outflow to or inflow from the Temescal Basin is a significant term in the water budget (see Section 3.3.2) instrumentation to mitigate this data gap is needed.

3.2 Current and Historical Groundwater Conditions

3.2.1 Groundwater Elevation

Arlington Basin groundwater levels are influenced primarily by groundwater production, and to a lesser degree by climate. Figure 3-15 shows water groundwater elevation contours from Fall 2018 which represents the most current data set. Groundwater contours for 2018 were prepared using eight control points with 2018 data from the upper to the lower portion of the basin. Groundwater elevations in the middle to upper portion of the basin range from 680 to 800 ft above mean sea level (amsl), generally staying within 0 to 20 ft of water levels from nearly 80 years ago. Despite changes in land use and water demands, as increasing urbanization reduced the once dominant agriculture in the area, present day groundwater flow patterns remain similar to those in the early 1930s (WRIME and Western 2012). Comparing water levels in January 1933 (Eckis 1934 - in Western and Watermaster 2010), Figure 3-15 also indicates that groundwater flow consistently moves towards the Arlington Gap in the main portion of the basin. A monitoring well is needed at the Arlington Gap and potentially immediately outside the basin to provide groundwater gradient data and saturated thickness information to monitor subsurface outflow in the future. Groundwater flow northwest of the Army 3 well, on California Avenue, has historically been thought to move towards Hole Lake near the Santa Ana River (Eckis 1933) and is modeled in this condition in the Integrated SAR model. Therefore, the groundwater gradient in this area decreases from the Army

3 well to Hole Lake. A monitoring well is needed in the vicinity of Arlington Avenue and Van Buren Boulevard to provide control on groundwater elevations and outflow to Hole Lake.

The water levels of January 1933 were measured within a historical wet period, as seen on Figure 3-15, and after the initial introduction of imported water for agricultural irrigation. Before this period, it is likely groundwater flow was opposite of present-day trends, heading towards Riverside Basin (WRIME and Western 2012). Figure 3-16 shows the locations of thirteen wells with hydrographs of plotted water levels from 1960 through part of 2010 including hydrographs for two desalter wells. Figure 3-16 also shows the range of depth to water for the period of the hydrographs. A few general trends can be discerned from the hydrographs: 1) water levels increased from 1960 to 1980, 2) an overall decline in water levels occurred from 1980 through 2010, and 3) the rate at which water levels changed nearing the 2010 time period was reduced, seemingly in all areas of the basin.

3.2.2 Groundwater Storage

Groundwater storage in Arlington Basin is computed from the top of bedrock of the aquifer to the top of the water table, using specific yield and specific storage in the lithologic model developed for the Integrated SAR model. Figure 3-17 shows the active model area for the Arlington Basin. Each lithologic type was assigned a value based on published literature (U.S. Geological Survey Water Supply Paper 1662-D (Johnson, 1967, California State Department of Public Works Division of Water Resources (now, DWR) Bulletin 45 (1934)). The specific yield values range between 0.01 and 0.20. Aquifer water levels in Fall of 2016 are plotted in Figure 3-18. In 2016, the total groundwater in storage in Arlington Basin was estimated to be 63,200 acre-feet (Figure 3-19).

3.2.2.1 Changes in Groundwater Storage

From 1966 to 2016, groundwater levels overall have declined in the Arlington Basin. Declining groundwater level trends in hydrographs have occurred since the 1980s. The decline in groundwater storage from the Integrated SAR model water budget was used to estimate overall change in groundwater storage. The decline in groundwater storage over the course of the 51-year simulation period is approximately 360 acre-feet per year (af/yr). The decline in groundwater storage is observed in the water budget, as well as water level declines in the groundwater basin. Some uncertainty regarding various components of the water budget is inherent. In particular, underflow outflow to Temescal Basin is dependent on model calculated gradients and water levels in both Arlington and Temescal Basins, as well as transmissivity and connectedness of alluvial aquifers in the two basins. Also, inflows such as mountain front runoff and aerial recharge are modeled inputs.

3.2.3 Groundwater Quality

Groundwater quality in the Arlington Basin has historically been degraded by elevated concentrations of TDS, nitrate, and other contaminants from industrial sources. In 1990, the Arlington Desalter began operating to improve overall quality of local potable supplies and decrease subsurface outflow of poor-quality groundwater. The facility is currently supplied by five production wells, and efforts are ongoing to expand its overall capacity to provide additional local potable supplies.

Groundwater quality data for the Arlington Basin were acquired through the 1996-2015 Triennial Recomputation of Ambient Water Quality (AWQ) for the Santa Ana River Watershed[2]. The AWQ is an established watershed-wide groundwater monitoring program for TDS and nitrate (reported as nitrate as nitrogen [N]) that is computed every three years. For each AWQ recomputation, current and historical data sets are reviewed for trends of concentrations exceeding federal and state Maximum Contaminant Levels (MCLs) and established Basin Plan Water Quality Objectives (WQOs).

The distribution of the primary water quality concerns in the Arlington Basin are discussed below based on (1) water quality point statistics and average values for TDS and nitrate as N applied for wells with enough data to assess temporal trends in groundwater quality and (2) water quality data on other contaminants based on available data from California State Water Resources Control Board (SWRCB) GEOTRACKER and Department of Toxic Substances Control (DTSC) Envirostor database websites.

3.2.3.1 Total Dissolved Solids

TDS is a measure of salinity which accounts for all dissolved solids in water (as milligrams per liter [mg/L]) including organic and suspended solids and is commonly analyzed to determine general suitability for human consumption. A TDS concentration of 500 mg/L is the secondary standard for drinking water established by the U.S. EPA and State Water Resources Control Board. TDS greater than 1,000 mg/L is generally considered to be brackish water and not suitable as a potable supply without treatment or blending. Natural sources of TDS include interaction of groundwater with the soil, rock, and organic matter which compose an aquifer system. Human activities such as irrigation and agricultural practices which include application of synthetic fertilizers and manure are also a common source of TDS. Effluent from wastewater treatment facilities, septic systems, and other industrial processes can also contribute to elevated TDS concentrations in water.

The TDS WQO for the Arlington Basin is 980 mg/L. TDS concentration data obtained from 1996 to 2015 were evaluated as part of the 2015 AWQ recomputation effort for 19 wells. Average TDS concentrations for this period of record ranged from approximately 913 to 1,330 mg/L. The highest average TDS concentrations occur in the northern and western wells. Of the 19 wells evaluated, seven had enough data to perform statistics used for ambient TDS trends. The TDS ambient water quality in the Arlington Basin over the period of record ranged from 960 to 1,030 mg/L. The historical TDS trend has either slightly increased or decreased but never by more than approximately 20 mg/L from one year to the next. The ambient TDS concentration decreased from 1,030 mg/L in 2012 to 1,020 mg/L in 2015. Figure 3-20 shows the distribution of TDS in the basin.

3.2.3.2 Nitrate

Nitrate is commonly associated with the industrial process of manufacturing synthetic fertilizers and with agricultural activities, septic systems, confined animal facilities, and wastewater treatment facilities. However, nitrate in water can also be naturally occurring. Nitrate in drinking water is a health concern to

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[2] 2017.Daniel B. Stephens and Associates, Inc. Recomputation of Ambient Water Quality in the Santa Ana River Watershed for the Period 1996 to 2015. Prepared for Santa Ana Watershed Project Authority Basin Monitoring Program Task Force. September.

both humans and animals, and the state has established an MCL of 10 mg/L (which is also the WQO for the Arlington Basin).

Nitrate as N concentration data obtained from 1996 to 2015 were evaluated as part of the 2015 AWQ recomputation effort for 23 wells. Average nitrate as N concentrations for this period of record ranged from approximately 0.1 to 51 mg/L; however, concentration ranged from approximately 15 to 25 mg/L for most wells. The highest average nitrate as N concentrations occur in the eastern and western wells. The nitrate as N ambient water quality over the period of record ranged from 17.8 to 26.0 mg/L based on historic average concentrations for 10 out of the 23 wells. The historical nitrate as N trend was similar in 1973 and 2003, declined to 18.1 mg/L in 2009 and remained relatively neutral through 2015. Figure 3-21 shows the distribution of nitrate as N in the Arlington Basin.

3.2.3.3 Saline Water Intrusion

The Arlington Basin has no connection with the ocean, therefore is not susceptible to intrusion of seawater from pumping in the basin. However, the Arlington Basin has higher TDS than the Temescal and Riverside Basins which are in hydraulic connection with the Arlington Basin (Wildermuth 2011). Therefore, in this situation, the Arlington Basin groundwater is managed to minimize potential impacts of salinity on neighboring basins. The flow of higher TDS groundwater out of Arlington Basin is minimized by reducing groundwater levels within the Basin. The Arlington Desalter removes salts from the water before delivery and the brines are disposed outside of the basin (Wrime 2012). Removal of salts along with managing the quality of recharge may improve the quality of groundwater in the basin. Maintaining control of salinity in the basin will require continued Arlington Basin groundwater monitoring and desalter operations.

3.2.3.4 Industrial Source Contaminants

The Arlington Basin has had numerous industrial operations within its boundaries that have affected groundwater quality. From these industrial operations there have been occurrences where contamination has been identified in the groundwater. The most common mobile contaminants that are present in the basin are:

1. Arsenic
2. Hexavalent Chromium
3. 1,2-Dibromo-3-chloroporane
4. Total Petroleum Hydrocarbons - Gasoline and Diesel
5. 1,2,3-Trichloropropane
6. Perchlorate
7. Tetrachlroethene
8. Trichloroethene
9. Uranium

There are currently multiple contaminated areas where cleanup efforts are ongoing within the Basin including, but not limited to, gas stations, car repair shops, dry cleaners, manufacturing operations, and the Riverside Municipal Airport (SWRCB, GEOTRACKER and DTSC, Envirostor). Figure 3-20 presents sites related to water quality impacts within the Basin (SWRCB, GEOTRACKER).

The most predominant industrial contamination site in the Basin is the Rohr Industries site located near the southwest corner of Arlington Avenue and Van Buren Boulevard (https://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0606500068). At this site, there are over 100 monitoring wells and piezometers where hexavalent chromium, volatile organic compounds, polychlorinated biphenyls, and total petroleum hydrocarbon contaminants have been detected. Cleanup efforts at this sight began in 1987 and are currently ongoing. Groundwater flow at this site generally flows from west to east-northeast towards the Anza Channel which is an earthen ditch that is used to direct stormwater towards the Santa Ana River.

A regulatory database search of existing sites with hazards or hazardous materials within Arlington Basin was conducted for the purpose of this analysis. The search was conducted using the California SWRCB Geotracker online system which provides information from both the SWRCB and DTSC environmental databases for sites with documented use, storage, or release of hazardous materials or petroleum products (Geotracker 2019, Envirostor 2019).

Twenty-one (21) potential contaminating activity (PCA) sites were identified in the database search as shown on Figure 3-22 and summarized on Table 3-3 below. The majority contaminant of concern is gasoline at current and past gas station locations throughout Arlington Basin (13 PCAs). There is one military site undergoing site assessment and two site assessments currently ongoing at the Riverside Municipal Airport. There are four (4) PCA sites with contaminants ranging from PCBs, PCE, TCE, chromium, to solvent that are in remediation or verification monitoring. None of these PCAs appear to pose a significant threat to groundwater quality.

Table 3-3. Potential Contaminating Activities within Arlington Groundwater Basin

PCA No.	Case Type	Status	Site Description	Contaminant of Concern	Regulator	Coordinates (Lat/Long)
1	LUST Cleanup Site	Open – Remediation	Gas Station	Gasoline	RWQCB (Region 8)	33.9350516 -117.4363997
2	Cleanup Program Site	Open – Verification Monitoring	Dry Cleaners	TCE	RWQCB (Region 8)	33.8838249 -117.5148603
3	Cleanup Program Site	Open – Assess. & Interim Remedial Action	Dry Cleaners	PCE & TCE	RWQCB (Region 8)	33.9107896 -117.4656499
4	LUST Cleanup Site	Open – Remediation	Gas Station	Gasoline	RWQCB (Region 8)	33.9216721 -117.4452197
5	LUST Cleanup Site	Open – Inactive	Auto Service and Repair	Gasoline	RWQCB (Region 8)	33.9193535 -117.4486003
6	LUST Cleanup Site	Open – Remediation	Gas Station	Gasoline	RWQCB (Region 8)	33.9350702 -117.4363996
7	Cleanup Program Site	Open – Active	Vacant Lot – Former Factory	None Specified	Riverside County LOP	33.9715598 -117.4645797
8	LUST Cleanup Site	Open – Site Assessment	Airport	Aviation	RWQCB (Region 8)	33.9506197 -117.4446598
9	Cleanup Program Site	Open – Site Assessment	Airport	Aviation & PCE	RWQCB (Region 8)	33.9497457 -117.4436298

PCA No.	Case Type	Status	Site Description	Contaminant of Concern	Regulator	Coordinates (Lat/Long)
10	LUST Cleanup Site	Open – Assess. & Interim Remedial Action	Former Gas Station	Gasoline	RWQCB (Region 8)	33.9462061 -117.4339396
11	LUST Cleanup Site	Open – Assess. & Interim Remedial Action	Gas Station	Gasoline	RWQCB (Region 8)	33.9456764 -117.43431
12	LUST Cleanup Site	Open – Assess. & Interim Remedial Action	Gas Station	Gasoline	RWQCB (Region 8)	33.9455978 -117.4349097
13	LUST Cleanup Site	Open – Remediation	Former Gas Station	Gasoline	RWQCB (Region 8)	33.946037 -117.4448098
14	LUST Cleanup Site	Open – Remediation	Gas Station	Gasoline	RWQCB (Region 8)	33.9462843 -117.4681803
15	Cleanup Program Site	Open – Remediation	Manufacturing Company	Chromium, Diesel, Gasoline, PCBs, & Solvents	RWQCB (Region 8)	33.9449328 -117.4631401
16	Military Cleanup Site	Open – Site Assessment	Former Camp Anza	None Specified	RWQCB (Region 8)	33.9428797 -117.4673192
17	LUST Cleanup Site	Open – Site Assessment	Gas Station	Gasoline	RWQCB (Region 8)	33.9348751 -117.4536699
18	LUST Cleanup Site	Open – Remediation	Gas Station	Gasoline	RWQCB (Region 8)	33.9345033 -117.4542998
19	LUST Cleanup Site	Open – Remediation	Gas Station	Gasoline	RWQCB (Region 8)	33.9341785 -117.4540801
20	LUST Cleanup Site	Open – Verification Monitoring	Gas Station	Gasoline	RWQCB (Region 8)	33.9339392 -117.4536802
21	LUST Cleanup Site	Open – Verification Monitoring	Apparel Services Business	Stoddard Solvent, Mineral Spirits, & Distillates	RWQCB (Region 8)	33.9608529 -117.446531

Note:
RWQCB – Regional Water Quality Control Board

3.2.3.4.1 Agriculture

The Arlington Basin area has hosted agriculture since the turn of 19th century. As stated above, elevated nitrate as N concentrations in groundwater have been associated with historical agriculture activities. Much of the Arlington Basin hosted agriculture prior to urbanization.

3.2.4 Land Subsidence

Land subsidence is the loss of surface elevation due to removal of subsurface support. Subsidence has many causes, including seismically induced stresses and the extraction of mineral, liquid, and/or gas deposits. Although mineral and gas extraction can and do result in subsidence, it is more common for subsidence to occur as a result of groundwater extraction in excess of groundwater recharge.

Aquifers store water in the pore spaces between soil particles of all sizes, from gravel and sand to clay and silt. All aquifers are compressible, however, increasing the amount of fine-grained materials, like clay, within or between aquifers increased the compressibility of the aquifer. When groundwater extraction is in excess of groundwater recharge a reduction in water pressure occurs within the aquifer resulting in the slow drainage of water from between clay and silt. Clay particles are unique in when water is given up the clay particles shrink and as water is taken on, they swell. As water pressure is reduced within the aquifer clay particles release water and compress. If enough clay particles compress to give off water the effects are the lowering of surface elevation (Leake 2016).

Within Arlington Basin there have been no historical measurements of subsidence and no identified instances of subsidence induced damage. Due to the composition of soils within Arlington Basin much of the basin is considered susceptible to subsidence. Currently there is no active subsidence monitoring program in the basin. Groundwater levels dropping below historical lows or the reporting of land subsidence within Arlington Basin will require additional land subsidence monitoring to be considered.

3.2.5 Groundwater-Surface Water Interactions

Although there are no major rivers in Arlington Basin, approximately three quarters of the total basin inflow is provided by boundary flow and recharge from both small watercourses within the basin and surrounding mountains. The Santa Ana River flows over an alluvial channel which directly overlies bedrock through the Arlington Basin. Therefore, there is no connection between the Santa Ana River and groundwater in the Arlington Basin except through fractures in the underlying granitic bedrock. The Arlington Channel, La Sierra Channel, and Arizona Channel are partially lined channels with sections composed of soils allowing water to soak into the ground and recharge underlying groundwater. Shallow groundwater can also discharge to surface water resulting in outflow from the basin in stream channels. In the northeast unlined channels recharged with groundwater have historically discharged into Hole Lake (Eckis 1934).

Generally, groundwater flow in the Arlington Basin mimics surface drainage patterns. Groundwater moves from areas of recharge in the north and south highlands towards the central axis of the basin eventually flowing southwesterly out of the basin through a bedrock constriction at the boundary with the Temescal Basin (Wildermuth 2008, Eckis 1934, see Figure 3-4). At the Arlington – Riverside Basin boundary groundwater flows southwestwardly away from the underlying groundwater divide into Arlington Basin.

3.3 Water Budget Information (§354.18)

The Integrated Santa Ana River model (Geoscience 2019a, 2019b) was used to prepare the historical water budget for the historical period from 1966 -2016. The Integrated SAR model integrated five existing groundwater models in the Upper Santa Ana Valley Groundwater Basin into one groundwater model encompassing the entire basin. The model was developed as a management tool to evaluate the effects of proposed projects on streamflow and groundwater levels within the Upper Santa Ana River Basin, including Habitat Conservation Plan “Covered Activities.” A streamflow network was developed for the Upper Santa Ana River, and the capability to simulate streamflow and streambed percolation was added to the model. An evapotranspiration component was added, as well, based on riparian vegetation mapping and shallow depth to groundwater mapping. In the Arlington Basin, the Integrated SAR model integrated the Riverside-Arlington Groundwater model (WRIME 2011). The Integrated SAR model incorporated updated water level measurements and information on water use in the groundwater basin. For additional information on the development of the Integrated SAR model, the reader is referred to TMs documenting its development (Geoscience 2018a, 2018b, 2018c, 2019a, 2019b) and documentation on the Riverside-Arlington Groundwater model (WRIME 2011). The groundwater budget for Arlington Basin is computed inside the yellow Integrated Santa Ana River model active area shown in Figure 3-17.

3.3.1 Historical Water Budget

In Arlington Basin, inflow to the groundwater basin occurs in the form of mountain front runoff and percolation in unlined stream channels, underflow inflow from adjacent groundwater basins (Riverside), aerial recharge from precipitation, and anthropogenic return flow from applied water. Discharge occurs from the groundwater basin in the form of groundwater pumping, and underflow outflow to adjacent groundwater basins. A conceptual diagram of water budget components is presented in Figure 3-23.

The historical water budget over the simulation period of the Integrated SAR model from 1966-2016 is presented in Table 3-4. The average value for each component of the water budget is presented in Figure 3-24. Historically, groundwater pumping makes up 5,820 af/yr of the total discharge from the groundwater basin. Underflow outflow to Temescal Basin makes up an average of 1,240 af/yr.

Estimates of historical aerial recharge from precipitation and anthropogenic return flows were estimated for the Integrated SAR model using DWR’s Integrated Water Flow Model Demand Calculator (IDC) developed by WRIME for the Riverside-Arlington Groundwater model (WRIME, 2011). The IDC model incorporated Natural Resource Conservation Service soil type and land use data from various sources to develop properties for 113 subregions. The IDC model output deep percolation, which was used as aerial recharge from precipitation and anthropogenic return flow for the groundwater flow model. Deep percolation in adjacent small watersheds was used as an estimate of mountain front runoff and streambed percolation in unlined channels at the boundary of the groundwater flow model.

Historical groundwater pumping averaged 5,820 af/yr from 1966 to 2016, with pumping shifting to the Arlington Desalter since the facility began operating in 1990. Western Municipal Water District operates the Arlington Desalter wells, which pumped a total of 4,892 acre-feet in 2016. The Arlington Desalter wells (Arlington Desalter Wells DS-1 through DS-5) comprise most current groundwater pumping in the basin.

Underflow outflow to adjacent groundwater basins shows a decline in recent years due to pumping in the Arlington Desalter wells. The operation of the Arlington Desalter reduces higher salinity groundwater discharge to adjacent groundwater basins.

3.3.2 Current Water Budget

The current water budget for the period 2012 through 2016 is presented in Table 3-4 and Figure 3-24. Average groundwater pumping from all sources is 7,230 af/yr. This value is higher than the long-term historical average. The Arlington Desalter pumps an average of 6,060 af/yr during this period. Underflow outflow occurs from the Arlington Basin to Temescal Basin through the Arlington Gap, underflow outflow to Hole Lake, and underflow outflow to Riverside Basin. Net underflow outflow over the last five years of the simulation period averaged approximately 1,800 af/yr. Some inflow and outflow occur across the boundary with Riverside Basin depending on water level. Underflow outflow to Temescal Basin has decreased in recent years due to operation of the Arlington Desalter. The average underflow outflow to Temescal Basin for 2012 -2016 was 860 af/yr, down from the long-term average value of 1,240 acre-feet.

3.3.3 Sustainable Yield

The sustainable yield of Arlington Basin was estimated using model water budgets from the Integrated SAR model discussed in the previous sections. The sustainable yield of the basin is the maximum amount that can be withdrawn annually from a groundwater supply without causing an undesirable result. The estimate is computed for a base period representative of long-term conditions, in this case, from 1966-2016. Undesirable results include long-term overdraft of the groundwater supply resulting in a decline of current groundwater supply. The sustainable yield of the basin is estimated as the sum of long-term groundwater pumping minus any decrease in groundwater storage over the same period. Groundwater pumping over the period from 1966 -2016 averaged 5,820 af/yr. Subtracting the long-term change in groundwater storage (360 af/yr), the sustainable yield would be estimated to be approximately 5,460 af/yr for average historical conditions. This sustainable yield estimate is lower than the previous estimate of 6,000 af/yr for normal conditions made by earlier investigators (WRIME, 2011). However, one of the desired results of Arlington Desalter operation is to reduce underflow of higher nitrate as N and TDS water to Temescal Basin (WRIME and WMWD 2012). Based on the results of the Integrated SAR model, Arlington Desalter operation reduces underflow outflow to 860 af/yr from 1,240 af/yr average over the simulation period. Excluding the difference in underflow outflow to Temescal, assuming operation of the Arlington Desalter, the sustainable yield is estimated to be approximately 5,840 af/yr. Additional increases to the sustainable yield are also anticipated with the completion of recharge projects planned for the basin. Recharge activities at Victoria Basin are expected to increase recharge by 1,800 - 2,500 af/yr. These recharge activities would potentially increase the sustainable yield of the basin to 8,340 af/yr. The addition of other projects may also increase the sustainable yield of the basin. The impacts of proposed projects on sustainable yield are discussed in Section 3.3.4.

Different methodologies were used in the two estimates of sustainable yield mentioned above. WRIME used a scenario simulation with existing land use conditions and fixed pumping rate assumptions for the Arlington Desalter. A historical model water budget with historical pumping was used to develop the estimate herein. In the WRIME water budget, a reversal of groundwater flow to Temescal Basin occurs and an average of 923 acre-feet of underflow inflow from Temescal Basin contributes to the higher estimate of sustainable yield. In the current estimate, the period from 1966 to 2016 includes the recent drought period not included in the previous WRIME hydrology. Other differences in simulated underflow outflow to Riverside Basin and Hole Lake also affect the sustainable yield calculation. Combined, the differences in the groundwater simulations used and hydrological evaluation periods result in differences in the estimates of sustainable yield above.

3.3.4 Projected Water Budget

The historical and current water budgets are based on land use conditions an annual water demand pumping under the historical conditions for the period in question (1966 through 2016 for historical and 2012 through 2016 for current). The projected water budget will need to account for water demands based on long-term water supply planning by basin stakeholders. Section 6.0 provides a discussion of potential Projects and Management Actions to achieve and maintain long-term stability of groundwater levels and water quality in the Arlington Basin. Three main projects (see Section 6.4) are proposed to support continued operation within the current sustainable yield of the groundwater basin and/or increase the sustainable yield through the addition of new water supplies. A brief discussion on the changes to projected water budgets, based on results from four model scenarios, for these three select projects is provided below. Detailed descriptions on the influence potential these projects can have on the water budget can be found in Section 6.4.

Project #1: Stormwater Recharge at Victoria Spreading Basin

Modeling for the feasibility study of stormwater recharge spreading at Victoria Spreading Basin (Scenario 1) calculated an annual average volume of 440 acre-feet per year of stormwater was able to be recharged. This amount would vary on an annual basis based on the availability of stormwater. The recent study shows that 15,408 af/yr of stormwater flow could be available over a 25-year period. The modeling indicates that Victoria Basin can recharge up to 11,824 acre-feet of stormflows over a 25-year period, leaving about 3,500 acre-feet (or approximately 140 af/yr) of stormwater available to another future potential project.

Implementation of a stormwater recharge project at Victoria spreading basin would increase groundwater in storage providing additional water supply to the basin. The water balance shows an increase in change in groundwater storage, from -450 af/yr to -230 af/yr, as seen on Figure 3-25.

Project #2: Recycled Water Recharge at Victoria Spreading Basin

Modeling for the feasibility study of spreading recycled water rat Victoria Spreading Basin from the Western Wastewater Reclamation Facility (Scenario 2) simulated two months of recycled water recharge in January and February of each year, totaling 340 af/yr. This recharge volume, smaller than Scenario 1, results in an improvement in change in groundwater storage, from -450 af/yr to -260 af/yr (see Figure 3-25). As in Scenario 1, components of underflow outflow increase slightly due to the increased water levels versus the baseline run (i.e., no recharge in Victoria Basin).

Project #3: Recharge of Water from Riverside South Groundwater Basin at Victoria Spreading Basin

Modeling for the feasibility study of recharge of water from Riverside South Groundwater Basin at Victoria Spreading Basin (Scenario 3) determined groundwater recharge would occur year-round at an average rate of 1,280 af/yr. The rate of groundwater recharge is limited by water levels, particularly at the northwest corner of the site. Due to the larger annual volume of recharge under Scenario 3 conditions, greater increase in groundwater storage is observed. Change in groundwater storage increases from -450 af/yr under baseline conditions to 170 af/yr under Scenario 3 conditions: a 620 af/yr increase (see Figure 3-25). As in Scenarios 1 and 2, underflow outflow terms increase due to increased water levels.

Combination of Recharge Sources Utilized to Recharge at Victoria Spreading Basin

Modeling Scenario 4 is a cumulative scenario with recharge from stormwater, recycled water, and Riverside South Groundwater Basin at Victoria Basin. A total of 1,280 af/yr recharge at Victoria Basin results in an increase in groundwater storage of 620 af/yr (see Figure 3-25). Total recharge is rate limited by the water levels near Victoria Basin. Total underflow outflow increases to Hole Lake, Riverside South, and Temescal Basin as a result of the elevated groundwater levels versus the no Victoria Basin recharge baseline run. Stormwater is prioritized when available, and recycled water and Riverside South groundwater supplement stormwater during periods when the full capacity of Victoria Basin is not being met.

3.4 Management Areas (§354.20)

The Arlington Basin is designated a Groundwater Management Zone for water quality by the Santa Ana Regional Water Quality Control Board (see Section 2.2.2.3 and Figure 3-26). Ambient TDS and nitrate as N concentrations are re-computed every three years on behalf of the Santa Ana Watershed Project Authority as a part of compliance with the Santa Ana Basin Water Quality Control Plan to maintain water quality standards. Management areas can be used within a groundwater basin to control and/or mitigate the development of undesirable effects. The assessment of undesirable results is discussed in Section 4.5. Based on current data the management of groundwater levels, ambient groundwater quality, and mobilization of contaminants from PCAs will be the focus in managing undesirable results.

TDS concentrations in the Arlington Basin have remained generally stable over the period of record (1996 through 2015) and TDS ambient water quality in the Arlington Basin ranged from 960 to 1,030 mg/L. The historical TDS trend has either slightly increased or decreased but never by more than approximately 20 mg/L from one year to the next. Figure 3-20 shows that the average TDS concentration appear to be highest in the northern portion of the basin near Arlington Avenue, however, this is only based on two control points. The groundwater flows towards Hole Lake in this area. The TDS concentrations are slightly lower in the northeastern part of the main portion of the basin then in southwestern portion of the basin near the desalter wells. As groundwater flow is northeast to southwest in the main portion of the basin, the desalter wells act to remove salts from the groundwater basin, mitigating the effects of salinity additions from landscape irrigation return flows. Ambient nitrate as N conditions have decreased in the basin since approximately 2009. This suggests that with respect to nitrate as N water quality, current basin operation and management is resulting in decreasing nitrate as N concentrations. With regard to TDS and nitrate as N, current basin operation and management is appropriate to avoid groundwater degradation.

With respect to PCAs, 19 out of the 21 PCA sites are located in the portion of the basin that extends north from Magnolia Avenue along Van Buren Boulevard. Currently, there is no suggestion that pumping in the main portion of the basin is mobilizing localized contaminants from the PCAs. This portion of the basin is much shallower than the main portion of the basin which extends northeast to southwest with Magnolia Avenue at the approximate axis of the basin. Since the largest portion of groundwater pumping is from the desalter wells located in the southwest portion of the basin, it appears that current basin operation and management is able to avoid mobilization of localized shallow contaminants. Should pumping conditions or new contaminant site be discovered, the need to include a management area to reduce potential contamination should be revisited.

3.4.1 Reason for Creation of Management Area

At present there is no need to create management areas in the Arlington Basin, either to control groundwater levels or groundwater quality.

3.4.2 Level of Monitoring and Analysis

Groundwater monitoring is discussed in detail in Section 5 – Monitoring Network. A minimum of two new monitoring wells will be needed to allow a more complete spatial assessment of groundwater flow and groundwater quality in the Arlington Basin. Recommended monitoring wells is described in Section 5.

3.4.3 How Management Will Prevent Negative Impacts Elsewhere

Current basin operations and management appear to result in stabilization of ambient TDS and decrease in ambient nitrate as N concentrations, all without mobilization of contaminants from local PCAs. Therefore, at present there is no apparent need to create management areas in the Arlington Basin to control groundwater quality. Should pumping conditions or new contaminant site be discovered, the need to include a management area to reduce potential contamination should be revisited.

Groundwater levels and groundwater in storage have decreased during the base period. Mitigation of this condition is discussed in Section 6.0 – Projects and Management Actions.

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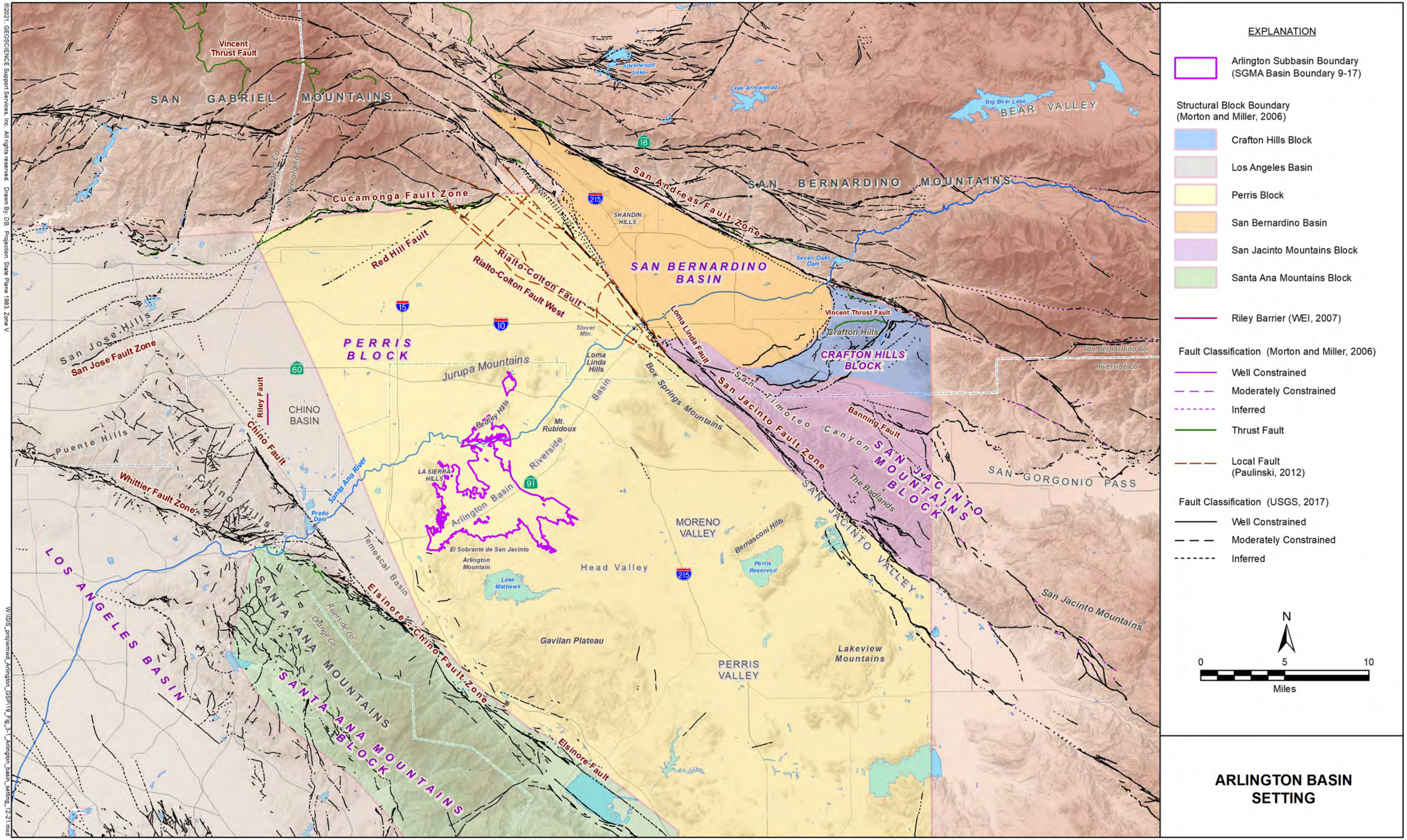

ARLINGTON BASIN SETTING

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Nov-21

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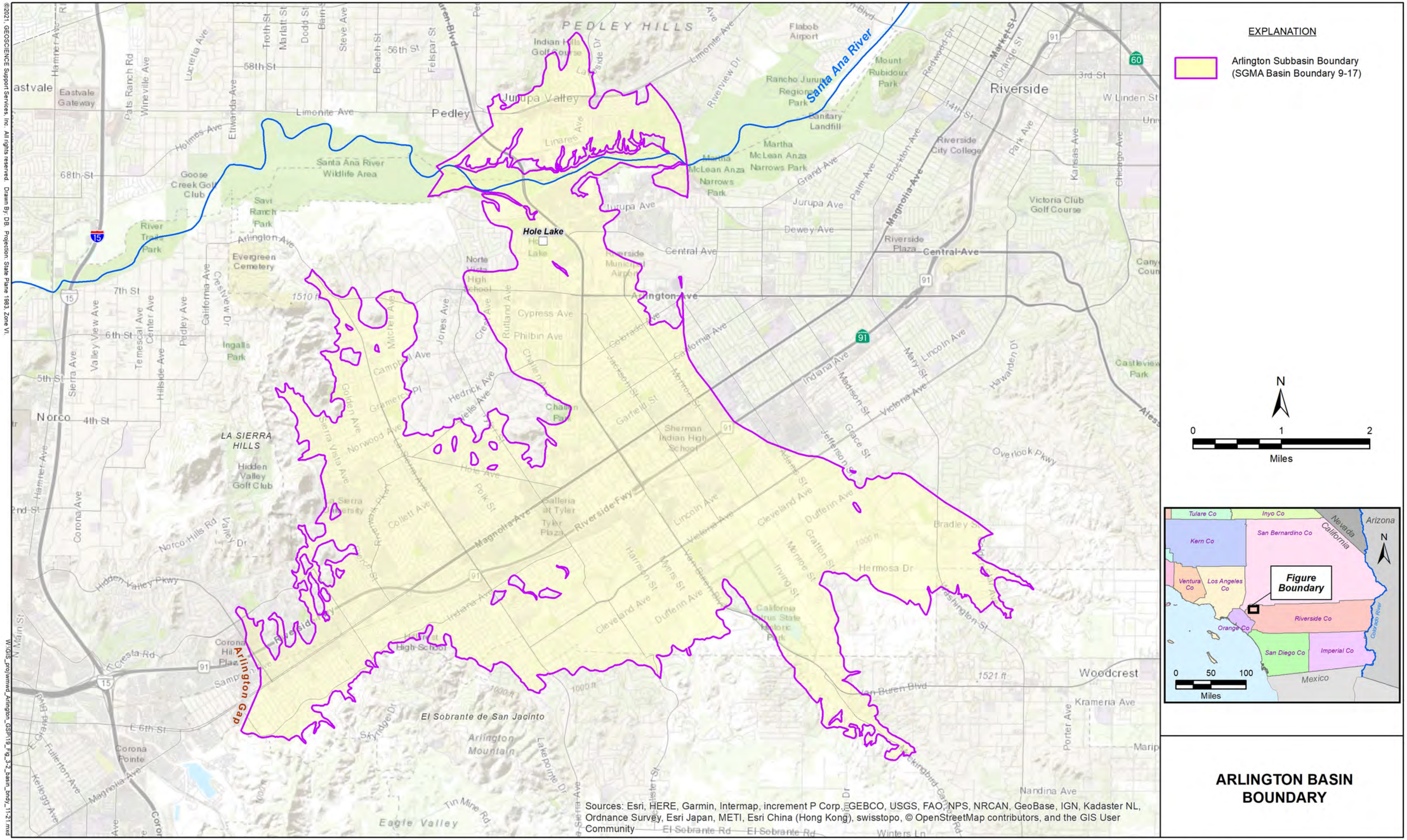
FIGURE 3-1

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

GEOSCIENCE



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Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

ARLINGTON BASIN BOUNDARY

Nov-21

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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FIGURE 3-2

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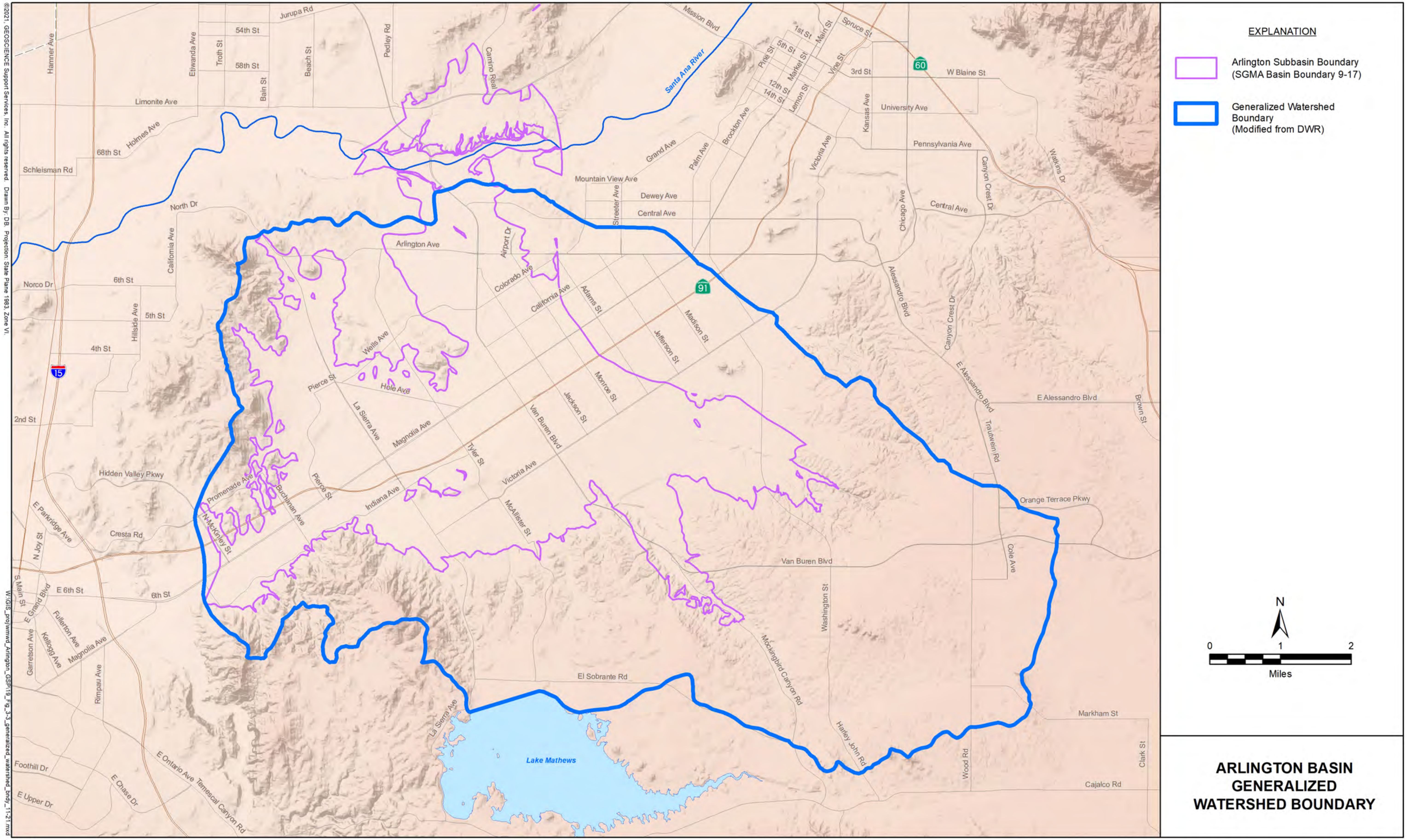
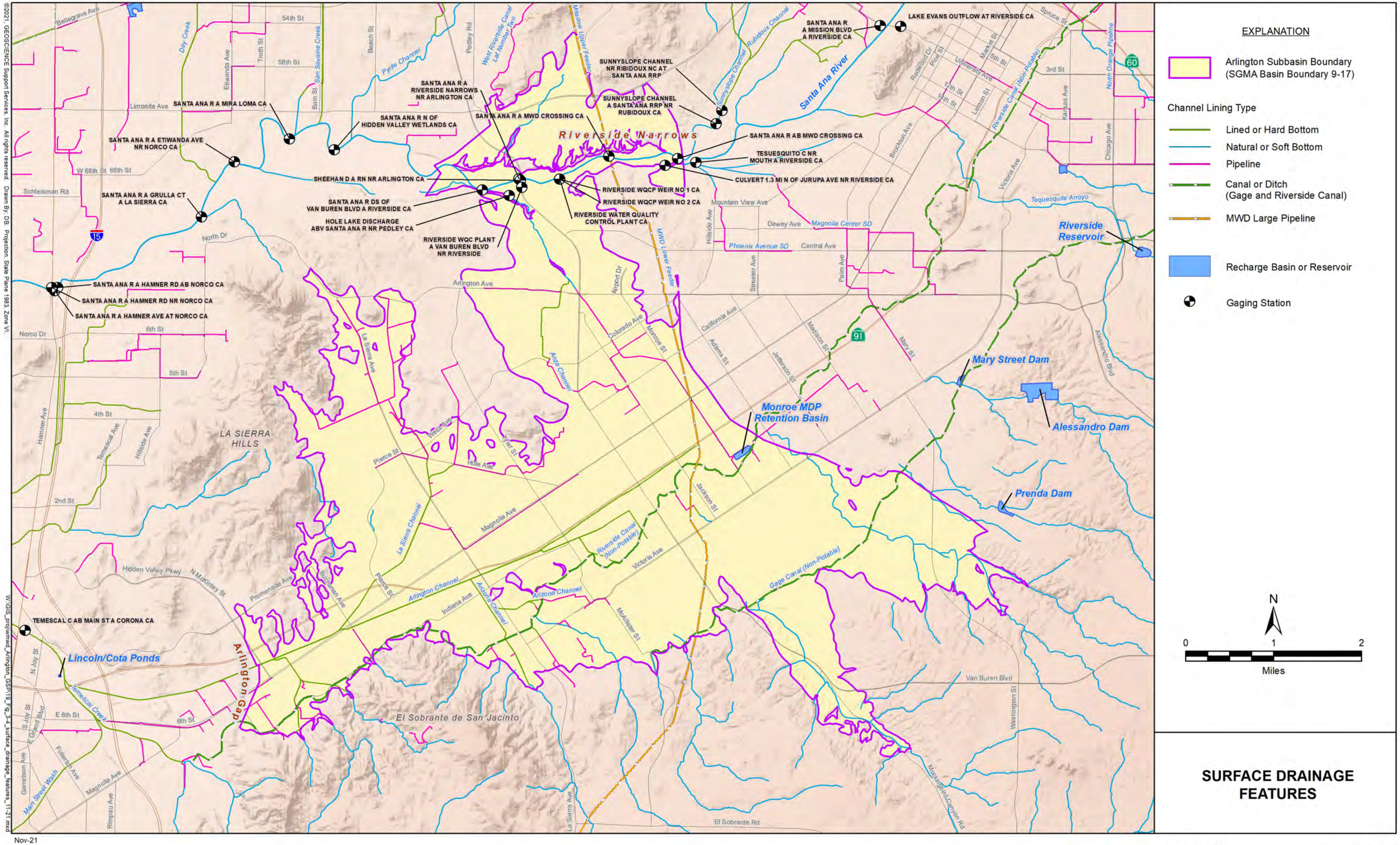


ARLINGTON BASIN
GENERALIZED
WATERSHED BOUNDARY

Nov-21



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SURFACE DRAINAGE FEATURES

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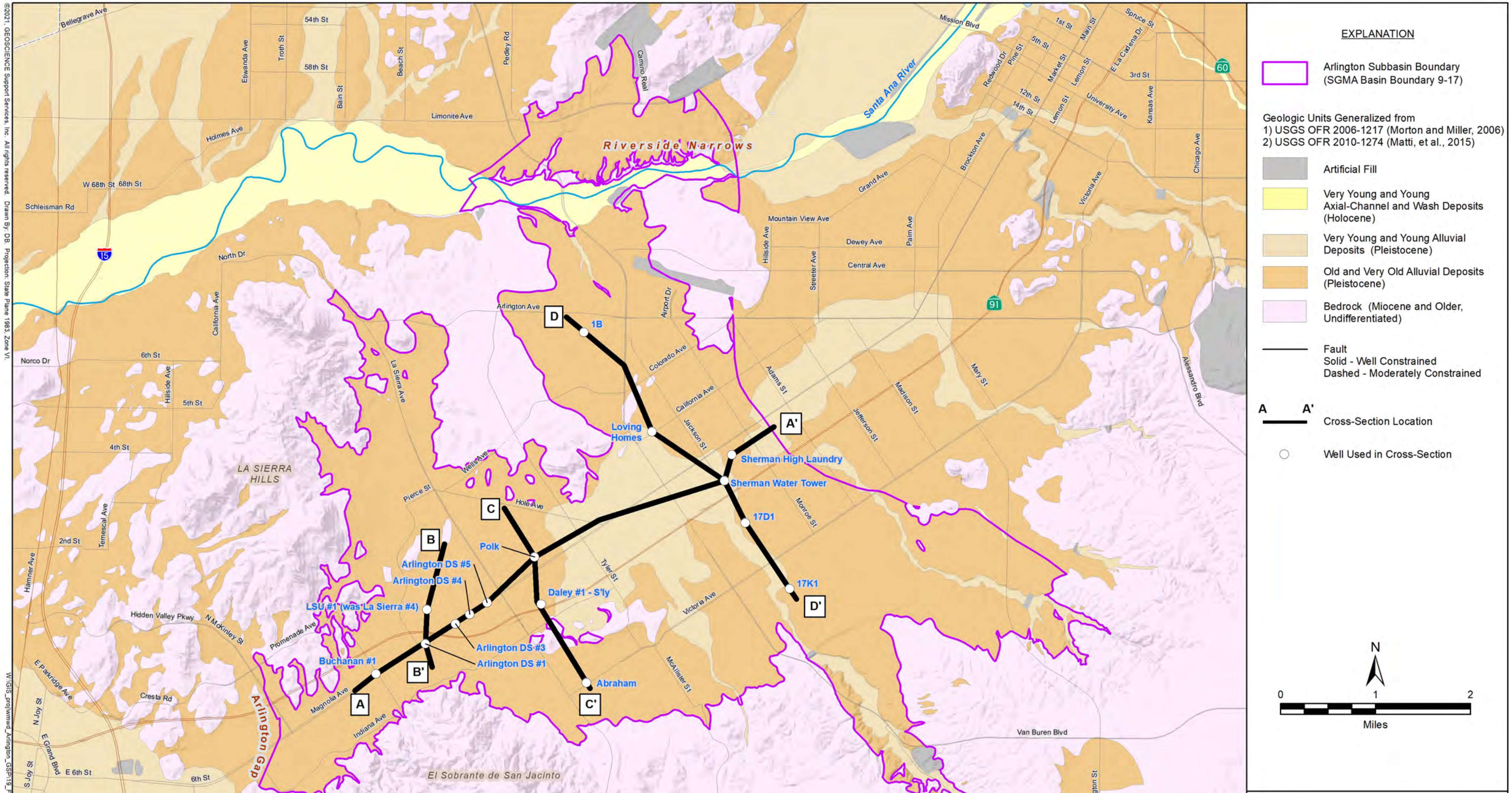
FIGURE 3-4



SURFICIAL GEOLOGY

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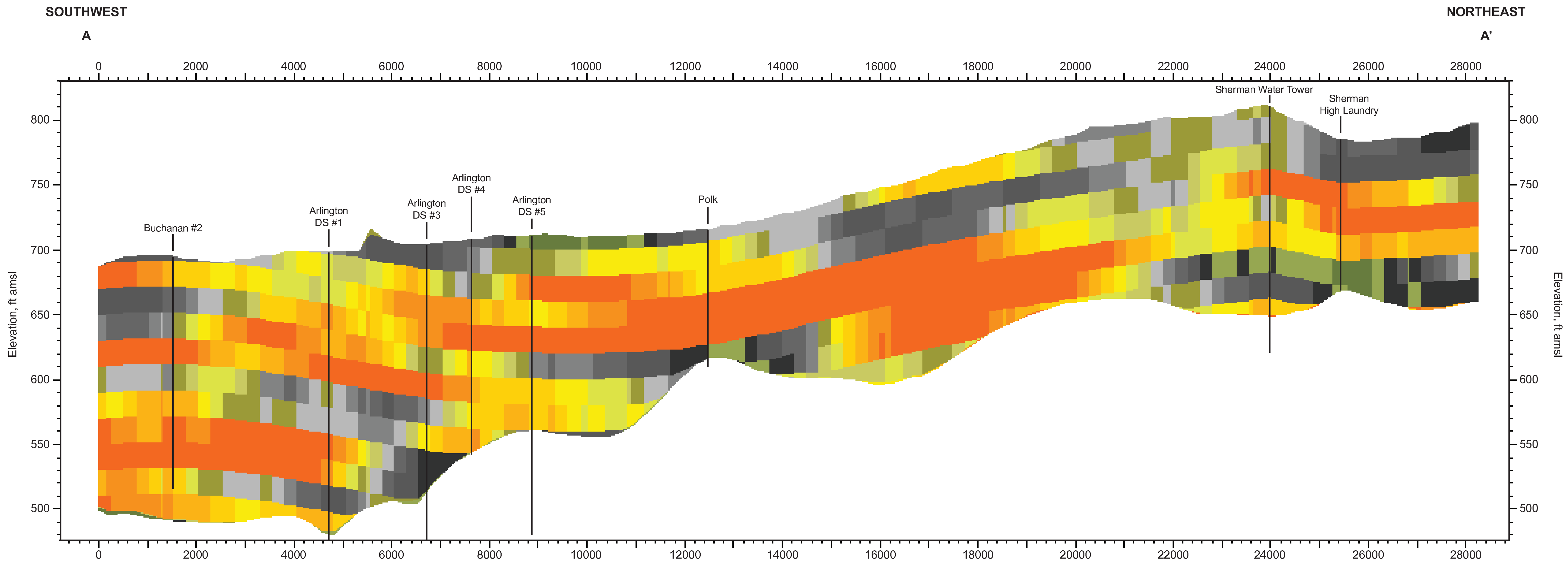
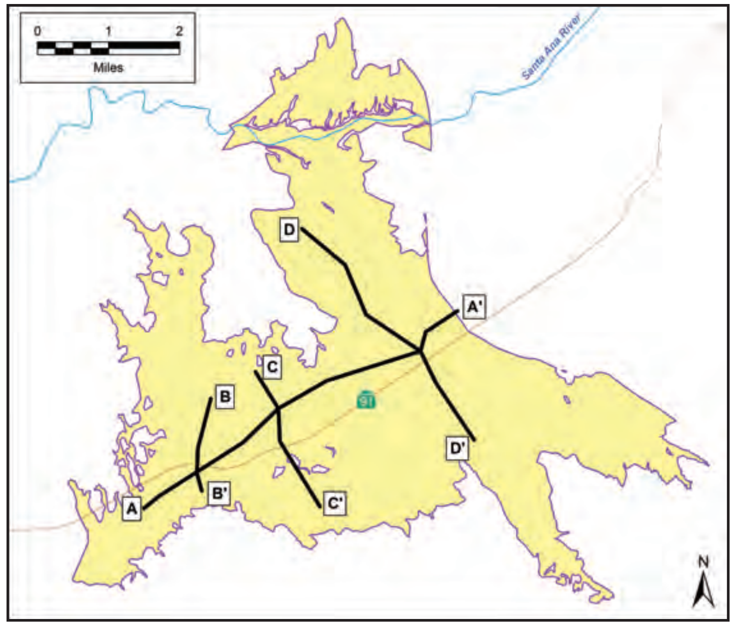
FIGURE 3-5

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

GEOSCIENCE





- ■ High Plasticity Clays
- ■ Clay
- ■ Silt
- ■ Sandy Silt
- ■ Clayey Sand
- ■ Silty Sand
- ■ Sand (Minor Silt/Clay)
- ■ Clean Sand
- ■ Gravel with Clay
- ■ Gravel with Silt
- ■ Gravel with Sand
- ■ Clean Gravel

W:GIS_proj\wmwd_Arlington_GSP\19_Fig_3-6_x-sec_A-A_lith_11X17_11-21.ai

GEOLOGIC CROSS-SECTION A-A'

Nov-21

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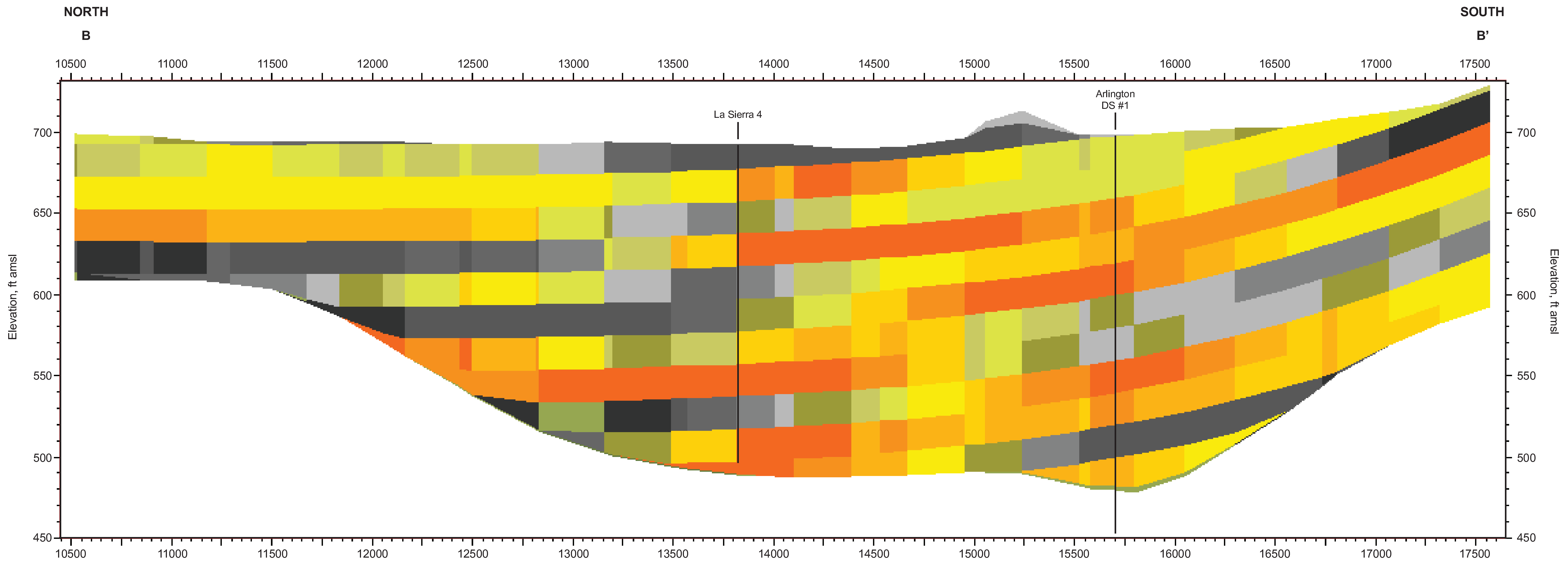
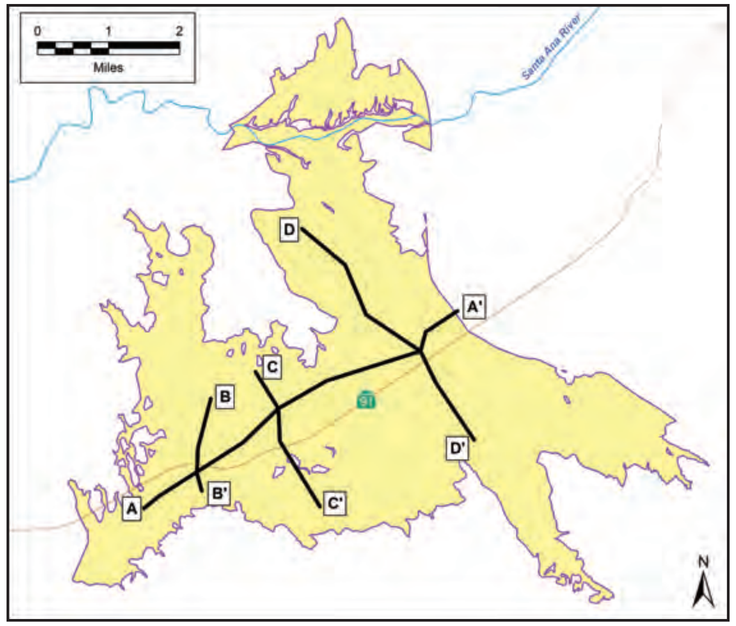
FIGURE 3-6





GEOLOGIC CROSS-SECTION B-B'

W:GIS_proj\wmwd_Arlington_GSP\19_Fig_3-7_x-sec_B-B_lith_11X17_11-21.ai

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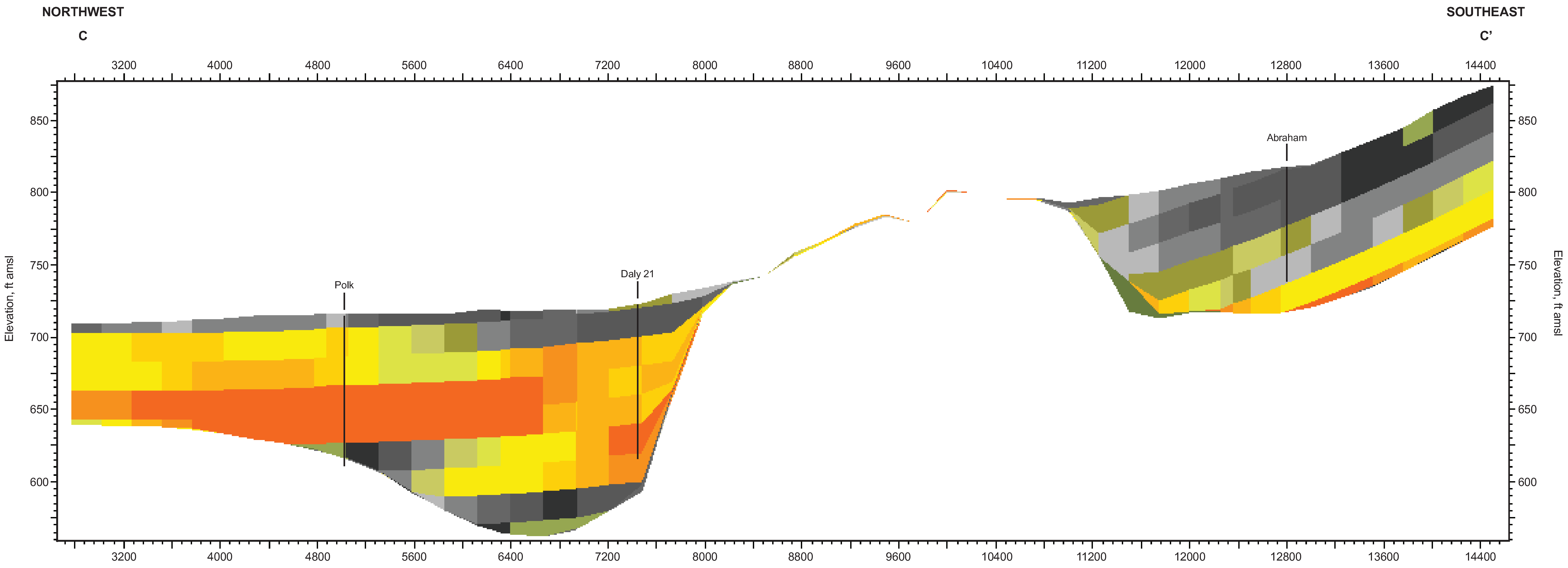
FIGURE 3-7

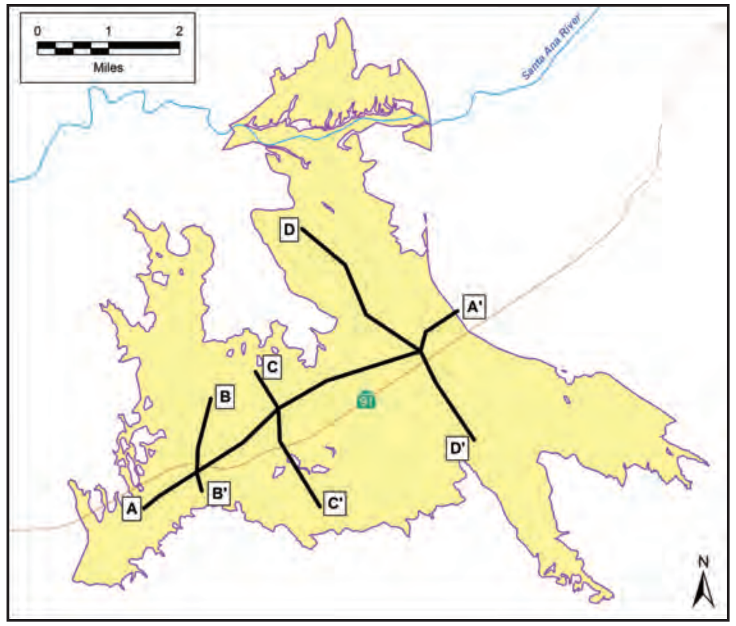
WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

GEOSCIENCE



▨ High Plasticity Clays
▨ Clay
▨ Silt
▨ Sandy Silt
▨ Clayey Sand
▨ Silty Sand
▨ Sand (Minor Silt/Clay)
▨ Clean Sand
▨ Gravel with Clay
▨ Gravel with Silt
▨ Gravel with Sand
▨ Clean Gravel



GEOLOGIC CROSS-SECTION C-C'

W:GIS_proj\wmwd_Arlington_GSP\19_Fig_3-8_x-sec_C-C_lith_11X17_11-21.ai

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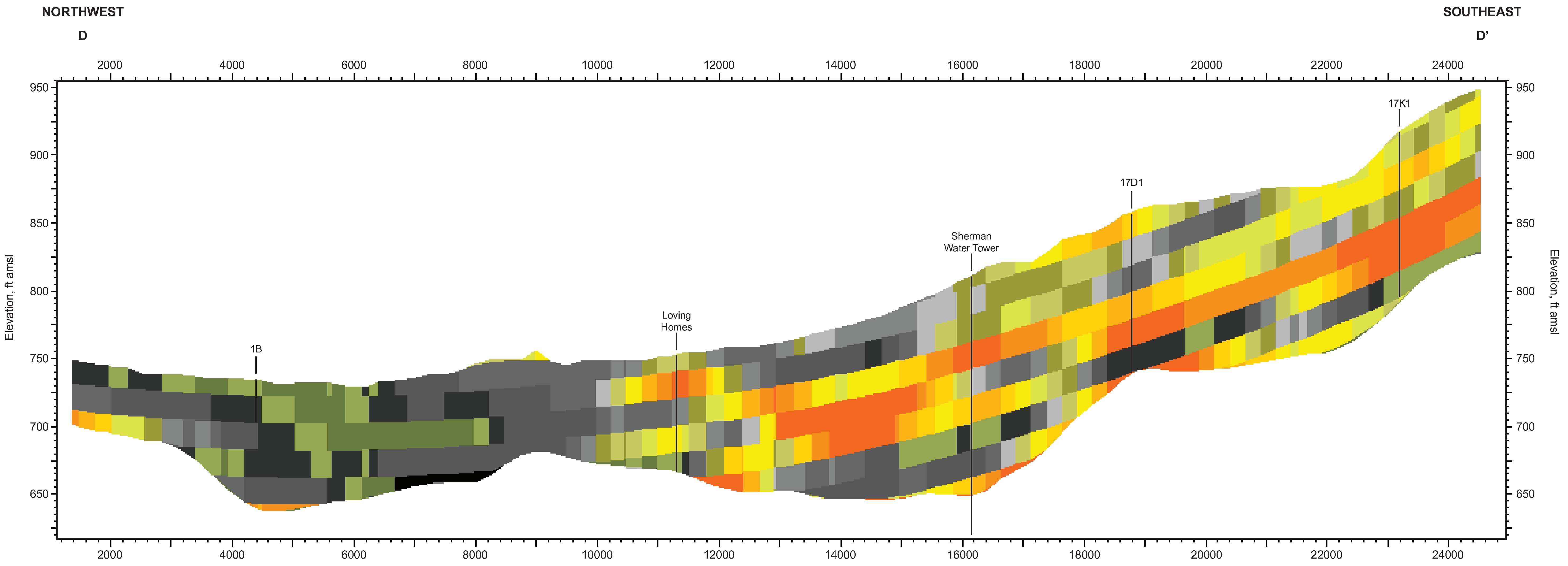
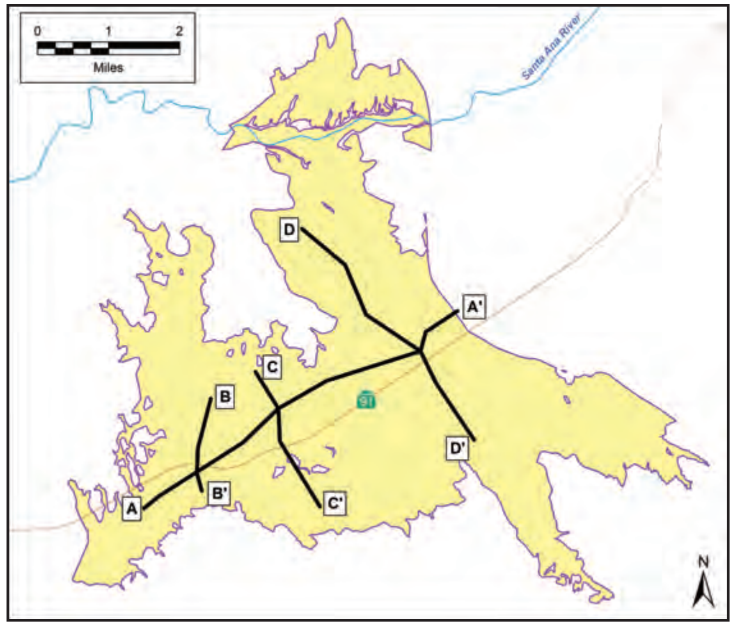
FIGURE 3-8

WESTERN MUNICIPAL WATER DISTRICT
GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

GEOSCIENCE





■ High Plasticity Clays
■ Clay
■ Silt
■ Sandy Silt
■ Clayey Sand
■ Silty Sand
■ Sand (Minor Silt/Clay)
■ Clean Sand
■ Gravel with Clay
■ Gravel with Silt
■ Gravel with Sand
■ Clean Gravel

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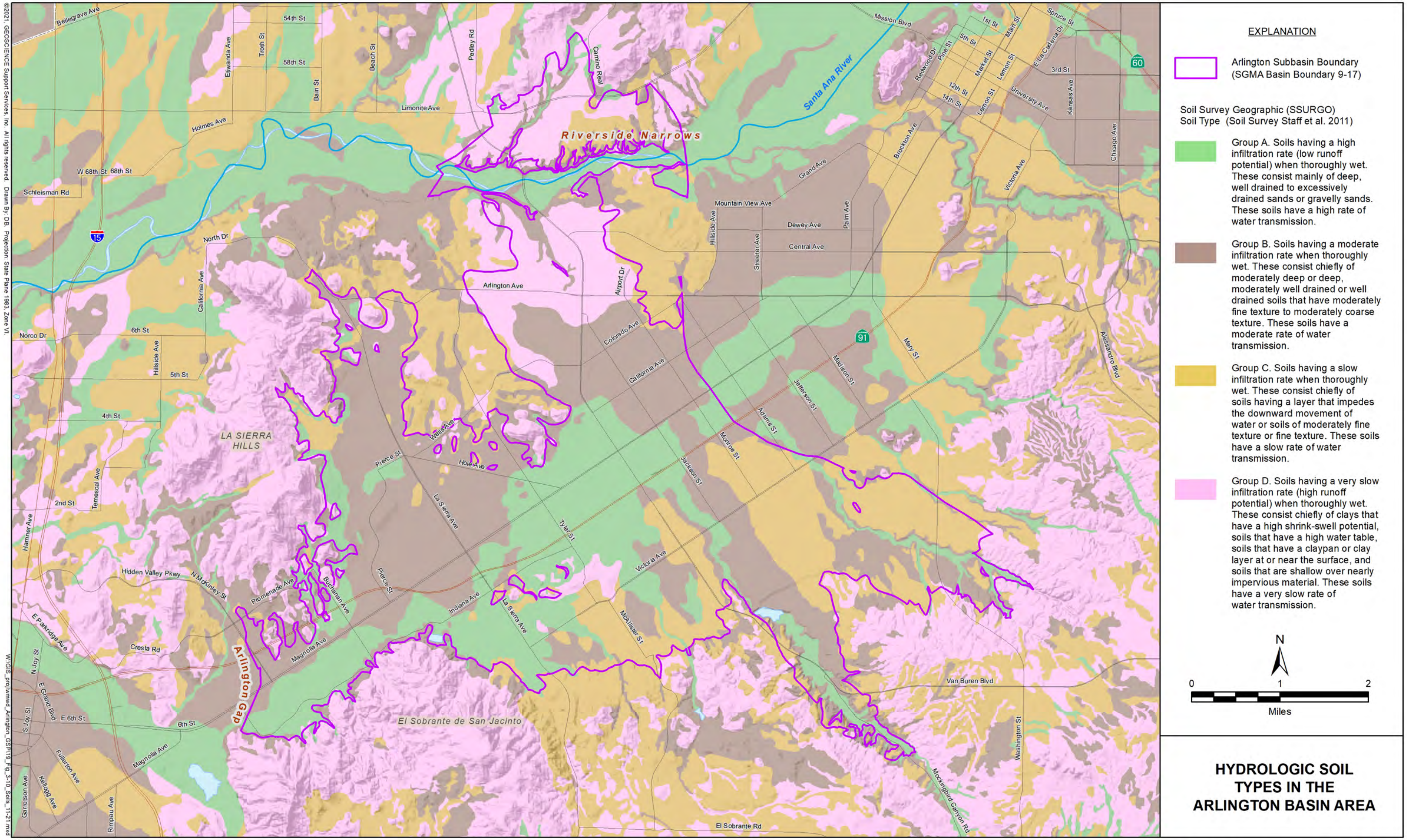
GEOLOGIC CROSS-SECTION D-D’

DRAFT

FIGURE 3-9

WESTERN MUNICIPAL WATER DISTRICT
GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

GEOSCIENCE



EXPLANATION

Arlington Subbasin Boundary (SGMA Basin Boundary 9-17)

Soil Survey Geographic (SSURGO) Soil Type (Soil Survey Staff et al. 2011)

🟩 Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

🟫 Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

🟨 Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

🟪 Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

HYDROLOGIC SOIL TYPES IN THE ARLINGTON BASIN AREA

Drawn By: DB. Projection: State Plane 1983, Zone VI.

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Nov-21

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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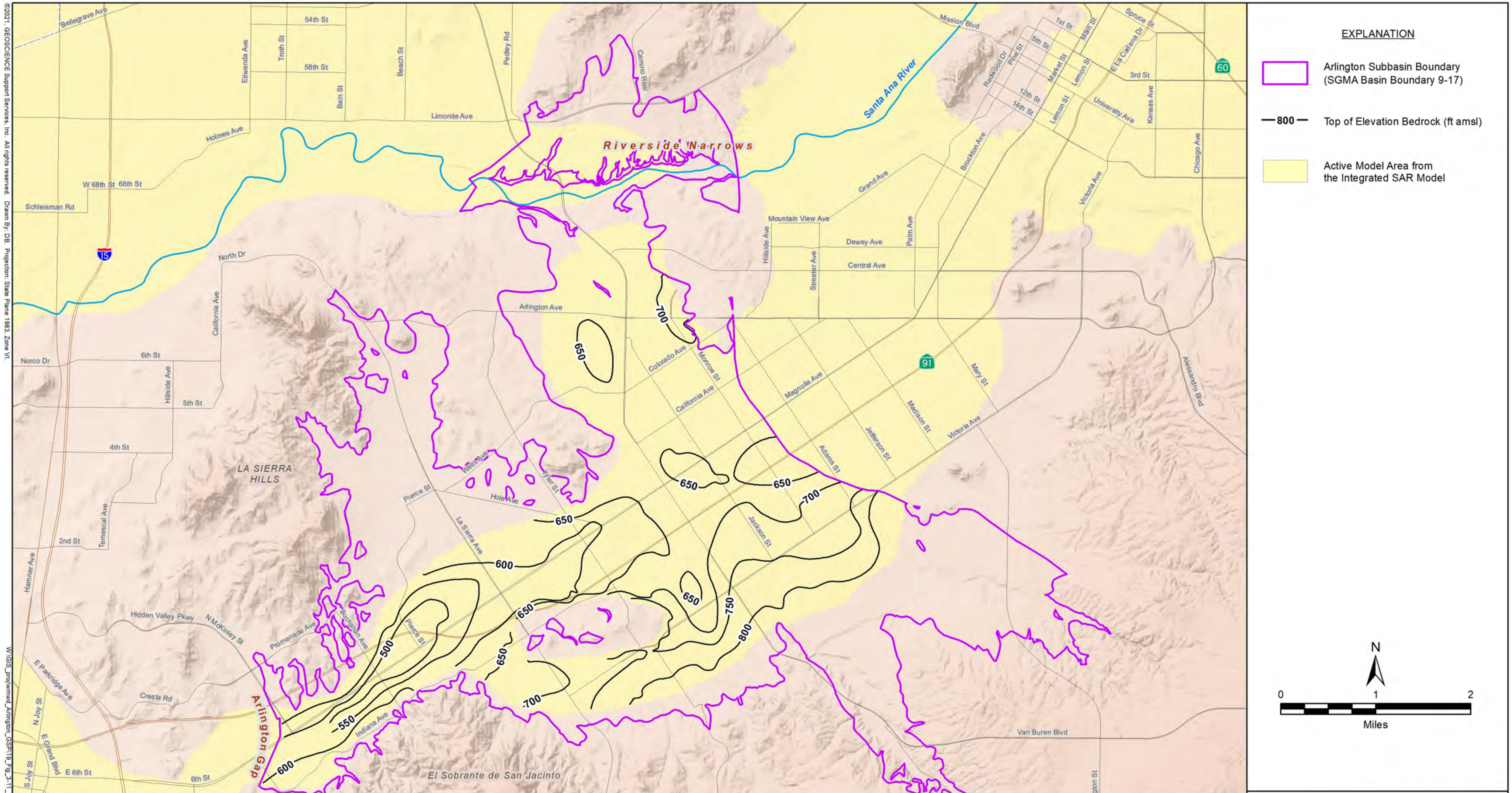
FIGURE 3-10

GEOSCIENCE



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TOP OF BEDROCK ELEVATION IN THE ARLINGTON BASIN AREA

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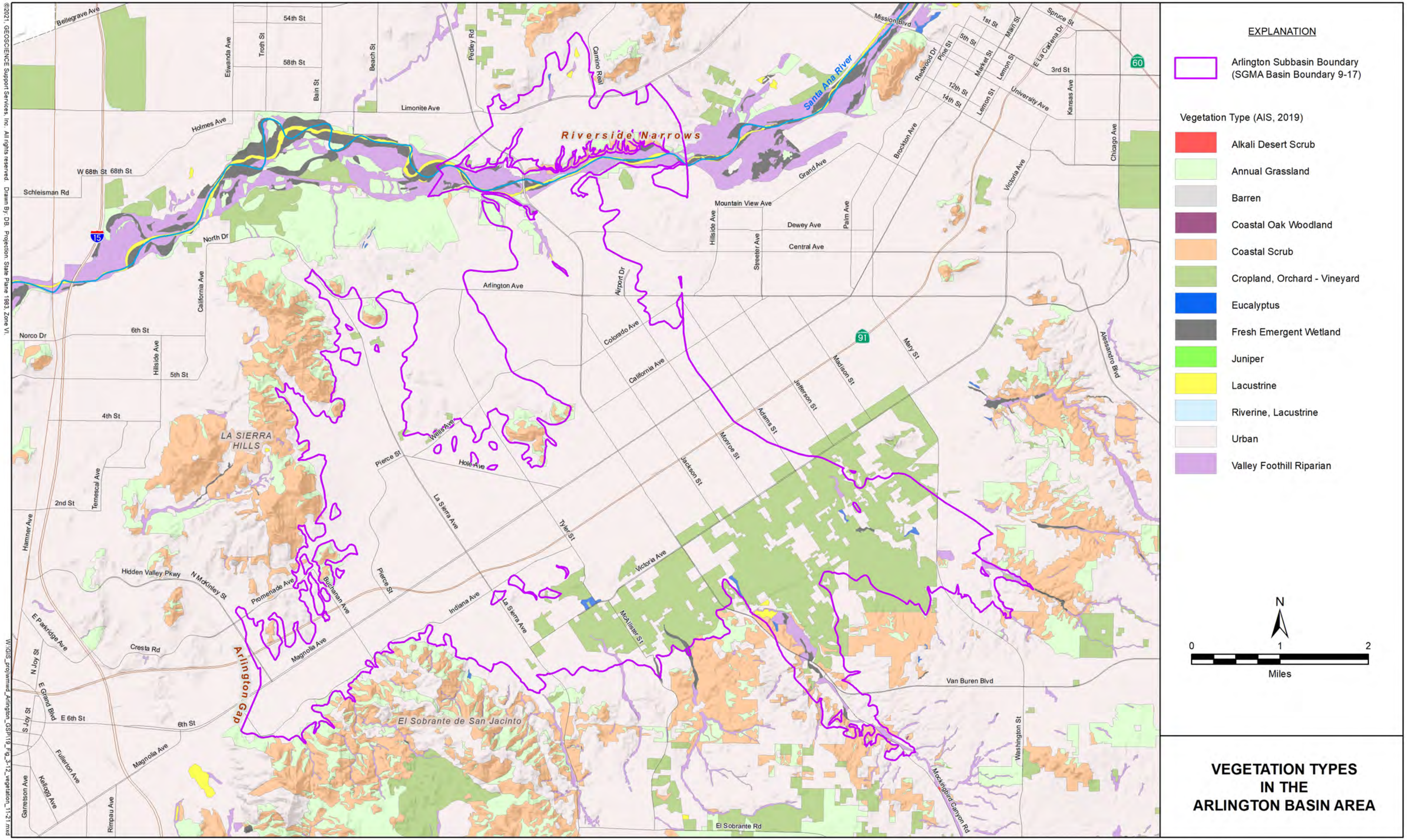
FIGURE 3-11



VEGETATION TYPES IN THE ARLINGTON BASIN AREA

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WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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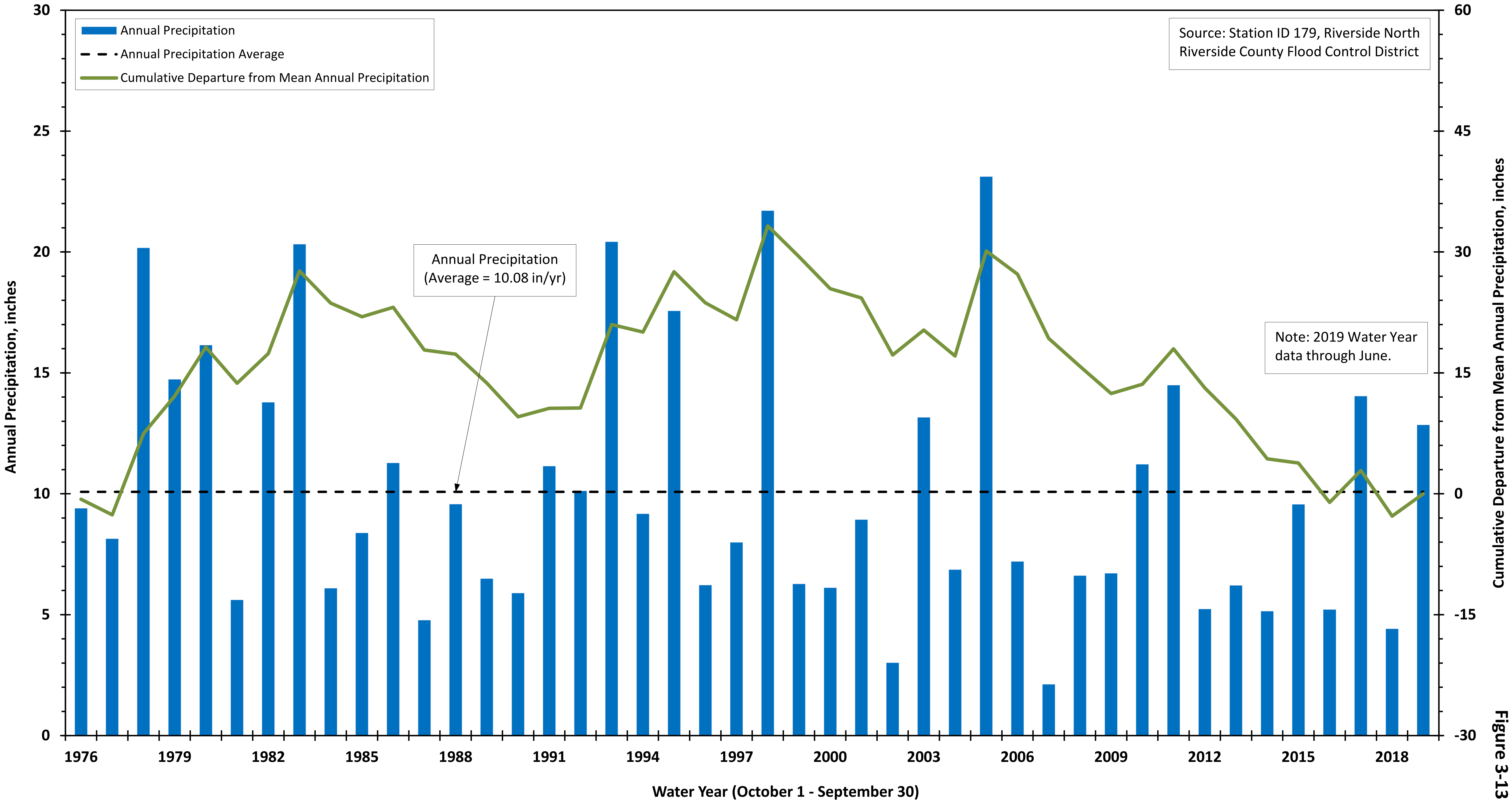
FIGURE 3-12

GEOSCIENCE

Annual Precipitation and Cumulative Departure from Mean Annual Precipitation (1975-2019)



Source: Station ID 179, Riverside North
Riverside County Flood Control District

Annual Precipitation
(Average = 10.08 in/yr)

Note: 2019 Water Year
data through June.

Figure 3-13

Average Monthly Precipitation

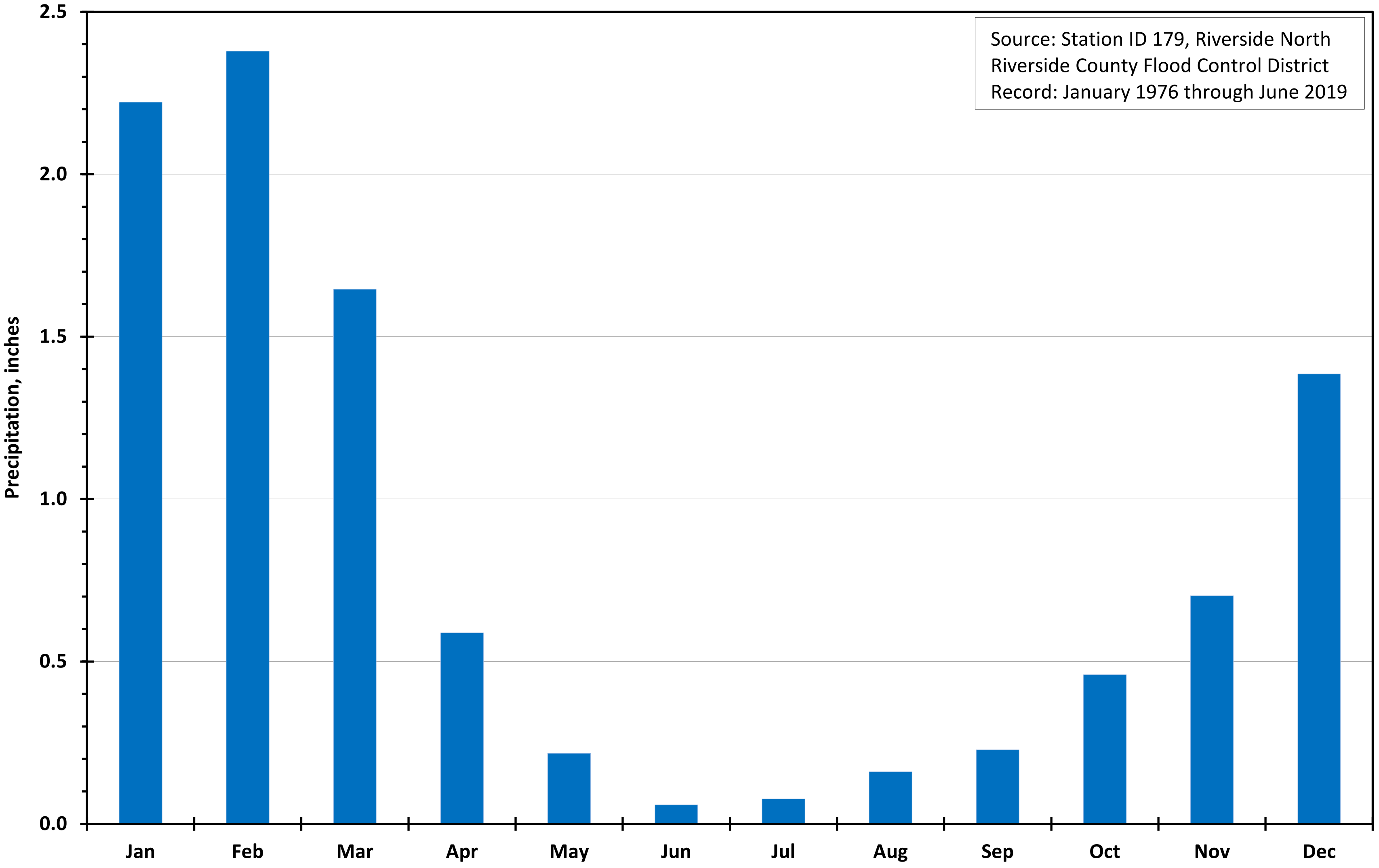
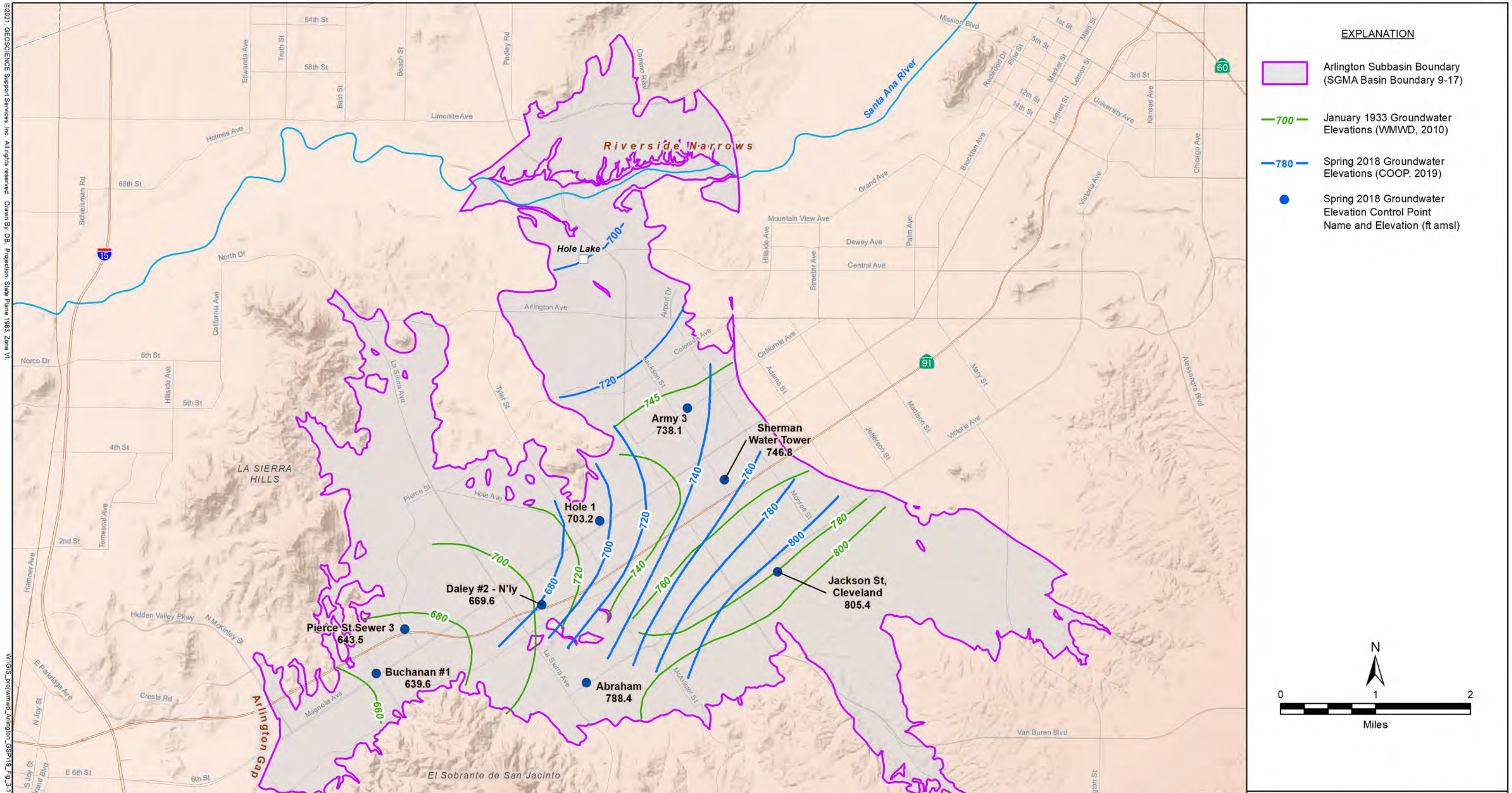


Figure 3-14

Drawn By: DB. Projection: State Plane 1983, Zone VI.



ARLINGTON BASIN GROUNDWATER CONTOURS 2018 AND 1933

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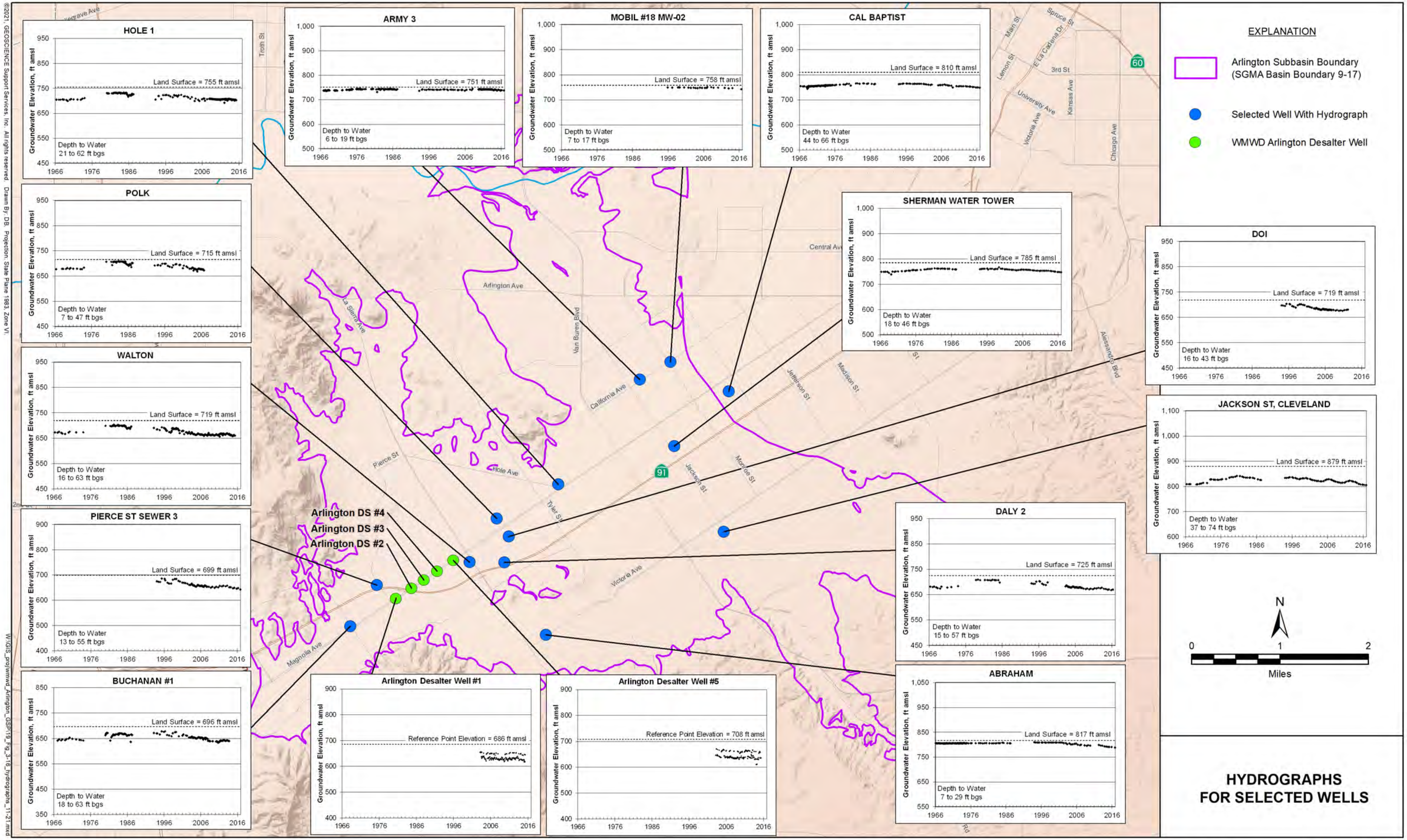
FIGURE 3-15



HYDROGRAPHS FOR SELECTED WELLS

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WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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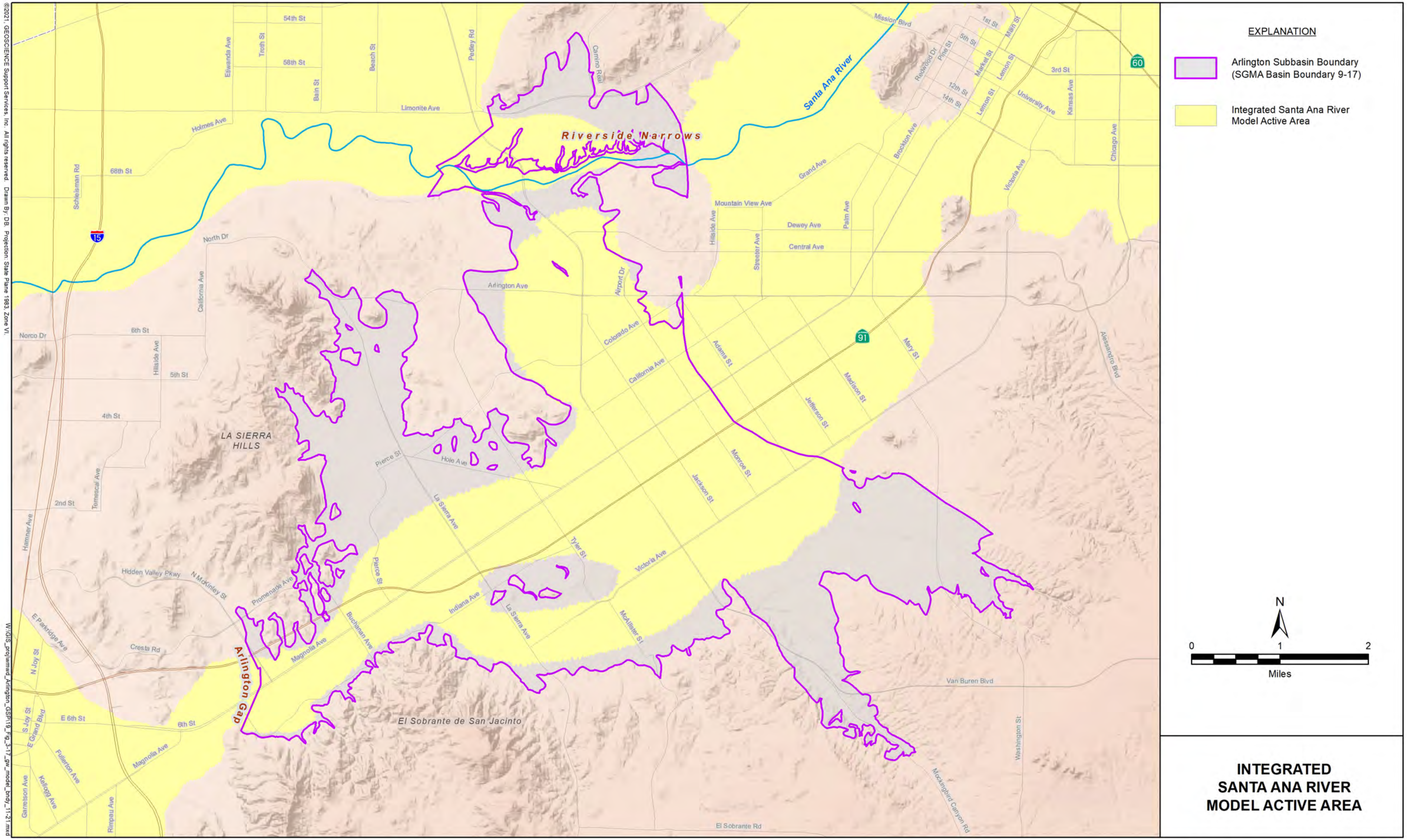
FIGURE 3-16

GEOSCIENCE



INTEGRATED SANTA ANA RIVER MODEL ACTIVE AREA

W:\GIS_proj\wmwd_Arlington_GSP\19_Fig_3-17_gw_model_bndy_11-21.mxd

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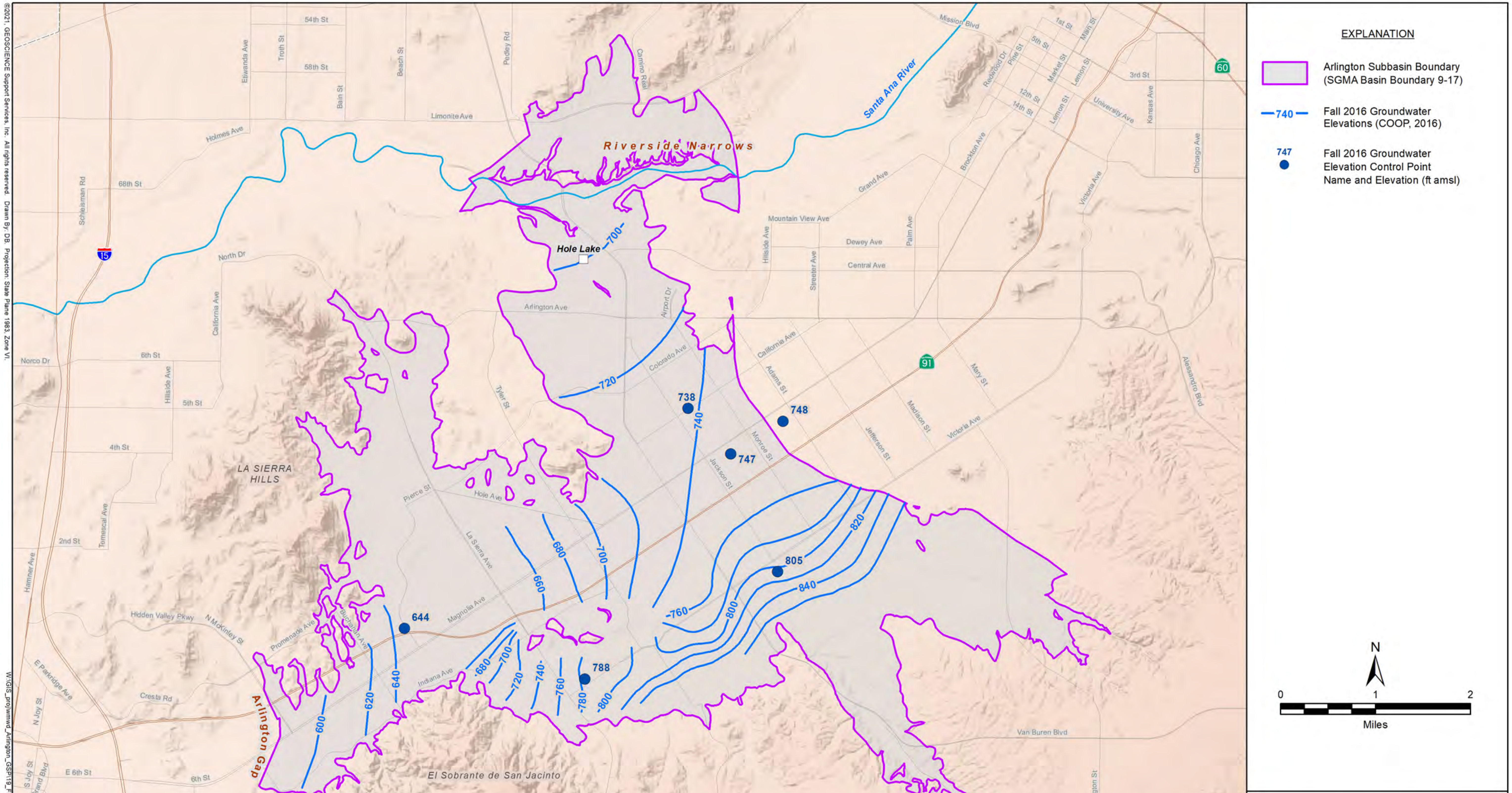
FIGURE 3-17



ARLINGTON BASIN GROUNDWATER CONTOURS FALL 2016

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WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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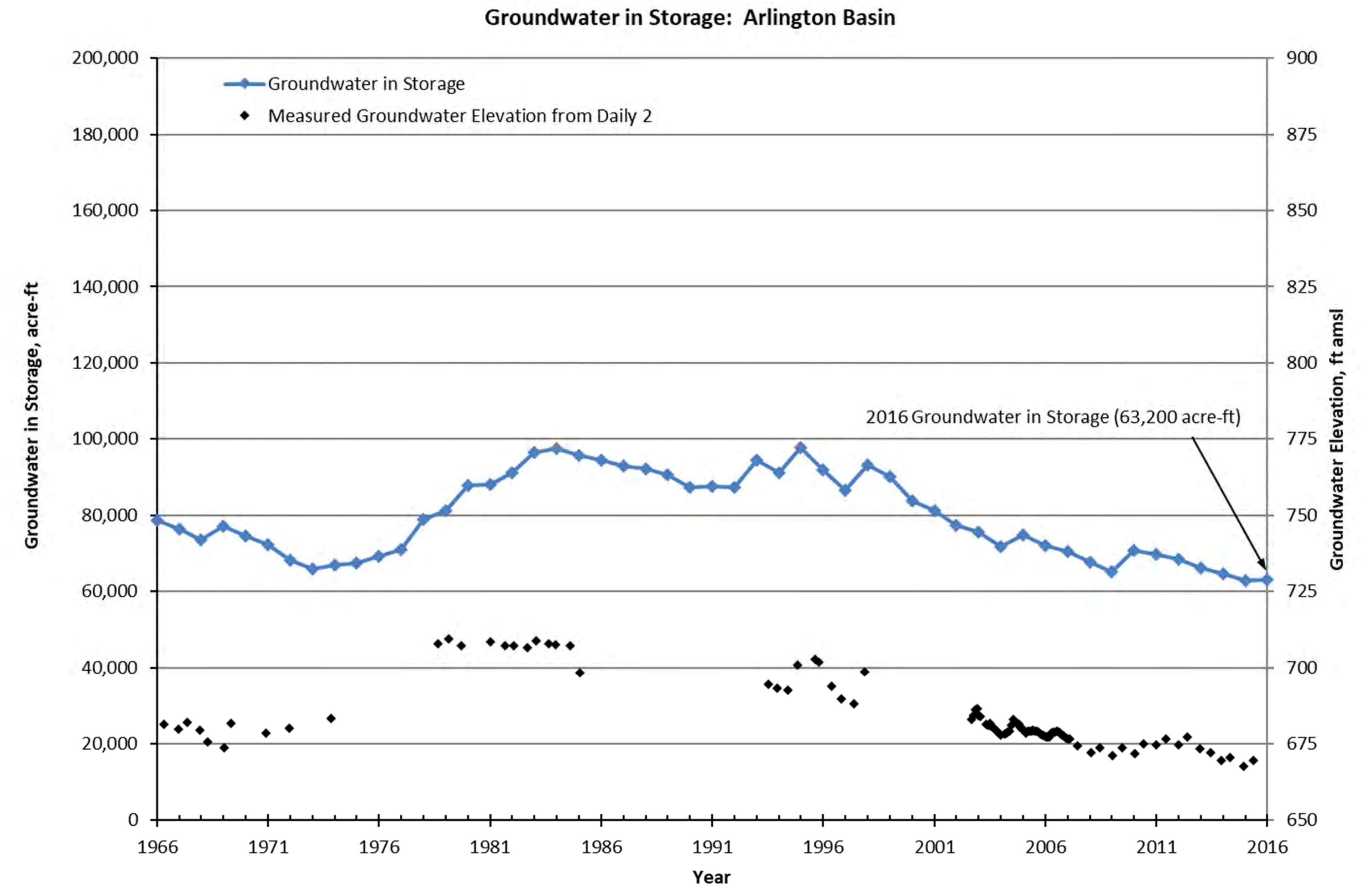
FIGURE 3-18

GEOSCIENCE

X:\Projects\Western_Municipal_WD\Arlington Basin GSP\GSP_TMs\TM-4_Sustainability Criteria\Figures\Figures with Figure Numbers__UPDATED



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WESTERN MUNICIPAL WATER DISTRICT

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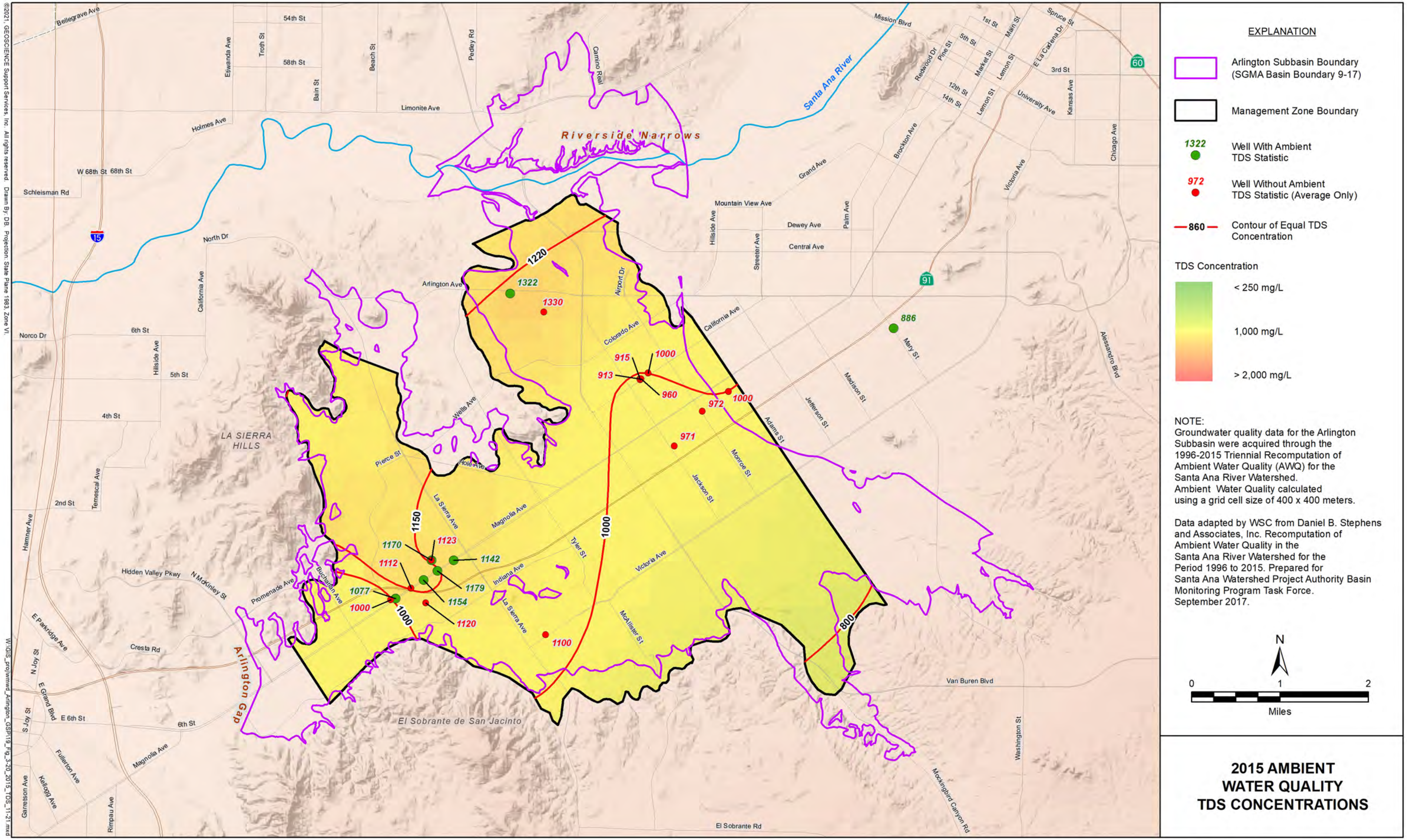
FIGURE 3-19

GROUNDWATER SUSTAINABILITY PLAN FOR THE ARLINGTON GROUNDWATER BASIN

GEOSCIENCE



NOTE:
Groundwater quality data for the Arlington Subbasin were acquired through the 1996-2015 Triennial Recomputation of Ambient Water Quality (AWQ) for the Santa Ana River Watershed.
Ambient Water Quality calculated using a grid cell size of 400 x 400 meters.

Data adapted by WSC from Daniel B. Stephens and Associates, Inc. Recomputation of Ambient Water Quality in the Santa Ana River Watershed for the Period 1996 to 2015. Prepared for Santa Ana Watershed Project Authority Basin Monitoring Program Task Force. September 2017.

2015 AMBIENT WATER QUALITY TDS CONCENTRATIONS

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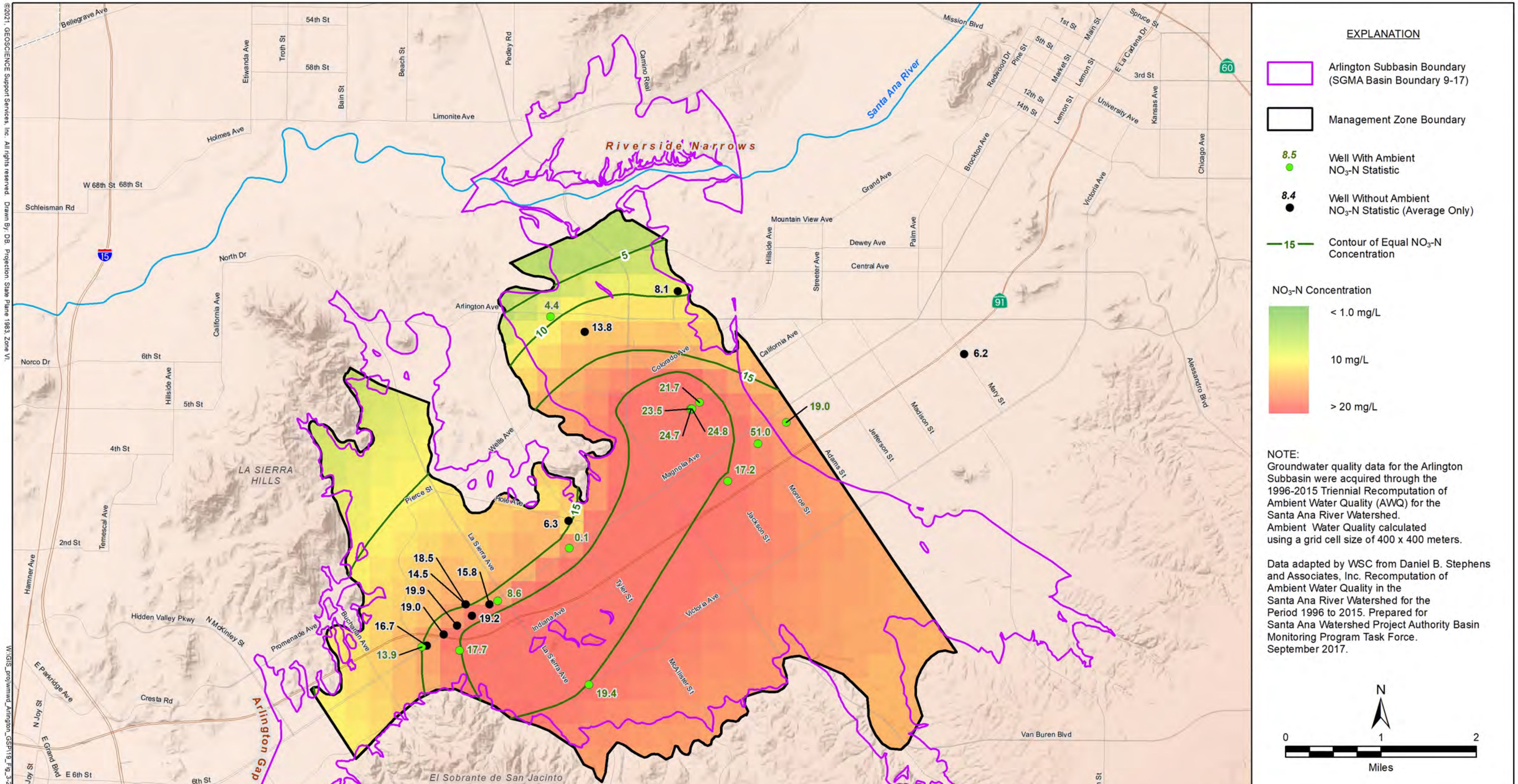
FIGURE 3-20



NOTE:
Groundwater quality data for the Arlington Subbasin were acquired through the 1996-2015 Triennial Recomputation of Ambient Water Quality (AWQ) for the Santa Ana River Watershed.
Ambient Water Quality calculated using a grid cell size of 400 x 400 meters.

Data adapted by WSC from Daniel B. Stephens and Associates, Inc. Recomputation of Ambient Water Quality in the Santa Ana River Watershed for the Period 1996 to 2015. Prepared for Santa Ana Watershed Project Authority Basin Monitoring Program Task Force. September 2017.

2015 AMBIENT WATER QUALITY NITRATE AS NITROGEN CONCENTRATIONS

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Nov-21

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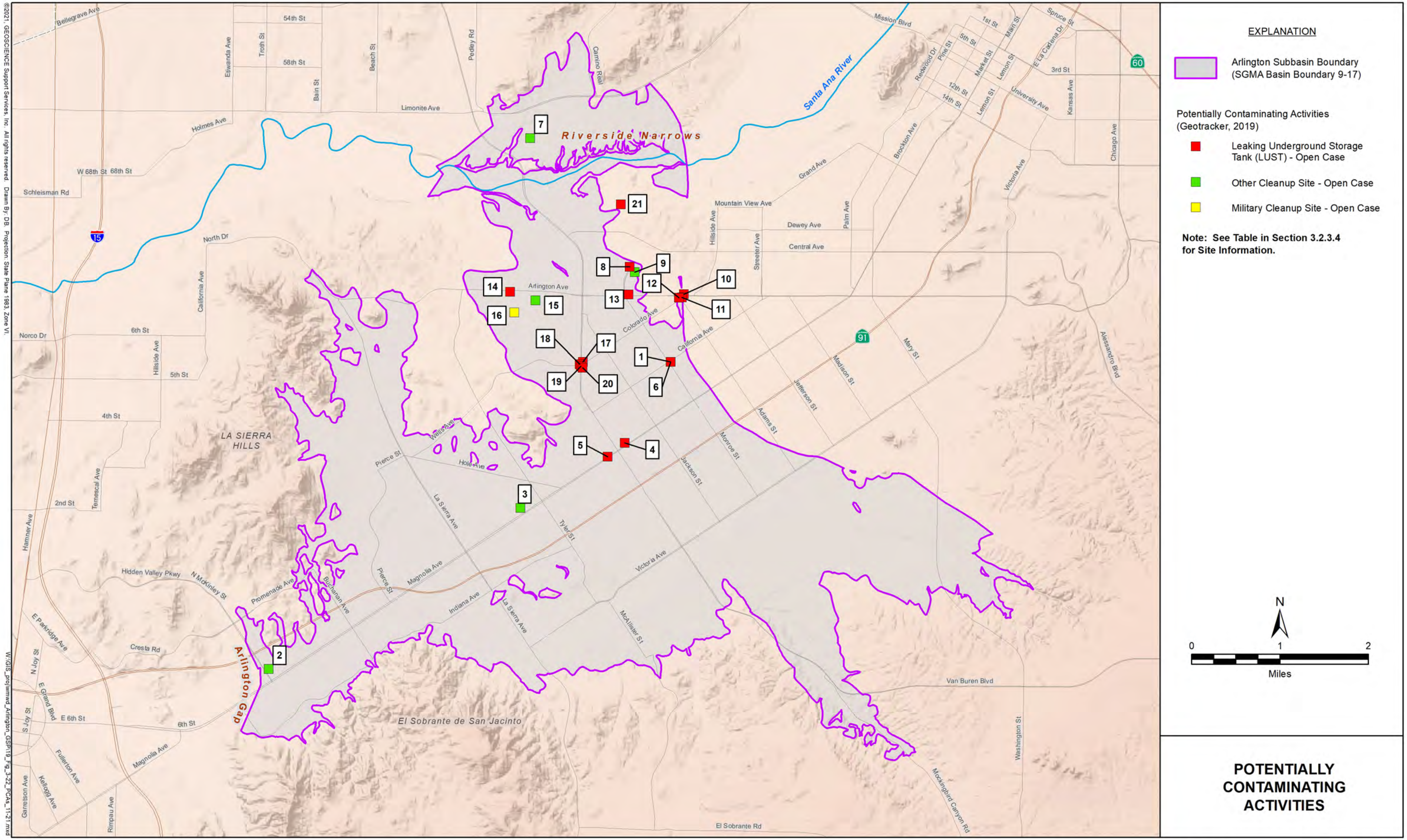
FIGURE 3-21



EXPLANATION

▭ Arlington Subbasin Boundary (SGMA Basin Boundary 9-17)

Potentially Contaminating Activities (Geotracker, 2019)

- 🟥 Leaking Underground Storage Tank (LUST) - Open Case
- 🟩 Other Cleanup Site - Open Case
- 🟨 Military Cleanup Site - Open Case

Note: See Table in Section 3.2.3.4 for Site Information.

POTENTIALLY CONTAMINATING ACTIVITIES

Nov-21

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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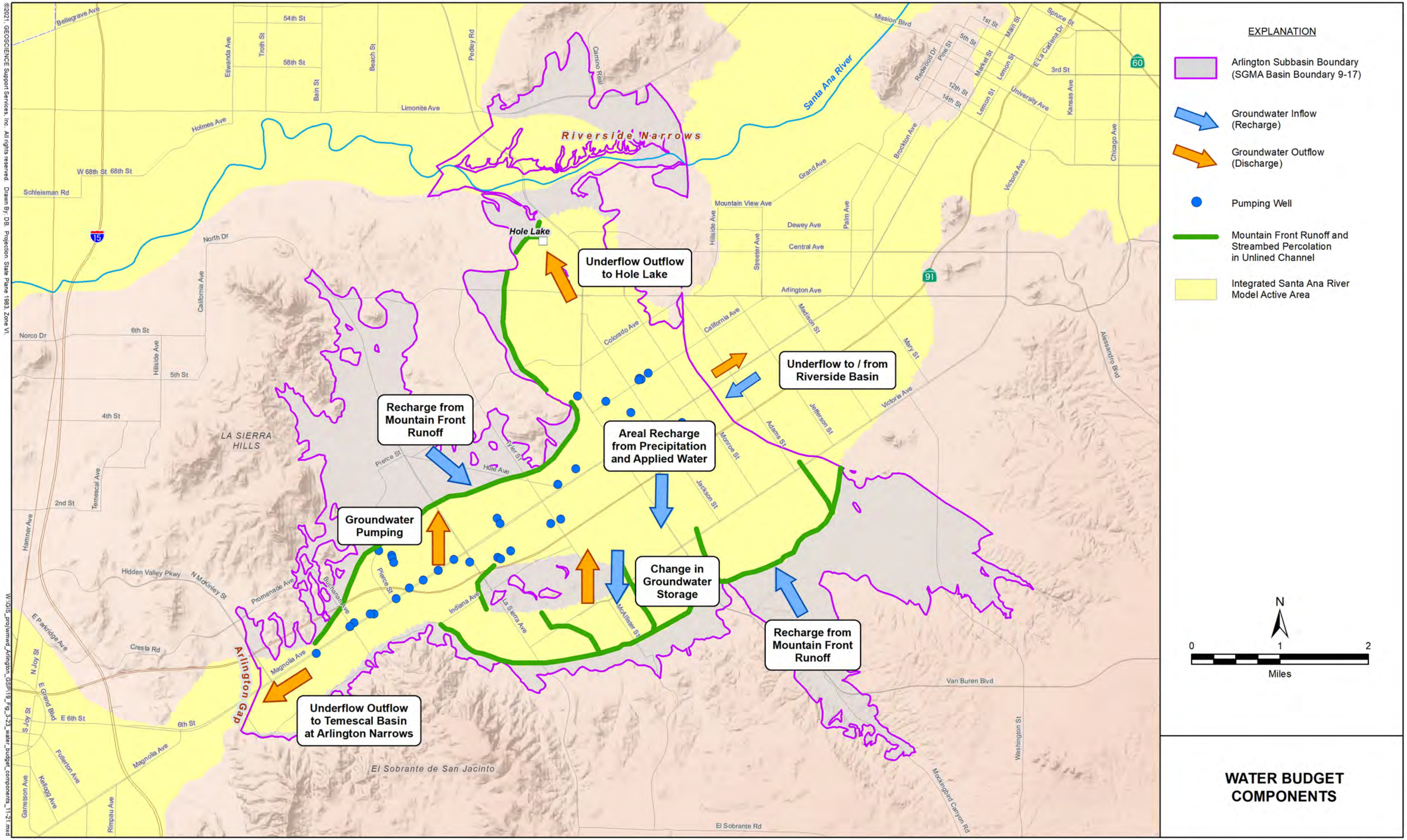
FIGURE 3-22

GEOSCIENCE



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WATER BUDGET COMPONENTS

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FIGURE 3-23

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

GEOSCIENCE

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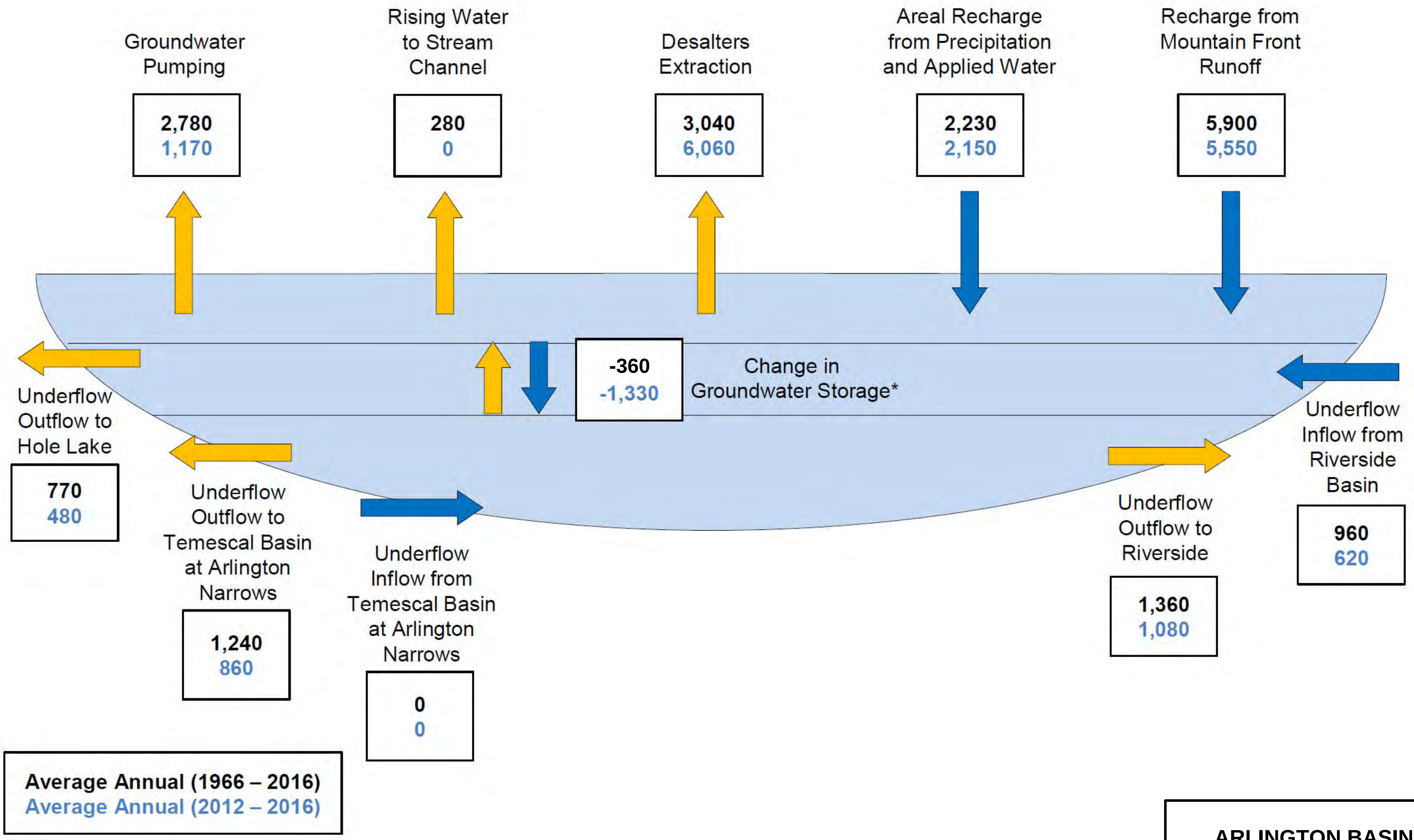

All values in acre-ft/yr

*A positive sign indicates an increase in groundwater storage and a negative sign represents a decline in groundwater storage.

ARLINGTON BASIN WATER BUDGET (1966 – 2016 AND 2012 – 2016)

Nov-2021

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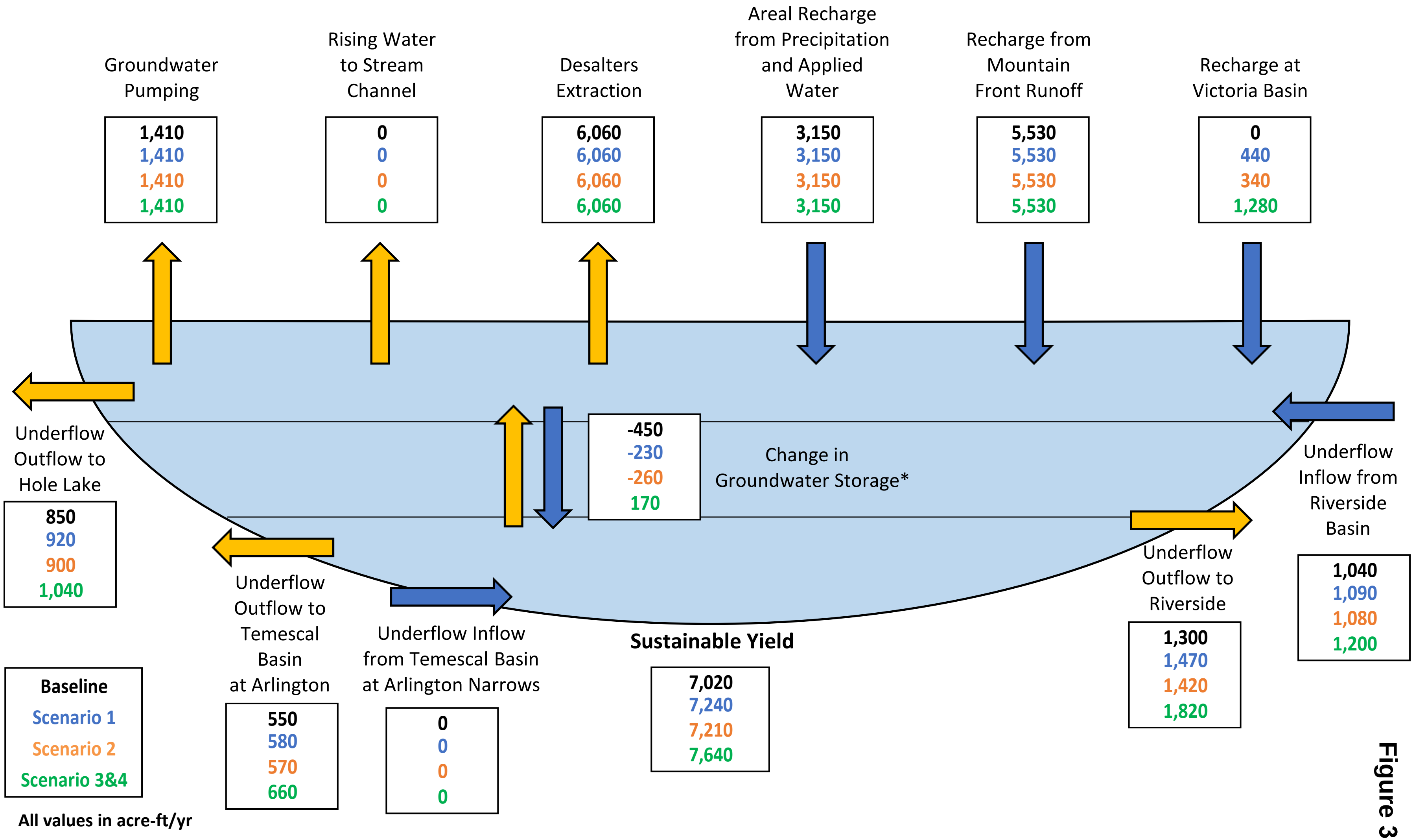
FIGURE 3-24

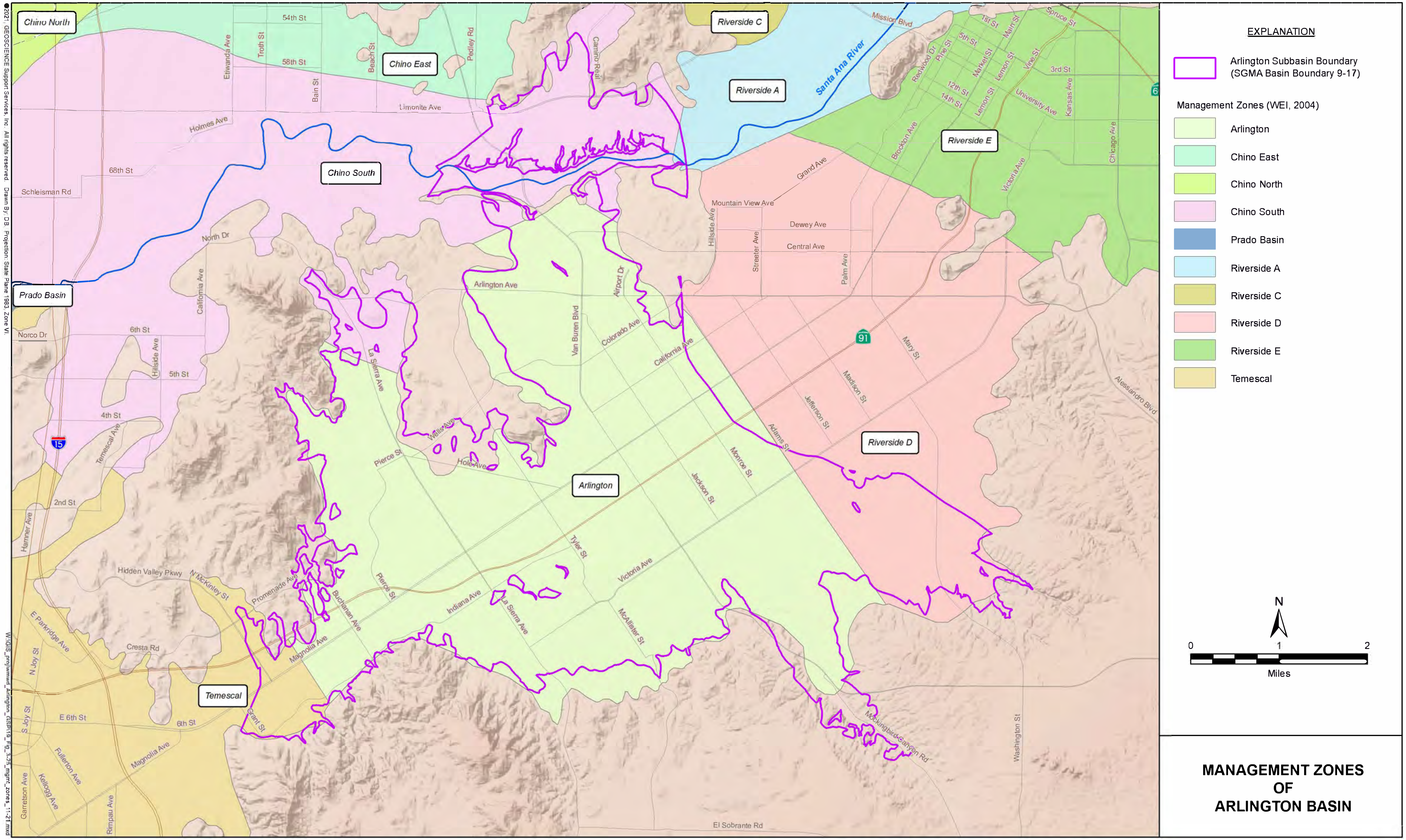
Average Annual Water Budget



All values in acre-ft/yr

*A positive sign indicates an increase in groundwater storage; a negative sign represents a decline in groundwater storage.

Figure 3-25



MANAGEMENT ZONES OF ARLINGTON BASIN

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WESTERN MUNICIPAL WATER DISTRICT

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FIGURE 3-26

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

GEOSCIENCE

Table 3-4

Annual Water Budget
1966 to 2016

Calender Year	Areal Recharge from Precipitation and Applied Water	Recharge from Mountain Front Runoff	Underflow Inflow from Riverside Basin	Underflow Inflow from Hole Lake	Underflow Inflow from Temescal Basin at Arlington Narrows	Total Inflow	Groundwater Pumping	Desalters Extraction	Rising Water to Stream Channel	Underflow Outflow to Riverside Basin	Underflow Outflow to Hole Lake	Underflow Outflow to Temescal Basin at Arlington Narrows	Total Outflow	Change in Storage	Cumulative Change in Storage
	acre-ft						acre-ft							acre-ft	
1966	2,855	5,518	887	1	0	9,260	9,671	0	0	1,087	514	1,165	12,437	-3,177	-3,177
1967	2,525	4,677	909	1	0	8,111	7,624	0	0	873	545	1,172	10,213	-2,102	-5,279
1968	2,311	4,434	948	1	0	7,694	8,078	0	0	813	529	1,161	10,580	-2,886	-8,166
1969	4,382	9,926	1,102	0	0	15,410	8,790	0	0	1,164	738	1,151	11,843	3,566	-4,599
1970	2,850	5,316	1,082	0	0	9,250	8,929	0	0	1,160	710	1,084	11,883	-2,633	-7,233
1971	2,768	5,202	1,095	0	0	9,065	8,440	0	0	1,205	754	988	11,386	-2,321	-9,554
1972	2,104	4,178	1,094	0	0	7,377	8,264	0	0	1,239	800	913	11,215	-3,839	-13,393
1973	2,067	4,792	1,061	0	0	7,921	7,645	0	0	1,231	768	768	10,412	-2,491	-15,884
1974	2,531	5,112	1,053	0	0	8,696	4,862	0	0	1,200	789	719	7,570	1,126	-14,758
1975	1,840	3,931	996	0	0	6,768	3,544	0	0	1,221	771	798	6,334	434	-14,324
1976	2,238	4,815	961	0	0	8,015	3,265	0	0	1,231	790	869	6,155	1,860	-12,464
1977	2,226	4,851	947	0	0	8,025	3,293	0	0	1,181	777	949	6,200	1,825	-10,639
1978	3,701	9,526	1,082	0	0	14,309	3,243	0	0	1,322	853	1,056	6,474	7,835	-2,804
1979	2,124	5,761	1,093	0	0	8,978	3,502	0	0	1,305	733	1,147	6,686	2,292	-512
1980	3,444	8,838	1,199	0	0	13,481	3,156	0	0	1,526	845	1,273	6,800	6,681	6,169
1981	1,520	4,868	1,195	0	0	7,582	3,625	0	0	1,517	849	1,368	7,359	224	6,393
1982	1,780	6,341	1,191	0	0	9,313	2,270	0	0	1,592	929	1,453	6,244	3,069	9,462
1983	2,376	8,792	1,227	0	0	12,395	1,915	0	689	1,735	1,051	1,615	7,005	5,390	14,852
1984	1,635	5,714	1,216	0	0	8,566	1,406	0	1,789	1,710	1,034	1,770	7,709	857	15,709
1985	1,136	4,006	1,184	0	0	6,326	1,356	0	2,178	1,685	1,036	1,858	8,112	-1,786	13,923
1986	1,245	4,824	1,148	0	0	7,216	1,654	0	2,190	1,632	1,012	1,866	8,354	-1,138	12,785
1987	1,047	4,103	1,101	0	0	6,252	1,193	0	2,195	1,537	974	1,880	7,780	-1,528	11,257
1988	1,149	4,524	1,056	0	0	6,729	959	0	2,336	1,459	936	1,885	7,575	-846	10,411
1989	935	3,875	1,010	0	0	5,821	996	0	2,168	1,367	897	1,903	7,330	-1,509	8,902
1990	880	3,926	960	0	0	5,766	1,166	3,462	484	1,305	842	1,899	9,158	-3,392	5,510
1991	2,741	7,265	950	0	0	10,956	1,022	5,515	9	1,342	843	1,797	10,529	428	5,937
1992	2,224	5,470	925	0	0	8,619	876	4,324	0	1,348	792	1,647	8,987	-368	5,570
1993	3,648	11,131	1,025	0	0	15,805	1,199	3,167	0	1,643	891	1,644	8,544	7,261	12,831
1994	1,872	4,091	1,016	0	0	6,980	691	5,557	0	1,638	815	1,635	10,336	-3,356	9,475
1995	2,946	8,513	1,080	0	0	12,539	1,276	435	1	1,779	909	1,626	6,026	6,513	15,988
1996	1,876	3,970	1,060	0	0	6,906	1,277	7,065	0	1,720	893	1,710	12,665	-5,759	10,230
1997	1,945	4,629	1,030	0	0	7,605	1,629	7,375	0	1,656	895	1,485	13,040	-5,435	4,795
1998	2,999	9,105	1,081	0	0	13,185	759	1,469	0	1,785	988	1,385	6,386	6,799	11,594
1999	1,765	3,688	1,046	0	0	6,499	891	4,619	0	1,669	905	1,498	9,582	-3,082	8,512
2000	1,789	3,711	1,016	0	0	6,516	1,822	7,147	0	1,571	884	1,433	12,857	-6,341	2,170
2001	1,758	5,545	954	0	0	8,258	1,228	6,027	0	1,482	846	1,261	10,844	-2,586	-415

Annual Water Budget
1966 to 2016

Calender Year	Areal Recharge from Precipitation and Applied Water	Recharge from Mountain Front Runoff	Underflow Inflow from Riverside Basin	Underflow Inflow from Hole Lake	Underflow Inflow from Temescal Basin at Arlington Narrows	Total Inflow	Groundwater Pumping	Desalters Extraction	Rising Water to Stream Channel	Underflow Outflow to Riverside Basin	Underflow Outflow to Hole Lake	Underflow Outflow to Temescal Basin at Arlington Narrows	Total Outflow	Change in Storage	Cumulative Change in Storage
	acre-ft						acre-ft							acre-ft	
2002	1,828	5,218	888	0	0	7,935	1,084	7,431	0	1,353	785	1,177	11,831	-3,896	-4,312
2003	1,975	6,394	841	0	0	9,210	1,402	6,397	0	1,324	739	1,121	10,983	-1,772	-6,084
2004	2,121	6,200	800	1	0	9,122	2,060	7,888	0	1,241	681	1,038	12,908	-3,786	-9,870
2005	2,992	10,344	849	0	0	14,186	1,704	6,306	0	1,391	736	958	11,095	3,091	-6,779
2006	2,108	6,369	815	1	0	9,293	1,754	7,657	0	1,306	635	907	12,258	-2,965	-9,744
2007	2,261	6,838	790	1	0	9,891	1,218	7,388	0	1,278	611	849	11,345	-1,454	-11,199
2008	2,254	5,709	757	1	0	8,721	1,322	7,476	0	1,239	597	811	11,446	-2,725	-13,923
2009	2,234	5,698	716	1	0	8,650	1,668	6,935	0	1,231	575	763	11,172	-2,522	-16,445
2010	4,127	10,562	721	1	0	15,411	1,139	6,085	0	1,292	605	729	9,850	5,561	-10,884
2011	1,970	4,976	710	1	0	7,656	974	4,943	0	1,324	628	763	8,633	-976	-11,860
2012	2,168	5,616	683	1	0	8,468	1,144	6,060	0	1,220	548	839	9,811	-1,344	-13,204
2013	2,053	5,331	649	1	0	8,034	1,197	6,582	0	1,141	515	881	10,316	-2,282	-15,486
2014	2,250	5,764	615	1	0	8,630	1,159	6,562	0	1,074	489	870	10,153	-1,523	-17,009
2015	2,001	5,211	579	1	0	7,791	1,177	6,205	0	1,003	454	846	9,685	-1,894	-18,903
2016	2,293	5,828	551	1	0	8,673	1,163	4,892	0	944	415	860	8,274	400	-18,504
Average 1966 to 2016	**2,233**	**5,903**	**960**	**0**	**0**	**9,095**	**2,778**	**3,039**	**275**	**1,359**	**768**	**1,240**	**9,458**	**-363**	
Average 2012 to 2016	**2,153**	**5,550**	**615**	**1**	**0**	**8,319**	**1,168**	**6,060**	**0**	**1,076**	**484**	**859**	**9,648**	**-1,329**	

4.0 Sustainable Management Criteria (§354.22)

Sustainable Groundwater Management is defined as the "…management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results…" (Water Code Section 10721 (v)). The Groundwater Sustainability Plan (GSP) regulations collectively include four GSP requirements for Sustainable Management Criteria:

1. Sustainability Goal,
2. Undesirable Results,
3. Minimum Thresholds
4. Measurable Objectives

The development of these criteria relies upon information about the Arlington Basin developed in the hydrogeologic conceptual model presented in Section 3 – Basin Setting, the description of current and historical groundwater conditions, and the water budget. The impacts and estimated changes to future Arlington Basin conditions from the projects and management actions proposed in Section 6 were considered when developing the sustainable management criteria for the Arlington Basin. As discussed in Section 3 – Basin Setting, the Arlington Basin has been in slight overdraft for decades – resulting in some reduction of useable groundwater storage and incipient chronic lowering of groundwater levels (without local wells going dry). There is no evidence of water quality degradation as a result of lowering groundwater levels. Water quality in the basin has shown elevated total dissolved solids (TDS) and nitrate as nitrogen (N) since at least the 1950s (Arlington GWMP 2012). The sustainable management criteria are used to establish thresholds and objectives to ensure the Arlington Basin does not experience undesirable results in the future.

4.1 Sustainability Indicators

The Sustainable Groundwater Management Act (SGMA) has identified six sustainability indicators which refer to effects caused by groundwater conditions occurring throughout a basin that, when significant and unreasonable, cause undesirable results (Water Code Section 10721(x)). Basin sustainability, and the effectiveness of the proposed plans and programs will be judged by the ability to eliminate undesirable results and conditions represented by the six sustainability indicators, as specifically applicable to the Arlington Basin:

- Reduction of Groundwater in Storage
- Chronic Lowering of Groundwater Levels
- Seawater Intrusion
- Degraded Water Quality
- Land Subsidence
- Depletion of Interconnected Surface Water

For these sustainability indicators, a GSP must develop quantitative sustainability criteria that allow a Groundwater Sustainability Agency (GSA) to define, measure, and track sustainable management. These criteria include the following:

- Undesirable Result – significant and unreasonable conditions for any of the six sustainability indicators.
- Minimum Threshold (MT) – numeric value used to define undesirable results for each sustainability indicator.
- Measurable Objective (MO) – specific, quantifiable goal to track the performance of sustainable management.
- Interim Milestone (IM) – target value representing measurable groundwater conditions, in increments of five years, set by the GSA as part of the GSP.

These sustainability criteria form the framework to define sustainable management particular to the basin and delineate between sustainable and unsustainable groundwater conditions based on current and proposed use. In addition, these criteria allow for real-time and consistent tracking of groundwater conditions to show progress towards sustainability, provide early identification of potential problems as they might arise, and allow for timely appropriate decisions to be made regarding additional or modified management actions.

4.2 Sustainability Goal (§354.24)

The Department of Water Resources (DWR) states that SGMA requires local agencies to develop and implement GSPs that achieve sustainable groundwater management by implementing projects and management actions intended to ensure that the basin is operated within its sustainable yield by avoiding undesirable results. As discussed in Section 3.3.3, the sustainable yield is a crucial and fundamental element of GSP development, including establishing sustainable management criteria. The importance of the Arlington Basin sustainable yield is magnified by the fact that groundwater is the sole source of water for some users and provides a significant supply to the basin pumpers. The results of the water balance analysis indicate that an average natural recharge from all sources of 8,710 acre-feet per year (af/yr) represents the long-term (1966-2016) sustainable yield of the basin. However, for the hydrologic period from 2012 through 2016 (a dry hydrologic period), the sustainable yield was estimated at 6,990 af/yr over this five-year period. This explains why, even though long-term extractions have been fairly similar, a consistent downward trend of groundwater levels has characterized the basin in the recent period (2012-2016) while the long-term trend has approached sustainability. Over this period (2012-2016), groundwater storage decreases by 1,330 af/yr.

4.2.1 Description of Sustainability Goal

The sustainability goal for the Arlington Basin is to manage and preserve its groundwater resource as a sustainable water supply. To the greatest extent possible, the goal is to preserve historic operations of beneficial use in the basin as well as allow for future planned uses as conceived by the GSA and basin stakeholders. The sustainability goal will be accomplished by achieving the following objectives:

- Operate the Arlington Basin groundwater resource within the sustainable yield.
- Implement projects and management actions to reduce Arlington Basin groundwater demands, increase reuse of current supplies, obtain supplemental water supplies, and mitigate undesirable results.

- Monitor the Arlington Basin actively and thoroughly and adaptively manage projects and management actions to ensure the GSP is effective and undesirable results are avoided.

4.2.2 Approach to Sustainability Indicators

The approach to assess sustainability indicators and set the sustainability criteria has been based on:

1. Review of available information from the Plan Area, Hydrogeologic Conceptual Model, Historic and Current Groundwater Conditions, and Water Budget sections of the GSP, and
2. Discussions with basin stakeholders at TAC meetings and workshops.

The approach began by qualitatively defining undesirable results based on a simple understanding that an undesirable result is something that cannot be allowed to happen since it would have a potentially unmitigable impact on beneficial users. Based on the initial assessment, it became clear that seawater intrusion and subsidence are not likely to occur. Therefore, these two conditions are discussed only briefly in the sections below.

The monitoring of groundwater levels is directly tied to management of the volume of groundwater storage, so sustainability goals for managing groundwater levels are considered with groundwater storage goals. In addition, while there are no natural steam drainages in the Arlington Basin, there is some contribution of surface water flow to the Santa Ana River via Hole Lake (see Section 3.2.5). Groundwater pumping in the Arlington Basin does not directly influence surface water in the Santa Ana River since outflow from Hole Lake represents an insignificant amount in comparison to constant flows of treated wastewater from the Riverside Wastewater Treatment Plant and San Bernardino Wastewater Treatment Plants farther upstream.

Consideration of the causes and circumstances of undesirable results is important in Arlington Basin, particularly for groundwater quality because general mineral quality (e.g., TDS and nitrate) is poor throughout much of the basin and has been poor for decades. Sustainable management is all about use and management of groundwater without causing undesirable results but does not necessarily include reversing natural undesirable conditions. Moreover (per SGMA §10727.2(b)(4)), a GSP may – but is not required – to address undesirable results that occurred before and have not been corrected by the SGMA benchmark date of January 1, 2015.

4.2.3 Summary of Sustainable Management Criteria

This section documents the six sustainability criteria as relevant to Arlington Basin and as guided by the Sustainability Goal. As documented in this section, the basin has been managed nearly sustainably over the long-term, though the basin has experienced groundwater level declines more recently for the period from 2012 through 2016. Therefore, the sustainability goals set forth in this section, with the exceptions of seawater intrusion and land subsidence which are not relevant to the site-specific conditions in the Arlington Basin, will provide a means to measure basin management toward sustainable basin conditions. Accordingly, sustainability needs to be achieved either by operating within the current sustainable yield of the groundwater basin or by increasing the sustainable yield through the addition of new water supplies through planned projects.

The Minimum Threshold (MT) for:

- Chronic lowering of groundwater levels is defined at designated Key Wells by historical groundwater water levels and the elevation of the top of the well screens for the five known basin pumpers. Undesirable results are indicated when two consecutive exceedances occur in each of two consecutive years, in 50 percent or more of the Key Wells. The Measurable Objective (MO) is to maintain groundwater levels above the MTs and within the historical operating range.
- Reduction of storage is fulfilled by the MT for groundwater levels as a proxy. The MO for storage is also fulfilled by the MT for groundwater levels, which maintains groundwater levels within the operating range to protect operations of municipal wells in the basin and provide for a minimum five-year supply of groundwater.
- Degradation of water quality addresses TDS and nitrate. The MT for TDS is defined as the ambient groundwater quality discussed in Section 3.2.3.1 and shown on Figure 3-20 from Section 3. The MT for nitrate is defined as the ambient water quality as discussed in Section 3.2.3.2 and shown in Figure 3-21. The MOs for both TDS and nitrate are defined as maintaining or reducing the percentage of wells with median concentrations exceeding the MTs.
- Depletion of interconnected surface water cannot be established based on the current available data. The MT for depletion of interconnected surface water with specific reference to Hole Lake will be reviewed for the 5-year update when additional data are collected and analyzed.

4.3 Chronic Lowering of Groundwater Levels (§354.26(a),(b),(c))

Chronic lowering of groundwater levels can indicate significant and unreasonable depletion of supply, causing undesirable results to domestic, agricultural, or municipal groundwater users if continued over the planning and implementation horizon. As a clarification, drought-related groundwater level declines are not considered chronic if groundwater recharge and discharge are managed such that groundwater levels fully recover during non-drought periods.

Declining groundwater levels directly relate to other potential undesirable effects (e.g., groundwater storage and interconnected surface water). These effects are described in subsequent sections. Effects on well users are described here.

As stated in Section 3 – Basin Setting, Arlington Basin groundwater levels are influenced primarily by groundwater production and, to a lesser degree, by climate. 2018 groundwater elevations in the middle to upper portion of the basin ranged from 680 to 800 feet above mean sea level (ft amsl) (Figure 4-1), generally staying within 0 to 20 ft of water levels from nearly 80 years ago despite changes in land use and water demands from increasing urbanization. Review of the hydrographs provided on Figure 4-2 indicates that groundwater elevations in wells have a generally concave upward trend, with historically low groundwater elevations in the 1960s, followed by increasing groundwater levels to a historical high in the late 1980s and early 1990s, followed by decreasing trends through the present. Sustainability will be achieved when the seasonal range of groundwater changes remains within a range of elevations that will have no long-term negative impacts on basin pumpers.

4.3.1 Description/Definition of Undesirable Results

As mentioned previously, the Arlington Basin Sustainability Goal has the objective to provide a long-term, reliable, and efficient groundwater supply for agricultural, domestic, municipal, and industrial uses. Accordingly, the definition of undesirable results would be the chronic lowering of groundwater levels, indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. In particular, undesirable results with respect to groundwater elevations are those elevations that will have a negative impact on basin pumpers, such as groundwater elevations falling below the top of well screen intakes. This is defined by groundwater conditions occurring throughout the basin.

This definition also recognizes that chronic lowering of groundwater levels could affect groundwater flow to or from the hydraulically connected Temescal Subbasin, and thereby potentially affect their ability to maintain sustainability. However, since the City of Corona is supplied water from the Arlington Desalter, downgradient outflow is much less of a consideration and previous planning documents have sought to reduce outflow as a means of decreasing high TDS outflow and substituting with good quality desalinated water from the Desalter.

4.3.1.1 Potential Causes of Undesirable Results

Groundwater level declines have been occurring over the last several decades but, to date, without reported undesirable results. Review of historical groundwater contours indicates that groundwater levels have not declined to elevations below the top of well screens of basin pumpers. However, without implementation of sustainability goals to maintain basin operation within sustainable limits (i.e., pumping in excess of sustainable yield), undesirable results could occur in the near future.

4.3.1.2 Potential Effects on Beneficial Uses and Users

Groundwater is a significant source of supply in the GSP Area and supplies wells for agricultural, municipal, industrial, and domestic beneficial uses. Groundwater has been and is being used for a range of beneficial uses, even during drought, and with reasonable operation and maintenance by well owners. Undesirable results in regard to groundwater elevations include the lowering of groundwater levels below the top of well screen intakes. Significant lowering of groundwater levels can require lowering of pumps and increased energy costs from the additional hydraulic lift. However, the Arlington Basin is a shallow groundwater basin with generally short well screens and pump settings. Maintaining groundwater levels at the appropriate elevations so as not to fall below the top of well screens will eliminate the need to change pump settings in the future.

4.3.2 Sustainable Management Criteria for Groundwater Levels

The general approach to defining sustainability criteria (MTs and MOs) for groundwater levels has involved the development of a groundwater elevation surface constructed from monitoring well sites in the basin. Groundwater surface elevations were selected to keep levels in wells from the five known pumpers at appropriate depths in reference to the well screens for those wells. This involved review of historical groundwater level data and well location/construction information to gage potential undesirable effects. Specifically, this has included evaluating historical low groundwater levels in wells. This approach is founded on the idea that undesirable results – whether reported or not – should not be allowed to occur in the future. Therefore, MTs and MOs at Key Wells were developed to avoid the undesirable lowering of groundwater levels.

4.3.2.1 Selection of Key Wells

The selected representative monitoring sites include wells of known basin pumpers, along with three additional monitoring points, for a total of 15 wells. Table 4-1 summarizes pertinent well data. The wells are also shown on Figure 4-3.

Table 4-1. Selected Representative Monitoring Site Wells

Well Name	Latitude NAVD88	Longitude NAVD88	Total Depth[1] ft	Land Surface/RP[2] ft bgs	Screen Interval[1] ft bgs	Top of Screen Elevation[3] ft amsl	Specific Capacity[4]
Arlington DS #1	33.895678	-117.48993	245	698	95-195	603	83
Arlington DS #2	33.897393	-117.486927	180	710	80-150	630	100
Arlington DS #3	33.898752	-117.484498	232	705	80-180	625	91
Arlington DS #4	33.900242	-117.481884	187	708	80-160	628	95
Arlington DS #5	33.902037	-117.478743	180	711	80-130	631	68
Army 3	33.932125	-117.442426	92	752	50-87	702	77
Buchanan #1	33.891032	-117.498881	100	687	32-100	655	-
Cal Baptist #2B	33.926841	-117.427222	-	804	110-190	694	ND
Flatrock	33.903333	-117.491822	200	693*	100-200	593	ND
Hole 1	33.914743	-117.458264	136	753	-	-	-
Loving Homes	33.928469	-117.448892	-	755	75-135	680	26
LSU #1 (was La Sierra #4)	33.900861	-117.489748	202	693*	102-202	591	195‡
LSU #2 (was La Sierra #6)	33.901793	-117.490476	193	700	77-180	623	230‡
LSU #3 was (La Sierra #5)	33.903024	-117.491378	200	700	112-190	588	24
Sherman Water Tower	33.921243	-117.43548	190	811	120-180	691	ND

Notes:
[1] Total depth and screen intervals determined from driller's logs or by stakeholder.
[2] Land surface and reference point (RP) elevation determined from driller's logs, Google Earth, or was reported by the stakeholder. Values are rounded to the nearest foot.
[3] Top of screen elevation determined using land surface and RP elevation.
[4] Specific capacity calculated from initial well installation test reported on the driller's logs. ND = no data.
*Assumes a four-foot difference between the ground surface and RP, similar to the set up for La Sierra Well 6 and Well 5.
‡Specific capacity calculated from 2016 data provided by Daniel Graham of La Sierra University.
ft bgs – feet below ground surface
ft amsl – feet above mean sea level

4.3.2.2 Minimum Thresholds (MTs) (§354.28)

According to GSP Regulations Section 354.28(c), the MT for the chronic lowering of groundwater levels must be the groundwater elevation indicating depletion of supply at a given location that may lead to undesirable results. MTs for chronic lowering of groundwater levels are to be supported by information on the rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin. The MT for Arlington Basin has been selected as the groundwater elevation needed to maintain water levels 10 ft above the top of the well screen. The 10-foot distance above the well screen was selected based on the largest drawdowns observed in the La Sierra wellfield, which range from 3.2 ft to 5.7 ft. Therefore, 10 ft provides a factor of safety to ensure that groundwater levels during pumping remain above the top of the well screen. An alternative MT for the Desalter wells was selected, less than the 10 ft above the top of the well screens, however pumping will stay within the long-term sustainable yield.

Table 4-2 below shows historical low groundwater elevations for each selected well and the respective elevation of each top of well screen determined to be each well's undesirable result. Historical low groundwater elevations for each selected well are also shown on Figure 4-4. Most of the wells exhibited the lowest groundwater elevation between 2018/2019. The MTs for groundwater elevation are also shown in Table 4-2 and on Figures 4-5 through 4-16, based on the criteria above. For all wells, with the exception of Desalter wells, the MT elevations are below historical low groundwater elevations. It should be noted that due to the proximity of wells in the La Sierra wellfield, pumping levels at the MT in for La Sierra Wells #4, #5, and Flatrock may cause the MT to be exceeded in La Sierra Well #6. This is because the well screen is 30 to 35 ft higher than the other three wells in the wellfield. If the MT is exceeded in a Sierra Well #6, it may become necessary to alter the depth of the well screen to more closely match the other wells in the wellfield.

Table 4-2. Minimum Thresholds for Groundwater Elevation

Well Name	Screen Interval[1] ft bgs	Historical Lowest GW Elevation Date	Historical Lowest GW Elevation ft amsl	Undesirable Results[2] GW Elevation ft amsl	Minimum Threshold[3] GW Elevation ft amsl
Arlington DS #1	95-195	5/2/2018	604.32	603	605
Arlington DS #2	80-150	11/30/2015	619.59	630	631
Arlington DS #3	80-180	11/6/2004	631.47	625	627
Arlington DS #4	80-160	5/1/2019	630.40	628	629
Arlington DS #5	80-130	11/14/2019	629.44	631	636
Army 3	-	10/29/2018	736.27	-	680*
Buchanan #1	-	10/28/2010	633.20	-	631‡
Cal Baptist #2B	110-190	5/7/2018	747.86	694	704
Flatrock	100-200	-	-	593	603
Hole 1	-	11/26/2019	696.44	-	-

Well Name	Screen Interval[1] ft bgs	Historical Lowest GW Elevation Date	ft amsl	Undesirable Results[2] GW Elevation ft amsl	Minimum Threshold[3] GW Elevation ft amsl
Loving Homes	75-135	11/24/2009	731.91	680	690
LSU #1 (was La Sierra #4)	102-202	4/26/2018	634.42	591	601
LSU #2 (was La Sierra #6)	77-180	11/25/2019	639.31	623	633
LSU #3 was (La Sierra #5)	112-190	11/25/2019	638.98	588	598
Sherman Water Tower	120-180	11/21/2019	746.26	691	701

Notes:
[1] Screen intervals determined from driller's logs or by the stakeholder.
[2] Undesirable result determined by pumping levels at or below the top of the well screen.
[3] Minimum threshold determined by pumping level elevations 10 ft above the top of the well screen.
*Assumes Army 3 groundwater elevation is approximately the same as Sherman Water Tower.
ǂAssumes Buchanan #1 groundwater elevation is similar to the Desalter Wellfield.
ft bgs – feet below ground surface
ft amsl – feet above mean sea level

4.3.2.3 Measurable Objectives (MOs) and Interim Milestones (IMs) (§354.30)

MOs are defined as an operating range of groundwater levels allowing reasonable fluctuation with changing hydrologic conditions. The MTs represent the bottom of the operating range and are protective of basin pumpers. The MOs for groundwater levels are also subject to the need of each basin pumper. In general, the sustainability goal is set at a groundwater elevation that is an average of 30 ft above the top of the well screen, which should provide sufficient aquifer saturation for ongoing successful operation of the wells.

Current groundwater levels, with the exception of the Arlington Desalter and La Sierra #6 wells, are generally above MOs. La Sierra Well #6 has a particularly shallow well screen compared to other wells in the La Sierra University wellfield and may require mitigation to enact a regional measurable objective. Western choose an alternative MO for the Desalter wells in order to limit the volume of poor-quality groundwater leaving the groundwater basin as subsurface outflow while keeping pumping within the long-term sustainable yield, see Table 4-3.

A 5-year IM represents the goal of increasing groundwater levels to the measurable objective elevations. The IMs were calculated by dividing the desired saturation depth of 30 ft above the well screen by four assessment periods to reach sustainability in 20 years. This results in increasing groundwater levels by approximately 8-foot intervals per five-year period to reach the 30-foot saturated thickness. As noted previously, many of the wells have groundwater elevations greater than the MO based on 2020 groundwater elevations. Therefore, the IMs for these wells will not apply. Previous management goals were to limit outflow of high TDS groundwater to Temescal Basin. An alternative MO was selected for the Desalter wells to continue limiting the volume of groundwater leaving the Arlington Groundwater Basin. Table 4-3 summarizes the MO and IM for each of the selected wells. Figures 4-5 through 4-16 shows the MOs for each well based on the criteria above.

Table 4-3. Measurable Objectives and Interim Milestones

Well Name	Screen Interval[1] ft bgs	Top of Screen Elevation[2] ft amsl	Measurable Objective[3] GW Elevation ft amsl	5-Year Interim Milestone[4] GW Elevation ft amsl	2020 GW Elevations ft amsl	At or Above Measurable Objective with Current GWEs
Arlington DS #1	95-195	603	633	611	NM	No*
Arlington DS #2	80-150	630	633	631	NM	No*
Arlington DS #3	80-180	625	633	627	630.90	No*
Arlington DS #4	80-160	628	635	630	629.84	No*
Arlington DS #5	80-130	631	640	633	NM	No*
Army 3	50-87	702	-	-	737.82	NA
Buchanan #1	32-100	655	-	-	NM	NA
Cal Baptist #2B	110-190	694	724	702	747.94	Yes
Flatrock	100-200	593	623	601	NM	Yes‡
Hole 1	-	-	-	-	NM	NA
Loving Homes	75-135	680	710	688	NM	Yes‡
LSU #1 (was La Sierra #4)	102-202	591	621	599	641.88	Yes
LSU #2 (was La Sierra #6)	77-180	623	653	631	643.45	No
LSU #3 was (La Sierra #5)	112-190	588	618	596	644.32	Yes
Sherman Water Tower	120-180	691	721	699	746.76	Yes

Notes:

[1] Screen intervals determined from driller's logs or by stakeholder.

[2] Top of screen elevation determined using land surface and reference point (RP) elevation. Land surface and RP elevation determined from driller's logs, Google Earth, or was reported by the stakeholder.

[3] Five-year interim milestones determined by the minimum sustainability goal depth of 40 ft above the top of the screen divided by five assessment periods to reach sustainability in 20 years, or increasing by 8-foot intervals per a five-year period.

[4] Specific capacity calculated from initial well installation test reported on the driller's logs. ND = no data.

*Assumes Desalter wells #1 - #5 groundwater elevations are similar to the Desalter wellfield.

‡Assumes Loving Home and Flatrock groundwater elevations are approximately the same as Sherman Water Tower.

NM – No measurement

NA – Not applicable

ft bgs – feet below ground surface

ft amsl – feet above mean sea level

4.3.2.4 Impact of Climate Change

The approach to evaluate impacts as a result of climate change consisted of reviewing climate change scenarios from the Integrated Santa Ana River (SAR) model. The model consists of an integrated surface and groundwater model covering six groundwater basins in the Upper Santa Ana Valley Groundwater

Basin, including the Arlington Basin. 2030 climate conditions were developed based on SGMA Climate Change Technical Advisory Group (CCTAG) guidance. The CCTAG reviewed an ensemble of climate simulations to develop change factors for precipitation and evapotranspiration (DWR 2018). The climate change factors were downscaled to the Variable Infiltration Capacity (VIC) land surface model grid by the CCTAG. Each VIC grid cell contains a change factor which varies by month and location. Integrated SAR model groundwater modeling applied the change factors to a base period hydrology (1966 through 1990) to develop updated boundary conditions reflective of future climate conditions.

Under 2030 climate change conditions, the average precipitation climate change factor shows a reduction in precipitation of 3 to 5 percent. In the summer months, increases in precipitation are anticipated. However, these months have little precipitation, so these increases do not correspond to large increases in rainfall amount. Decreases during October through December account for the primary reduction in overall precipitation. Tributary inflow and runoff were also reduced by an average climate change factor for each groundwater basin. Evapotranspiration (ET) is anticipated to increase approximately 5% per 2030 climate change guidance. The ET change factors show greater uniformity than precipitation factors, which are more variable[3]. For the Arlington Basin, the overall change in mean minimum groundwater levels was 0.14 ft under 2030 climate change conditions. This change is insignificant with regard to basin water levels.

4.4 Reduction of Groundwater in Storage

Groundwater in storage is the volume of groundwater in the basin that is available for groundwater production. In the Arlington Basin, groundwater in storage is the water that is within the pore spaces of alluvial aquifer that lies above the bedrock surface. In general, the alluvial aquifer reaches a maximum thickness along the axial line of the basin and is up to 200 ft thick. Undesirable results would involve insufficient stored water to sustain beneficial uses through drought periods. The storage criterion is directly linked to groundwater levels and is evaluated as a volume on a basin-wide basis. The sustainability indicator for groundwater in storage addresses the ability of the groundwater basin to support existing and planned beneficial uses of groundwater, even during drought.

Figure 4-17 shows the rainfall record from 1976 through 2019. The chart shows that this hydrologic period has been on a generally downward trend (i.e., below average hydrology) since a major rainfall of 1998. However, pumping has continued in the groundwater basin through three hydrologic dry periods (consecutive years when rainfall was below average: 1999-2004, 2006-2009, and 2012-2016). Hydrographs of basin wells show that groundwater levels have continued to decline since 1998, with only brief periods of recovery. Figure 4-18 shows a plot of groundwater elevations for the Sherman Water Tower for the period 1999 through 2020, located in the upper portion of the basin. Figure 4-19 shows a plot of the La Sierra #4 well and La Sierra #5 well for the same period, located in the lower portion of the basin. The plots both show a general decline in groundwater levels with brief but incomplete recovery during the period of record.

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[3] For a full description of the Integrated SAR model climate change assumptions and results, please see Geoscience, 2020: "Upper Santa Ana River Integrated Model Summary Report." Prepared for San Bernardino Valley Municipal Water District, dated September 2020.

Figure 4-20 shows a plot of total production in the basin versus rainfall. Basin pumping has continued through all dry periods represented on the plot. Figure 4-21 shows changes in groundwater storage in the basin as a whole from 1966 through 2016. Figure 4-22 provides the water balance and indicates that under current basin pumping (2012-2016), groundwater in storage is reduced by 1,330 af/yr. Reduction of pumping or the addition of other supplies will be required to bring the basin in balance in the future. However, 2012 through 2016 represented a period of five consecutive years with below average rainfall. Potential projects and management actions to mitigate the current negative change in storage are discussed in Section 6 of this GSP.

Figures 4-23 and 4-24 show a plot of groundwater levels, groundwater production, and rainfall for La Sierra Wells #4 and # 5. The plots show that groundwater pumping continued through the dry period from 2012 through 2016 and through 2020.

4.4.1 Description/Definition of Undesirable Results

Undesirable results are defined with respect to the Sustainability Goal for the Arlington Basin which includes and objective to provide reliable storage for water supply resilience during droughts and shortages. As such, the definition of potential undesirable results for storage reduction would be the inability of the groundwater basin to meet water supply demands during drought periods and includes consideration of how much storage has been historically (i.e., operating storage) and how much stored groundwater reserve is needed to withstand drought. To date, the basin has not reached a point considered to be reflective of undesirable results. However, groundwater levels in the Arlington Desalter wellfield have approached undesirable result thresholds for the Desalter wells, which would limit the capacity of the wellfield to extract groundwater.

The Arlington Basin is a shallow groundwater basin with limited storage. Therefore, additional deeper storage is not available to sustain pumping during drought periods. Based on historical and current pumping and groundwater trends, managing groundwater levels in the future above the MTs will result in appropriate groundwater in reserves. Mitigation of basin negative change in storage to remain within the long-term sustainable yield will provide further sustainability. However, if future operations from any of the basin pumpers include increasing pumping volumes or new extractions are planned, the current analysis will require revisiting and additional supplies or reductions elsewhere will be required. Basin management should include recommendations to reduce groundwater production during drought years in order to maintain groundwater levels above the MTs.

4.4.1.1 Potential Causes of Undesirable Results

As with a chronic lowering of groundwater levels, undesirable results with respect the groundwater in storage can be the result of sustained groundwater extraction in excess of the long-term sustainable yield. In addition, a portion of applied water (contributing to groundwater return flow) currently comes from the Gage Canal which flows from outside Arlington Basin to the greenbelt area located in the southern portion of the basin. The return flow from this applied, imported surface water contributes to the water budget and meets a portion of the water demand in the basin. If the supply is reduced or disrupted, continued pumping could further reduce groundwater in storage.

4.4.1.2 Potential Effects on Beneficial Uses and Users

Groundwater is a significant source of supply for basin pumpers, primarily for landscape application. Desalting of the high TDS water has been occurring for several decades and provides a source of supply through Western to the City of Corona. Reduction of groundwater in storage would reduce access to supply with adverse effects on the community, economy, and environmental setting of portions of the Arlington Basin reliant on groundwater. However, groundwater has historically been available during droughts.

4.4.2 Sustainable Management Criteria for Groundwater Storage

The general approach for defining sustainability criteria for groundwater in storage has involved review of historical cumulative change in storage and expected future storage declines during droughts. Review of historical change in storage indicates that an average decline in groundwater storage of 380 af/yr has occurred between 1966 and 2016. During the 2012 through 2016 period, declines in groundwater storage averaged 1,330 af/yr. Historically, groundwater has been available even when groundwater levels reached historical low elevations. Management of groundwater levels above the MTs will result in sufficient groundwater in storage to meet historical demands. Reduction of pumping or addition of supplies to balance the water budget will further ensure a reliable water supply for basin pumpers.

4.4.2.1 Minimum Thresholds (§354.28)

SGMA guidance documents do not recommend a specific requirement for groundwater in storage. Considerations offered by the “Draft Best Management Practices for Sustainable Management of Groundwater - Sustainable Management Criteria BMP” when establishing the MT for groundwater storage may include, but are not limited to:

- What are the historical trends, water year types, and projected water use in the basin?
- What groundwater reserves are needed to withstand future droughts?
- Have production wells ever gone dry?
- What is the effective storage of the basin? This may include understanding of the:
  - Average, minimum, and maximum depth of municipal, agricultural, and domestic wells.
  - Impacts on pumping costs (i.e., energy cost to lift water).
- What are the adjacent basin’s minimum thresholds?

Planning for Urban Water Management Plans requires an assessment of available water supplies for a normal, single dry, and 5-year drought period. For planning purposes, considered herein is a groundwater reserve for a 5-year dry period. Two approaches have been taken. The first approach involved reviewing the hydrologic record and assessing pumping that occurred during a historical 5-year drought. The second approach was to use the groundwater model to assess groundwater in storage between the MO elevations, MT elevations, and the undesirable result elevations. This second approach is very conservative because it assumes no rainfall (aerial recharge) to the groundwater basin for the period.

4.4.2.1.1 Evaluation of Available Groundwater in Storage During a Historical 5-Year Drought

Historically, the period from 2012 through 2016 represents a consecutive 5-year period of below average rainfall. At the end of this 5-year drought, wells were and continue to be in production. Groundwater pumping during the 2012 through 2016 period averaged 7,230 af/yr, which represents current pumping demands. Groundwater supply for a 5-year drought would require a reserve of 36,150 af/yr. (7,230 af/yr x 5 years), not considering potential future recommendations to reduce pumping during drought periods. Actual basin production for the period from 2012 through 2016 was 36,197 acre-feet. As an example, the La Sierra University Wells #4 and #6 pumped consistently, but with gradually reduced annual pumping through the drought period.

Table 4-4 below shows the groundwater elevations at the beginning at the lowest point between 2012 and 2016. The average change in groundwater level across the basin was approximately 14 ft but ranged from approximately 3.6 ft at the Sherman Water Tower Well in the upper basin to 37 ft in Desalter Well #1 at the lower end of the basin. Therefore, groundwater in storage was able to meet a reserve for 5-years at 2012 elevations. Groundwater elevations at the end of the drought period were above both the MTs and MOs for groundwater elevations. However, maintaining groundwater elevations at the 2012 level may not be beneficial to optimize basin utilization and optimization. Higher groundwater elevations will result in greater outflow of elevated TDS groundwater to the Temescal Basin as well as to the Santa Ana River through Hole Lake. Higher groundwater elevations will also result in a decrease in usable space for groundwater recharge when water is available.

Table 4-4. Change in Groundwater Elevations – 5-Year Drought (2012 – 2015)

Well Name	GWE at Beginning of 5-Year Drought	GWE at End of 5-Year Drought	Difference: End of Drought from Beginning	Historical Lowest GWE		2020 GWEs
	2012 – 2015					
	ft amsl	ft amsl	ft	Date	ft amsl	ft amsl
Arlington DS #1	648.52	611.42	37.1	5/2/2018	604.32	NM
Arlington DS #2	642.09	619.59	22.5	11/30/2015	619.59	NM
Arlington DS #3	655.45	637.75	17.7	11/6/2004	631.47	NM
Arlington DS #4	659.79	648.30	11.49	5/1/2019	630.40	630.90
Arlington DS #5	643.84	662.94	-19.1	11/14/2019	629.44	629.84
Army 3	741.73	738.14	3.59	10/29/2018	736.27	737.82
Buchanan #1	640.87	NM	-	10/28/2010	633.20	NM
Cal Baptist #2B	NM	748.51	-	5/7/2018	747.86	748.41
Flatrock	-	-	-	-	-	-
Hole 1	706.80	699.94	6.86	11/26/2019	696.44	696.92
Loving Homes	733.03	NM	-	11/24/2009	731.91	NM
LSU #1 (was La Sierra #4)	652.89	638.22	14.67	4/26/2018	634.42	641.88

Well Name	GWE at Beginning of 5-Year Drought	GWE at End of 5-Year Drought	Difference: End of Drought from Beginning	Historical Lowest GWE		2020 GWEs
	2012 – 2015					
	ft amsl	ft amsl	ft	Date	ft amsl	ft amsl
LSU #2 (was La Sierra #6)	652.58	643.07	9.51	11/25/2019	639.31	643.45
LSU #3 was (La Sierra #5)	655.09	643.49	11.6	11/25/2019	638.98	644.32
Sherman Water Tower	753.30	749.13	4.17	11/21/2019	746.26	746.84

Notes:
NM – No measurement
ft amsl – feet above mean sea level

Managing groundwater elevations to allow for a 5-year reserve of groundwater in storage at the lowest elevations without declining below MTs is recommended. The recommended MT is an elevation 10-ft above the top of the well screens in wells used for basin pumping. Therefore, the MO for groundwater storage is that elevation above the MT which will provide a volume of groundwater in storage to meet a 5-year reserve. On average, current (2020) groundwater levels in upper basin wells and in the La Sierra wellfield are at the 2012 pre-5-year drought groundwater elevations. Groundwater levels in the Desalter wellfield are on average about 21 ft lower.

Groundwater in storage between the MO elevations for groundwater levels shown on Table 4-2 and the MT elevations shown on the same table represents an approximate 5-year reserve of groundwater, based on current pumping demands, and also the MO for groundwater in storage. This is extremely conservative since the volume does not reflect annual inflows to the basin, even during drought conditions. For example, the change in groundwater storage during the 2012 through 2016 drought was approximately -5,000 af/yr (see Figure 4-21) while total groundwater pumping for the same period was about 36,000 acre-feet. Groundwater in storage between the MT for groundwater levels and the undesirable result elevation (see Table 4-5) represents a volume in storage of approximately 10,500 acre-feet, or an approximately 1.5-year supply based on current water demand. The groundwater level MT for groundwater levels will act as the MT for the groundwater in storage.

Table 4-5. Groundwater in Storage

Parameter	Minimum Threshold	Undesirable Results	Measurable Objective
Average Groundwater Elevation, ft amsl	605	603	633
Groundwater in Storage, acre-feet	-	10,500	30,000

Note:
ft amsl – feet above mean sea level

4.4.2.2 Measurable Objectives (§354.30)

The MO elevation for groundwater levels was set at an elevation which conservatively represents the volume of a 5-year reserve between the MO elevation and the MT elevation. The 5-year reserve volume does not consider annual inflow to the basin that will occur even during drought periods, so it is very conservative. Table 4-5 provides a summary of groundwater in storage between the MT and undesirable result elevations and between the MT and MO elevations. Groundwater in storage between the MT and undesirable result elevations is about 10,500 acre-feet. Groundwater in storage between the MT and MO elevations is about 30,000 acre-feet.

4.4.2.3 Impact of Climate Change

As noted in Section 4.3, the analysis of groundwater level changes as a result of climate change in the Arlington Basin under 2030 conditions is insignificant. Since water level changes directly reflect groundwater in storage, changes to groundwater in storage due to climate change are also anticipated to be insignificant.

4.5 Degradation of Water Quality

Degraded of water quality to drinking water supply wells can result in increased sampling and monitoring, increased treatment cost, use of bottled water, and the loss of wells. Groundwater quality in the Arlington Basin has historically been degraded by elevated concentrations of TDS, nitrate, and other contaminants from industrial sources. In 1990, the Arlington Desalter began operating to improve the overall quality of local potable supplies and decrease subsurface outflow of poor-quality groundwater. The facility is currently supplied by five production wells.

The overall groundwater quality in the Arlington Basin is evaluated as part of the Regional Water Quality Control Boards triennial “Recomputation of Ambient Water Quality (AWQ) for the Santa Ana Watershed” (DBSA, 2017). The 2015 recomputation was used as the basis for assigning ambient groundwater concentrations for the Arlington Basin for this plan. Section 3.2.3.1 and Section 3.2.3.2 provides an overview of the current ambient concentration of TDS and nitrate as N, respectively. The TDS water quality objective (WQO) for the Arlington Basin is 980 milligram per liter (mg/L). Average TDS concentrations for the period of record from 1996 through 2015 ranged from approximately 913 to 1,330 mg/L. The highest average TDS concentrations occur in the northern and western wells. The historical TDS trend has either slightly increased or decreased, but never by more than approximately 20 mg/L from one year to the next. The ambient TDS concentration decreased from 1,030 mg/L in 2012 to 1,020 mg/L in 2015.

Nitrate as N concentration data obtained from 1996 through 2015 were evaluated as part of the 2015 AWQ recomputation effort for 23 wells. Average nitrate as N concentrations for this period of record ranged from approximately 0.1 to 51 mg/L; however, concentrations ranged from approximately 15 to 25 mg/L for most wells. The highest average nitrate as N concentrations occur in the eastern and western wells. The historical nitrate as N trend was similar in 1973 and 2003, declined to 18.1 mg/L in 2009, and remained relatively neutral through 2015.

Given that ambient water quality for the basin exceeds basin objectives for both TDS and nitrate as N, the sustainability goal—to protect groundwater quality—is not to reverse undesirable water quality during the planning period, but rather to prevent circumstances wherein future management activities might make water quality worse and to ensure that water quality is maintained (at a minimum) or improved by basin management measures.

4.5.1 Description/Definition of Undesirable Results

Undesirable Results are defined in the GSP Regulations (§354.26) as occurring when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin. The GSA is not responsible for local problems or degradation caused by others. At present, there are no sites under regulatory clean-up within the basin. Degradation from point industrial or municipal sources will be regulated by the appropriate City, County, State, or Federal Agency. An undesirable result with respect to groundwater quality for the Arlington Basin can be defined as any further increase in ambient concentrations of TDS and nitrate based on triennial recomputations of the AWQ.

4.5.1.1 Potential Causes of Undesirable Results

The potential causes that could lead to undesirable results regarding groundwater quality are the advent of land uses that would increase salt loading, such as a re-expansion of agricultural land use, recharging or applying water of greater salinity than the current ambient concentrations, or a shutdown of the Desalter.

4.5.1.2 Potential Effects on Beneficial Uses and Users

Further degradation of groundwater quality with respect to TDS and nitrate could cause loss of beneficial use to basin users with regard to landscape irrigation due to salinity requirements, as well as to certain landscape and industrial use through increased scaling in pipes and other appurtenances. In addition, significant increases in TDS and nitrate concentrations may require costly modifications to the desalination plant to maintain desalting operations.

4.5.2 Sustainable Management Criteria for Groundwater Quality

The definition of an undesirable result due to degraded water quality—TDS and nitrate concentrations—was evaluated in the context of historical, existing, and potential future conditions in the Arlington Basin. A major consideration in this evaluation is the reality of historical salt and nitrate loading in the shallow aquifer – the likely vestige of wide-spread agricultural irrigation pre-1980s.

It is likely that legacy salts remain in the vadose zone and are periodically mobilized through major rainfalls that occur infrequently in the basin. The fate and transport of such loading would require extensive study and time. However, the plots of TDS data from 1973 through 2015 (see Section 3.2.3.1) suggest that movement of salt in the vadose zone is nearly in equilibrium with the hydrologic regime during this time period, which has included two major wet hydrologic periods. The significant decrease in nitrate concentrations may also be associated with decreasing contribution of nitrate from legacy loading.

For the decision to set sustainable management criteria for water quality, SGMA poses two basic questions:

- Were undesirable results occurring as of the SGMA baseline of January 2015?

- Is there a potential for future undesirable results?

The answer to the first question is yes, groundwater quality for TDS and nitrate exceeded the basin objective set by the Regional Water Quality Control Board (RWQCB) and, as such, cannot be considered the undesirable result for this sustainability plan. The undesirable result for Arlington Basin would be groundwater quality that precludes the use of the groundwater for current uses. The answer to the second question cannot be completely answered, but current groundwater trends suggest that, under current land and groundwater use, it is unlikely that undesirable results will occur since planned use is currently towards residential and commercial uses rather than agricultural. The risk to future groundwater quality through salt loading can be assessed through current land use planning process prior to initiation of development that will increase salt loading (see Section 2.3). The undesirable results regarding TDS and nitrate are concentrations which would make the groundwater unusable for beneficial uses by existing basin users.

4.5.2.1 Minimum Thresholds (§354.28)

MT concentrations are the current ambient concentrations for TDS and nitrate calculated for the 2015 AWQ for the period from 1996 through 2015. MTs for the basin will be assessed during the triennial AWQ conducted by the RWQCB. Future TDS and nitrate ambient concentrations will be compared to ambient conditions set forth in this plan.

4.5.2.2 Measurable Objectives (§354.30)

MOs for TDS and nitrate are set at the MT concentrations, which represent the TDS and nitrate concentrations calculated for the 2015 AWQ for the period from 1996 through 2015.

4.6 Depletions in Interconnected Surface Water

As stated in Section 3.2.5, there are no major rivers (creeks or lakes) in Arlington Basin. Approximately three quarters of the total basin inflow is provided by boundary flow and recharge from both small watercourses within the basin and surrounding mountains. The Santa Ana River flows over a shallow alluvial channel which has been incised into and directly overlies bedrock over an approximately 2.5-mile reach in the most northerly portion of the Arlington Basin (see Figure 4-25). Therefore, there is no connection between the Santa Ana River and groundwater in the Arlington Basin except through fractures in the underlying granitic bedrock which are not part of the groundwater basin.

The Arlington Channel, La Sierra Channel, and Arizona Channel are flood control channels created artificially to transport stormwater (see Figure 4-25). The channels are partially lined, with sections composed of soils allowing water to soak into the ground and recharge underlying groundwater. The Arlington Groundwater Management Plan (2012) reports “that groundwater is discharged to surface water in three areas: Arizona Channel, Arlington Channel, and Hole Lake, based on persistent dry-weather flow and historical evidence of nuisance high groundwater levels in those areas.” Evaluation of hydrographs for modeling analysis conducted for this study showed that groundwater levels rose to the approximate level of the channel bottom elevations and remained at these elevations for short periods – suggesting that during high groundwater periods, discharge has occurred as rising groundwater discharge to surface water. Groundwater discharge to storm drain channels occurred during the 1980s when groundwater levels were at their highest recorded levels. Since then, groundwater levels have been at lower elevations, and groundwater has not discharged to the storm drain channels.

Eckis (1934) opined that shallow groundwater can also discharge to surface water, resulting in outflow from the basin through stream channels. Unlined channels recharged with groundwater have historically discharged into Hole Lake.

4.6.1 Hole Lake

Review of the 1901 Riverside, CA, USGS 1:62,500 topographic quadrangle indicates that Hole Lake was created in 1915 by construction of a dam in the natural drainage that extended approximately 1.3 miles southeast from the Santa Ana River and was historically used for irrigation. The outline of the lake is shown on Figure 4-25, as displayed on the 1952 USGS Riverside, CA, 7.5 Minute Quadrangle map. The lake was drained in the 1970s, exposing the natural channel.

Currently, the natural Hole Lake drainage is the northerly terminus of a storm drain channel. The storm drain system begins at Monroe Storm Water Retention Basin, located at the southeast corner of Monroe Street and the railroad line, which is adjacent to and north of the Riverside Canal. Seasonal flow is contained in a subsurface pipeline for approximately 1.4 miles to the intersection of Monroe Street and California Avenue (see Figure 4-25). From Monroe Street and California Avenue, the channel is present as an engineered flood control channel with soft bottom for 1.4 miles. The reach of the channel immediately northwest of the intersection of Van Buren Blvd. and Arlington Avenue to the Santa Ana River is a natural soft bottom channel. An approximately 0.25-mile section through the intersection of Van Buren Blvd. and Arlington Avenue is in a subsurface pipeline. Base flow occurs in the channel, but there is very limited data as to the quantity of the base flow. Flow increases as the storm drain collects and discharges water during wet seasons.

Currently, data is insufficient to understand the relationship between groundwater and surface water at Hole Lake. Available data are discussed in the sections below along with recommendations for data collection and analysis.

Figure 4-26 shows groundwater elevation contours for 2016. The 2016 dataset included data from all proposed monitoring wells. Although the majority of groundwater flow is southwest toward the Arlington Gap, groundwater contours suggest that there is a component of flow towards Hole Lake channel. The closest well with long-term monitoring data is Army 3. The well is located approximately 1.25 miles southeast of where the Hole Lake natural channel begins near the intersection of Van Buren Blvd. and Arlington Avenue. Based on review of the 1952 Riverside, CA, 7.5 Minute topographic map, the elevation of the open channel begins at approximately 730 amsl. The bottom of the channel may be 5 to 10 ft deeper, or at elevations of 720 to 725 ft amsl. Groundwater level at Army 3 in 2018 was 738.1 ft amsl while groundwater elevations in the vicinity of Hole Lake were estimated to be approximately 700 ft amsl in 2018 (see Figure 4-1). Therefore, groundwater levels at Hole Lake were likely below the bottom of the channel. The historical highest groundwater elevation was approximately 744 ft amsl (see Figure 4-27), which is approximately six feet higher than 2018 groundwater elevations. Assuming groundwater levels at Hole Lake were also six feet higher, or about 706 ft, then groundwater levels would also have been below the channel bottom even during historical high groundwater levels at the Army 3 well. These relationships need to be investigated with land surface elevation surveys and groundwater monitoring wells.

4.6.1.1 Hole Lake Outflow

Only five years of flow data have been collected from Hole Lake channel (see yellow bars in Figure 4-27). Figure 4-27 shows model simulated flow along with the five years of physical flow measurements in relation to groundwater elevations in the Army 3 well. There is no apparent correlation between flow in the Hole Lake channel and groundwater levels, but this is based on extremely limited data. As stated previously, insufficient data are currently available to demonstrate that surface flow at Hole Lake is interconnected to surface water. It is likely that base flow in the channel is the result of urban nuisance flow coming from the storm drain system and that larger flows represent stormwater collected during storm seasons. If, during the first five-year reporting period, data suggests a connection between groundwater and surface water near Hole Lake drainages, the need to establish undesirable results, MTs, and MOs will be re-visited.

4.7 Land Subsidence

Land subsidence is not of concern for the Arlington Basin due to a lack of significant thickness of compressible fine-grained sediments and the overall shallow character of the alluvial basin.

4.8 Seawater Intrusion

The downstream boundary of the Arlington Basin is located approximately 36 miles from the Pacific Ocean along the course of the Santa Ana River, through the Santa Ana Gap. As such, is not subject to seawater intrusion due to the distance. In addition, Orange County Water District has operated a seawater intrusion injection barrier which protects the coastal basin of Orange County from seawater intrusion.

4.9 References (§354.4(b))

DBSA (Daniel B. Stephens & Associates, Inc.). 2017. Recomputation of Ambient Water Quality in the Santa Ana River Watershed for the Period 1996 to 2015. Prepared for the Santa Ana Watershed Protection Authority Basin Management Program Task Force under contract to CDM Smith, dated September 22.

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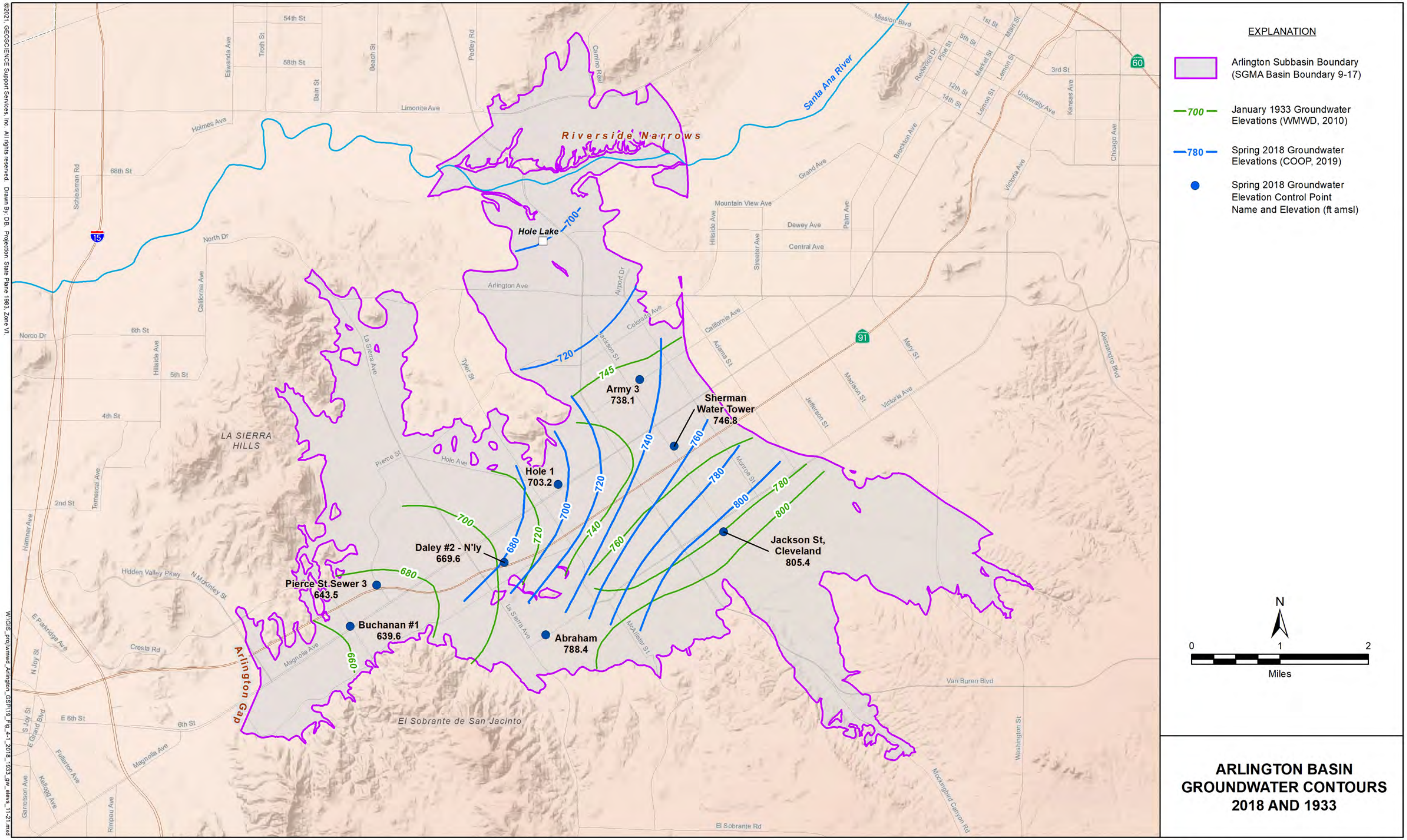
———. 2018. Resource Guide: DWR-Provided Climate Change Data and Guidance for Use During Groundwater Sustainability Plan Development. Dated July.

Eckis, R. 1934. South Coastal Basin Investigation. California Department of Public Works, Division of Water Resources. Bulletin 45.

GEOSCIENCE (GEOSCIENCE Support Services, Inc.). 2020. Upper Santa Ana River Integrated Model – Summary Report. Prepared for San Bernardino Valley Municipal Water District, dated September.

RWQCB (Santa Ana Regional Water Quality Control Board). 2016. The Water Quality Control Plan for the Santa Ana Basin.

WRIME and Western (Western Municipal Water District). 2012. Arlington Basin Groundwater Management Plan.



Drawn By: DB. Projection: State Plane 1983, Zone VI.

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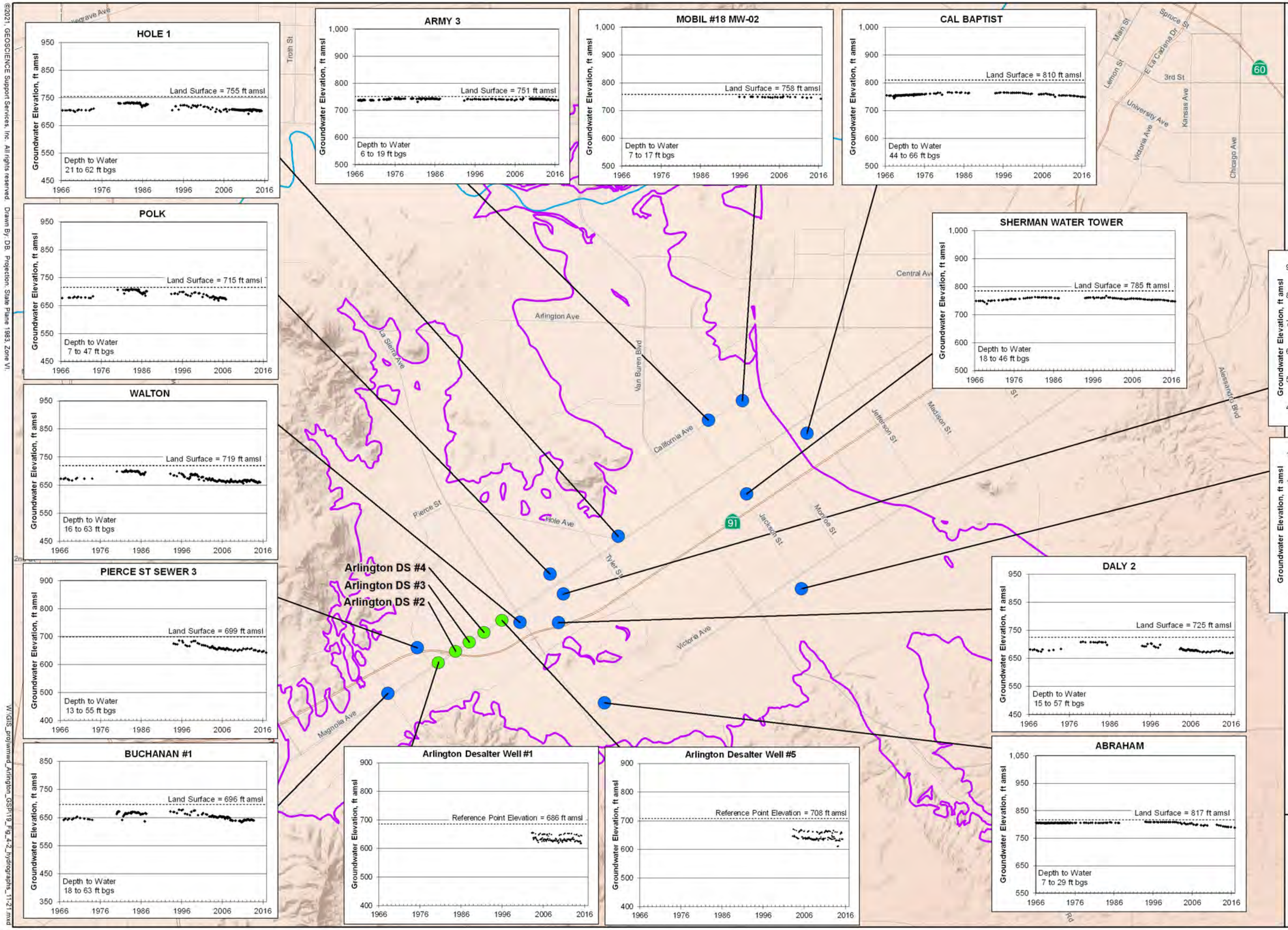
ARLINGTON BASIN GROUNDWATER CONTOURS 2018 AND 1933

Nov-21

DRAFT

FIGURE 4-1



EXPLANATION

Arlington Subbasin Boundary (SGMA Basin Boundary 9-17)

● Selected Well With Hydrograph

● WMWD Arlington Desalter Well

HYDROGRAPHS FOR SELECTED WELLS

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Nov-21

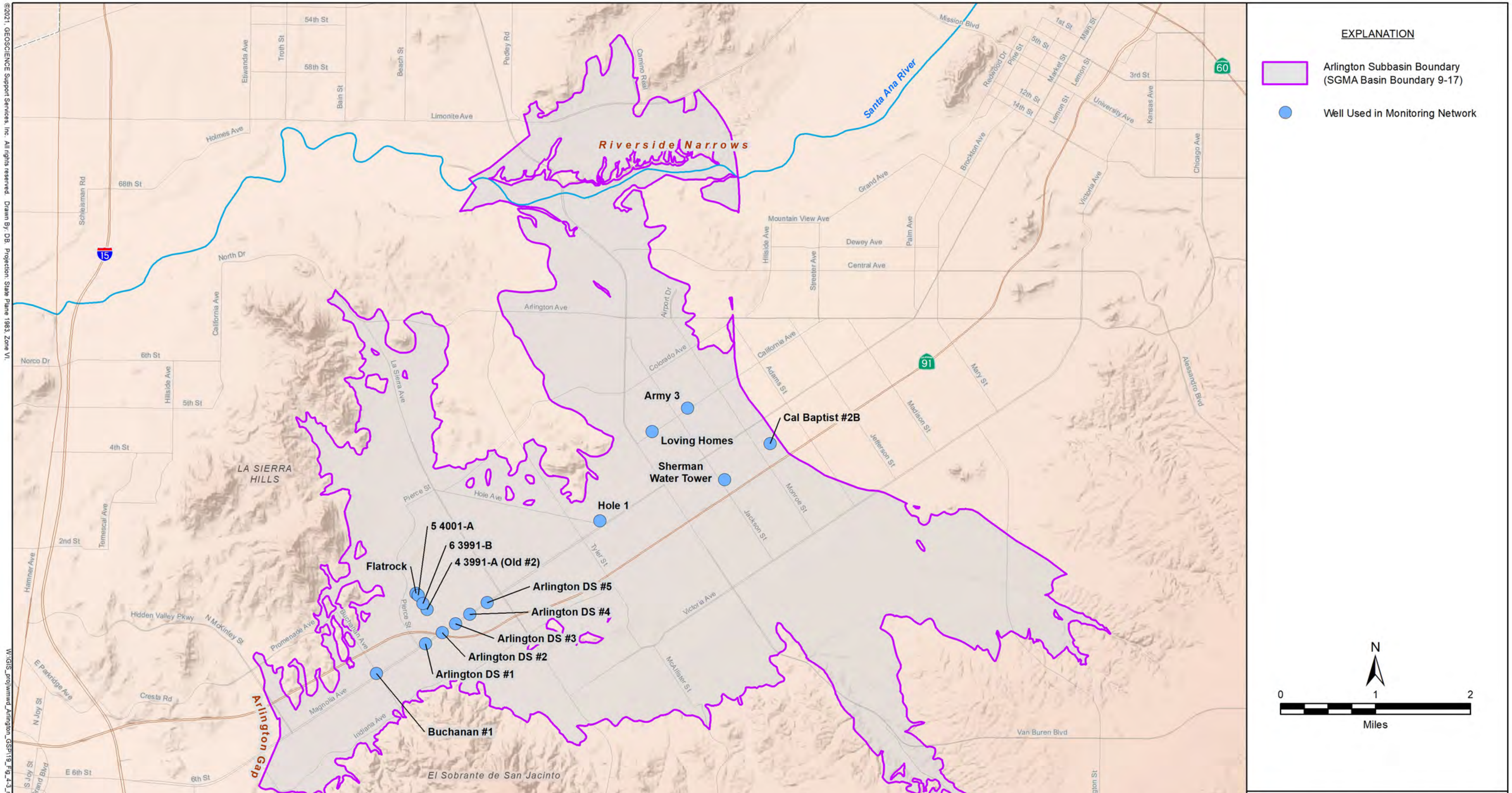
WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

DRAFT

FIGURE 4-2

GEOSCIENCE



ARLINGTON BASIN SUSTAINABILITY REPRESENTATIVE MONITORING SITES

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Nov-21

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FIGURE 4-3

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

GEOSCIENCE

Lowest Groundwater Elevation in Select Wells

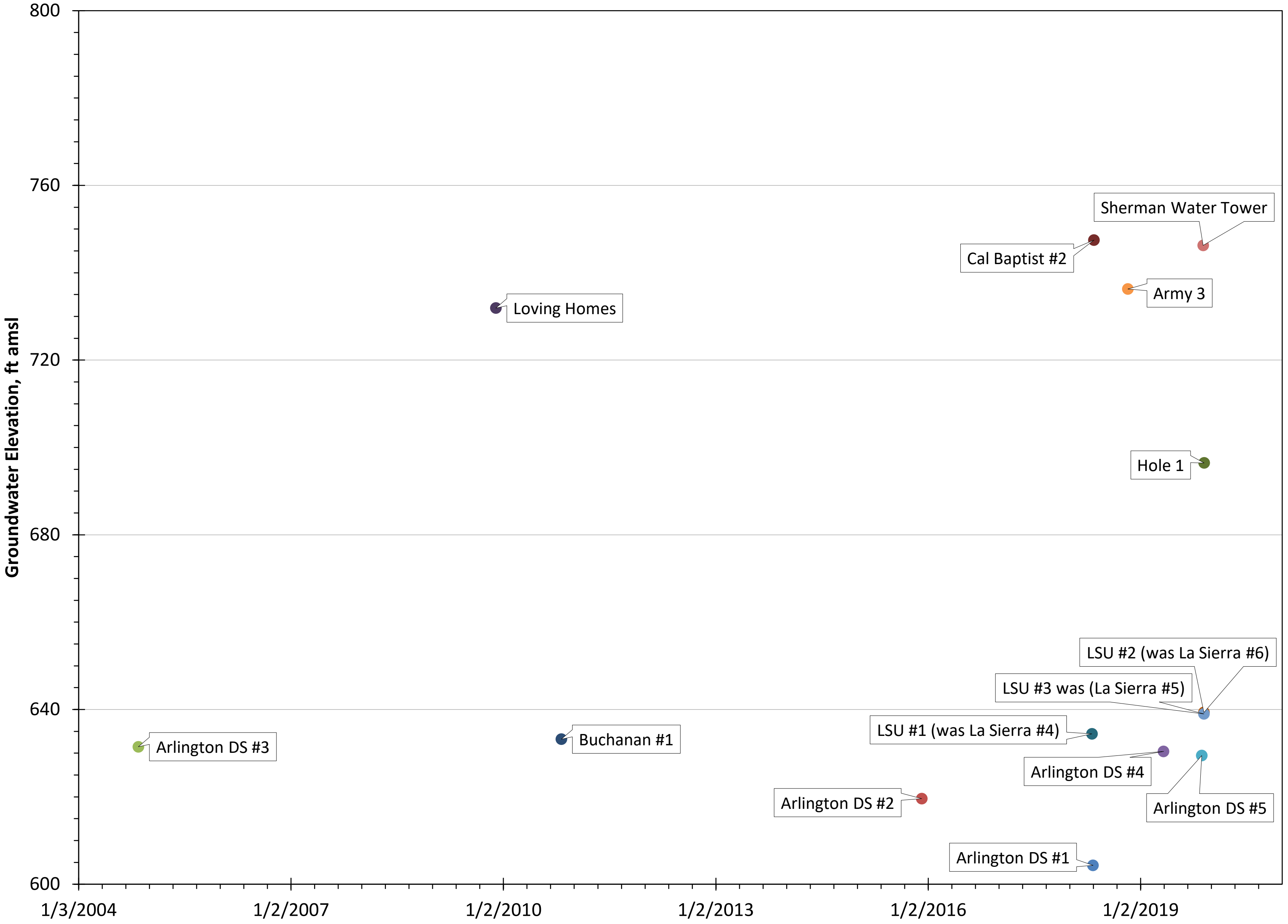


Figure 4-4

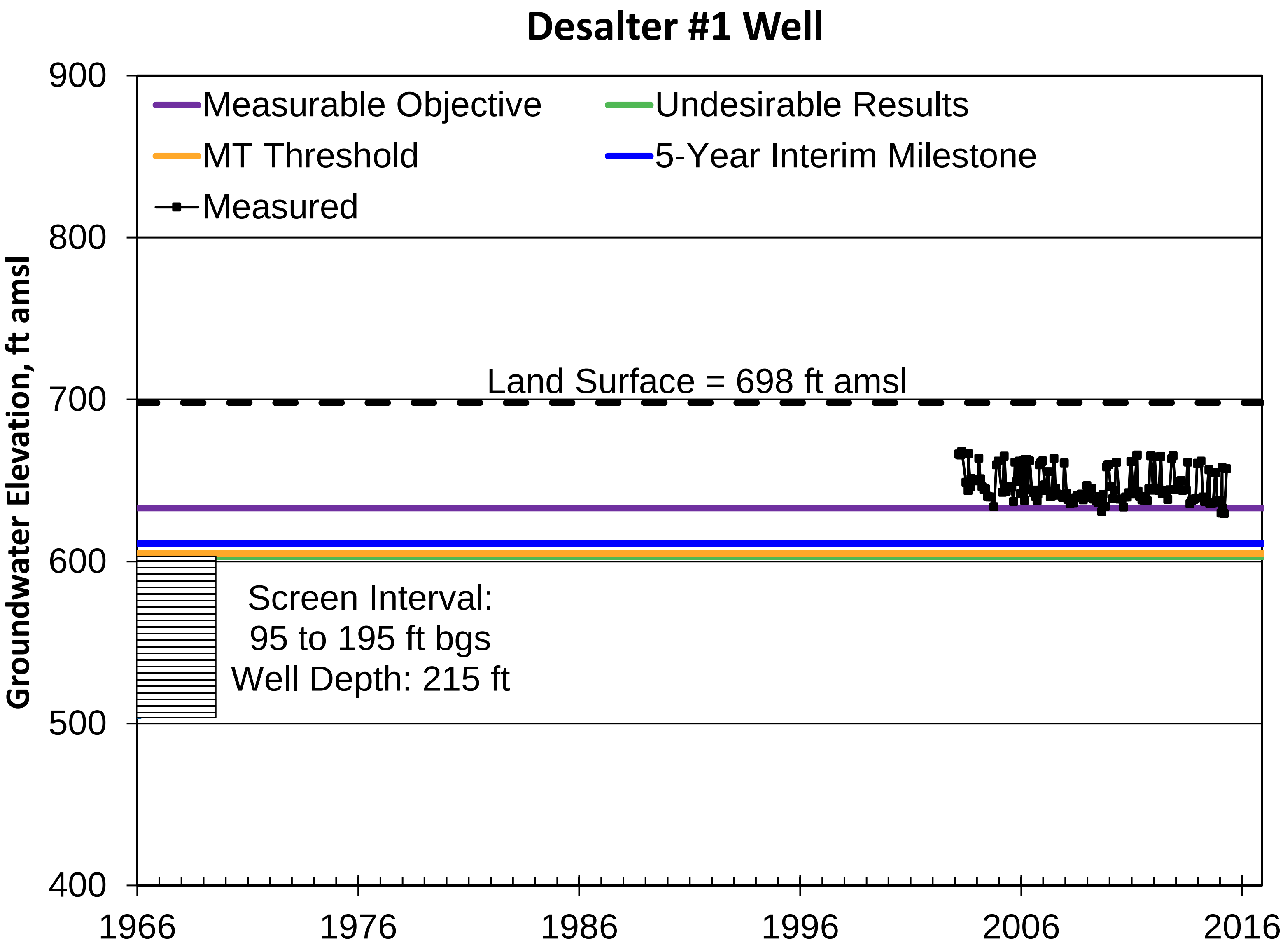

Desalter #1 Well
Measurable Objective
Undesirable Results
MT Threshold
5-Year Interim Milestone
Measured
Land Surface = 698 ft amsl
Screen Interval:
95 to 195 ft bgs
Well Depth: 215 ft
Groundwater Elevation, ft amsl
900
800
700
600
500
400
1966
1976
1986
1996
2006
2016

Figure 4-5

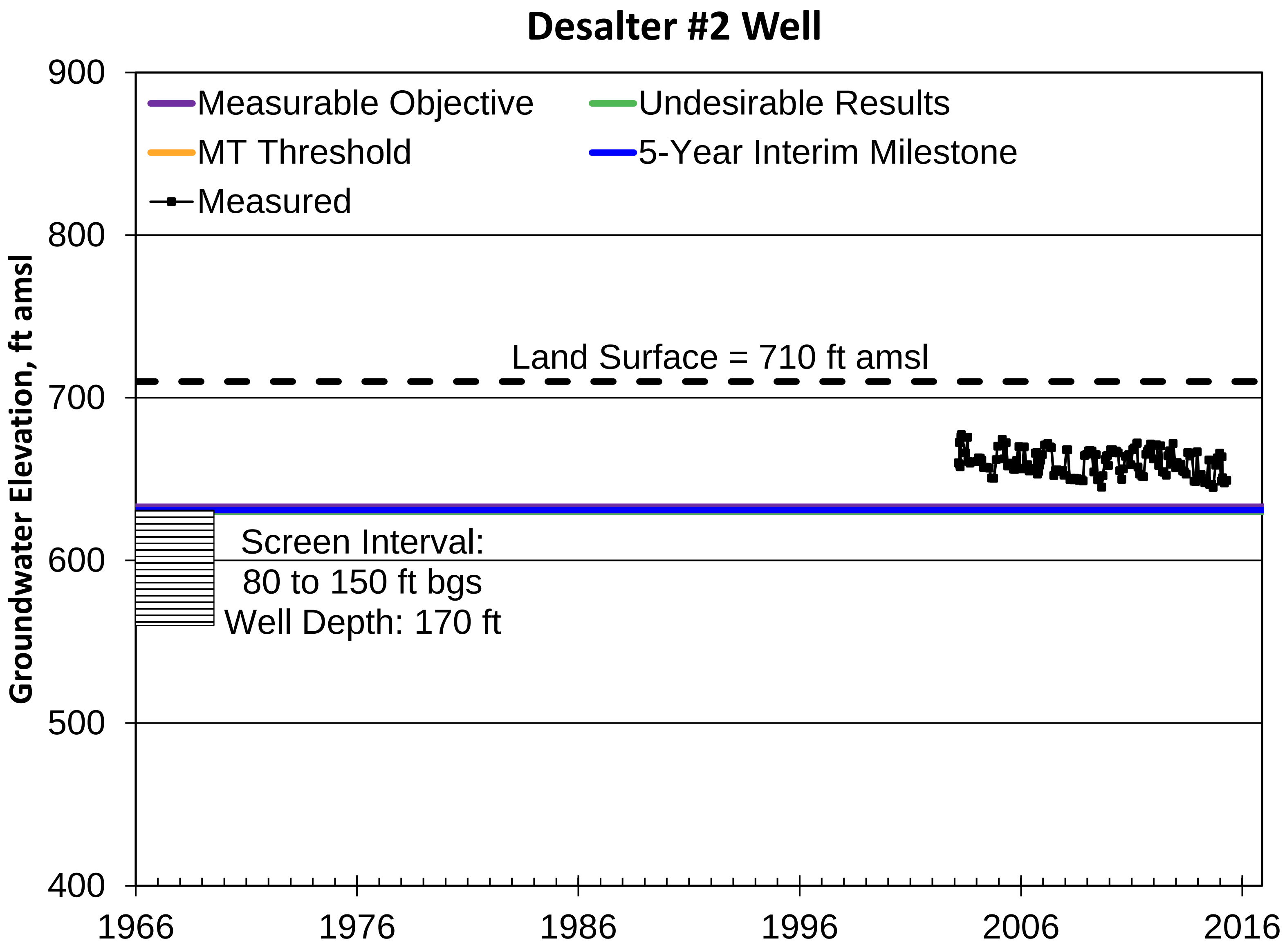

Desalter #2 Well
Measurable Objective
Undesirable Results
MT Threshold
5-Year Interim Milestone
Measured
Land Surface = 710 ft amsl
Screen Interval:
80 to 150 ft bgs
Well Depth: 170 ft
Groundwater Elevation, ft amsl
900
800
700
600
500
400
1966
1976
1986
1996
2006
2016

Figure 4-6

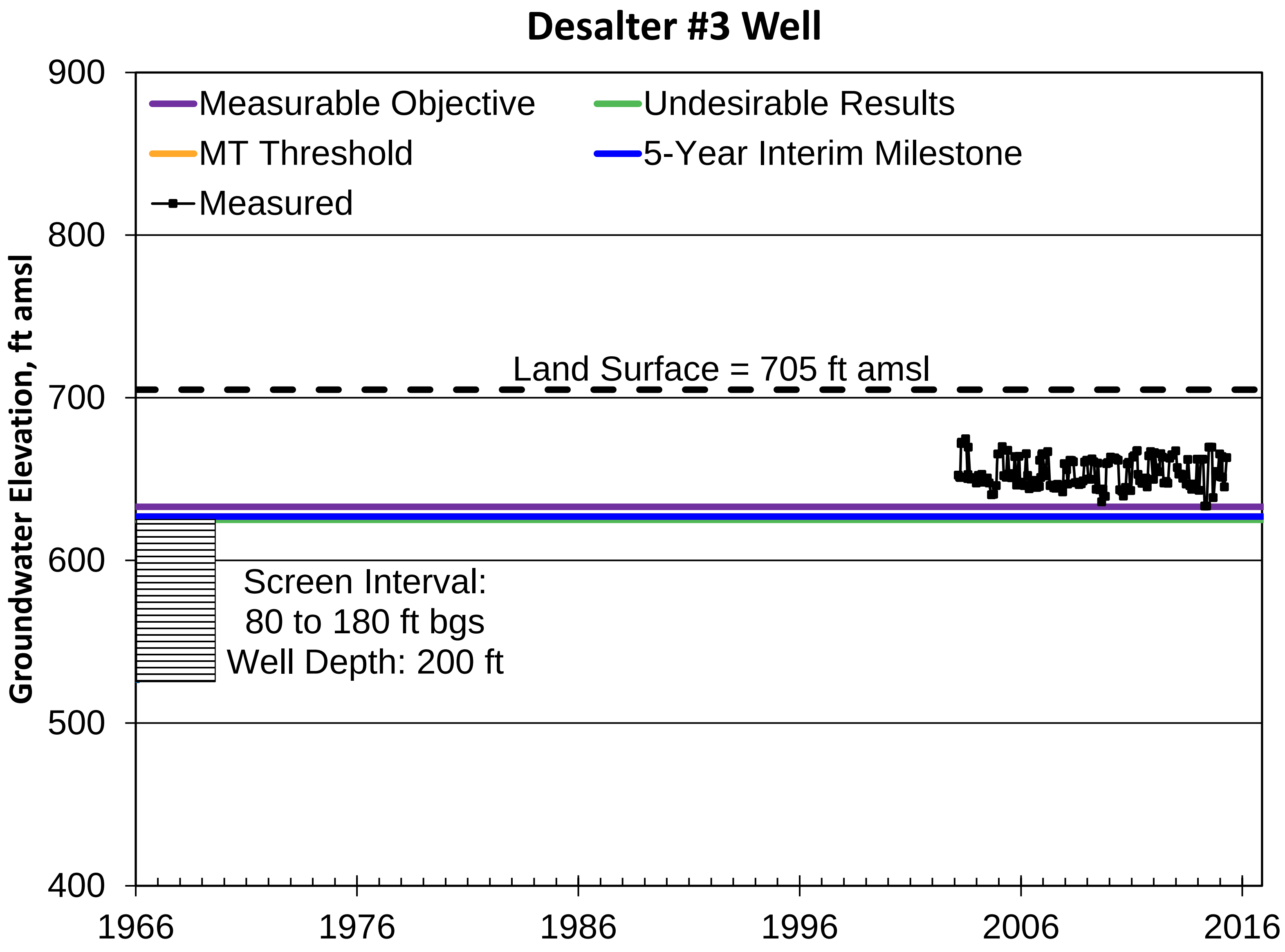

Desalter #3 Well
Measurable Objective
Undesirable Results
MT Threshold
5-Year Interim Milestone
Measured
Land Surface = 705 ft amsl
Screen Interval:
80 to 180 ft bgs
Well Depth: 200 ft
Groundwater Elevation, ft amsl
900
800
700
600
500
400
1966
1976
1986
1996
2006
2016

Figure 4-7

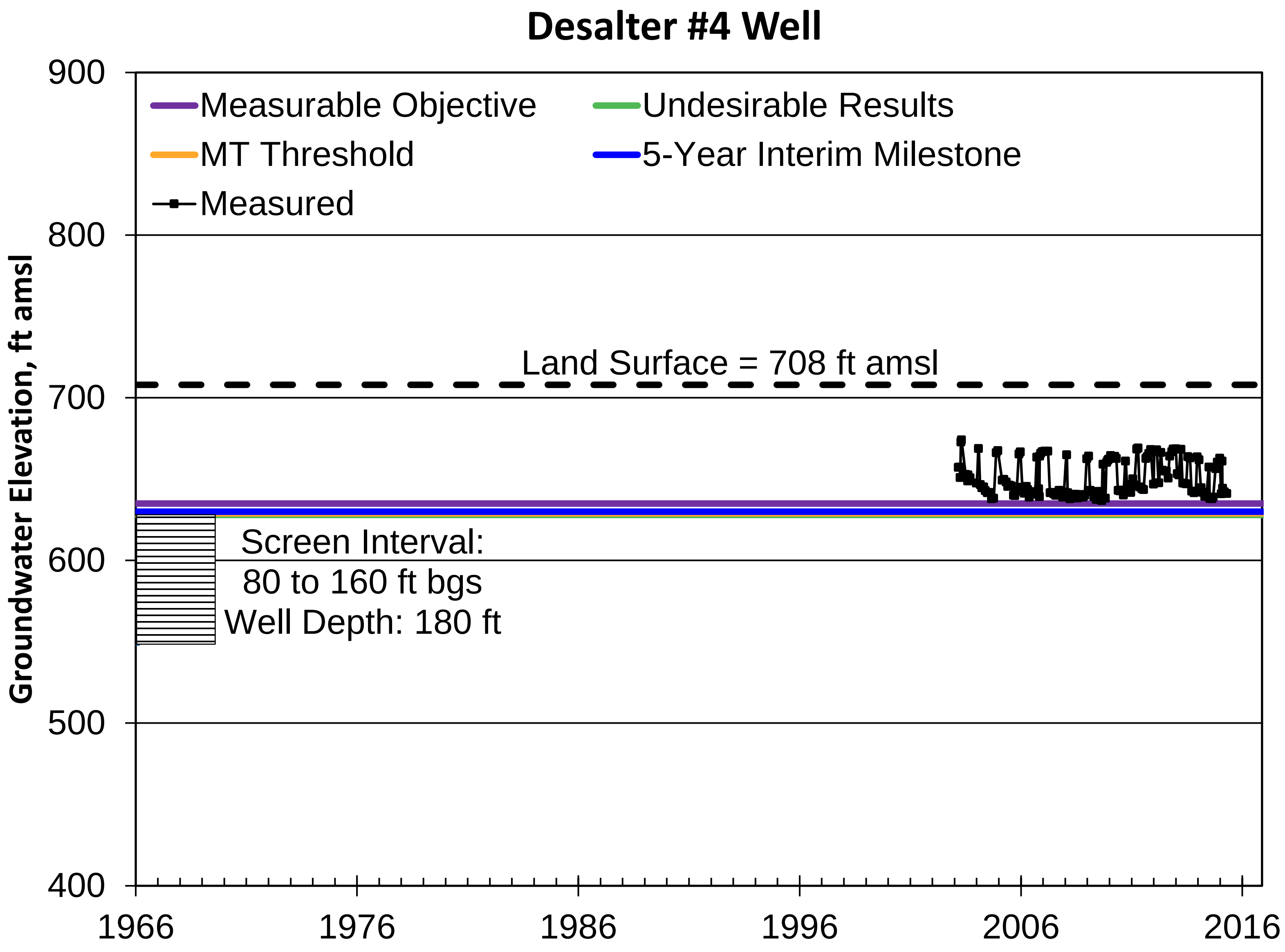

Desalter #4 Well
Measurable Objective
Undesirable Results
MT Threshold
5-Year Interim Milestone
Measured
Land Surface = 708 ft amsl
Screen Interval:
80 to 160 ft bgs
Well Depth: 180 ft
Groundwater Elevation, ft amsl
900
800
700
600
500
400
1966
1976
1986
1996
2006
2016

Figure 4-8

Desalter #5 Well

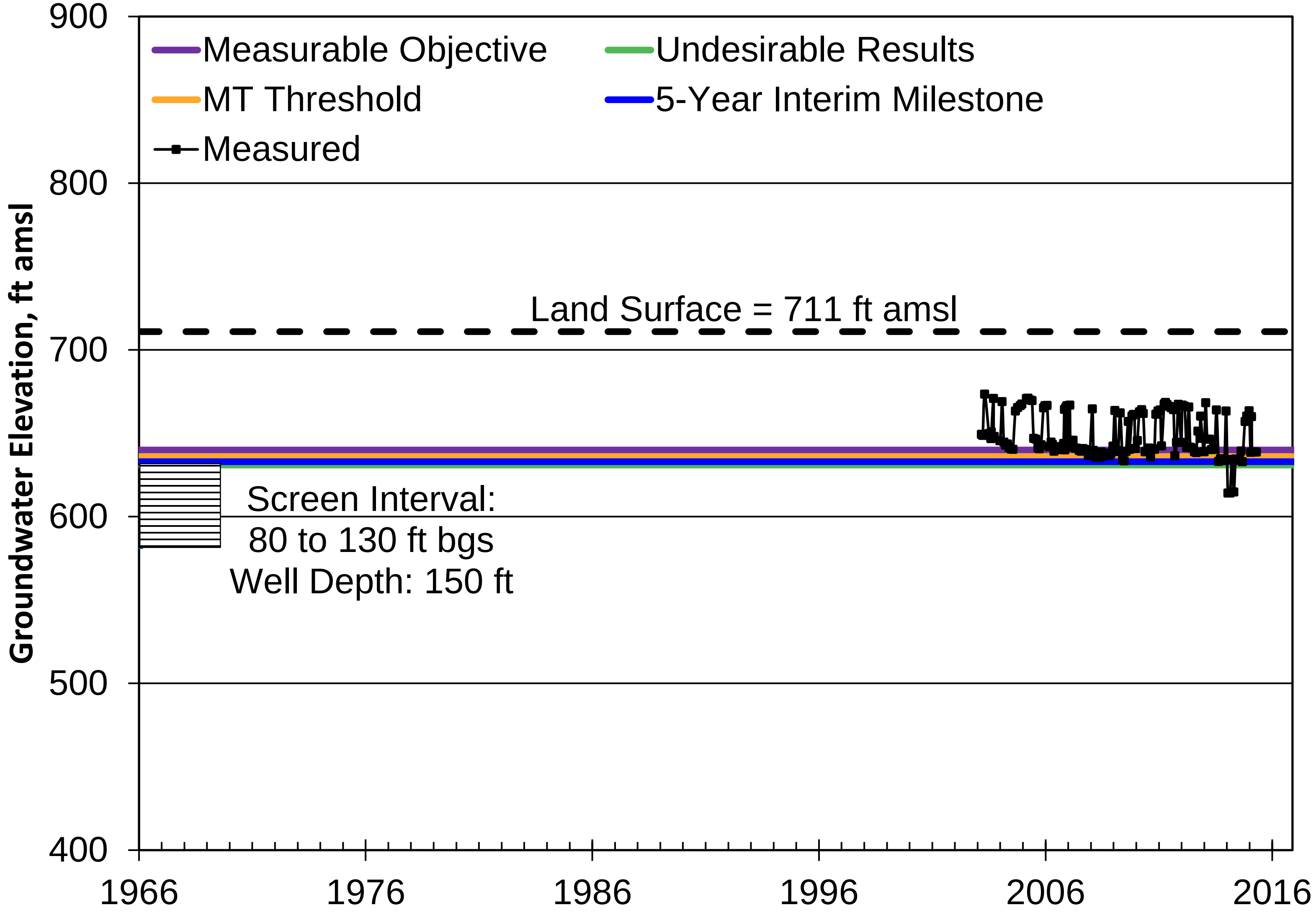


Figure 4-9

Cal Baptist Well

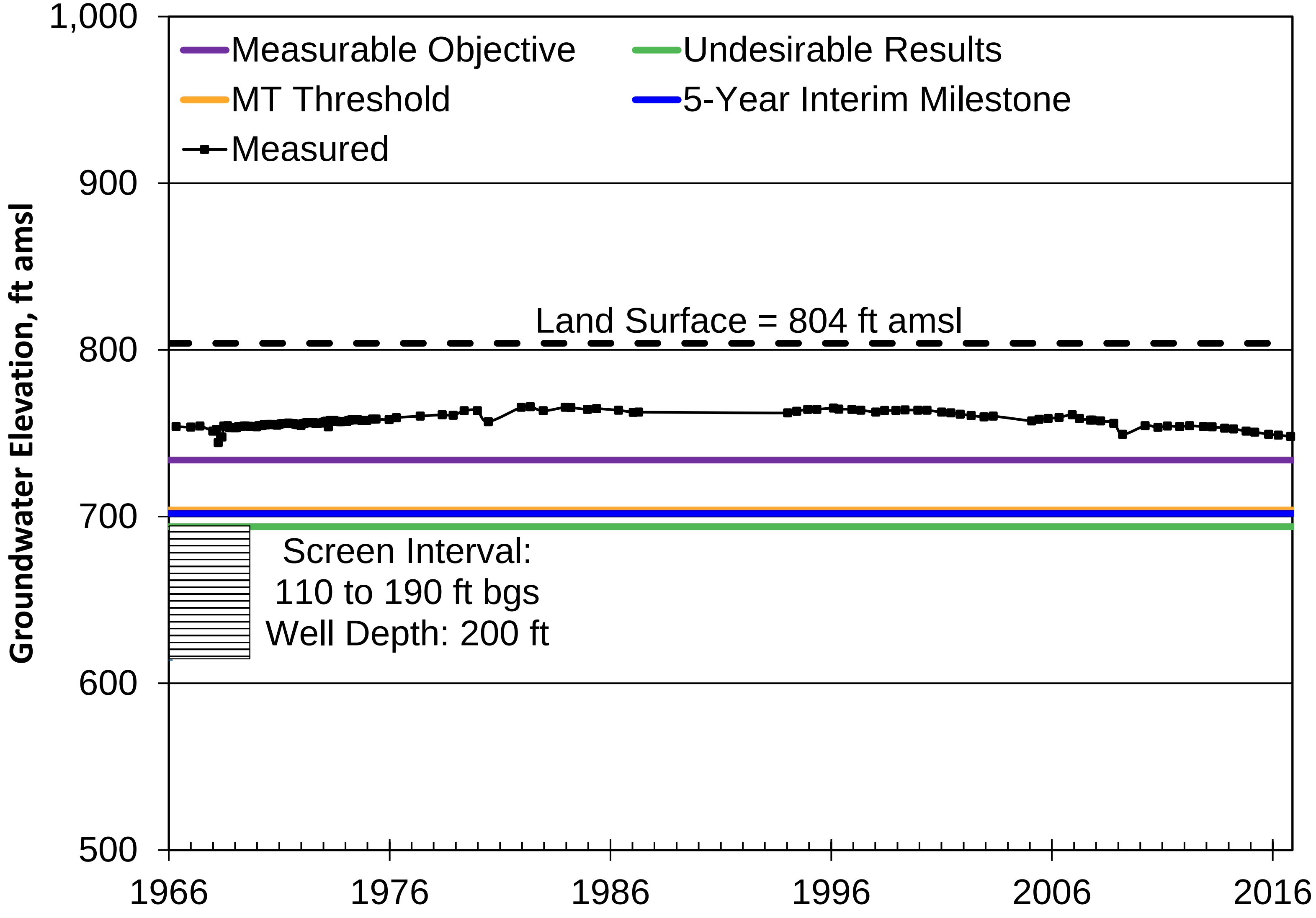


Figure 4-10

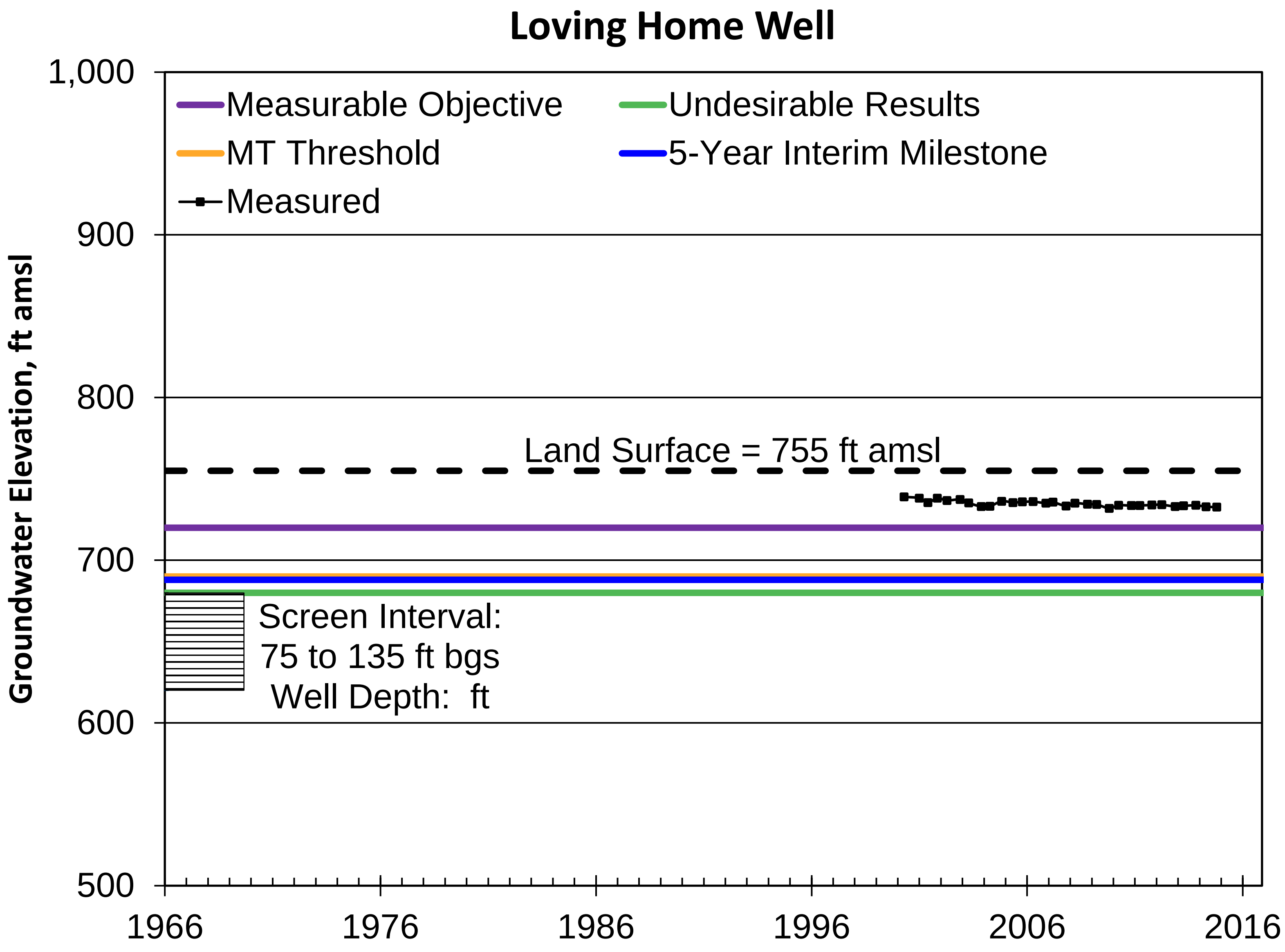

Loving Home Well
Groundwater Elevation, ft amsl
1,000
900
800
700
600
500
1966
1976
1986
1996
2006
2016
Measurable Objective
Undesirable Results
MT Threshold
5-Year Interim Milestone
Measured
Land Surface = 755 ft amsl
Screen Interval:
75 to 135 ft bgs
Well Depth: ft

Figure 4-11

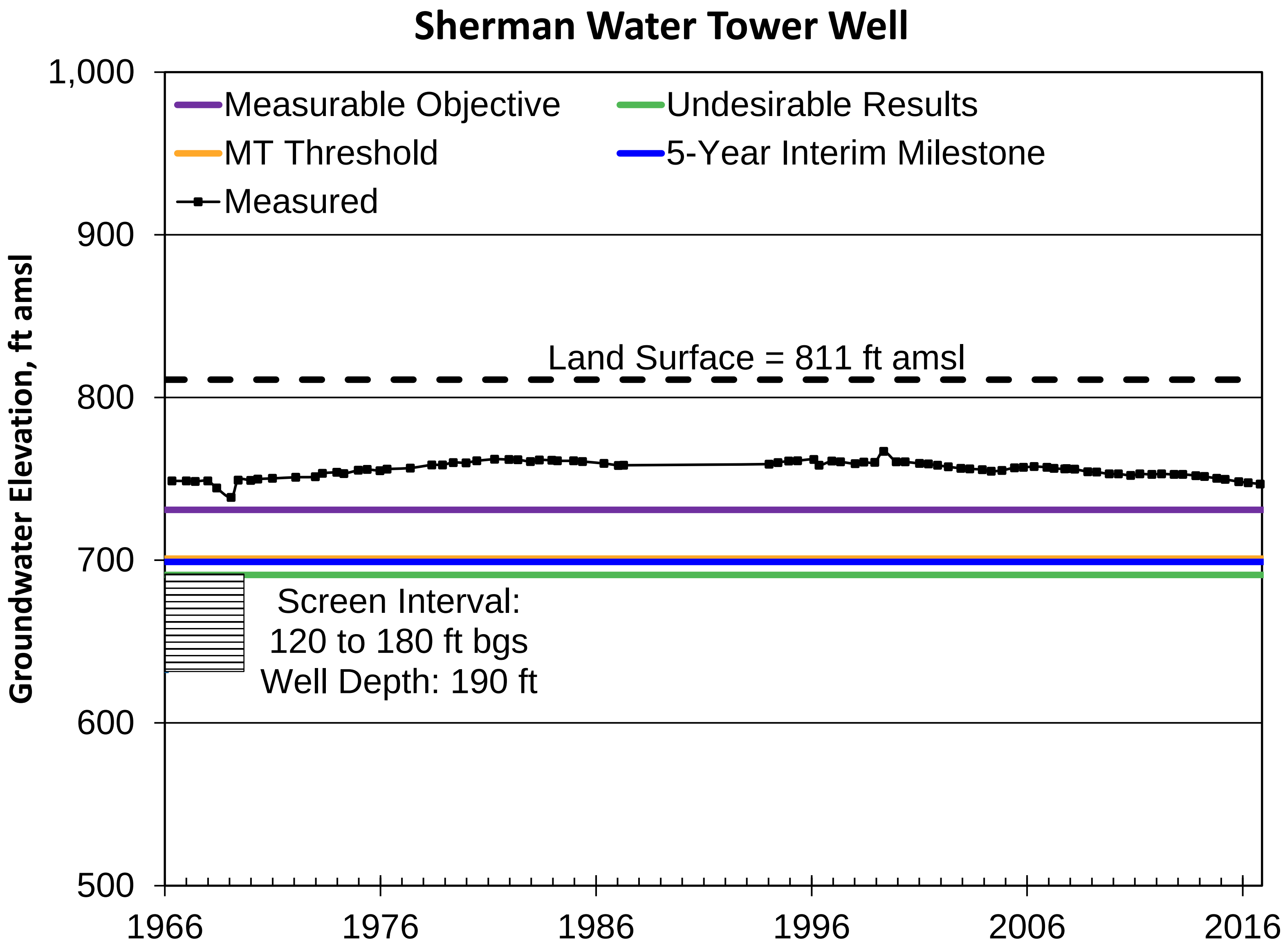

Sherman Water Tower Well
Measurable Objective
Undesirable Results
MT Threshold
5-Year Interim Milestone
Measured
Land Surface = 811 ft amsl
Screen Interval:
120 to 180 ft bgs
Well Depth: 190 ft
Groundwater Elevation, ft amsl
1,000
900
800
700
600
500
1966
1976
1986
1996
2006
2016

Figure 4-12

La Sierra 3991B Well

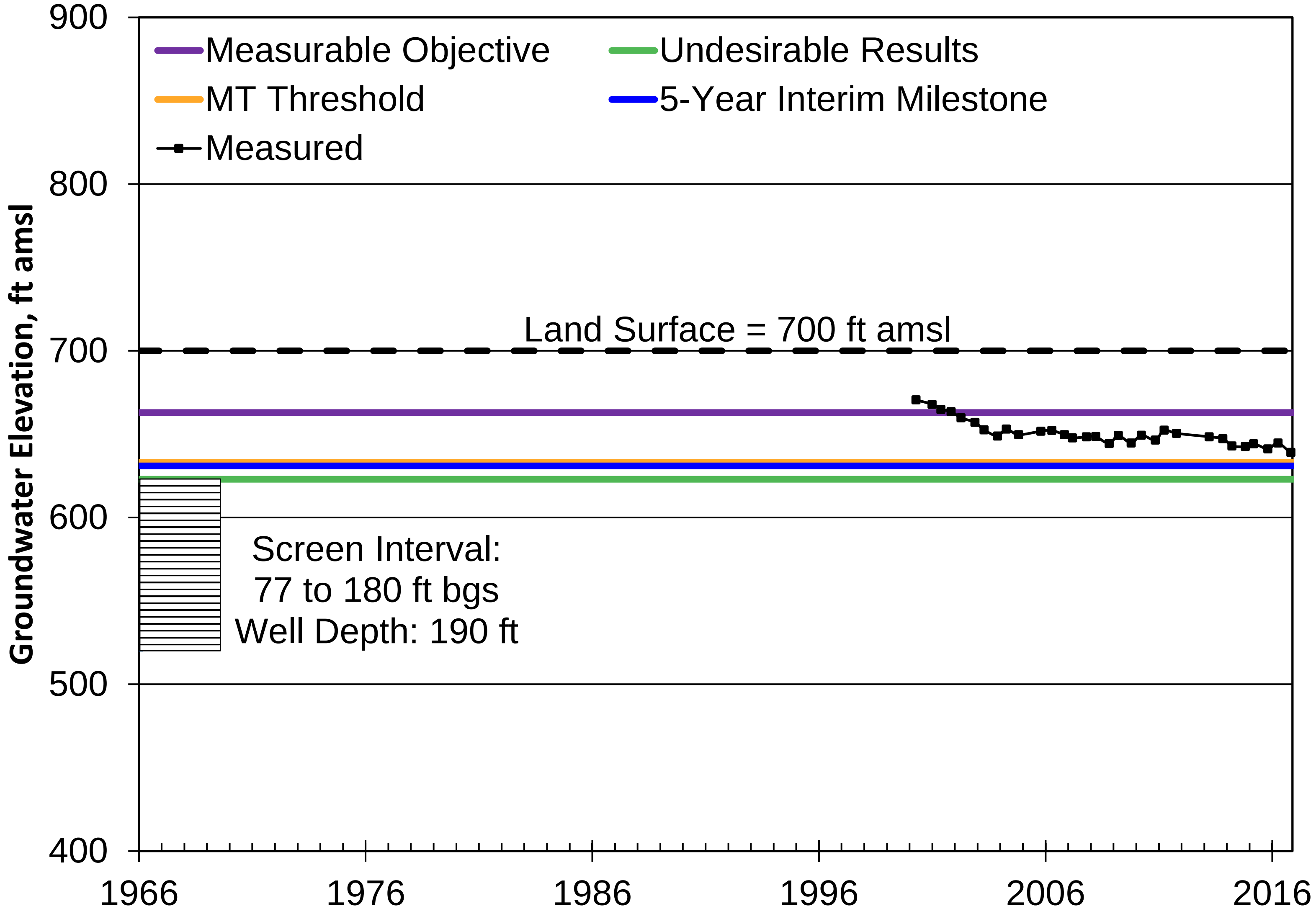


Figure 4-13

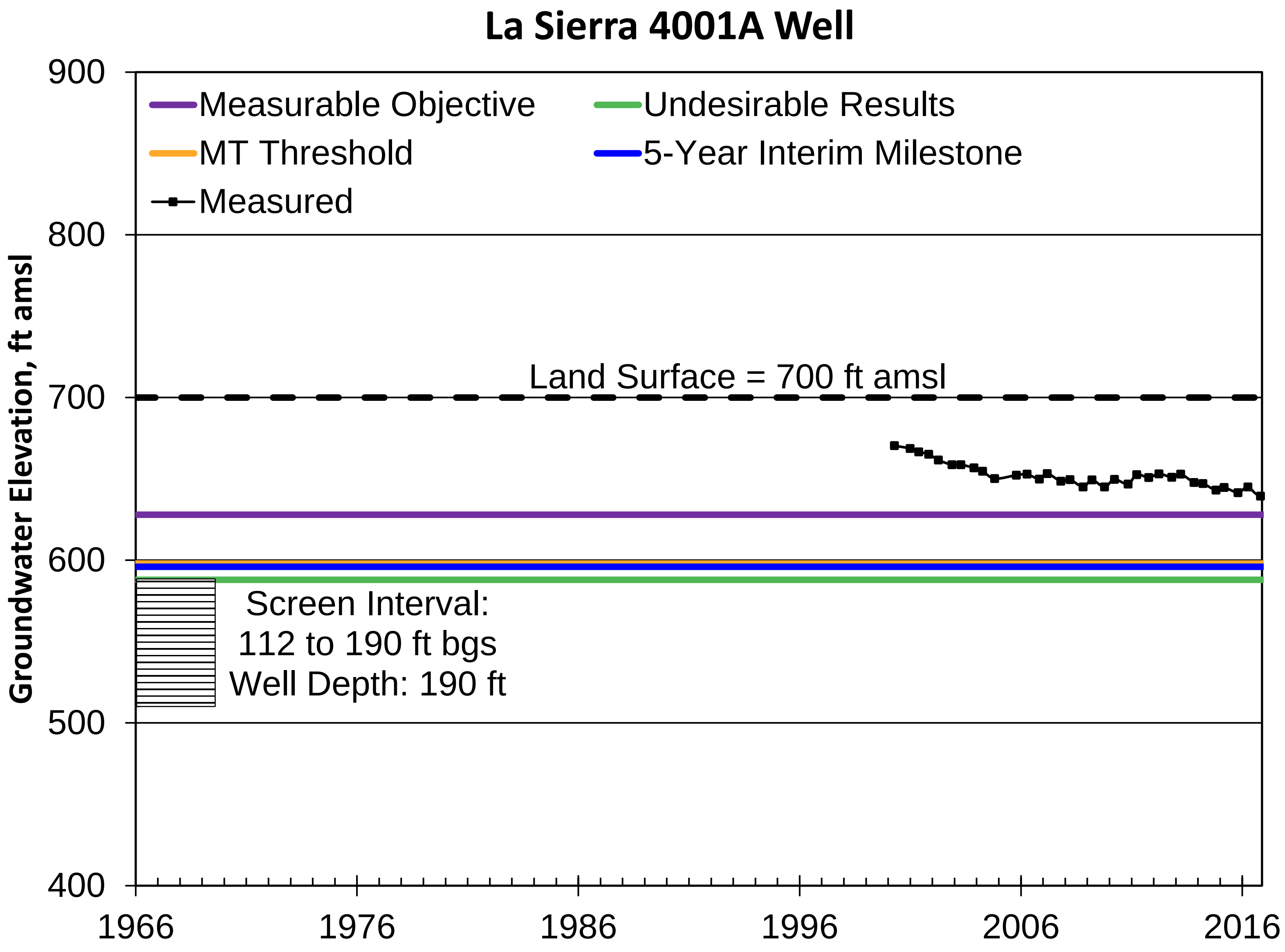

La Sierra 4001A Well
Groundwater Elevation, ft amsl
900
800
700
600
500
400
1966
1976
1986
1996
2006
2016
Measurable Objective
Undesirable Results
MT Threshold
5-Year Interim Milestone
Measured
Land Surface = 700 ft amsl
Screen Interval:
112 to 190 ft bgs
Well Depth: 190 ft

Figure 4-14

La Sierra 3991A Well

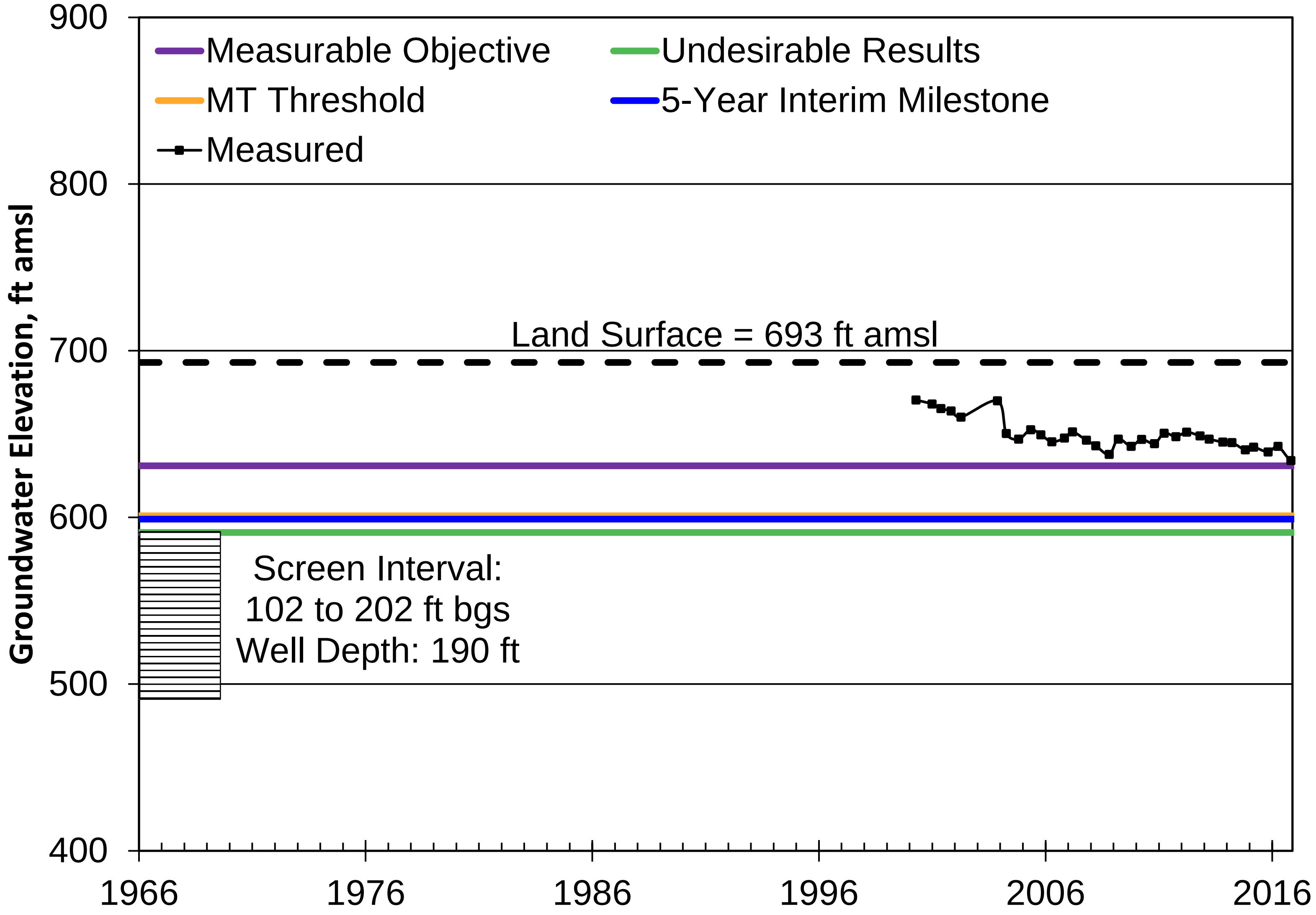


Figure 4-15

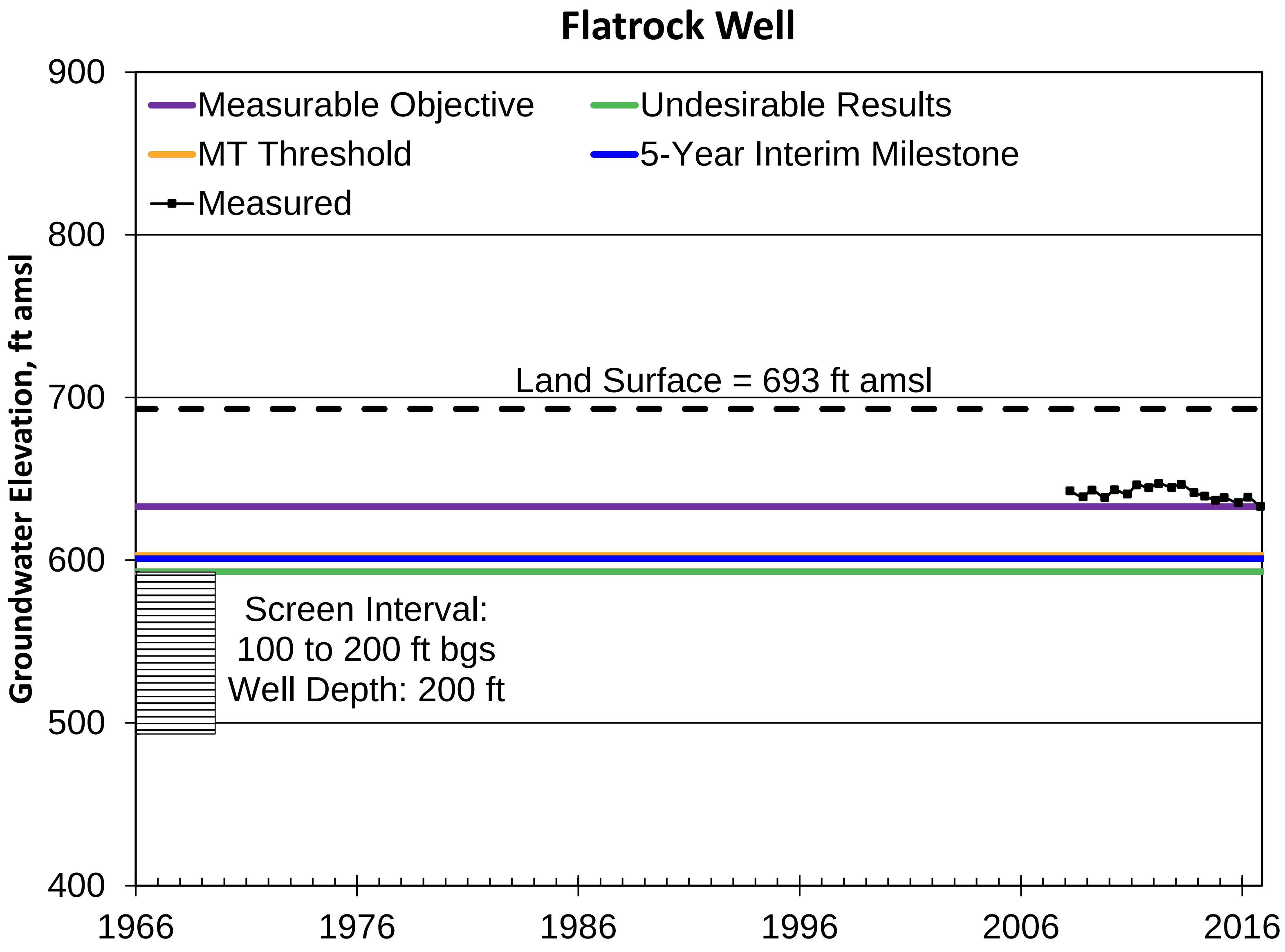
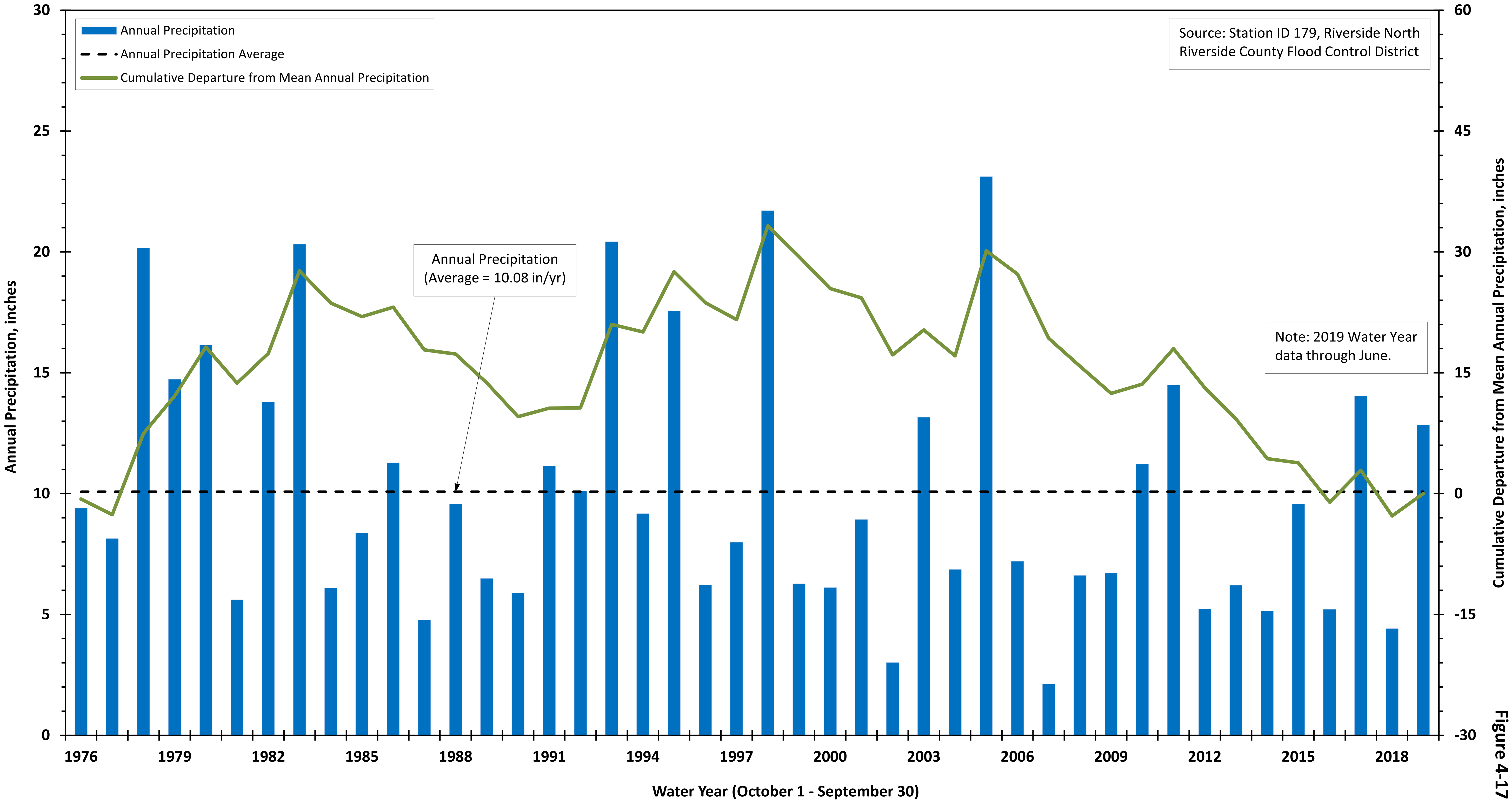

Flatrock Well
Groundwater Elevation, ft amsl
900
800
700
600
500
400
1966
1976
1986
1996
2006
2016
Measurable Objective
Undesirable Results
MT Threshold
5-Year Interim Milestone
Measured
Land Surface = 693 ft amsl
Screen Interval:
100 to 200 ft bgs
Well Depth: 200 ft

Figure 4-16

Annual Precipitation and Cumulative Departure from Mean Annual Precipitation (1975-2019)



Source: Station ID 179, Riverside North Riverside County Flood Control District

Annual Precipitation (Average = 10.08 in/yr)

Note: 2019 Water Year data through June.

Figure 4-17

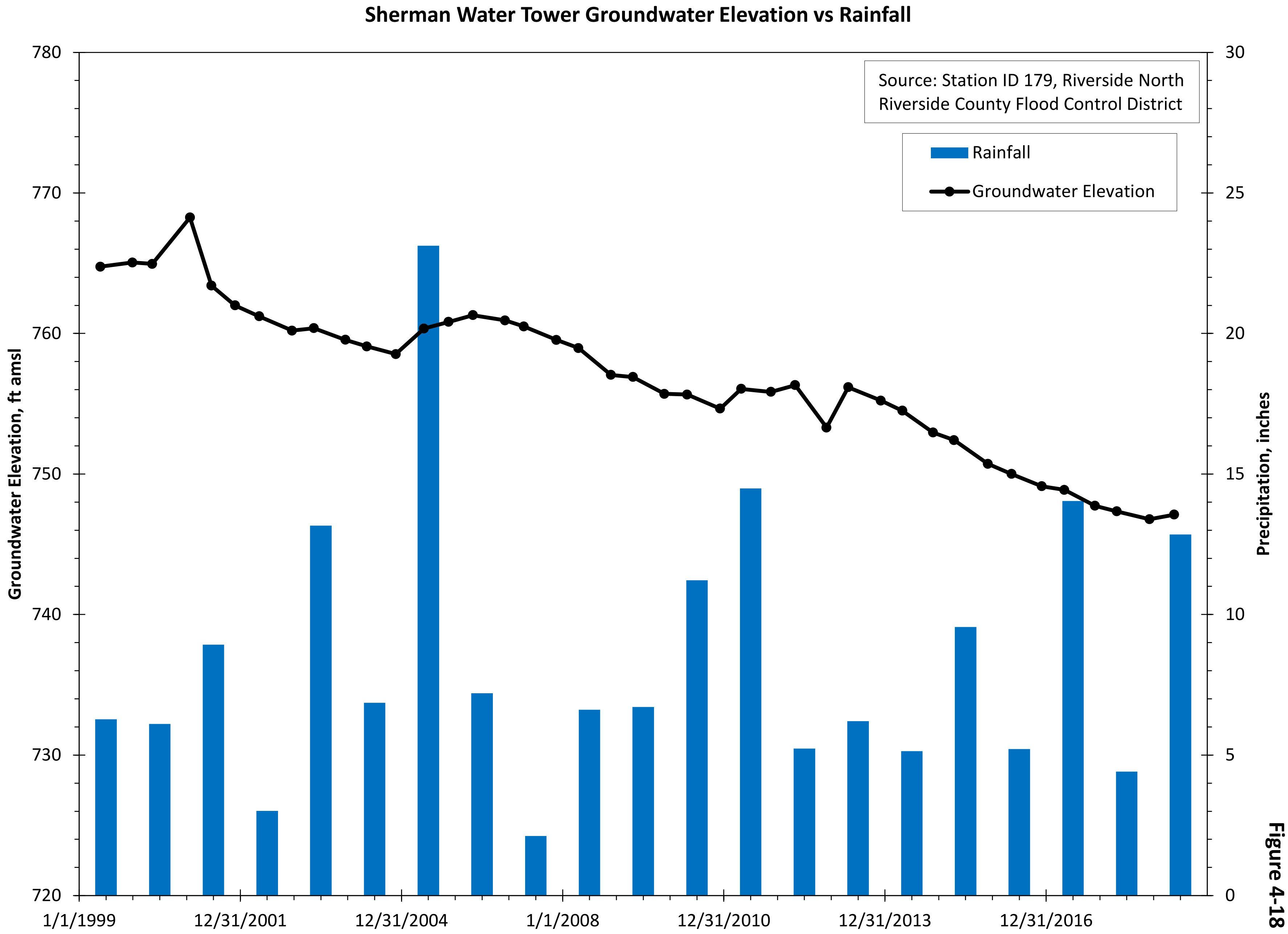
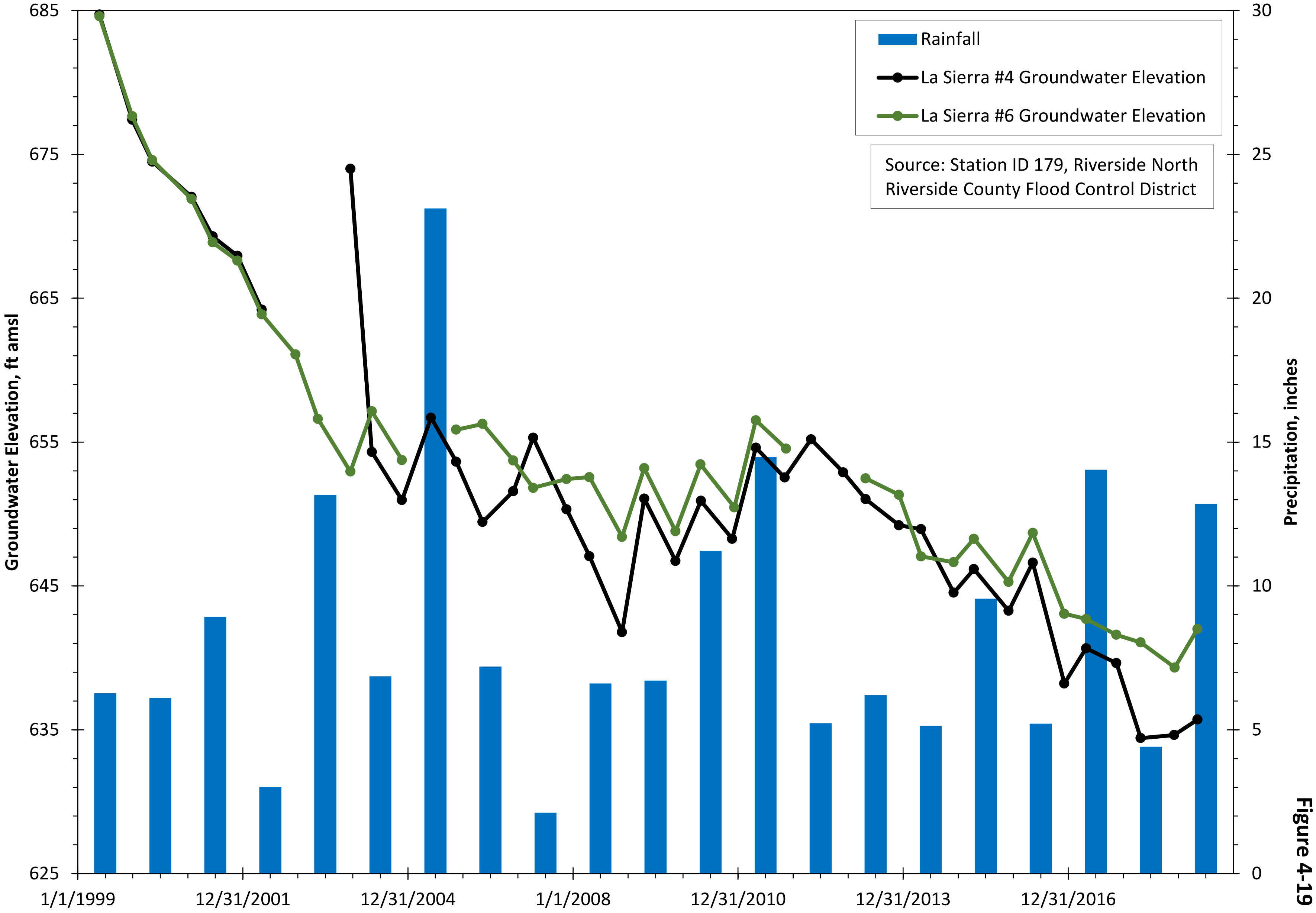

Sherman Water Tower Groundwater Elevation vs Rainfall
Source: Station ID 179, Riverside North
Riverside County Flood Control District
Rainfall
Groundwater Elevation
Groundwater Elevation, ft amsl
Precipitation, inches
780
770
760
750
740
730
720
30
25
20
15
10
5
0
1/1/1999
12/31/2001
12/31/2004
1/1/2008
12/31/2010
12/31/2013
12/31/2016

Figure 4-18

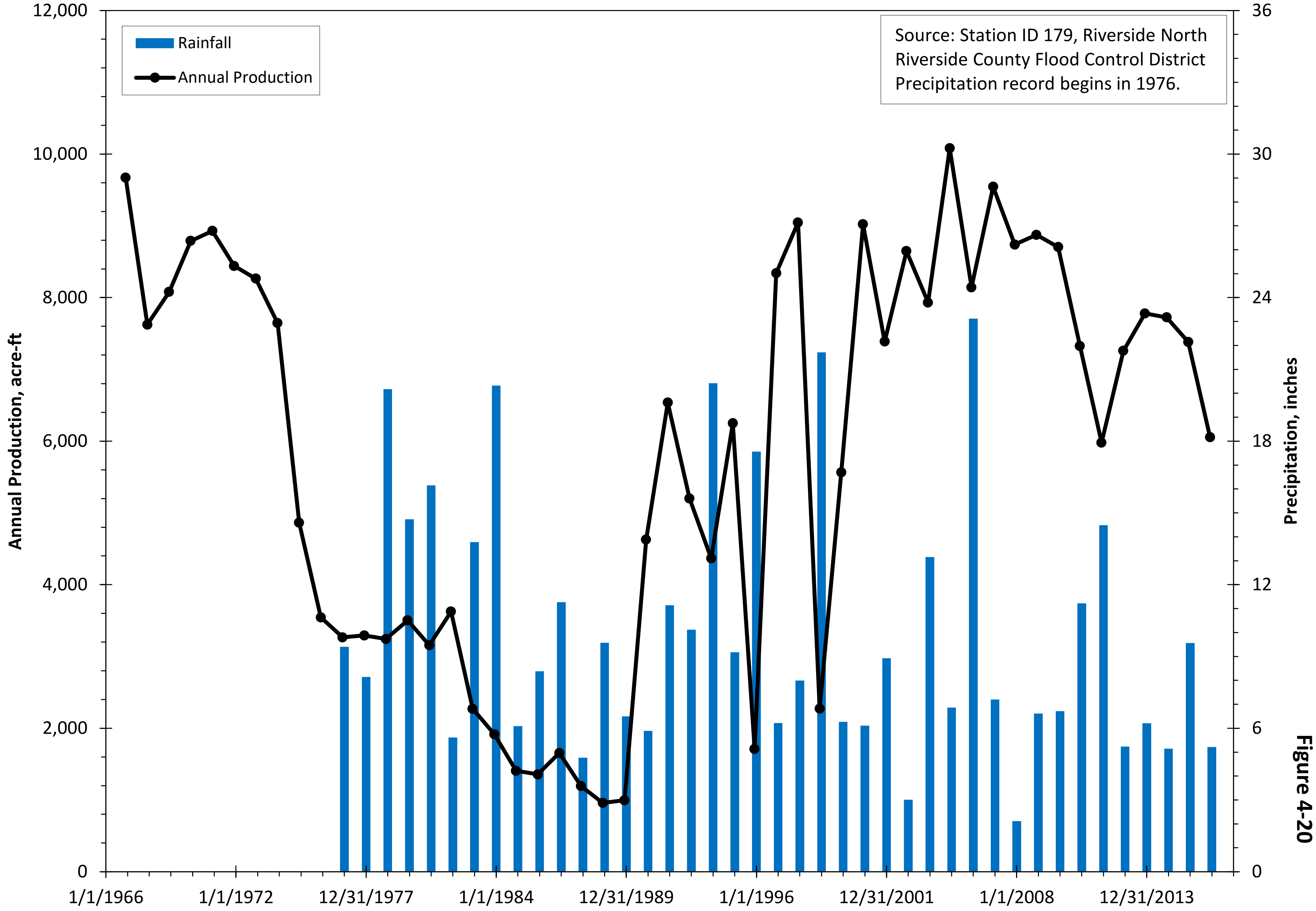
La Sierra #4 and #6 Groundwater Elevation vs Rainfall



Source: Station ID 179, Riverside North
Riverside County Flood Control District

Figure 4-19

Annual Production vs Rainfall



Source: Station ID 179, Riverside North
Riverside County Flood Control District
Precipitation record begins in 1976.

Figure 4-20

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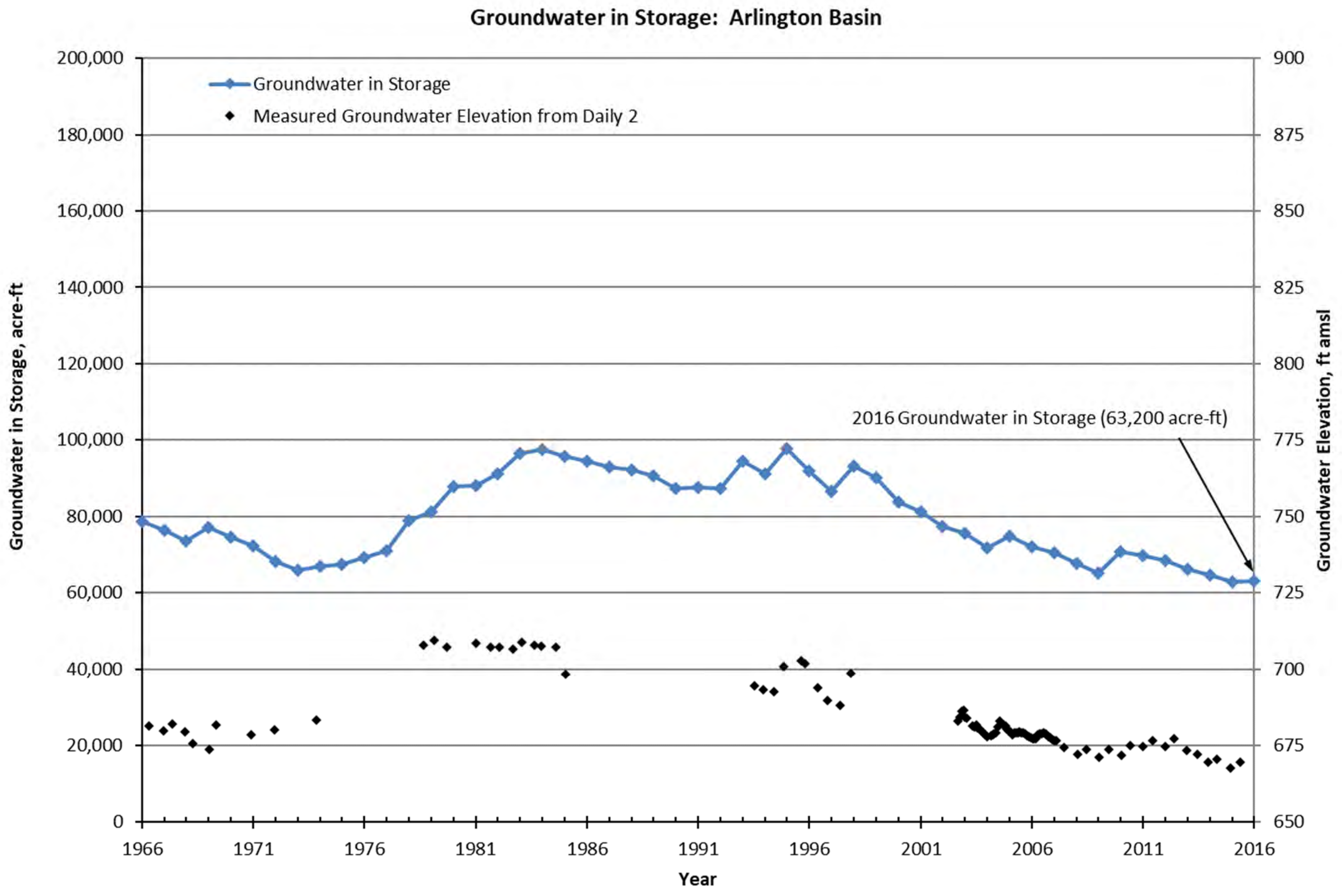

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WESTERN MUNICIPAL WATER DISTRICT

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FIGURE 4-21

GROUNDWATER SUSTAINABILITY PLAN FOR THE ARLINGTON GROUNDWATER BASIN

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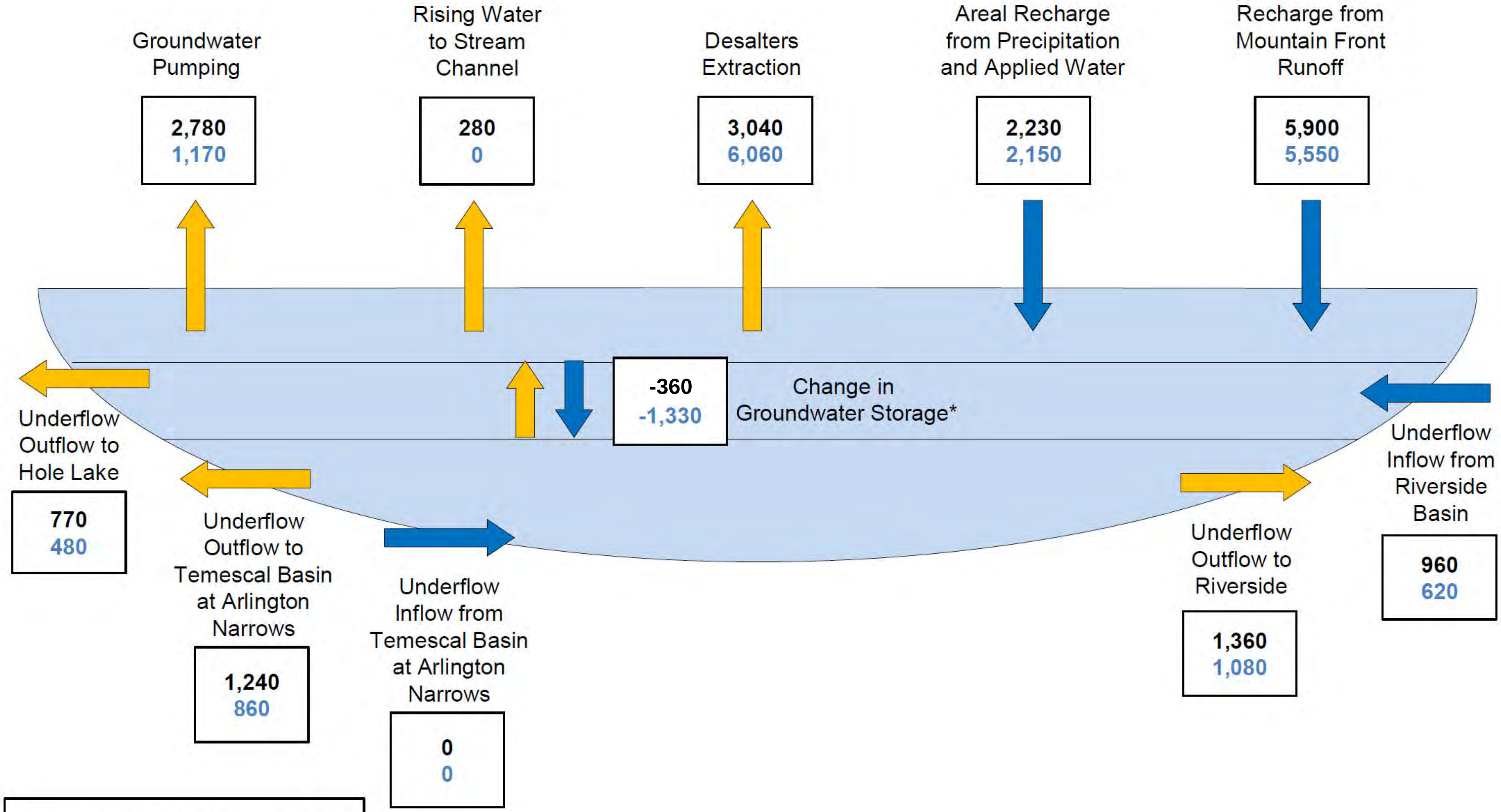

Average Annual (1966 – 2016)
Average Annual (2012 – 2016)

All values in acre-ft/yr

*A positive sign indicates an increase in groundwater storage and a negative sign represents a decline in groundwater storage.

ARLINGTON BASIN WATER BUDGET (1966 – 2016 AND 2012 – 2016)

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Sherman Water Tower Groundwater Elevation vs Annual Production

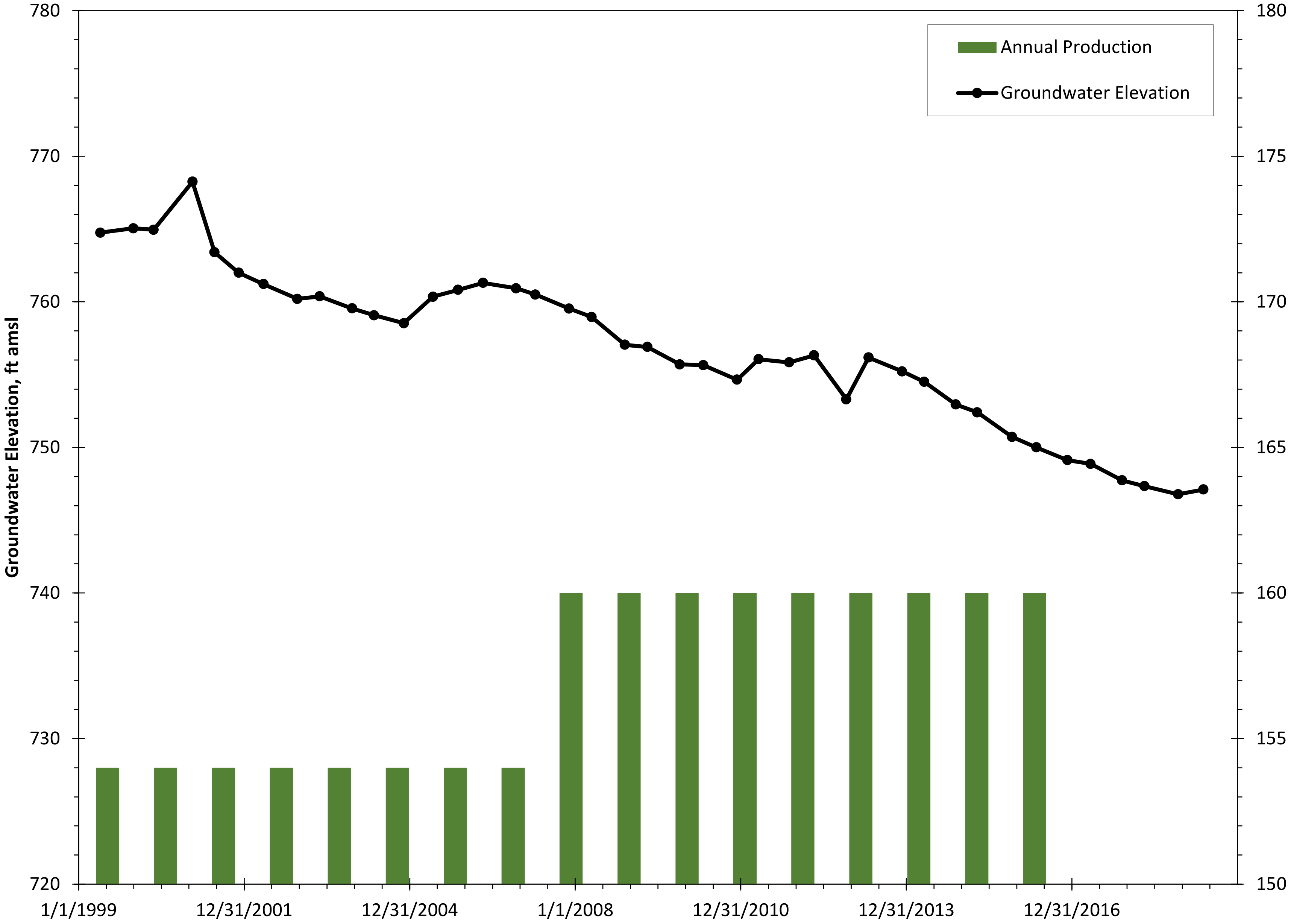


Figure 4-23

La Sierra #4 and #6 Groundwater Elevation vs Annual Production

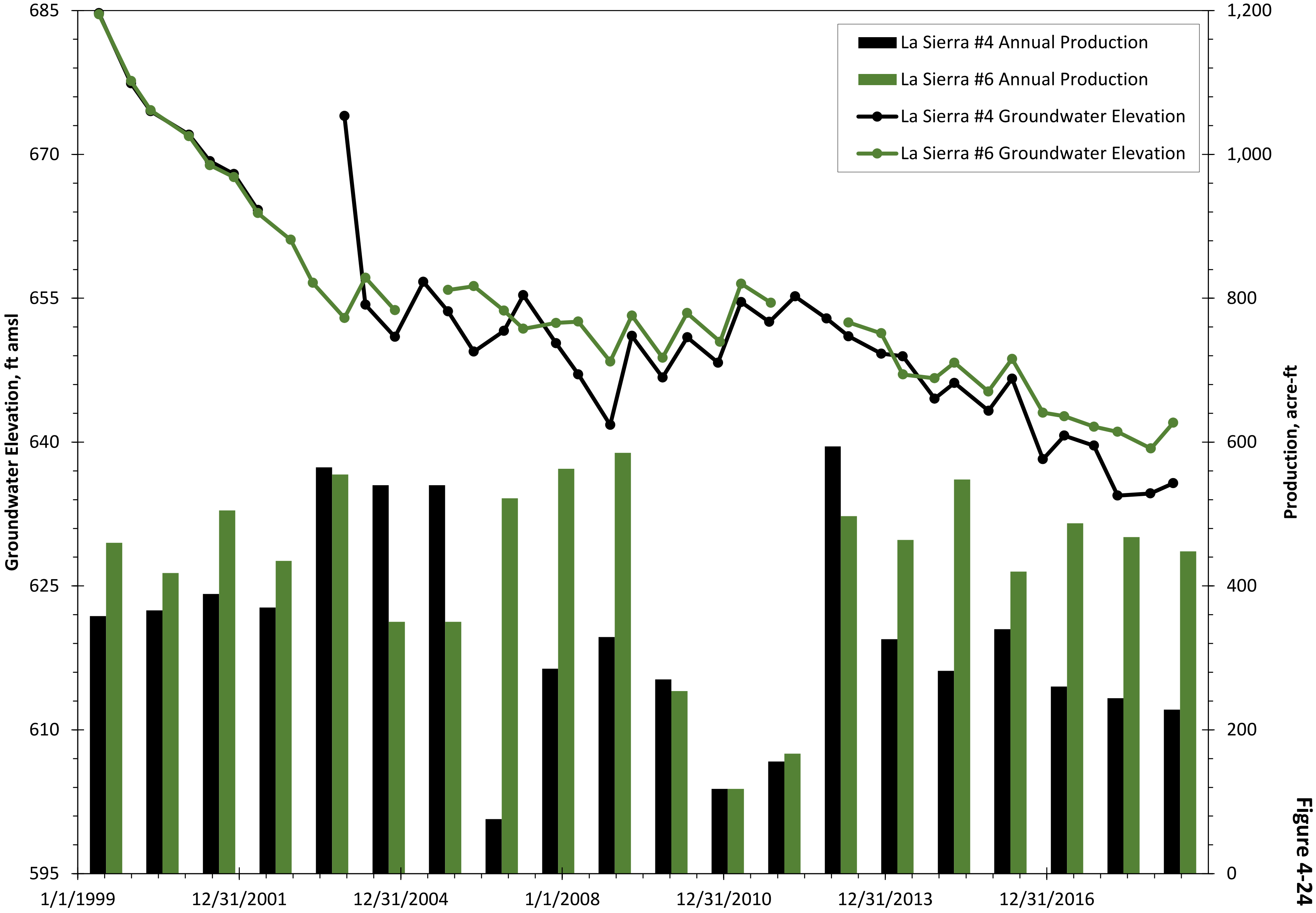
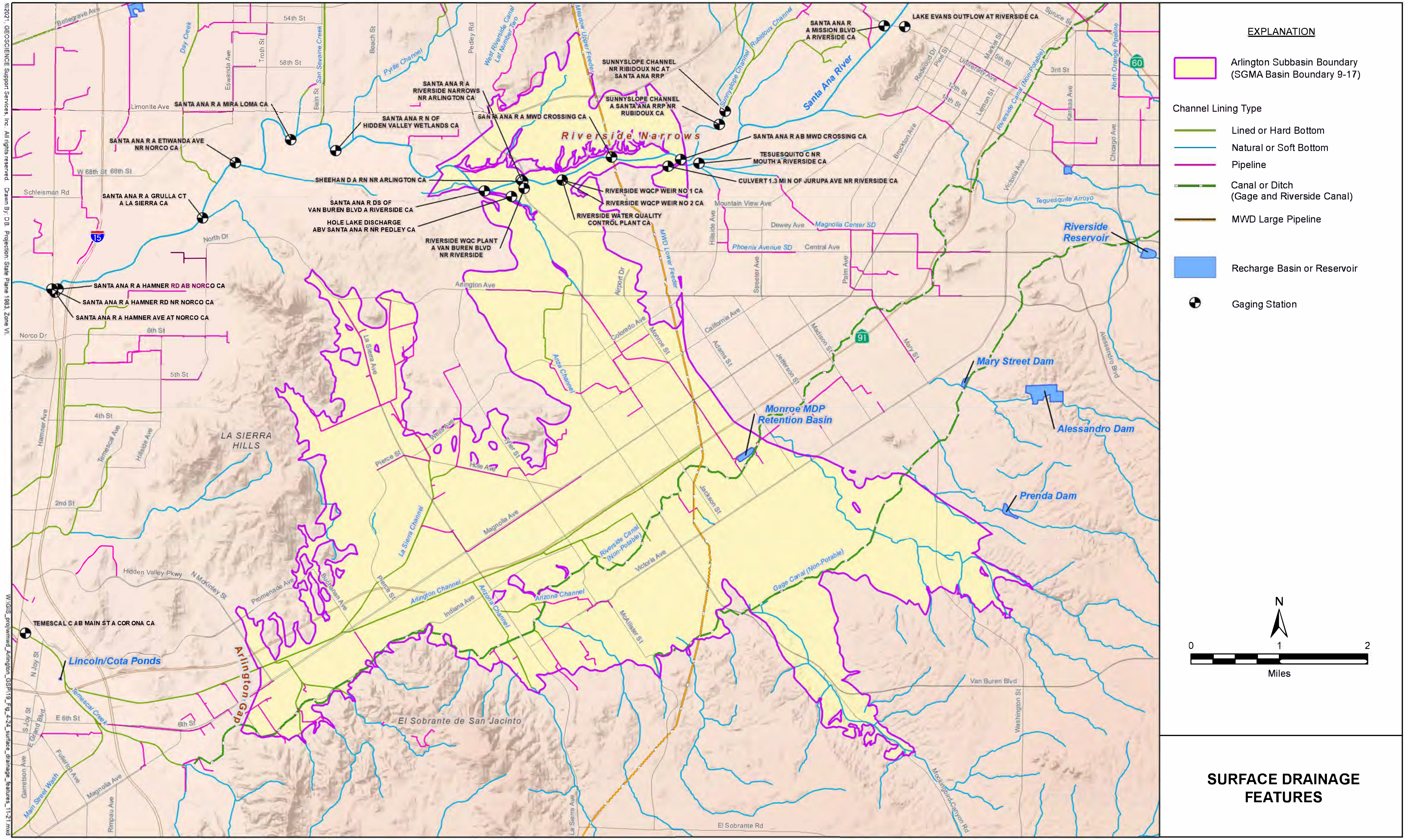


Figure 4-24



SURFACE DRAINAGE FEATURES

©2021, GEOSCIENCE Support Services, Inc. All rights reserved. Drawn By: DB Projection: State Plane 1983, Zone VI.

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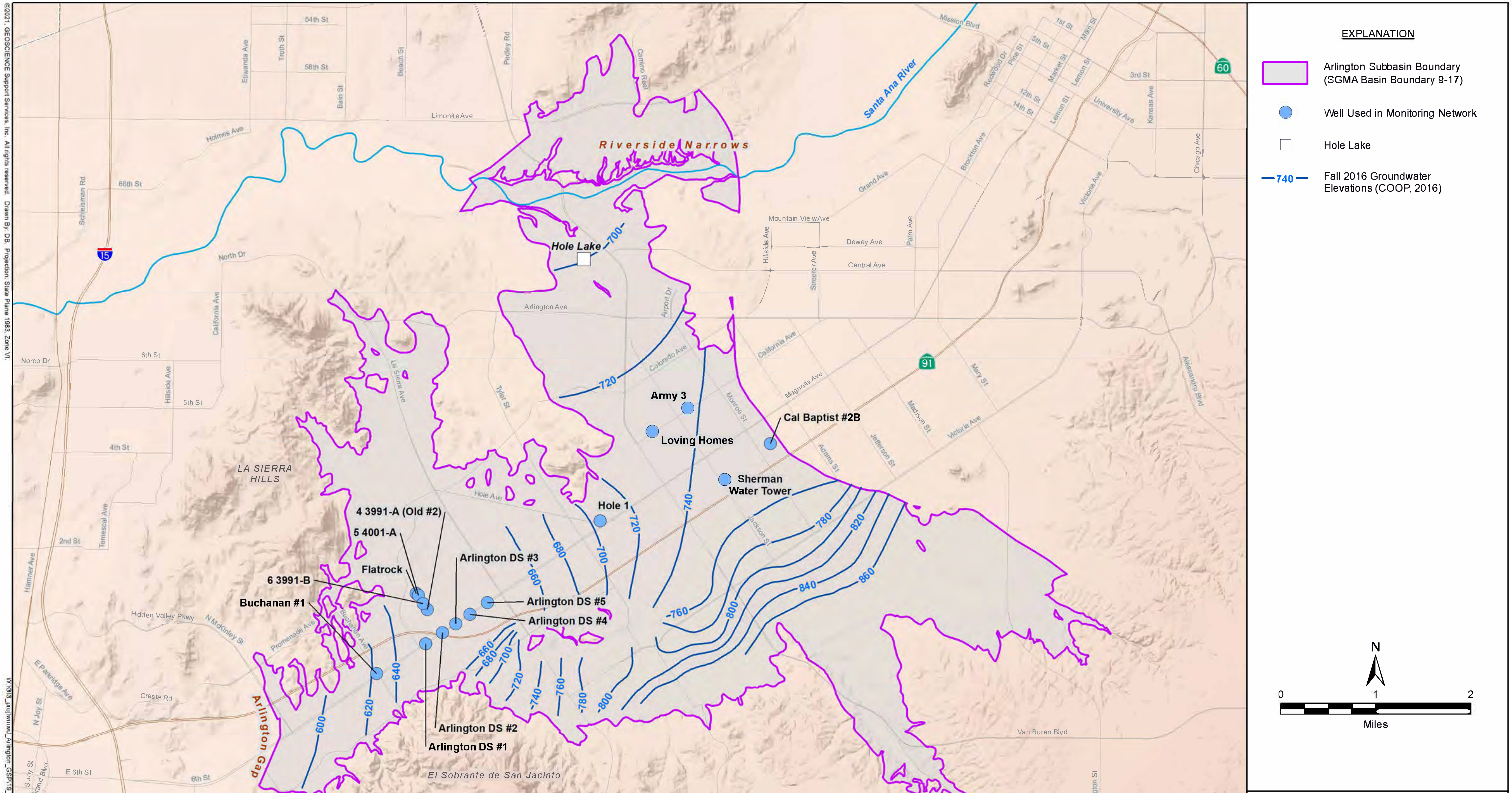
FIGURE 4-25



HOLE LAKE SURFACE WATER OUTLET TO SANTA ANA RIVER

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FIGURE 4-26

Model Simulated and Observed Outflow to Hole Lake and Army 3 Groundwater Elevation

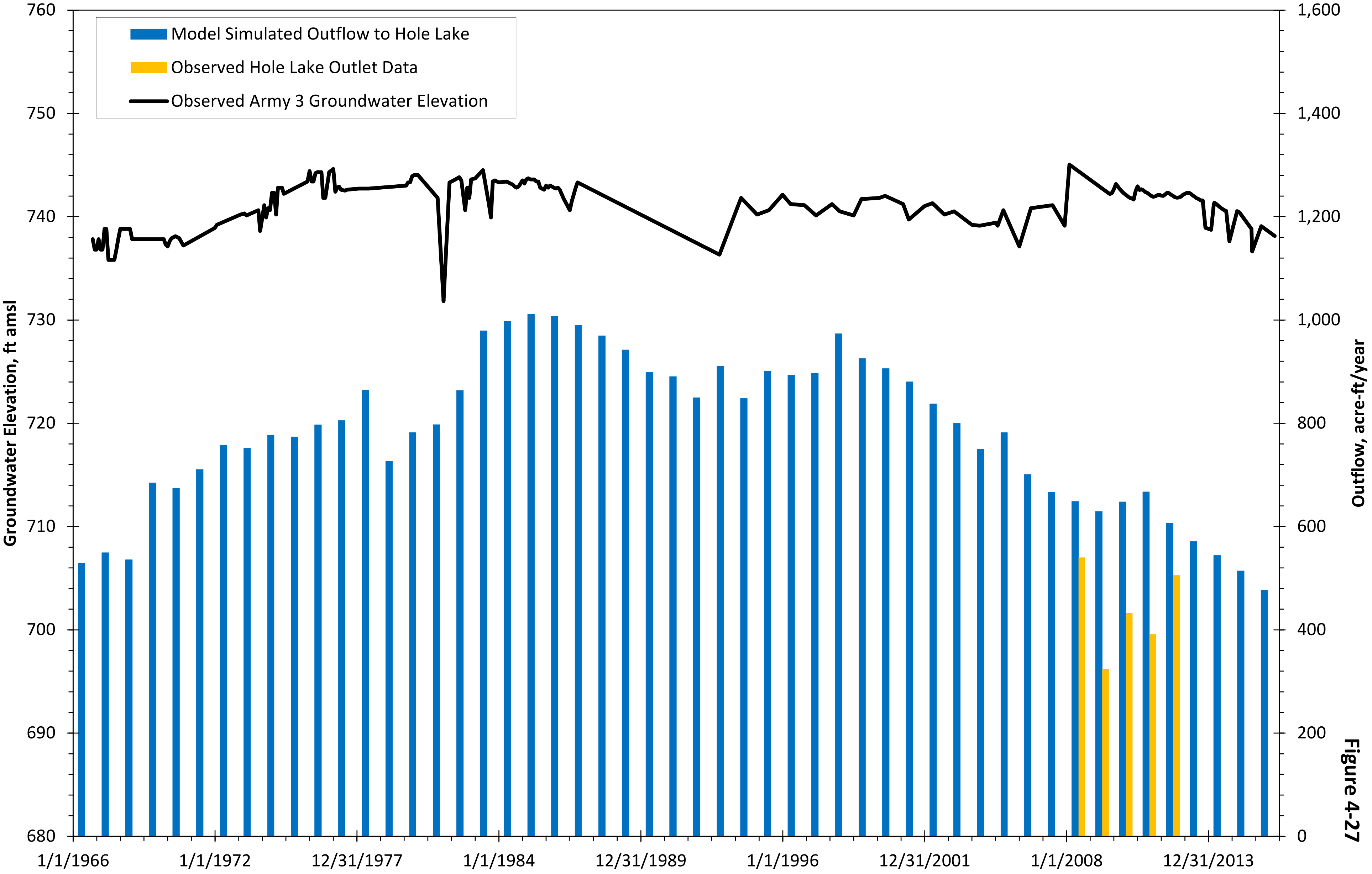


Figure 4-27

5.0 Monitoring Network

Groundwater monitoring is key to Sustainable Groundwater Management Act (SGMA) compliance as it provides the basis to evaluate groundwater level trends for sustainability and can be used to demonstrate measured progress toward achieving sustainability goals through implementation of the Groundwater sustainability Plan (GSP). During development of the GSP, available well information was reviewed to identify wells in the groundwater basin that would provide a good foundation for characterizing current groundwater conditions and which could be used for future, ongoing monitoring after GSP implementation. Presently, groundwater level data are collected from wells in the basin and incorporated into regional groundwater level databases maintained by the Santa Ana Watershed Project Authority (SAWPA) and Western Municipal Water District (Western). 15 existing wells were identified that were available for the GSP monitoring (Figure 5-1). These include pumping wells owned and operated by Western and other public/private operations. At present, there are no de minimis users that have come forward in response to requests for well information or following discussion at GSP workshops. Using existing wells reduces GSP implementation costs by minimizing costs associated with drilling new monitoring wells. In addition, many of the wells used in the GSP monitoring well network have the benefit of previous groundwater level measurements and water quality results, providing a record of previous hydrologic conditions that is used to evaluate trends.

Groundwater quality within Arlington Basin is continuously monitored to meet the California Department of Public Health's (CDPH's) requirements specified in Title 22 of the California Code of Regulations (CCR). All active municipal production wells must comply with CDPH's requirements. Groundwater quality data are collected through many different programs at the local, state, and national levels. The groundwater quality monitoring programs (provided in Section 2 – Plan Area) are described below:

- SAWPA Ambient Water Quality Recomputation Project for the Santa Ana River Basin – SAWPA currently maintains an ambient groundwater quality monitoring program for total dissolved solids (TDS) and nitrate (reported as nitrate as nitrogen [N]) and provides point statistics by management zone.
- California Department of Toxic Substances Control (DTSC) – The DTSC Envirostor database provides cleanup tracking, access to permitting, and enforcement and investigation efforts for contamination by toxic substances from point sources.
- Environmental Protection Agency (EPA) – The EPA develops and enforces regulations, studies environmental issues, and provides tools to advance environmental education, among many other responsibilities at the Federal level.

Groundwater level measurements, which are compiled from the existing monitoring network databases cover semi-annually (in Spring and Fall) measurements to provide a representation of seasonal groundwater levels in the basin. Wells used for groundwater level monitoring are shown on Figure 5-1. Groundwater quality data for the Arlington Basin were acquired through the 1996-2018 Triennial Recomputation of Ambient Water Quality (AWQ) for the Santa Ana River Watershed (SAWPA, 2020). The AWQ is an established watershed-wide groundwater monitoring program for TDS and nitrate as N that is computed every three years. For each AWQ re-computation, current and historical data sets are reviewed for trends of concentrations exceeding federal and state Maximum Contaminant Levels (MCLs) and established Basin Plan Water Quality Objectives (WQOs). The AWQ for TDS and nitrate as N, discussed in the previous section as a sustainability goal, was developed through the triennial analysis conducted by SAWPA. The five-year update report will again utilize the SAWPA analysis for evaluating water quality conditions during the five-year period. Monitoring events are conducted by Western and the cooperative program (Steve Mains). This section summarizes the proposed and existing monitoring network for on-going monitoring in support of GSP implementation.

5.1 Monitoring Network Objectives

Arlington Basin management currently, and has historically, participated in multiple monitoring programs and maintains extensive monitoring databases. The continued use of these programs and databases provides sufficient data from the basin to establish current (ambient) conditions for basin characterization and demonstrate short term, seasonal, and long-term trends in groundwater and any related surface water conditions. After implementation of the GSP, the monitoring network will continue to provide representative data to evaluate GSP sustainability indicators and objectives, including groundwater levels, groundwater storage, and water quality in accordance with the specific sustainability goals established by the GSA. A periodic re-evaluation of the representative monitoring sites will be conducted as data are collected and analyzed.

The existing monitoring network and this monitoring plan are designed to evaluate groundwater conditions in the basin to demonstrate progress toward achieving the measurable objectives described in the GSP. With ongoing collection of groundwater level and water quality data, impacts to beneficial uses of groundwater will be continually evaluated. If impacts occur, one or more of the proposed projects and management actions outlined in Section 6.0 may be implemented.

The monitoring network functions to allow collection of data relative to groundwater levels, groundwater quality, flow direction, and gradient. From this data, an evaluation can be made of the changes in groundwater conditions such as storage (groundwater depths) and water quality. These data are used to quantify changes in the water budget components and to evaluate sustainability indicators. Data may also be used to update a local groundwater flow model of the basin to refine estimates of sustainable yield and improve the model's reliability for evaluating future projects and management actions.

5.2 Monitoring Locations

The wells identified during the GSP development process are shown on Figure 5-1 for water level. These wells were selected based on available data, and geographic and vertical distribution. Where good well coverage was available, selected monitoring locations were determined based primarily on available data (wells with greater historical data coverage were prioritized over wells with less or no available information) in order to take advantage of the historical data record. Utilizing the Western's and SAWPA's monitoring well databases, existing wells were located which were appropriately constructed to allow adequate spatial and temporal collection of multiple groundwater level and water quality datasets. This allowed for calculations of baseline (ambient) groundwater conditions and assessment of current conditions for all sustainability indicators.

5.3 Data Gaps

5.3.1 Data Gaps in the Arlington Basin

Arlington Basin has an extensive historical record for both groundwater level and groundwater quality through the existing programs and monitoring databases. As data are collected and reviewed, future recommendations may be made to add new monitoring locations or revise the selected monitoring locations.

5.4 Evaluation of Sustainability Indicators

5.4.1 Chronic Lowering of Groundwater Levels

Groundwater in the Arlington Basin occurs primarily in alluvium under unconfined conditions. The existing monitoring network provides adequate data to understand the unconfined nature of the basin and to evaluate over time, whether changes in groundwater levels are occurring and to what magnitude. Existing and ongoing groundwater monitoring during implementation of the GSP will be conducted no less than semi-annually in the spring and fall to represent high and low groundwater level conditions, respectively. Groundwater surface elevations were selected to keep levels in selected wells at appropriate depths in reference to the well screens for those wells. This involved review of historical groundwater level data and well location/construction information to gage potential undesirable effects, and to evaluate potential exceedance of Minimum Thresholds (MTs) and progress towards Measurable Objectives (MOs) presented in Section 4.0 – Sustainable Management Criteria.

5.4.2 Reduction of Groundwater Storage

Because the aquifer in the Arlington Basin is generally unconfined, and the size and shape of the basin is generally understood, changes in water levels will allow evaluation of changes in groundwater storage in the basin. Calculation of groundwater storage will use the Arlington Basin portion of the Integrated Santa Ana River (SAR) model to assess groundwater in storage between the MO elevations, MT elevations, and the undesirable result elevations. This approach is very conservative because it assumes no rainfall (aerial recharge) to the groundwater basin for the period.

5.4.3 Degraded Water Quality

TDS and nitrate were evaluated for historical and future conditions of the Basin. Given that ambient water quality for the basin exceeds basin objectives for both TDS and nitrate, the sustainability goal—to protect groundwater quality—is not to reverse undesirable water quality during the planning period, but rather to prevent circumstances wherein future management activities might make water quality worse and to ensure that water quality is maintained (at a minimum) or improved by basin management measures. Implementation of the GSP will include review and evaluation of the AWQ calculation conducted by SAWPA every three years (AWQ Report) and comparison with the previous ambient calculation.

5.4.4 Depletions of Interconnected Surface Water

There is no current evidence for interconnected groundwater-surface water in the Arlington Basin. As a result, sustainability indicators have not been proposed. As such the monitoring plan does not include monitoring features for depletions in interconnected surface water.

5.4.5 Seawater Intrusion

The downstream boundary of the Arlington Basin is located approximately 36 miles from the Pacific Ocean along the course of the Santa Ana River, through the Santa Ana Gap. As such, is not subject to seawater intrusion due to the distance and elevation. In addition, Orange County Water District has operated a seawater intrusion injection barrier which protects the coastal basin of Orange County from seawater intrusion. Therefore, the monitoring program does not include a component to evaluate seawater intrusion. The absence of seawater intrusion will be verified in the five-year update report.

5.4.6 Land Subsidence

Land subsidence is not of concern for the Arlington Basin due to a lack of significant thickness of compressible fine-grained sediments and the overall shallow character of the alluvial basin. As with seawater intrusion, the monitoring network will not include components specifically designed to monitor possible land subsidence. However, conditions within the basin, specifically performance of well heads, may be observed for indications of subsidence. For example, a well head being pushed out of the ground or well pad rising above ground level is an indication that the land in the vicinity of that well is subsiding. Evidence of or potential for land subsidence will be reevaluated in the five-year update report

5.5 Groundwater Level and Groundwater Quality Monitoring Plan

Presently, groundwater level monitoring is performed by Western and SAWPA personnel. Groundwater levels are measured at least twice a year, in spring and fall, and incorporated into regional groundwater level databases maintained by SAWPA and Western. Groundwater quality monitoring will not be conducted by the GSA. However, the GSA will obtain the ambient groundwater quality analysis prepared by SAWPA triennially. Each triennial groundwater quality data set will be compared to the previous ambient calculation to determine any changes in the basin water quality.

The data collected from this monitoring effort will allow the GSA to demonstrate measured progress toward achieving the sustainability goals set forth in the GSP and inform management decisions. The data will also be reviewed and analyzed to serve the purpose of characterizing focused hydrologic conditions in Arlington Basin for sustainable groundwater resource management.

5.5.1 Monitoring Frequency

The scale and frequency of the monitoring effort was considered so that monitoring events would provide a cost-effective means to characterize groundwater conditions (i.e., groundwater elevation and water quality) following implementation of the GSP. Static groundwater levels will continue to be measured at a minimum twice per year: once in the spring and once in the fall, to represent seasonal high and seasonal low levels, respectively. Groundwater quality data will be collected triennially from SAWPA through the existing monitoring program discussed in Section 2.2.1.1.3. Additional monitoring events may be conducted on an as needed basis to monitor areas of interest.

5.5.2 Monitoring Protocols

Per SGMA, a GSP must contain monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, flow directions, hydraulic gradients, and quality of surface water that directly affects groundwater levels or quality or are caused by groundwater extraction in the basin (surface water/groundwater interactions). Western and SAWPA have been actively monitoring the Basin for more than 30 years. Monitoring protocols discussed below have been developed and implemented to ensure efficient, accurate, and consistent data collection through the course of the monitoring programs.

5.5.2.1 Water Level Monitoring

Figure 5-1 shows the group of monitoring wells included in the initial GSP water level monitoring network. 15 existing wells were identified that were available for the monitoring. These include pumping wells owned and operated by Western and other public/private operations. Many of the wells used in the GSP monitoring well network have the benefit of previous groundwater level measurements and water quality results, providing a record of previous hydrologic conditions that is used to evaluate trends. At present, there are no de minimis users apart of the water level monitoring network. Groundwater level monitoring is performed at least twice per year in spring and fall by Western and SAWPA personnel.

Since many of the wells in the monitoring network represent active pumping wells, the sampling team will need to coordinate with well owners prior to a water level monitoring event so that readings may be representative of static water level conditions. If possible, it is recommended that wells be measured after a period of no pumping to allow local water levels to recover (e.g., coordinate well shut off the night before and measure water levels the next morning). The recovery time will vary from well to well and the sampling team will work with the well owner to ensure that water levels used for the evaluation of sustainability criteria represent static conditions.

Any updates to the monitoring network (refinement of monitoring location, inclusion of additional monitoring location(s), etc.) will be discussed in the five-year update report.

5.5.2.2 Water Quality Sampling

The AWQ established a watershed-wide groundwater monitoring program for TDS and nitrate as N that is computed every three years. For each AWQ re-computation, current and historical data sets are reviewed for trends of concentrations exceeding federal and state MCLs and established Basin Plan WQO. Monitoring events are conducted by Western and the cooperative program (Steve Mains). Although the water quality sampling will be performed by Western and others, any updates to the monitoring network (refinement of monitoring location, inclusion of additional monitoring location(s), etc.) will be discussed in the five-year update report.

5.5.3 Reporting

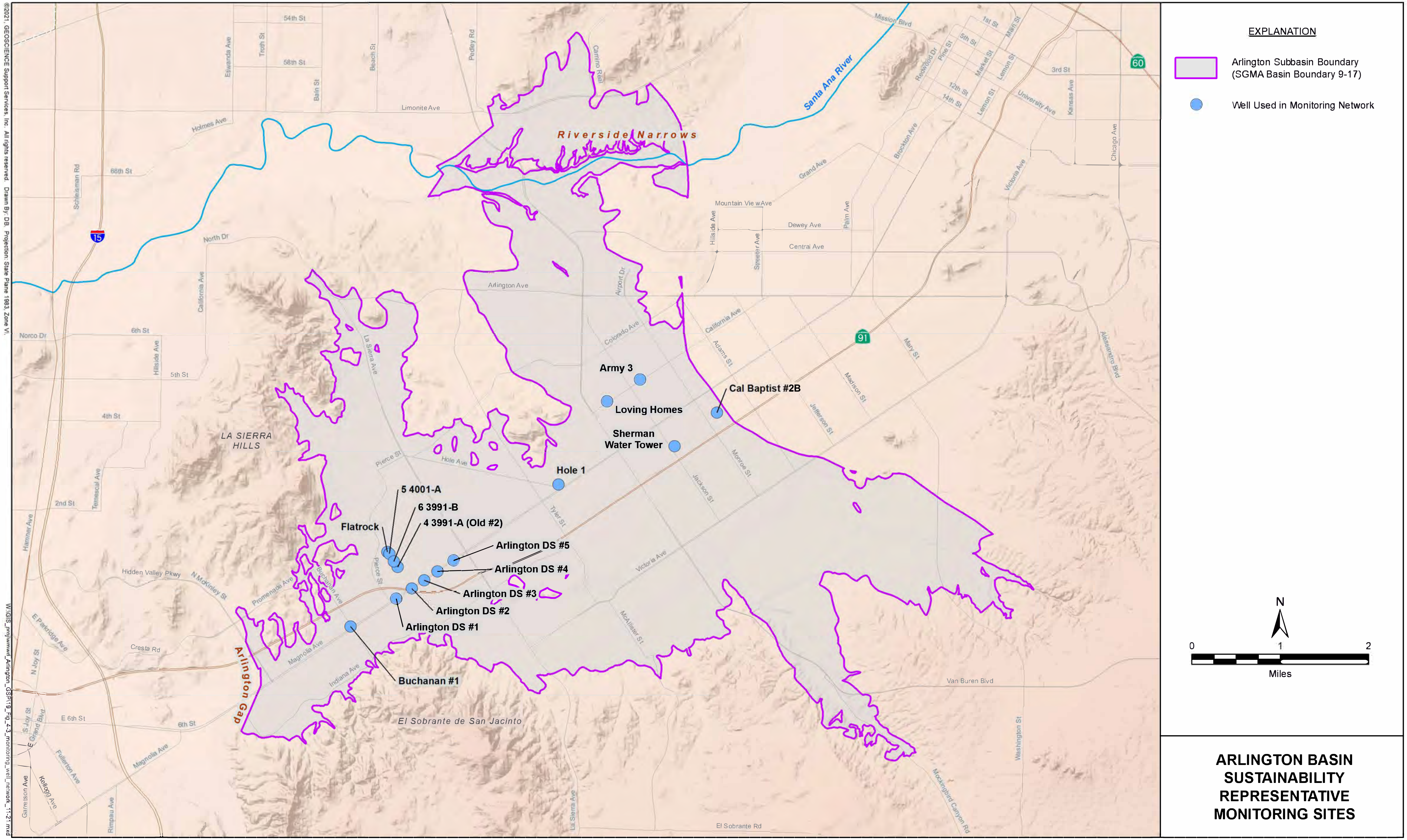
The well inventory databases currently used by the GSP will continue to be updated and maintained. This includes well elevations so water level measurements can be converted into elevation. New water level monitoring data will be included in the database and the creation of hydrographs will allow the GSA to track temporal changes in groundwater levels. Comparison of ambient groundwater concentrations for TDS and nitrate as N using the historical and most recent re-computations of ambient groundwater quality will allow tracking of any potential changes in groundwater quality in the Arlington Basin.

5.6 References

CCR (California Code of Regulations), Title 22, Social Security, Chapter 15, Domestic Water Quality and Monitoring.

SAWPA (Santa Ana Watershed Project Authority). 2020. Recomputation of Ambient Water Quality for the Period 1999 - 2018

EPA (Environmental Protection Agency). 2004. Groundwater Well Sampling, Field Sampling Guidance Document #1220, Method 314.0.



ARLINGTON BASIN SUSTAINABILITY REPRESENTATIVE MONITORING SITES

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FIGURE 5-1

6.0 Projects and Management Actions

The projects and management actions described in this section provide the framework to achieve the sustainability goal for the Arlington Groundwater Basin, in accordance with §354.42 and §354.44 of the Sustainable Groundwater Management Act (SGMA) regulations. Each project and management action will be considered during the Groundwater Sustainability Plan (GSP) implementation however not all will be needed for Arlington to reach its sustainability goal. Current and impending projects and management actions are expected to continue so long as assistance to achieve the Arlington Basin sustainability goal is provided. The measurable objectives and undesirable results described in Section 4 – Sustainable Management Criteria will also be addressed by the proposed projects and management actions, with their effectiveness being judged by the ability to eliminate the undesirable results and conditions represented by the sustainability indicators discussed in Section 4. Management actions are considered programs or policies that support groundwater sustainability and do not require infrastructure. Projects refer to groundwater sustainability supporting activities that do require infrastructure.

As discussed, in Section 2 – Plan Area, Arlington Basin has been in overdraft for decades – resulting in some reduction of useable groundwater storage and incipient chronic lowering of groundwater levels (without local wells going dry). Reduction in storage has primarily been the result of water quality control efforts to remove salts from the basin through the Arlington Desalter program. There is no evidence of water quality degradation as a result of basin operations. General mineral quality (e.g., total dissolved solids [TDS] and nitrate) throughout much of the Arlington Groundwater Basin is poor and has been poor for decades. The project and management actions described in this section are designed to ensure that Arlington Basin operates within its sustainable yield by achieving sustainable groundwater management. The importance of the Arlington Basin sustainable yield is magnified by the fact that groundwater is the sole source of water for some users and provides a significant supply to the few basin pumpers. The following objectives will be accomplished with the implementation of select projects and management actions, active monitoring of the Arlington Basin, and adaptive management of the projects and management actions:

- Reduction of Arlington Basin groundwater demands,
- Increase reuse of current supplies,
- Obtain supplemental water supplies, and
- Mitigation of undesirable results.

6.1 Sustainability Indicators

Summarized in Table 6-1 are descriptions on how the applicable sustainability indicators for the Arlington Basin will be addressed by the proposed projects and management actions. The sustainability indicators are measured directly by, or tied to, groundwater elevation except for water quality. Land subsidence and seawater intrusion are not applicable for the Basin and are not included in Table 6-1. There is no concern for land subsidence in the Basin due to a lack of significant thickness of compressible fine-grained sediments and the overall shallow character of the alluvial basin, as discussed in Section 2 – Plan Area and Basin Setting. Additionally, given the distance of the downgradient boundary from the ocean and the seawater intrusion injection barrier operated by Orange County Water District, seawater intrusion is also of no concern for the Basin. Evidence of or potential for land subsidence and seawater intrusion will be reevaluated and verified in the 5-year report. Currently insufficient data are available to demonstrate interconnected surface water, therefore this indicator will also be excluded from Table 6-1. Recommendations for investigative studies to design a monitoring program are provided as a part of the proposed monitoring program discussed in Section 5 of this GSP. Undesirable results, minimum thresholds (MTs), and measurable objectives (MOs) will be recommended, if appropriate, in the 5-year update report.

6.2 Mitigation of Overdraft

A groundwater basin is generally regarded as being in overdraft when pumping exceeds natural and artificial groundwater recharge. As stated in Section 4 – Sustainable Management Criteria, sustainability will be achieved when the seasonal range of groundwater changes remains within a range of elevations that will have no long-term negative impacts on basin pumpers. Arlington Basin has been managed nearly sustainably over the long-term, though the basin has experienced groundwater level declines more recently, for the period from 2012 through 2016. The results of the water balance analysis, see Section 3 – Basin Setting, indicate that an average natural recharge from all sources of 8,710 acre-feet/year (af/yr) represents the long-term (1996-2016) sustainable yield of the basin. However, for the hydrologic period from 2012 through 2016 (a dry hydrologic period), the sustainable yield was estimated at 6,990 af/yr over this five-year period. This explains why, even though long-term extractions have been fairly similar, a consistent downward trend of groundwater levels has characterized the basin in the recent period (2012-2016) while the long-term trend has approached sustainability. Over this period (2012-2016), groundwater storage decreased by 1,330 af/yr.

6.3 Modeling Scenarios

To the greatest extent possible, this GSP aims to preserve historic operations of beneficial use in the basin as well as allow for future planned uses as conceived by the GSA and basin stakeholders. Three main projects are proposed to support continued operation within the current sustainable yield of the groundwater basin and/or increase the sustainable yield through the addition of new water supplies. These are:

- Stormwater recharge at Victoria spreading basin,
- Recycled water recharge at Victoria spreading basin, and
- Recharge of water from Riverside South Groundwater Basin at Victoria spreading basin.

The Integrated Santa Ana River (SAR) model was used to evaluate the effects of these three proposed projects and cumulative projects on groundwater levels and groundwater storage in the basin, specifically in regard to achieving MTs and MOs outlined in Section 4.0 – Sustainable Management Criteria of this GSP. Geoscience evaluated the results of Victoria Basin stormwater modeling to determine the impacts on groundwater levels with respect to sustainability and GSP planning efforts.

Both stormwater and recycled water availability occur primarily in winter months when both source waters are available to the project. Therefore, both potential projects may be limited in the volume that can be recharged by annual groundwater storage available beneath the basin during winter months. The use of recycled water or groundwater from Riverside South Groundwater Basin may become a primary focus during years when stormwater may not be available. Figures 6-1 and 6-2 show the location of Victoria Basin and the location of key monitoring locations in Arlington Groundwater Basin, respectively.

Four model scenarios were evaluated:

- Scenario 1: Stormwater recharge at Victoria Basin: Assess the results of the stormwater recharge scenario with respect to impacts on water levels and sustainability for GSP planning efforts.
- Scenario 2: Recycled water recharge at Victoria Basin: Assess recycled water recharge in Victoria Basin as a stand-alone project. Greater availability is anticipated in the winter months.
- Scenario 3: Recharge from Riverside South Groundwater Basin at Victoria Basin: Assess the recharge of water pumped from Riverside South Groundwater Basin in Victoria Basin. Water from groundwater pumping in Riverside South may occur throughout the calendar year.
- Scenario 4: Cumulative scenario with recharge from stormwater, recycled water, and Riverside South Groundwater Basin at Victoria Basin: The fourth scenario assesses the cumulative impact of all projects operating simultaneously.

Results of the modeling scenarios are presented in Section 6.3.2 while assumptions are described below.

6.3.1 Scenario Assumptions

6.3.1.1 Scenario 1: Stormwater Recharge Only

Ongoing design engineering work for Victoria Basin being completed by Scheevel Engineering simulated stormwater availability and recharge at the Victoria Basin facility by creating an O&M model. Stormwater recharge is shown on Figure 6-3, which averages 440 af/yr. Recharge from stormwater is higher during wet years with more precipitation. West Basin has a higher infiltration capacity than East Basin, and recharges 330 af/yr of the total recharge, while East Basin recharges 80 af/yr.

6.3.1.2 Scenario 2: Recycled Water Recharge Only

Recycled water recharge in Victoria Basin was simulated during January and February of each year, which is when there is anticipated to be greater supply availability, at a rate of 175 acre-feet per month. This equates to an annual recharge volume of 340 af/yr, which was simulated annually for 25 years. Annual recharge volumes for Scenario 2 are shown on Figure 6-4.

6.3.1.3 Scenario 3: Riverside North Groundwater Recharge Only

In this scenario, groundwater from Riverside South is imported into Arlington Groundwater Basin and recharged in Victoria Basin. Annual recharge volumes are shown on Figure 6-5, which averages 1,280 af/yr. Initial annual recharge volumes are slightly higher than the average since a groundwater mound underneath the site develops with continued recharge. During wet hydrologic periods, recharge capacity under the Victoria Basin site is limited by higher groundwater levels.

6.3.1.4 Scenario 4: Combination of Recharge Sources

A mix of sources is simulated in Scenario 4. Recycled water recharge, stormwater recharge, and Riverside South groundwater are recharged based on availability. Both recycled and stormwater recharge have elevated availability during winter months. Riverside South groundwater is used during periods when stormwater or recycled water do not, in sum, exceed the recharge capacity of Victoria Basin. A total recharge volume of 1,280 af/yr is simulated, as shown on Figure 6-6.

6.3.2 Overview of Modeling Results

Results from the specific scenarios (Scenarios 1 through 4) are provided in Section 6.4. General modeling results are provided below.

6.3.2.1 Water Level Contours

Water level contours for each scenario are plotted on Figures 6-7 through 6-10. The largest changes in water level occur in the vicinity of the Arlington Desalters near the end of the simulation period, buoying water levels approximately 20 feet (ft) in the area under Scenario 3 and 4 conditions.

6.3.2.2 Water Balance

A zone budget was conducted for the Arlington Basin and the results for each scenario are reported in Figure 6-11. Recharge activities contribute to an increase in groundwater storage under all scenario conditions. Recharge also results in increases groundwater levels in the groundwater basin, which contributes to slight shifts in the distribution of underflow outflow from the basin. Scenarios 3 and 4 have identical annual recharge volumes and effects on the water budget but contain recharge from different sources.

6.3.2.3 Water Level Hydrographs

Projected water levels are shown on Figures 6-12 through 6-20 for Scenarios 1 through 4. Hydrographs have been prepared for key wells, including the Arlington Desalter wells and La Sierra University wells. The baseline scenario shows water levels initially decreasing and stabilizing.

6.4 Proposed Projects

Projects presented in this GSP utilize infrastructure, either new or requiring improvements, to utilize current water sources more efficiently and increase the availability of new water supplies for the Arlington Groundwater Basin. The GSA and basin stakeholders will determine which projects are implemented. Projects that may help the sustainable management of the basin are described below.

6.4.1 Stormwater Capture and Spreading

A feasibility study, utilizing modeling scenarios, was conducted to evaluate the potential surface water available for capture and spreading. There are no perennial (year-round) streams in Arlington Basin. Drainage in Arlington Basin includes intermittent surface water flow in ephemeral streams, pipelines, and canals. A Stormwater Capture and Spreading project is currently planned for Victoria Basin as the spreading facilities will allow infiltration of storm flows into the Arlington Basin aquifers. Implementation of a capture and spreading project would increase groundwater in storage providing additional water supply to the basin. Storm flows do not require treatment when infiltrating spreading basins reducing the cost and infrastructure required for this project. The Integrated SAR model was used to assess the potential impacts of spreading recycled water at Victoria Basin, as described in Section 6.3. The results, as they pertain to this project, are discussed below.

6.4.1.1 Expected Benefits and Measurable Objective

Modeling for the initial feasibility study looked at stormwater recharge spreading as Scenario 1 (see Section 6.3). In Scenario 1, an annual average volume of 440 af/yr of stormwater was able to be recharged, which varies on an annual basis based on the availability of stormwater. The annual distribution of stormwater is shown on Figure 6-3. The recent study shows that 15,408 af/yr of stormwater flow could be available over a 25-year period. Storm flows vary annually and are primarily available during the wetter winter months. The modeling indicates that Victoria Basin can recharge up to 11,824 acre-feet of stormflows over a 25-year period, leaving about 3,500 acre-feet (or approximately 140 af/yr) of stormwater available to another future potential project. A feasibility study would be required to site an additional basin facility and potential structures to get the water to the basin to fully utilize available stormwater.

Implementation of a Stormwater Capture and Spreading project would increase groundwater in storage providing additional water supply to the basin. This project utilizes high precipitation events and with the additional infiltration for storm flows provides supplemental water supply for use during droughts. The water balance shows an increase in change in groundwater storage, from -450 af/yr to -230 af/yr, as shown on Figure 6-11. Underflow outflow components between Riverside South, Hole Lake, and Temescal increase slightly as well. Water level contours show increases in water levels throughout the basin, reaching a maximum near the Arlington Desalters. Water level increases in the Arlington Basin, as compared to the baseline simulation, lead to the slightly elevated underflow outflow.

6.4.1.2 Implementation and Schedule

The Stormwater Capture and Spreading project has been constructed and is currently in operation.

6.4.1.3 Public Notice and Outreach

All required outreach and coordination with relevant agencies and the public did occur during the development of the project.

6.4.1.4 Permitting and Regulatory Process

All required permits were obtained in order to build the facility. Western is still in the process for obtaining the necessary permits and approvals to spread recycled water in the basins.

6.4.1.5 Legal Authority

California state law provides authority to water districts to take necessary steps to supply sufficient water for present or future beneficial use. Land use jurisdictions have police powers to reach similar goals.

6.4.1.6 Estimated Costs and Plan for Funding

Western paid for the project, ~$10M in capital costs and received three grants of approximately $1M each to offset the cost. The three grants were provided by United States Bureau of Reclamation (USBR), CA Department of Water Resources (DWR), and Riverside County Flood Control.

6.4.1.7 Relationship to Additional GSP Elements

Stormwater Capture and Spreading will provide additional recharge to Arlington Basin and be managed to ensure there are no negative impacts to any of the additional GSP elements. The addition of groundwater in storage and increase in water supply in the basin will assist with achieving the sustainability goal.

6.4.2 Groundwater Replenishment and Reuse

Wastewater in Arlington Basin is treated at the Riverside Regional Water Quality Control Plant (RWQCP) and the Western Riverside County Regional Wastewater Authority (WRCWRA) Treatment Plant (TP). The Riverside RWQCP effluent requires tertiary treatment with filters and disinfection due to effluent use for water contact recreation. The effluent quality standard is equivalent to the Title 22 requirements for recycled water. RWQCP supplies recycled water to the northern part of the Plan Area, near the boundary with Riverside Basin. The WRCWRA effluent is currently only recycled for direct reuse on the plant site.

Riverside RWQCP and the Western Wastewater Reclamation Facility (WWRF) are the two tertiary treatment plants that can provide recycled water to Arlington Basin. Two potential uses of recycled water to achieve sustainability goals in Arlington Basin are discussed below.

6.4.2.1 Artificial Recharge using Recycled Water

A project of Artificial Recharge using Recycled Water would provide active recharge of recycled water, treated to drinking water standards, by spreading or injection in optimal recharge locations. A feasibility study and model would need to be conducted to evaluate potential recharge locations and track the movement of recharged recycled water in the aquifer system. Groundwater in storage would increase and additional water supplies would be available during drought periods. Artificial recharge using recycled water could also contribute to rising groundwater levels in the basin if a greater volume of recycled water recharges the aquifer compared to the amount of groundwater pumped out. A pilot test would be conducted after completion of the feasibility study. Current treatment facilities would require infrastructure for updates and/or expansion and to tie into new injection facilities for the artificial recharge. A feasibility study would provide the data required to determine potential project costs and benefits. The Integrated SAR model was used to assess the potential impacts of spreading recycled water at Victoria Basin, as described in Section 6.3. The results, as they pertain to this project, are discussed below.

6.4.2.1.1 Expected Benefits and Measurable Objective

Modeling for the initial feasibility study looked at spreading recycled water recharge from the WWRF as Scenario 2 (see Section 6.3). In Scenario 2, two months of recycled water recharge in January and February of each year are simulated, totaling 340 af/yr. This recharge volume, smaller than Scenario 1, results in an improvement in change in groundwater storage, from -450 af/yr to -260 af/yr. As in Scenario 1, components of underflow outflow increase slightly due to the increased water levels versus the baseline run (i.e., no recharge in Victoria Basin). Patterns of water level increase are similar to Scenario 1, with the largest increases in the vicinity of the Arlington Desalters. Therefore, active recharge using recycled water, treated to drinking water standards, would increase groundwater storage and provide additional water supplies during drought periods.

6.4.2.1.2 Implementation and Schedule

Western has a capital improvements plan that includes Gas Activated Carbon (GAC) Treatment of PFAS issues at the WWRF. Western is currently applying for both state and federal funding to help pay for the project. Upon notice of grant funding received or not received, Western will decide whether or not to construct the GAC. Throughout this grant and decision-making period. Western will be coordinating with the regional board for required permits. Timing of the project will be reported in the 5-year GSP update.

If injection of recycled water becomes a focus, then a feasibility study will be conducted to evaluate optimal locations to benefit groundwater levels in the basin and any potential impacts to the groundwater basin. Discussion on recharge area selections, required infrastructure, and public notice and outreach would be required. The completion of a feasibility study would provide the information necessary to decide how beneficial an Artificial Recharge project would be in assisting with reaching and further maintaining the Arlington Basin sustainability goal. This project would require the update and/or expansion of treatment facilities as well as construction of new infrastructure for injection facilities.

Once the feasibility study was complete a pilot study would be implemented. Continuous management would be needed to prevent excess groundwater extractions which could result in the drop of sustainability indicators below minimum thresholds.

6.4.2.1.3 Public Notice and Outreach

Public notice and outreach would occur during the many stages of implementing an Artificial Recharge project. Public notice would also occur in accordance with all pertinent laws and permits.

6.4.2.1.4 Permitting and Regulatory Process

All applicable groundwater laws and rights would be respected during the development of any Artificial Recharge project. A balance of recycled water usage and the Santa Ana River instream flow must be reached, as per the Santa Ana River Judgement.

6.4.2.1.5 Legal Authority

California state law provides authority to water districts to take necessary steps to supply sufficient water for present or future beneficial use. Land use jurisdictions have police powers to reach similar goals.

6.4.2.1.6 Estimated Costs and Plan for Funding

As stated in Section 6.4.2.1.2, Western is currently applying for grants to construct a GAC to address PFAS issues at the WWFF. The decision to move forward with the project will be made with or without grant funding.

6.4.2.1.7 Relationship to Additional GSP Elements

Active recharge by spreading of recycled water, treated to drinking water standards, would increase groundwater storage and provide additional water supplies during drought periods. Groundwater levels may also rise in the basin provided the volume of recycled water injected. This project be managed to ensure there are no negative impacts to any of the additional GSP elements. The addition of groundwater in storage and increase in water supply in the basin will assist with achieving the sustainability goal.

6.4.2.2 Irrigation with Recycled Water

Irrigation with Recycled Water can offset groundwater pumping by utilizing treated wastewater for irrigation. Currently recycled water is not used as a source of irrigation I the basin. However, this may change in the future in accordance with the Riverside Public Utility's Master Plan. A feasibility study, utilizing model scenarios, would be required conducted to evaluate potential project costs and benefits. Groundwater pumping for irrigation would be replaced with the use of recycled water providing the opportunity to contribute to the stabilization, and possibly rise, of groundwater levels in the basin depending on the volume of recycled water used. Current treatment facilities would require infrastructure for updates and/or expansion. Additional infrastructure would also be needed to transport the recycled water for irrigation.

6.4.2.2.1 Expected Benefits and Measurable Objective

Irrigation with Recycled Water would provide some assistance with the stabilization of groundwater levels in Arlington Basin through additional return flow, and potentially in-lieu decreased pumping. Dependent on the volume of recycled water used, groundwater levels could possibly rise. All potential benefits could be surmised using model simulations. Benefits of this project would be determined by measuring the volume of recycled water transported for irrigation and by comparing groundwater quality data against past observations.

6.4.2.2.2 Implementation and Schedule

The implementation of an Irrigation with Recycled Water project would require a feasibility study to provide the information necessary to decide how beneficial this project would be in assisting with reaching and maintaining the Arlington Basin sustainability goal. This project would require the necessary permits and approvals and an update and/or expansion of treatment facilities as well as construction of new infrastructure for transportation of recycled water to areas requiring irrigation.

Once the feasibility study was complete a pilot study would be implemented. Continuous management would be needed to prevent excess groundwater extractions which could result in the drop of sustainability indicators below minimum thresholds.

6.4.2.2.3 Public Notice and Outreach

Public notice and outreach would occur during the many stages of implementing an Irrigation with Recycled Water project. Public notice would also occur in accordance with all pertinent laws and permits.

6.4.2.2.4 Permitting and Regulatory Process

All applicable groundwater laws and rights would be respected during the development of any Irrigation with Recycled Water project. A balance of recycled water usage and the Santa Ana River instream flow must be reached, as per the Santa Ana River Judgement.

6.4.2.2.5 Legal Authority

California state law provides authority to water districts to take necessary steps to supply sufficient water for present or future beneficial use. Land use jurisdictions have police powers to reach similar goals.

6.4.2.2.6 Estimated Costs and Plan for Funding

Regional cooperation can minimize costs related to recycled water system development while plant operator and water purveyor partnerships can increase the area surrounding the plants allowed to utilize recycled water. Since Western does not have a recycled water system, Western will rely on future partnerships for delivery of recycled water. The Riverside Public Utility's Master Plan includes the potential for expanding recycled water delivery. Costs for delivery of recycled water will be developed when specific projects are identified.

6.4.2.2.7 Relationship to Additional GSP Elements

Irrigation with Recycled Water would offset groundwater pumping in Arlington Basin by utilizing treated wastewater for irrigation. This project would be managed to ensure there are no negative impacts to any of the additional GSP elements. The potential stabilization and rise in groundwater levels in the basin will assist with achieving the sustainability goal.

6.4.3 Aquifer Storage and Recovery (ASR) or Managed Aquifer Recharge

A potential future project to provide supplemental water supply during droughts would be an Aquifer Storage and Recovery (ASR)/Managed Aquifer Recharge. This project injects or spreads surface water, treated to drinking water standards, into basin aquifers to be used as underground storage reservoirs. ASR projects require a surplus of surface water to be available for injection or spreading. Groundwater in storage would increase and additional supplies during drought periods would be provided with the implementation of an ASR project. The project could also contribute to rising groundwater levels in the basin if a greater volume of surface water recharges the aquifer compared to the amount of groundwater pumped out. Before any ASR project can be evaluated a surface water source would need to be identified.

Currently, groundwater is extracted by private basin users and from the Arlington Desalters. Several Phases of feasibility studies have been completed to assess potential locations for recharge and as well as new extraction wells. Wildermuth Environmental prepared to studies in 2008 and 2009 providing an assessment of potential sites in the Arlington Basin. Todd Groundwater (2012) further studied the potential at five recharge sites in Arlington Basin, including field work which included borings and infiltration testing and determined that the Victoria Site was the most favorable. Geotechnical work was completed by Ninyo and Moore (2012) at the five potential recharge sites, including evaluation of potential liquefaction from groundwater mounding. Scheevel Engineering (2016) completed a full-scale pilot recharge test at Victoria Basin. In 2020, as a part of ASR considerations, Geoscience (2020) prepared well siting study to enhance the capability of Western to capture water spread at Victoria Basin. Scheevel Engineering (2021) provided a summary of recommendations for non-potable water recharge operations. Basins were constructed during the 2019 to 2020 period, and it is anticipated that monitoring equipment will in installed in 2022.

The Victoria Basin Recharge Project is currently well along in the development phase and is considering three sources of water for surface water recharge. Stormwater and recycled water discussed above, and groundwater pumped from the Riverside Basin and transported via canal to Victoria Basin. All three sources of water recharged and extracted would collectively be considered an ASR project in the Arlington Basin.

6.4.3.1 Expected Benefits and Measurable Objective

Modeling for the initial feasibility study looked at four scenarios of groundwater recharge at Victoria Basin (see Section 6.3). This included stormwater recharge only (Scenario 1; see Section 6.4.1.1 for discussion of results), recycled water recharge only (Scenario 2; see Section 6.4.2.1.1 for discussion of results), recharge of groundwater from Riverside South Groundwater Basin (Scenario 3; see below), and a combination of all recharge sources (Scenario 4; see below).

In Scenario 3, groundwater recharge occurs year-round at an average rate of 1,280 af/yr. The rate of groundwater recharge is limited by water levels, particularly at the northwest corner of the site. Water levels at the edge of the site are limited to a depth of 29 ft below land surface. This limits the volume of water that can be continuously recharged at the site. Due to the larger annual volume of recharge under Scenario 3 conditions, greater increase in groundwater storage is observed. Change in groundwater storage increases from -450 af/yr under baseline conditions to 170 af/yr under Scenario 3 conditions: a 620 af/yr increase. As in Scenarios 1 and 2, underflow outflow terms increase due to increased water levels. Groundwater contours show increases in water level after 25 years throughout the basin, with the largest increases nearing 20 ft in the vicinity of the Arlington Desalter wells.

In Scenario 4, a combination of different recharge sources is utilized. A total of 1,280 af/yr recharge at Victoria Basin results in an increase in groundwater storage of 620 af/yr and increases in groundwater elevations after 25 years of recharge of nearly 20 ft in the vicinity of the Arlington Desalter wells. Total recharge is rate limited by the water levels near Victoria Basin. Total underflow outflow increases to Hole Lake, Riverside South, and Temescal Basin as a result of the elevated groundwater levels versus the no Victoria Basin recharge baseline run. Stormwater is prioritized when available, and recycled water and Riverside South groundwater supplement stormwater during periods when the full capacity of Victoria Basin is not being met.

An ASR/Managed Aquifer Recharge project would increase groundwater storage and provide supplemental water supplies during droughts. The largest increases in groundwater level from groundwater recharge at Victoria Basin is anticipated in the vicinity of the Arlington Desalter wells, as recharged water buoys water levels in this area. Arlington Basin underflow outflow increases slightly due to increased water levels under scenario conditions versus the no Victoria Basin recharge baseline run. The model results indicate that recharge at Victoria Basin may be capable of bringing the water balance of Arlington Basin into sustainability, with a slightly net positive change in groundwater storage for Scenarios 3 and 4. Resulting water levels at wells of interest are shown on Figures 6-12 through 6-20, where water levels increase nearly 20 ft by the end of the 25-year simulation period.

Once the ASR/Managed Aquifer Recharge project is implemented benefits would be evaluated using the groundwater monitoring well network by comparing groundwater levels and groundwater quality against past observations. Continuous management would be needed to prevent excess groundwater extractions which could result in the drop of sustainability indicators below minimum thresholds.

6.4.3.2 Implementation and Schedule

The implementation of an ASR/Managed Aquifer Recharge project would require a feasibility study to evaluate optimal locations to benefit groundwater levels in the basin and any potential impacts to the groundwater basin. Discussion on recharge area selections, required infrastructure, and public notice and outreach would be required. The completion of a feasibility study would provide the information necessary to decide how beneficial the project would be in assisting with reaching and further maintaining the Arlington Basin sustainability goal. This project would require the update and/or expansion of treatment facilities as well as construction of new infrastructure for injection facilities.

Once the feasibility study was complete a pilot study would be implemented. Continuous management would be needed to prevent excess groundwater extractions which could result in the drop of sustainability indicators below minimum thresholds.

6.4.3.3 Public Notice and Outreach

Western has done extensive outreach and public notice and hosted a "ribbon-cutting" event after the completion of construction of Victoria Basin.

6.4.3.4 Permitting and Regulatory Process

All applicable groundwater laws and rights have and will be respected during the development of the Aquifer Storage and Recovery/Managed Aquifer Recharge project.

6.4.3.5 Legal Authority

California state law provides authority to water districts to take necessary steps to supply sufficient water for present or future beneficial use. Land use jurisdictions have police powers to reach similar goals.

6.4.3.6 Estimated Costs and Plan for Funding

As stated previously, Western already paid for the project, ~$10M in capital costs and received three grants of approximately $1M each to offset the cost. The three grants were provided by USBR, CA DWR, and Riverside County Flood Control.

6.4.3.7 Relationship to Additional GSP Elements

ASR/Managed Aquifer Recharge will provide active recharge by adding groundwater in storage. Supplemental water supplies during droughts and increased groundwater levels in the basin and two potential benefits of an ASR project which would also assist with achieving the basin's sustainability goal. The project will be managed to ensure there are no negative impacts to any of the additional GSP elements.

6.5 Additional Potential Projects and Management Actions

As mentioned above, preliminary modeling indicates that recharge at Victoria Basin may be capable of bringing the water balance of Arlington Basin into sustainability, especially if multiple sources of groundwater recharge are utilized to maximize water availability throughout the year and reduce the amount of rejected recharge due to groundwater mounding beneath the spreading basin. If, however, basin monitoring indicates that additional action is necessary, the GSA will research the feasibility of implementing supplementary management actions and/or projects. Proposed projects will be prioritized by considering potential cost, available funding, and anticipated benefits to groundwater levels, storage, water quality, and/or interconnected surface water. Potential additional projects and management actions are discussed in the following sections.

6.5.1 Metering Infrastructure

The installation of meters to track deliveries and/or pumping is beneficial to the sustainable management of Arlington Basin as one of the factors contributing to the calculation of the basin's sustainability yield and supporting the progress towards maintaining groundwater levels. Currently, as part of the Annual Notices of Groundwater Extraction and Diversion Program, groundwater production within the Arlington Basin is recorded and submitted to the California State Water Resources Control Board (SWRCB). In 2005 Western was given authority by SWRCB to continue this program for the Arlington Basin. Groundwater production submissions are made in compliance with Water Code Sections 4999 et seq. and compiled into annual Water Extraction Reports by the cooperating agencies. Filings are required when more than 25 acre-ft of groundwater is extracted from wells in Riverside, San Bernardino, Los Angeles, or Ventura Counties. Mandatory metering of all pumping entities and pumping is allowed under SGMA, except de minimis domestic users (2 af/yr for domestic purposes) who are exempt from metering under Water Code, section 10725.8(e).

6.5.1.1 Expected Benefits and Measurable Objective

Metering Infrastructure projects provide opportunities to maintain groundwater levels. As stated in Section 3 – Basin Setting, Arlington Basin groundwater levels are influenced primarily by groundwater production and, to a lesser degree, by climate. In conjunction with other Projects and Management Actions there is a possibility for groundwater levels to stabilize and even rise. Benefits would be evaluated by comparing groundwater levels against past observations. Once additional Projects and Management Actions are in place the evaluation of benefits can be revisited.

6.5.1.2 Implementation and Schedule

Groundwater production is already recorded and submitted to the SWRCB. New metering infrastructure would only be required to tie into existing systems.

6.5.1.3 Public Notice and Outreach

Any changes to the current metering of groundwater production would have a transparent development with public meetings to provide the opportunity for input. Public notice would also occur in accordance with all pertinent laws and permits.

6.5.1.4 Permitting and Regulatory Process

All applicable groundwater laws and rights have been and will continue to be respected regarding production metering.

6.5.1.5 Legal Authority

Mandatory metering of all pumping entities and pumping is allowed under SGMA, except de minimis domestic users who are exempt from metering under Water Code, section 10725.8(e). In 2005 Western was given authority by SWRCB to continue the Annual Notices of Groundwater Extraction and Diversion Program for the Arlington Basin.

6.5.1.6 Estimated Costs and Plan for Funding

Any additional cost estimates would be determined once the extent of new infrastructure needed for metering groundwater pumping is determine.

6.5.1.7 Relationship to Additional GSP Elements

Metering Infrastructure provides data, such as highlighting areas of high groundwater pumping, allowing for the development of effective management practices to promote sustainability. Metering along with additional Projects and Management Actions will work in conjunction to ensure there are no negative impacts to any of the additional GSP elements. Metering Infrastructure supports the progress towards maintaining groundwater levels in the Arlington Basin while assisting with achieving the Basin's sustainability goal.

6.5.2 Decreased Evapotranspiration

Replacement of invasive or nonnative vegetation with native plant species will not only have a positive impact on the health of an ecosystem but can also provide indirect aquifer recharge by decreasing evapotranspiration. Invasive/nonnative vegetation consume more water than native vegetation, therefore removing and replacing these plants with native plants will allow additional surface water to be available for recharge into the Arlington Basin aquifers by infiltration. Once the invasive/nonnative vegetation was identified and mapped, a feasibility study with model simulations would determine the amount of invasive/nonnative vegetation that could be removed and replaced, providing the data needed to calculate the approximate additional water available for indirect aquifer recharge.

6.5.2.1 Expected Benefits and Measurable Objective

Decreasing evapotranspiration would help maintain groundwater elevations in Arlington Basin by increasing the availability of surface water for infiltration to underlying aquifers. Removal of invasive or nonnative vegetation will have a positive impact on the health of ecosystems as well, potentially improving water quality. Stream flows downstream from invasive/nonnative vegetation removal sites and the overall health of native habitats would be evaluated to determine the benefits provided by this project.

6.5.2.2 Implementation and Schedule

A feasibility study, utilizing model scenarios, would be required to determine potential project costs and benefits, after invasive and nonnative vegetation was identified and mapped. The completion of a feasibility study would provide the information necessary to decide how beneficial this project would be in assisting with reaching and maintaining the Arlington Basin sustainability goal. A Decreased Evapotranspiration project would require the use of mechanical equipment and may need new infrastructure to remove and replace invasive/nonnative vegetation.

Discussion on removal sites, required infrastructure, and public notice and outreach would follow.

6.5.2.3 Public Notice and Outreach

A Decreased Evapotranspiration project would be developed in tandem with public meetings to inform customers on the elements and processes of the project while providing the opportunity for input. Public notice would also occur in accordance with all pertinent laws and permits.

6.5.2.4 Permitting and Regulatory Process

All applicable groundwater laws and rights will be respected during the development of any Decreased Evapotranspiration project, including but not limited to the California Environmental Quality Act. Multiple permits are expected to be required as well.

6.5.2.5 Legal Authority

California state law provides authority to water districts to take necessary steps to supply sufficient water for present or future beneficial use. Land use jurisdictions have police powers to reach similar goals.

6.5.2.6 Estimated Costs and Plan for Funding

Cost estimates would be determined once a Decreased Evapotranspiration project is deemed necessary and feasible. Funding in the form of grants from outside agencies that support the restoration of native plant habitat would be pursued. Additional funding sources would be explored.

6.5.2.7 Relationship to Additional GSP Elements

Decreased Evapotranspiration projects provide inactive recharge by increasing available surface water for infiltration to Arlington Basin aquifers. Removal of invasive/nonnative vegetation could potentially improve water quality as well. The potential benefits of this project would assist with achieving the basin’s sustainability goal. The project would be managed to ensure there are no negative impacts to any of the additional GSP elements.

6.5.3 Monitoring of Groundwater Levels and Water Quality Data

Groundwater Level and Water Quality Monitoring programs are essential for effective management of groundwater resources. The collection of water level and water quality data provides not only the information necessary to determine if most other Projects and Management Actions described in this section of the GSP are assisting to achieve the Arlington Basin sustainability goal but also a tangible measurement of the benefit by each. Besides water quality, sustainability indicators of the basin are measured directly by, or tied to, groundwater elevation data.

Presently, groundwater level data are collected from wells in the basin and incorporated into regional groundwater level databases maintained by the Santa Ana Watershed Project Authority (SAWPA) and Western. The details of these databases (also provided in Section 2 – Plan Area), as described by Western, are as follows:

- Cooperative Well Measuring Program Database – Maintained by Western, this database includes data from 74 cooperating agencies and firms and their nearly 4,500 wells in the Upper Santa Ana, San Jacinto, and Santa Margarita Watersheds. Groundwater level data in this database are available from 1993 to present and include fall and spring measurements. Data are available in various other formats under the Cooperative Well Measuring Program from 1964 to present.

- The following two SAWPA databases described below have been combined into one database.
    - Santa Ana basin Relational Information Network Application (SABRINA) Database – Maintained by SAWPA, this database contains monitoring data for 10,000 wells in the Santa Ana River Watershed and surrounding areas. Groundwater level data are available from 1904 to 2003.
    - Santa Ana Watershed Data Management System (SAWDMS) – Maintained by SAWPA, this database covers most of the Santa Ana River Watershed with groundwater level data available from the 1910 to present. The SAWDMS contains over 765,000 records related to approximately 6,600 wells in the Santa Ana Watershed and appurtenant groundwater basins.

Groundwater quality within Arlington Basin is continuously monitored to meet the California Department of Public Health's (CDPH's) requirements specified in Title 22 of the California Code of Regulations. All active municipal production wells must comply with CDPH's requirements. Groundwater quality data are collected through many different programs at the local, state, and national levels. The groundwater quality monitoring programs (provided in Section 2 – Plan Area and Basin Setting) are described below:

- SAWPA Ambient Water Quality Recomputation Project for the Santa Ana River Basin – SAWPA currently maintains an ambient groundwater quality monitoring program for TDS and nitrate (as nitrogen) and provides point statistics by management zone.
- California Department of Toxic Substances Control (DTSC) – The DTSC Envirostor database provides cleanup tracking, access to permitting, and enforcement and investigation efforts for contamination by toxic substances from point sources.
- Environmental Protection Agency (EPA) – The EPA develops and enforces regulations, studies environmental issues, and provides tools to advance environmental education, among many other responsibilities at the Federal level.

6.5.3.1 Expected Benefits and Measurable Objective

Groundwater Level and Water Quality Monitoring programs provide accurate and needed information on regional groundwater conditions throughout Arlington Basin. A clear and continuous understanding of the basin groundwater conditions is required for adaptive sustainable management of the basin water supply. There are multiple groundwater level and water quality monitoring programs creating a data collection network that spans the basin and provides a holistic view of the basin. Currently Arlington Basin has been in slight overdraft for decades, and more significant overdraft has occurred after the 2012-2016 drought – resulting in some reduction of useable groundwater storage and incipient chronic lowering of groundwater levels (without local wells going dry). General mineral quality (e.g., TDS and nitrate) throughout much of the basin is also poor and has been poor for decades. Progress towards the Arlington Basin sustainability goal will be evaluated using the groundwater monitoring network by comparing future groundwater levels and groundwater quality against these past observations.

6.5.3.2 Implementation and Schedule

The monitoring program provided as part of this GSP (see Section 5) has been reviewed and accepted by the GSA and stakeholders for future monitoring activities to achieve the sustainability goals of Arlington Basin.

6.5.3.3 Public Notice and Outreach

Any changes to the current groundwater level and water quality monitoring program would be developed in conjunction with public meetings to provide opportunities for public engagement and input. The current proposed monitoring program has been submitted for public review and comment.

6.5.3.4 Permitting and Regulatory Process

All applicable groundwater laws and rights have been respected during the development of the Groundwater Level and Water Quality Monitoring program.

6.5.3.5 Legal Authority

The Sustainable Groundwater Management Act of 2014 provides the legal authority to pass regulations necessary to achieve basin sustainability.

6.5.3.6 Estimated Costs and Plan for Funding

A monitoring program has been developed and will be implemented following installation of monitoring equipment (2022). Western is also receiving funding from Metropolitan Water District (MWD) for this equipment and a 3-yr reporting effort following installation. Approximately $500k in funding is being received from MWD for monitoring efforts.

6.5.3.7 Relationship to Additional GSP Elements

Groundwater Level and Water Quality programs provide data, such as highlighting areas of high groundwater pumping or poor water quality, allowing for the development of effective management practices to promote sustainability. This project would be managed to ensure there are no negative impacts to any of the additional GSP elements. Metering Infrastructure supports the progress towards maintaining groundwater levels in Arlington Basin and will assist with achieving the basin’s sustainability goal.

6.5.4 Collection of Pumping Records

Currently, as part of the Annual Notices of Groundwater Extraction and Diversion Program, groundwater production within the Arlington Basin is recorded and submitted to the California SWRCB. In 2005 Western was given authority by SWRCB to continue this program for the Arlington Basin. Groundwater production submissions are made in compliance with Water Code Sections 4999 et seq. and compiled into annual Water Extraction Reports by the cooperating agencies. Filings are required when more than 25 acre-ft of groundwater is extracted from wells in Riverside, San Bernardino, Los Angeles, or Ventura Counties. Requiring groundwater producers to provide pumping records as well as requiring the registration of all groundwater extraction facilities, including non-municipal private wells, will assist with the sustainable management of the basin. Mandatory metering of all pumping entities and pumping is allowed under

SGMA, except de minimis domestic users who are exempt from metering under Water Code, section 10721(e) and 10725.8(e). A sustainability yield was determined for Arlington Basin in Section 3 – Basin Setting and accurate up-to-date records of groundwater pumping would support the progress towards maintaining groundwater levels and further refining the sustainable yield as appropriate.

6.5.4.1 Expected Benefits and Measurable Objective

The collection of pumping records allows for a greater understanding of the relationship of pumping to groundwater levels across the basin and opportunities to maintain groundwater levels by adjustment in pumping if needed. In conjunction with other Projects and Management Actions groundwater levels can stabilize and possibly rise due to efficient sustainable groundwater management. Benefits from this management activity would be evaluated by comparing groundwater levels against past observations.

6.5.4.2 Implementation and Schedule

Groundwater production within Arlington Basin is already recorded and submitted to the California SWRCB when more than 25 acre-feet of groundwater is extracted. The process to register all groundwater extraction facilities, including non-municipal private wells, would require public notice and time to receive input on the design of the program.

6.5.4.3 Public Notice and Outreach

Any groundwater extraction registration projects would be developed with public meetings to provide the opportunity for input. Public notice would also occur in accordance with all pertinent laws and permits.

6.5.4.4 Permitting and Regulatory Process

All applicable groundwater laws and rights will be respected during the development of any Pumping Record Collection program.

6.5.4.5 Legal Authority

Mandatory metering of all pumping entities and pumping is allowed under SGMA, except de minimis domestic users who are exempt from metering under Water Code, section 10725.8(e). Domestic well users may be required to report groundwater information to a local GSA as part of a sustainability plan and the SWRCB may place requirements or restrictions on domestic well users in a basin that is considered probationary. All applicable groundwater laws and rights will be respected during the development of any metering program.

6.5.4.6 Estimated Costs and Plan for Funding

Cost estimates would be determined once the extent of a program to collect pumping records and register groundwater extraction has been designed.

6.5.4.7 Relationship to Additional GSP Elements

The collection of pumping records and registration of groundwater extraction will provide the data necessary to development effective management practices promoting sustainability. This management action will work in conjunction with additional Projects and Management Actions to ensure there are no negative impacts to any of the additional GSP elements. The collection of pumping records supports the progress towards maintaining groundwater levels in the Arlington Basin while assisting with achieving the Basin's sustainability goal.

6.5.5 Water Transfers / In-Lieu Groundwater Recharge

Water Transfers/In-Lieu Groundwater Recharge would replace groundwater pumping, provide passive recharge, and could potentially allow an increase in groundwater in storage with the delivery of excess, treated to drinking water standards, surface water to the Arlington Basin. The increase of groundwater in storage has the potential to be recovered during drought conditions as supplemental supply if water transfers prove consistent and continuously reach basin sustainability objectives.

Currently Western is a wholesale purchaser or imported water from the State Water Project (SWP) and, to a smaller extent, the Colorado River Aqueduct. As stated in Section 2 – Plan Area and Basin Setting, imported water is used by Western to meet retail demands within the Arlington Basin as well as retail and wholesale demands outside of the Plan Area. Untreated imported water is delivered directly to retail agencies while all other imported water is treated at the Mills Filtration Plant.

Western has rights to pump water in the Riverside South Groundwater Basin which shares a boundary with the Arlington Basin on the north. A potential project under consideration and which has recently been assessed using groundwater modeling (See Section 6.3.2) is transport of pumped groundwater to Victoria Basin for recharge into the Arlington Basin.

6.5.5.1 Expected Benefits and Measurable Objective

A Water Transfers/In-Lieu Groundwater Recharge program would passively recharge groundwater by providing treated drinking water as a source of supply, allowing the reduction of pumping by groundwater wells. Additional water supply and sustainable basin management would allow groundwater levels to potentially stabilize and increase. Also, with the transfer of consistent adequate quantities of treated surface water to cover any future excess customer demands there is a possibility to create supplemental groundwater in storage. Benefits from this passive recharge would be evaluated using the existing groundwater monitoring well network by comparing groundwater levels and groundwater quality against past observations.

The potential expected benefits from Water Transfers/In-Lieu Recharge behave been demonstrated by model simulations (See Section 6.3.2).

6.5.5.2 Implementation and Schedule

A Water Transfers from Riverside South groundwater basin for a surface spreading recharge program could be accomplished through groundwater extraction from RPU and/or the Meek's and Daley Wells that are within the Riverside Basin. However, Western has elected to and is currently in the design phase and construction of a new well in the basin that will be used to deliver water to Victoria Basin.

6.5.5.3 Public Notice and Outreach

Notification to the public would occur prior to the implementation of any additional long-term water transfer.

6.5.5.4 Permitting and Regulatory Process

All applicable groundwater laws and rights will be respected during the development of a Water Transfer/In-Lieu Groundwater Recharge program. Only standard well permits would be needed once the well site selection is made and reporting to the Watermaster and the State of California.

6.5.5.5 Legal Authority

California state law provides authority to water districts to take necessary steps to supply sufficient water for present or future beneficial use.

6.5.5.6 Estimated Costs and Plan for Funding

A Water Transfers/In-Lieu Groundwater Recharge program would be able to utilize a significant amount of existing infrastructure for any additional water transfers provided to Western. Additional costs to optimize this recharge would largely be for a new well, well equipping, maintenance, and increased operating costs including increased water quality monitoring and public notification.

6.5.5.7 Relationship to Additional GSP Elements

Water Transfers/In-Lieu Groundwater Recharge will provide passive recharge that could stabilize and raise groundwater levels in Arlington Basin. Continuous management would be needed to ensure there are no negative impacts to any of the additional GSP elements, such as excess groundwater extractions. The possible benefits of raised groundwater levels and additional groundwater in storage will assist with achieving the Arlington Basin sustainability goal.

6.5.6 Water Conservation

Water Conservation implements policies and programs promoting and incentivizing conservation and efficient use of water. These policies and programs can be targeted or pertain to the entire basin. Targeted water conservation could specify policies for specific areas in a basin or refer to new or expanding development that requires water demand. Western has been advocating water conservation for many years. By encouraging water demand reduction and efficient water practices, a reduction of stresses on groundwater aquifers, as well as on surface water sources, occurs. There are many options for water conservation and each policy or program would be evaluated to determine the benefits and costs associated with their implementation. Water Conservation policies and programs that are already used by Western in cooperation with the Metropolitan Water District include:

- Community outreach
- Residential Indoor and outdoor rebate programs
- Commercial Indoor and Outdoor rebate programs
- Turf Replacement
- Qualified Water Efficient Landscaper Program - QWEL
- Code requirements such as Gray Water Systems and Rain Water Collection Systems
- Irrigation efficiency
- Low impact development standards for new or retrofitted construction
- Imposition of SGMA or other available fees to encourage increased conservation

Additional information on existing and proposed water efficiency programs can reviewed in the Western Municipal Water Efficiency Masterplan located at the link below:

https://www.wmwd.com/DocumentCenter/View/4732/WUEMasterPlan1-25-19

6.5.6.1 Expected Benefits and Measurable Objective

Water demand reduction and efficient water practices provide opportunities to reduced groundwater pumping and surface water depletions. These reductions support maintaining and possibly raising groundwater levels. Benefits would be evaluated using the existing groundwater monitoring networks by comparing groundwater levels and groundwater quality against past observations.

6.5.6.2 Implementation and Schedule

Water Conservation programs have been in operations and will continue to a part of Western's conservation efforts.

6.5.6.3 Public Notice and Outreach

If additional water conservation policies and programs are created within Arlington Basin, or continue to evolve over time, any significant changes would be publicly noticed as necessary.

6.5.6.4 Permitting and Regulatory Process

All applicable groundwater laws and rights will be respected during the development of any Water Conservation program.

6.5.6.5 Legal Authority

California state law provides authority to water districts to implement water conservation programs. Land use jurisdictions have police powers to reach similar goals. The Sustainable Groundwater Management Act of 2014 also provides the legal authority to pass regulations necessary to achieve sustainability.

6.5.6.6 Estimated Costs and Plan for Funding

Cost estimates would be determined once any additional Water Conservation policies or programs are selected for implementation.

6.5.6.7 Relationship to Additional GSP Elements

Water Conservation would reduce groundwater pumping and surface water depletions, leading to possible groundwater level rise in the basin. Continuous management would be needed to ensure there are no negative impacts to any of the additional GSP elements. Water demand reduction and efficient water practices reduce stresses on groundwater aquifers and will assist with achieving the Arlington Basin sustainability goal.

6.5.7 Groundwater Pumping Curtailment and/or Restrictions

Groundwater Pumping Curtailment/Restriction programs are one of the main components of many groundwater basin GSP's. These programs are defined in this GSP as reductions or limitations placed on the amount of water current or future groundwater users can pump from the basin to achieve groundwater sustainability. Fees are often imposed on any groundwater extraction over stipulated amounts to provide replacement water. Implementation of a Groundwater Pumping Curtailment /Restriction program may apply to total pumping amount or area-specific restrictions. These efforts could achieve more uniform drawdown in Arlington Basin and will minimize groundwater level decline. Current pumping volume is too high for dry hydrologic periods, e.g., the hydrologic period from 2012 through 2016, and has resulted in a decline in groundwater levels. However, since pumping for water quality control is a major component of annual extractions, future management to reach sustainability goals will focus on arresting groundwater level declines while limiting outflow of the poor-quality groundwater. It is unlikely that this management measure will be implemented.

6.5.7.1 Expected Benefits and Measurable Objective

Groundwater Pumping Curtailment/Restriction programs aid in halting the decline of groundwater levels and provide the opportunity to reach groundwater level stability and recovery if groundwater levels increase. Rising groundwater levels, with continued sustainability management, would create the opportunity to increase groundwater in storage- a potential supplemental water during droughts. Benefits from pumping restrictions would be evaluated using the existing groundwater monitoring networks by comparing groundwater levels and groundwater quality against past observations.

The potential expected benefits of a Groundwater Pumping Curtailment/Restriction program would be demonstrated by model simulations.

6.5.7.2 Implementation and Schedule

It is unlikely that this management strategy will be implemented due to the plan to bring the basin into sustainability using projects and other conservation programs.

6.5.7.3 Public Notice and Outreach

A Groundwater Pumping Curtailment/Restriction program, if ever required, would be developed with the input of groundwater pumpers. Public meetings will inform groundwater pumpers on the process of creating the program, the individual elements of the program, and provide opportunity for input.

6.5.7.4 Permitting and Regulatory Process

All applicable groundwater laws and rights will be respected during the development of any Groundwater Pumping Curtailment/Restriction program.

6.5.7.5 Legal Authority

California Water Code §10726.4 (a)(2) authorizes GSAs to regulate, limit, or suspend pumping by individual groundwater wells or groundwater wells within an aquifer system.

6.5.7.6 Estimated Costs and Plan for Funding

Cost estimates would be determined once a Groundwater Pumping Curtailment/Restriction program is deemed necessary. A pumping restriction plan would include a cost estimate for public notification and outreach, measurement and tracking of groundwater extraction, plan enforcement, and implementation. Additional costs may be required once the process of creating a pumping restriction program is underway.

6.5.7.7 Relationship to Additional GSP Elements

Groundwater Pumping Curtailment/Restriction programs would directly reduce groundwater pumping, promoting stabilized groundwater levels and possibly raising levels in Arlington Basin. Continuous management would be needed to ensure there are no negative impacts to any of the additional GSP elements. Reducing groundwater pumping will assist with achieving the Arlington Basin sustainability goal.

6.5.8 Redistribution of Pumping

Programs that redistribute pumping can alter the timing of when groundwater extraction occurs or the location of groundwater is pumped, potentially from existing groundwater wells to new groundwater wells. Implementation of this program would redistribute pumping both vertically and horizontally within the basin aquifers to achieve groundwater sustainability. These efforts could provide more uniform drawdown in Arlington Basin and minimize localized pumping depressions.

6.5.8.1 Expected Benefits and Measurable Objective

Redistribution of Pumping programs halt the decline of groundwater levels in localized pumped depressions and provide the opportunity to reach groundwater level stability and recovery if groundwater levels increase. Rising groundwater levels, with continued sustainability management, could increase groundwater in storage providing a potential supplemental water during droughts. Benefits from redistributing pumping would be evaluated using the existing groundwater monitoring networks by comparing groundwater levels and groundwater quality against past observations.

The potential expected benefits of a groundwater pumping redistribution program would be demonstrated by model simulations.

6.5.8.2 Implementation and Schedule

Implementation of a pumping redistribution program would require a change in the timing of groundwater extractions or spatial distribution of groundwater extractions. Pumping redistribution could be required if operation of the wells results in extractions outside the recommended sustainability yield or in the drop of a sustainability indicator below a minimum threshold. If a groundwater pumping redistribution program is deemed necessary to reach and maintain sustainability in Arlington Basin, discussion to define the policies and procedures to define the redistribution of pumping would take place.

6.5.8.3 Public Notice and Outreach

A Redistribution of Pumping program would be developed with the input of groundwater pumpers. Public meetings will inform groundwater pumpers on the process of creating the program, the individual elements of the program, and provide opportunity for input.

6.5.8.4 Permitting and Regulatory Process

All applicable groundwater laws and rights will be respected during the development of any Groundwater Pumping Curtailment/Restriction program.

6.5.8.5 Legal Authority

California Water Code §10726.4 (a)(2) authorizes GSAs to regulate, limit, or suspend pumping by individual groundwater wells or groundwater wells within an aquifer system.

6.5.8.6 Estimated Costs and Plan for Funding

Cost estimates would be determined once a Redistribution of Pumping program is deemed necessary. A redistribution plan would include a cost estimate for public notification and outreach, measurement and tracking of groundwater extraction, plan enforcement, and implementation, and potentially the costs of feasibility and permitting of a new well(s) and conveyance system. Additional costs may be required once the process of creating a redistribution program is underway.

6.5.8.7 Relationship to Additional GSP Elements

Groundwater pumping redistribution would directly reduce localized groundwater pumping, promoting the stabilization of groundwater levels, and possibly rise in groundwater levels, in site-specific pumping depressions within Arlington Basin. Continuous management would be needed to ensure there are no negative impacts to any of the additional GSP elements. Reducing groundwater pumping will assist with achieving the Arlington Basin sustainability goal.

6.5.9 Adaptive Management

Adaptive Management will allow the GSA to react to the success or failure of Projects and Management Actions implemented in Arlington Basin and make management decisions to redirect efforts to achieve sustainability goals more effectively. Annual monitoring and 5-year reporting on the basin’s progress towards sustainability will provide consistent updates to the GSA. Investigations into any water quality or unexpected pumping issues would be investigated and addressed promptly by the GSA.

6.5.9.1 Drought Resilience Work Group

Western Municipal Water District would develop and coordinate a working group to address issues associated with and recovery from drought. The working group would review the current understanding of drought in the Arlington Basin, identify any data gaps, and develop a reliable recovery plan. The working group would be composed of stakeholders, local agencies, landowners, and technical experts.

6.5.9.2 Leak Detection Program

A leak detection program traces the flow of water from its source, through a water distribution system, to customers and other uses with the review of records and data collected. Creation of a leak detection program would help ensure supplied water reaches its destination, supporting water conservation in the basin. Senate Bill 555 (SB 555), implemented in 2015, established new requirements for monitoring and reporting water losses and a leak detection program would integrate with larger water loss audits conducted according to American Water Works Association guidelines. As part of the leak detection program Water Loss Audit Reports would be created and submitted to the California DWR.

Water Loss Audit Reports are made available to the public through the DWR Water Use Efficiency Data online public portal: https://wuedata.water.ca.gov/

Selection to 'View Water Audit Reports' provides individual Water Loss Audit Reports submitted to the DWR by suppliers.

6.6 Other Projects and Groundwater Management Activities

6.6.1 Conjunctive Use

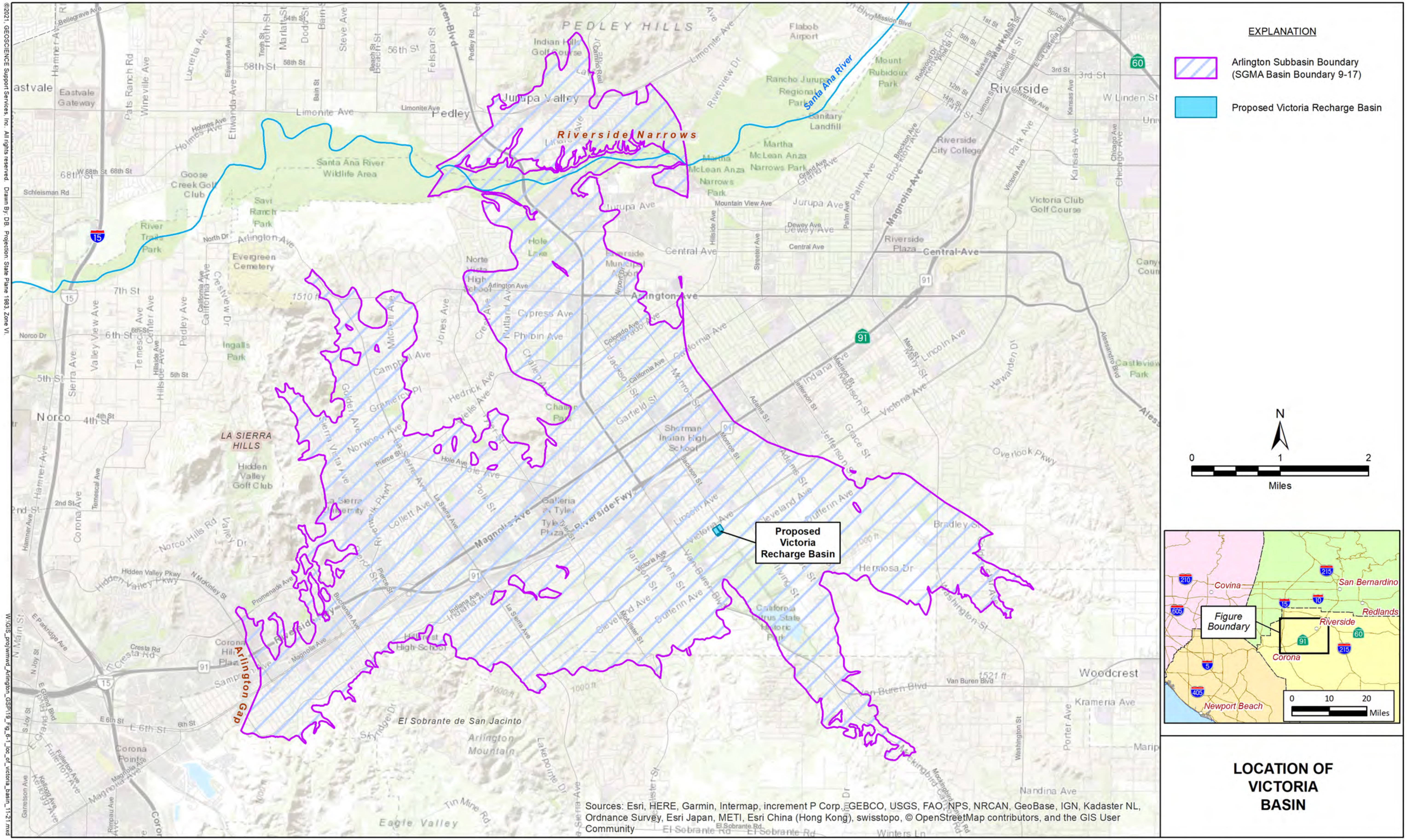
Projects and Management Actions implemented as part of this GSP will be managed holistically to ensure coordinated use of surface water and groundwater resources with no negative impacts to any of the additional GSP elements. Regional water supply and storage management will be optimized to obtain maximized benefits for Arlington Basin, efficiently achieve the sustainability goal, and make certain all sustainability indicators stay above minimum thresholds.

6.6.2 Basin-Wide Economic Analysis

A Basin Wide Economic Analysis would develop a study to review the economic impacts each Project and Management Action would have on Arlington Basin. The economic analysis would be consulted when a Project or Management Action is reviewed for potential implementation by providing the economic benefits and disadvantages. A Basin Wide Economic Analysis would not provide direct benefits to the Arlington Basin sustainability goal but would help with the economic uncertainty that goes with implementing Projects and Management Actions. Unintended consequences could be eliminated or reduced in magnitude and the period of operation for proposed Projects and Management Actions providing beneficial results could be extended.

Although water supply needs in Arlington Basin have shifted from being largely agricultural to largely urban over the latter half of the 20th century, 21% of land use within the basin is irrigated agriculture dependent on groundwater availability. A change in access to water supplies could result in economic consequences. Stormwater/Dry Weather Capture and Spreading could also alter agricultural output if agricultural land is purchased for required spreading facilities. Projected regional land uses and populations would be considered as part of the economic analysis to evaluate the support each Project and Management Action would provide for Arlington Basin's planned growth. An analysis would evaluate each implementation to determine the effect on the regional, as well as local agricultural industry, economic health to reduce the chance of causing inadvertent economic harm.

An economic consultant would assist with the completion and implementation of the Basin Wide Economic Analysis. The cost for this management action would be determined when an economic consultant is selected.



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

LOCATION OF VICTORIA BASIN

Drawn By: DB. Projection: State Plane 1983, Zone VI.

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Nov-21

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

DRAFT

FIGURE 6-1

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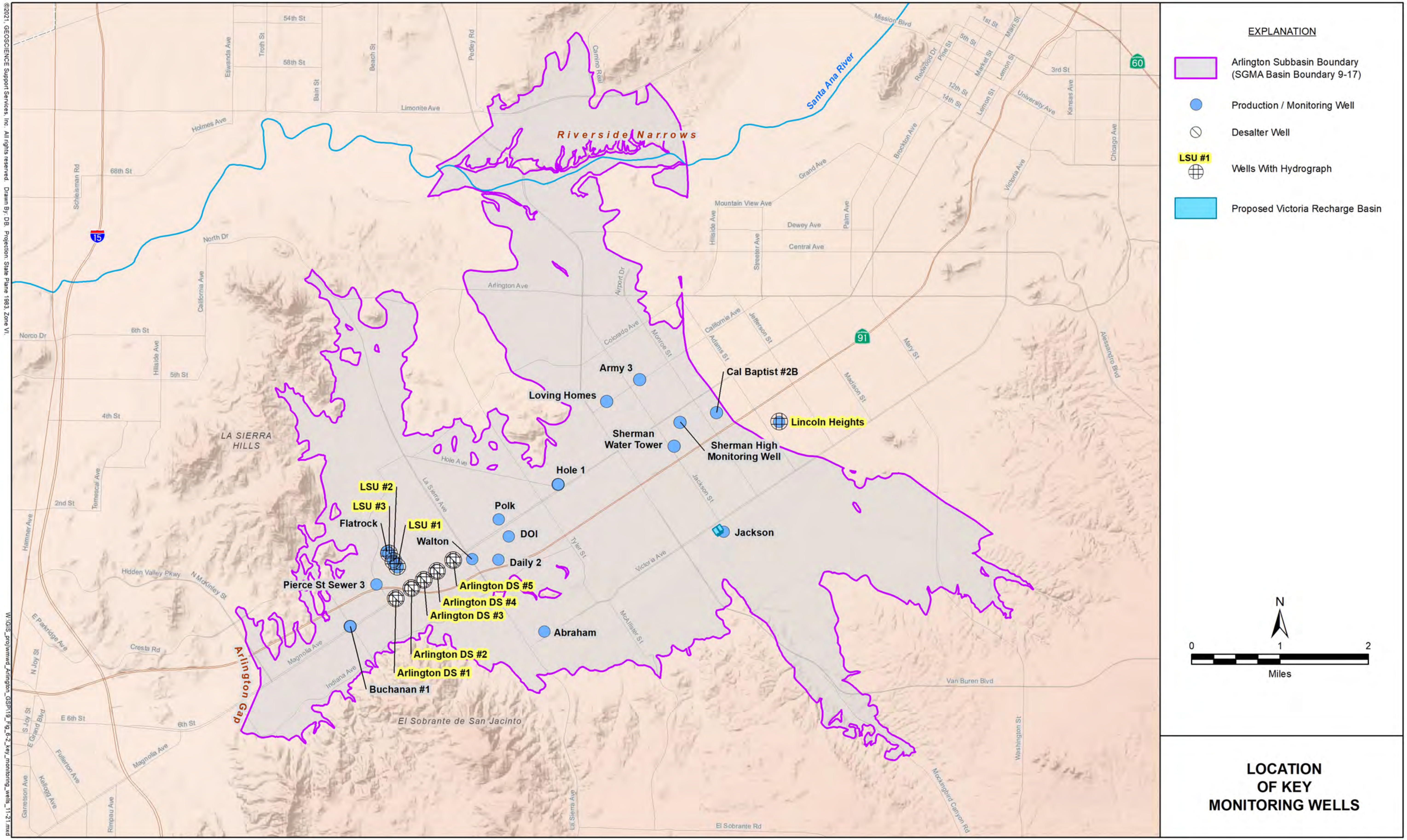

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Nov-21

LOCATION OF KEY MONITORING WELLS

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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FIGURE 6-2

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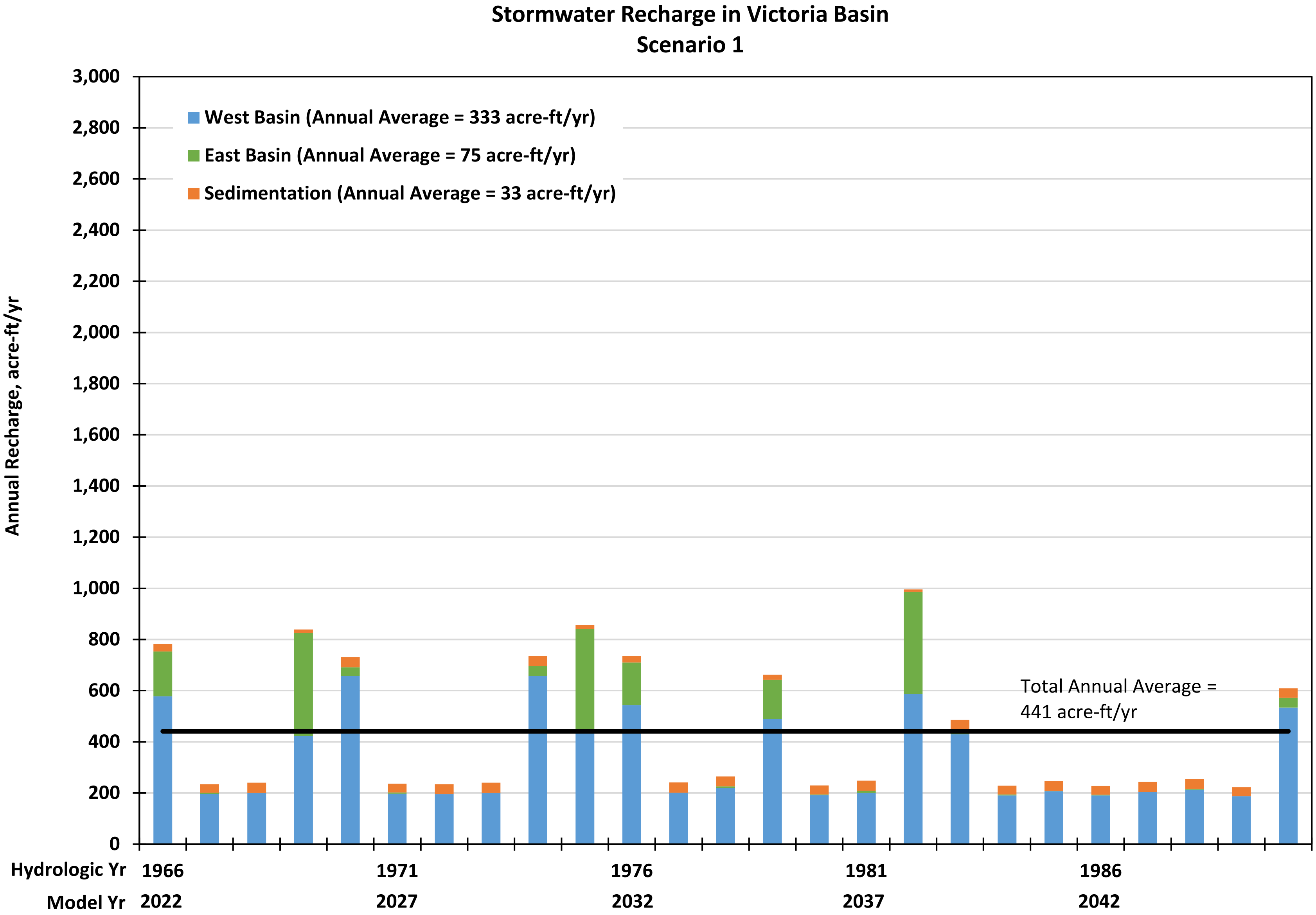

Stormwater Recharge in Victoria Basin
Scenario 1
West Basin (Annual Average = 333 acre-ft/yr)
East Basin (Annual Average = 75 acre-ft/yr)
Sedimentation (Annual Average = 33 acre-ft/yr)
Total Annual Average =
441 acre-ft/yr
Annual Recharge, acre-ft/yr
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Hydrologic Yr
Model Yr
1966
2022
1971
2027
1976
2032
1981
2037
1986
2042

Figure 6-3

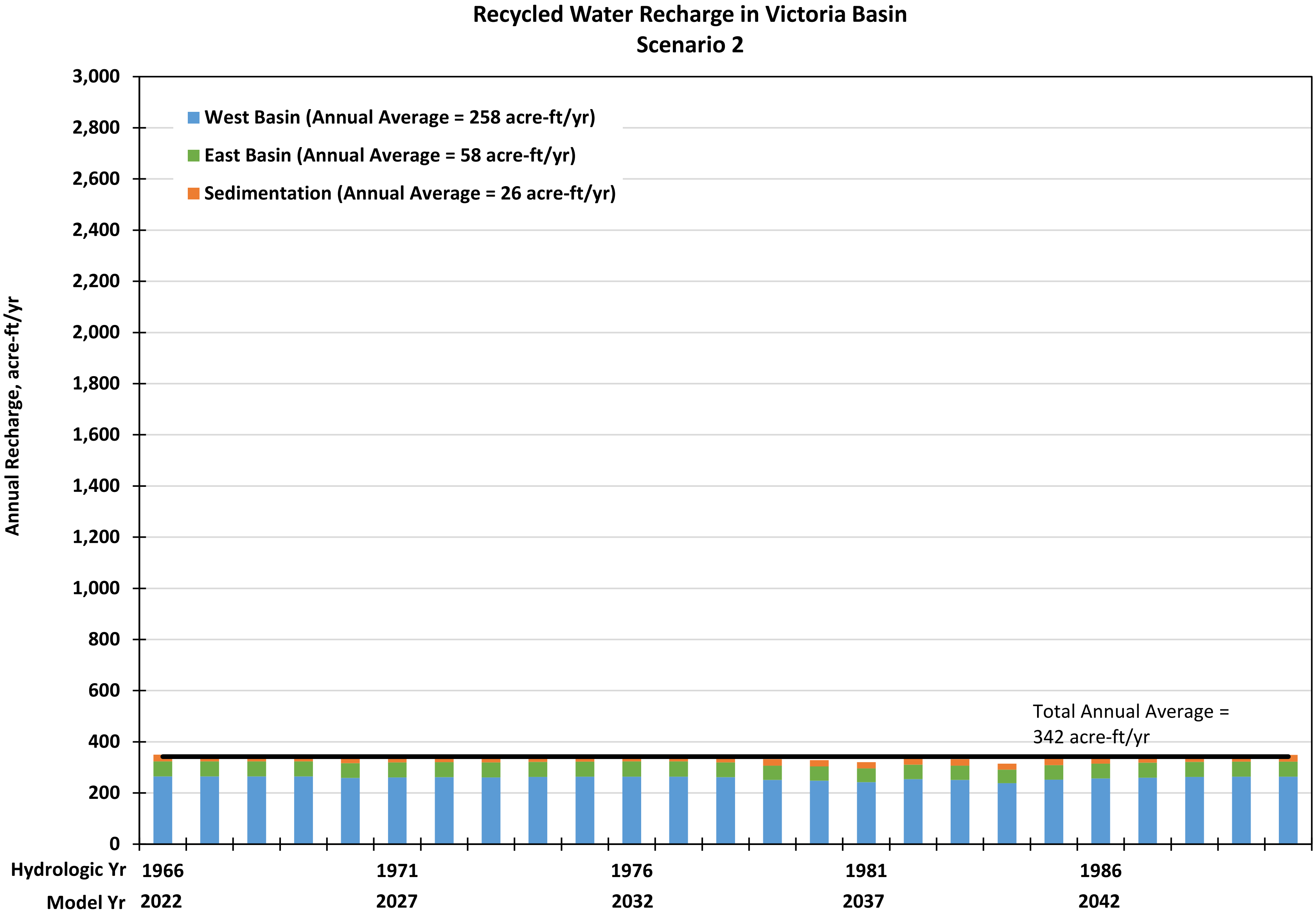

Recycled Water Recharge in Victoria Basin
Scenario 2
West Basin (Annual Average = 258 acre-ft/yr)
East Basin (Annual Average = 58 acre-ft/yr)
Sedimentation (Annual Average = 26 acre-ft/yr)
Total Annual Average = 342 acre-ft/yr
Annual Recharge, acre-ft/yr
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Hydrologic Yr
1966
1971
1976
1981
1986
Model Yr
2022
2027
2032
2037
2042

Figure 6-4

Riverside South Groundwater Recharge in Victoria Basin
Scenario 3

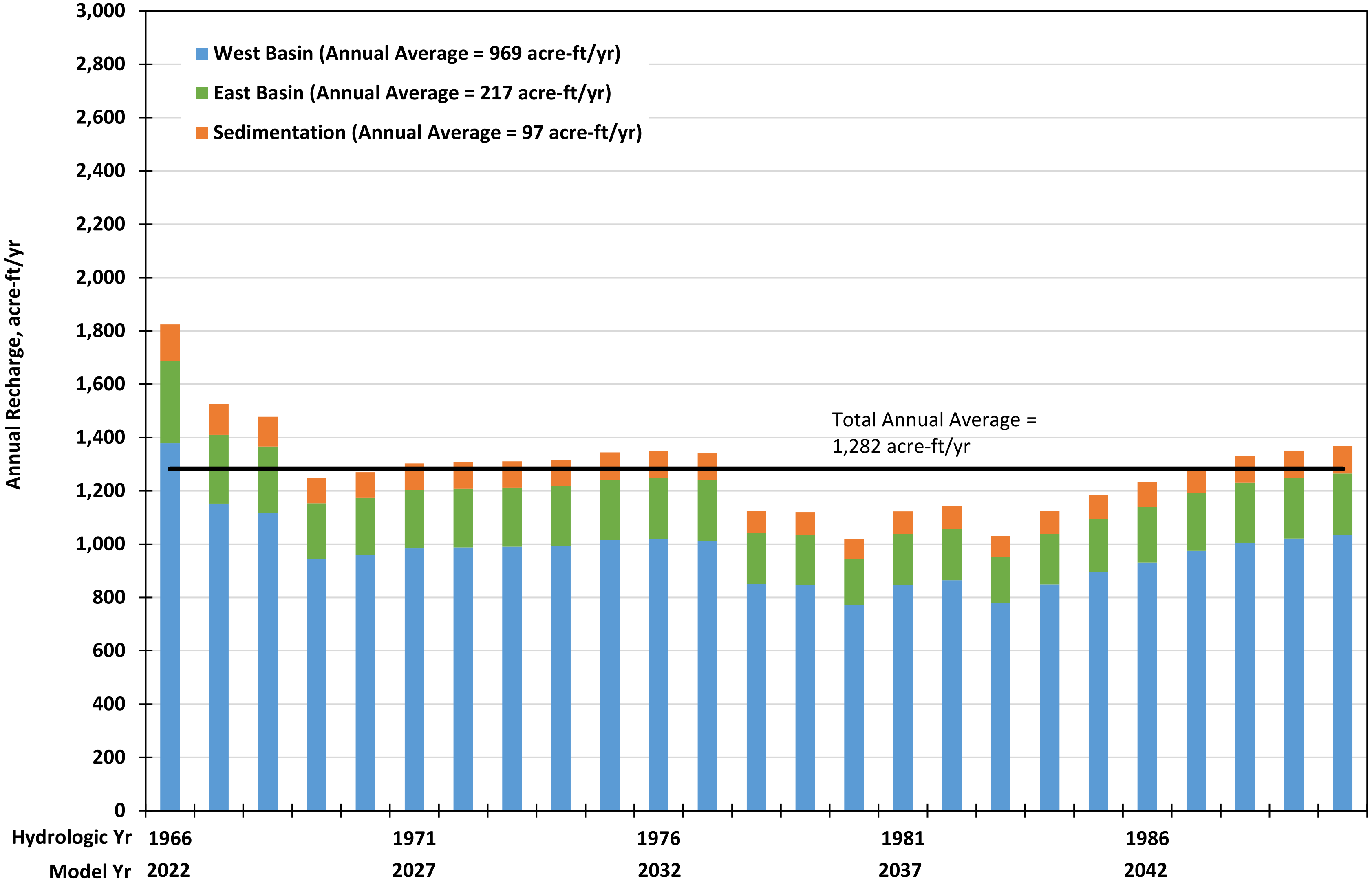


Figure 6-5

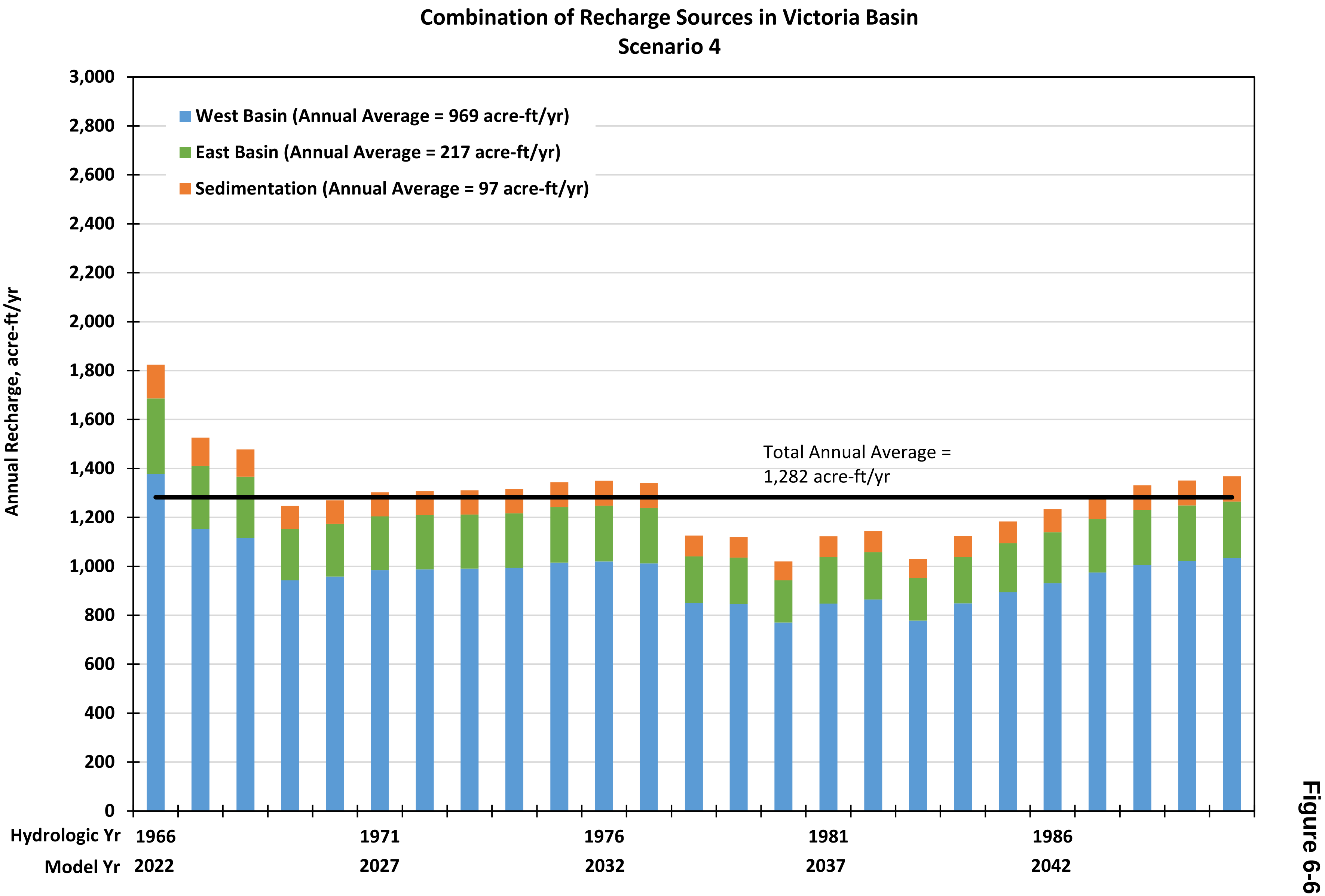
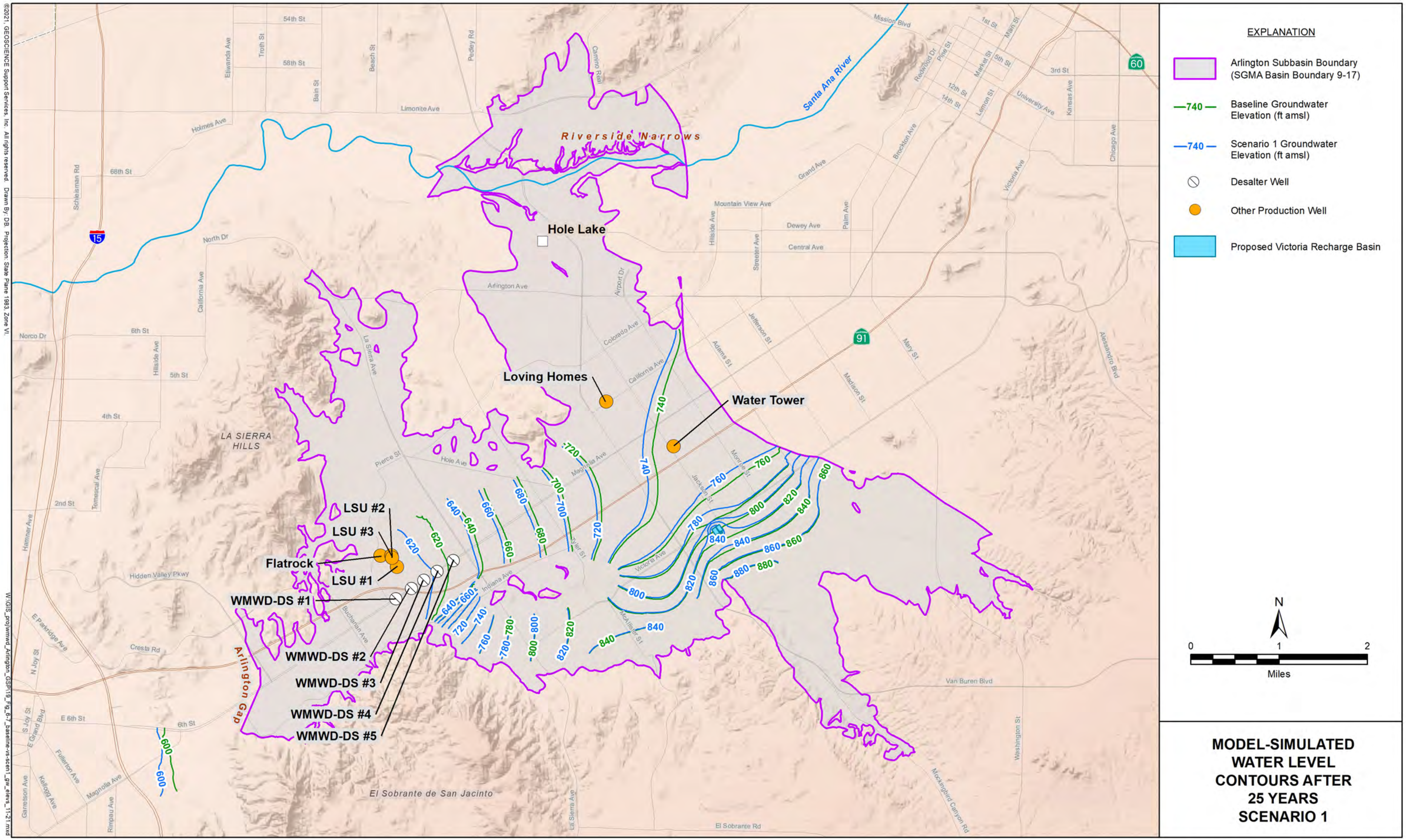

Combination of Recharge Sources in Victoria Basin
Scenario 4
Annual Recharge, acre-ft/yr
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
West Basin (Annual Average = 969 acre-ft/yr)
East Basin (Annual Average = 217 acre-ft/yr)
Sedimentation (Annual Average = 97 acre-ft/yr)
Total Annual Average =
1,282 acre-ft/yr
Hydrologic Yr
1966
1971
1976
1981
1986
Model Yr
2022
2027
2032
2037
2042

Figure 6-6



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MODEL-SIMULATED WATER LEVEL CONTOURS AFTER 25 YEARS SCENARIO 1

Nov-21

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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FIGURE 6-7

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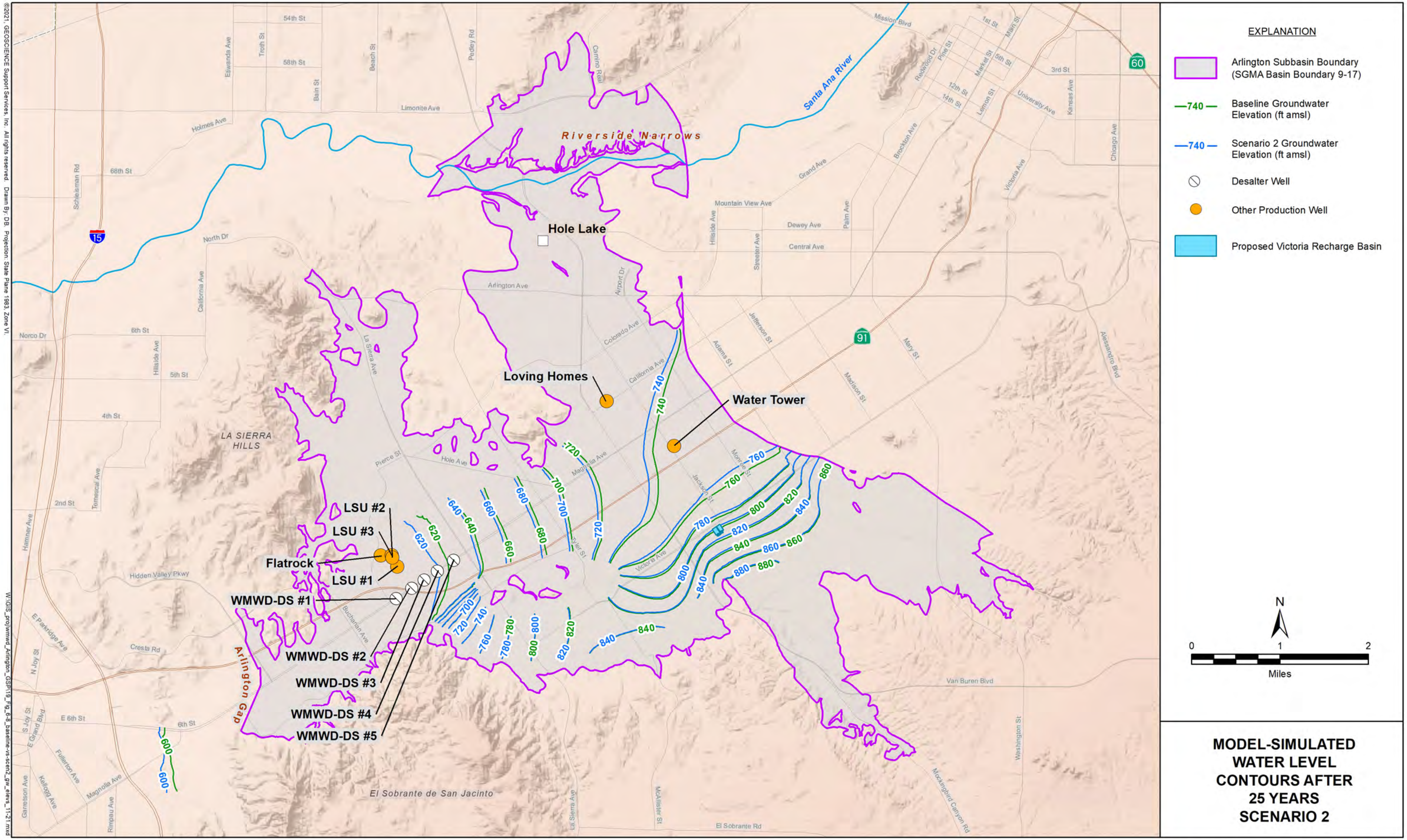

MODEL-SIMULATED WATER LEVEL CONTOURS AFTER 25 YEARS SCENARIO 2

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FIGURE 6-8

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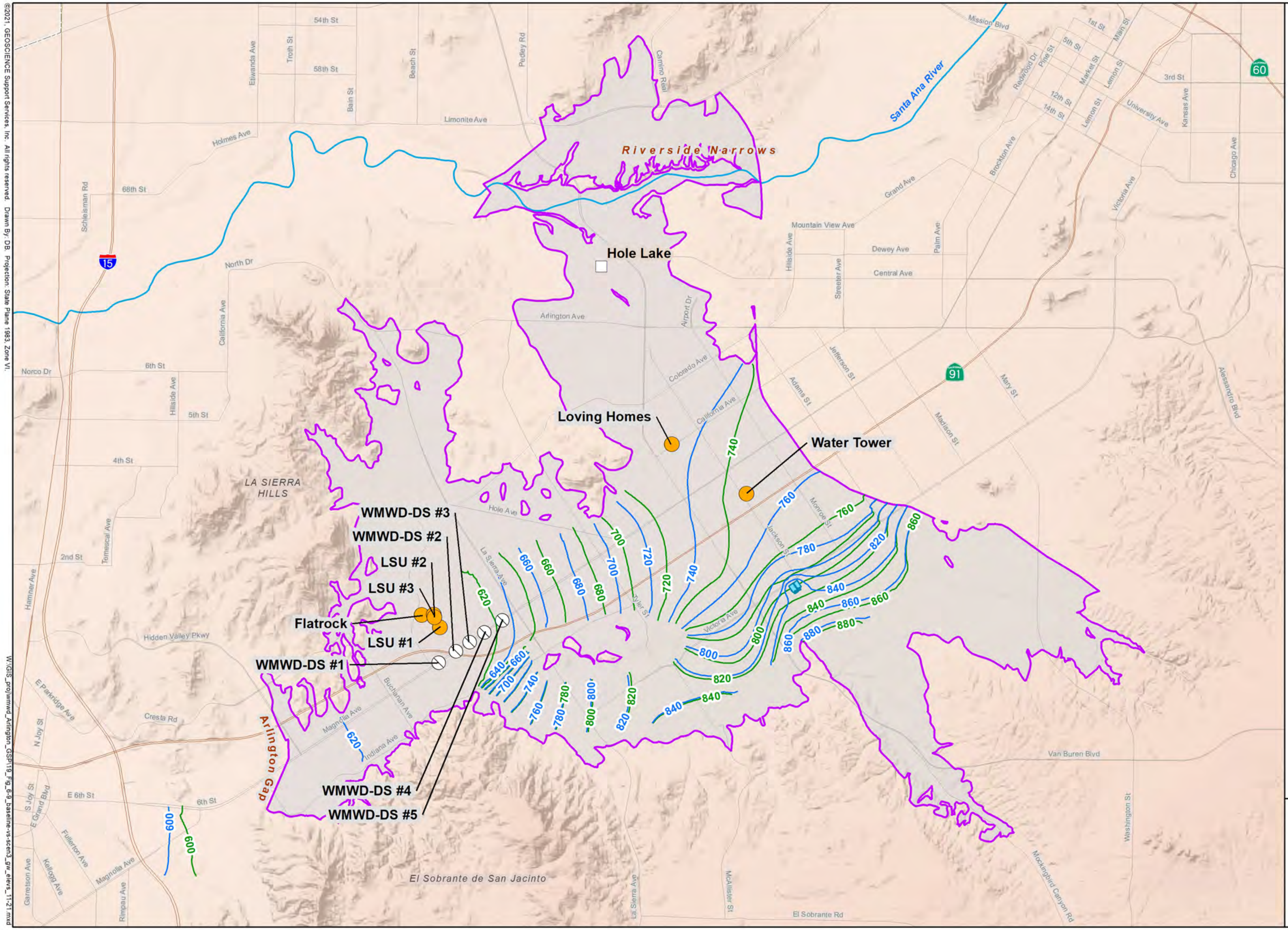

EXPLANATION

- Arlington Subbasin Boundary (SGMA Basin Boundary 9-17)
- —740— Baseline Groundwater Elevation (ft amsl)
- —740— Scenario 3 Groundwater Elevation (ft amsl)
- ⊘ Desalter Well
- ● Other Production Well
- Proposed Victoria Recharge Basin

N

0 1 2

Miles

MODEL-SIMULATED WATER LEVEL CONTOURS AFTER 25 YEARS SCENARIO 3

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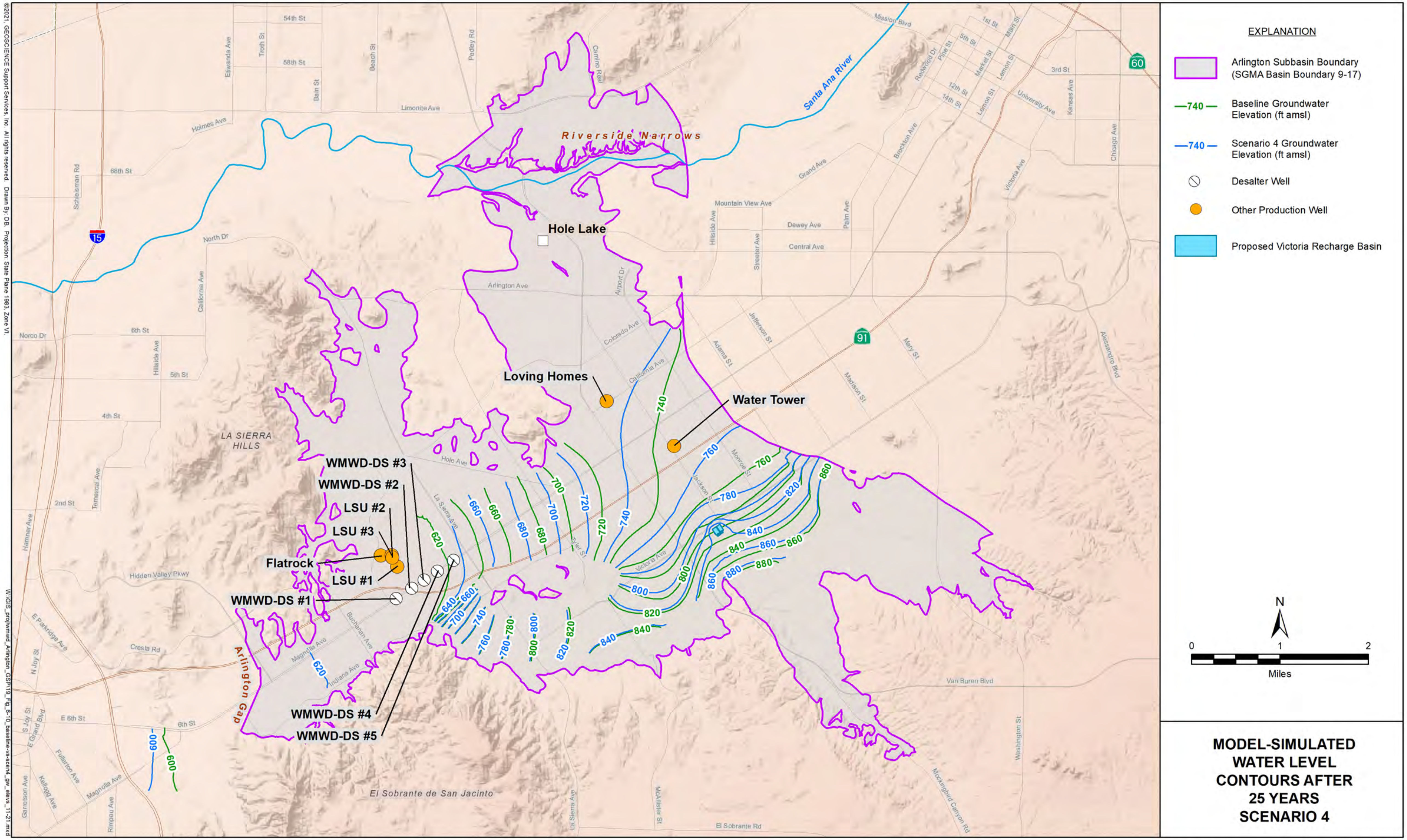
FIGURE 6-9



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MODEL-SIMULATED WATER LEVEL CONTOURS AFTER 25 YEARS SCENARIO 4

Nov-21

WESTERN MUNICIPAL WATER DISTRICT

GROUNDWATER SUSTAINABILITY PLAN FOR ARLINGTON GROUNDWATER BASIN

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FIGURE 6-10

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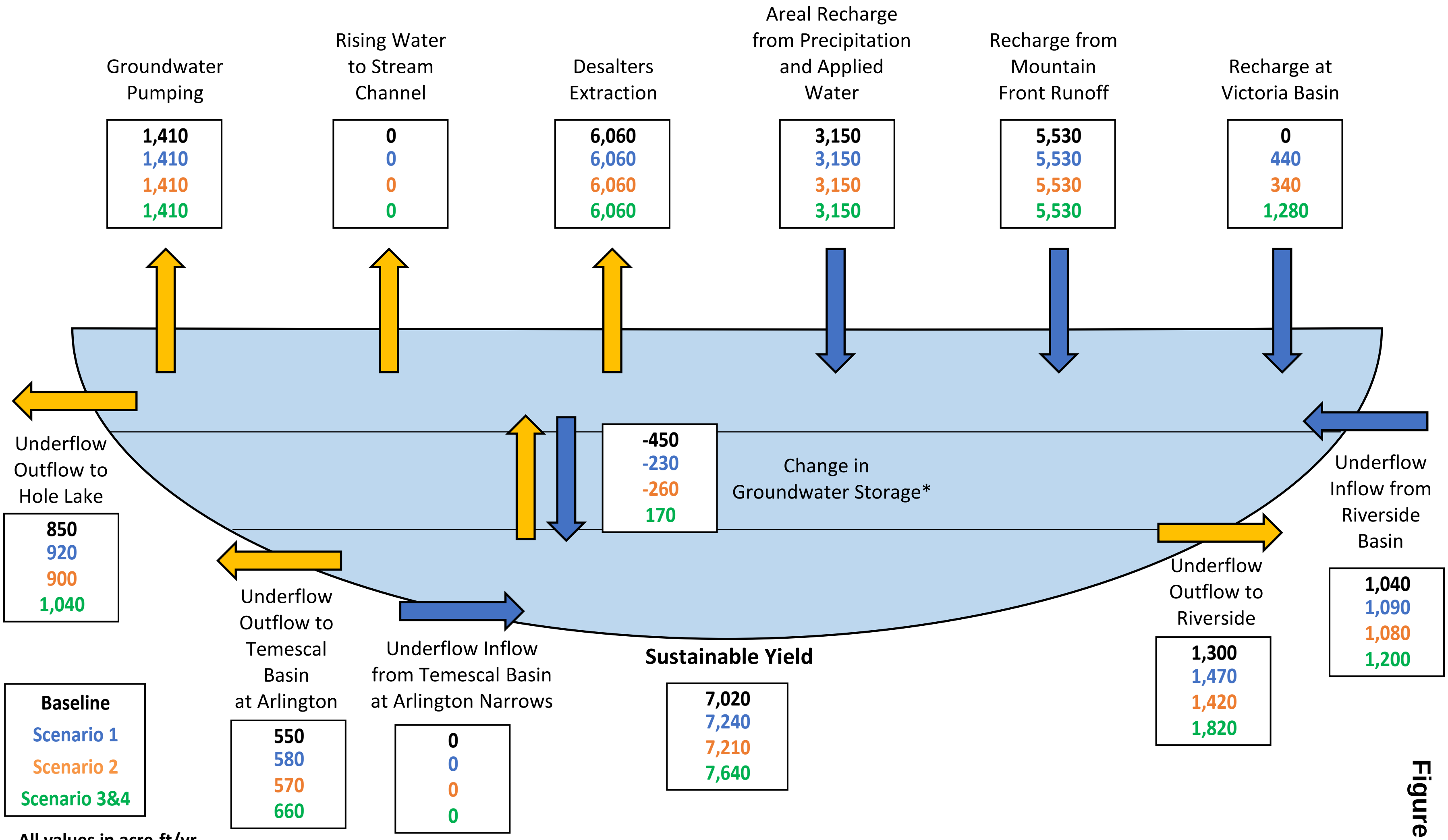
Average Annual Water Budget



All values in acre-ft/yr

*A positive sign indicates an increase in groundwater storage; a negative sign represents a decline in groundwater storage.

Figure 6-11

Water Level Hydrographs in Lincoln Heights Well
Model Layer 2

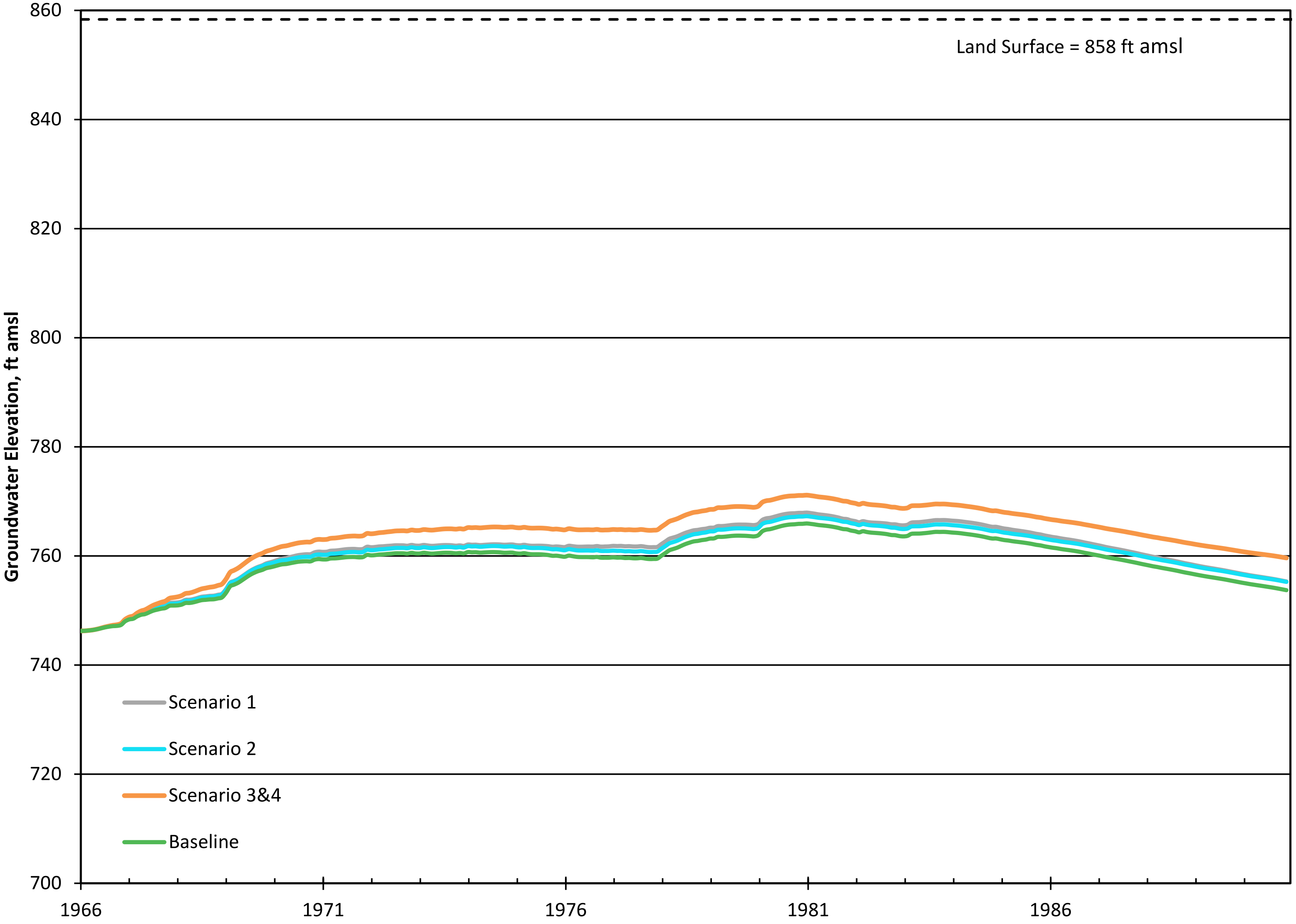


Figure 6-12

Water Level Hydrographs in WMWD Desalter Well No. 5
Model Layer 2

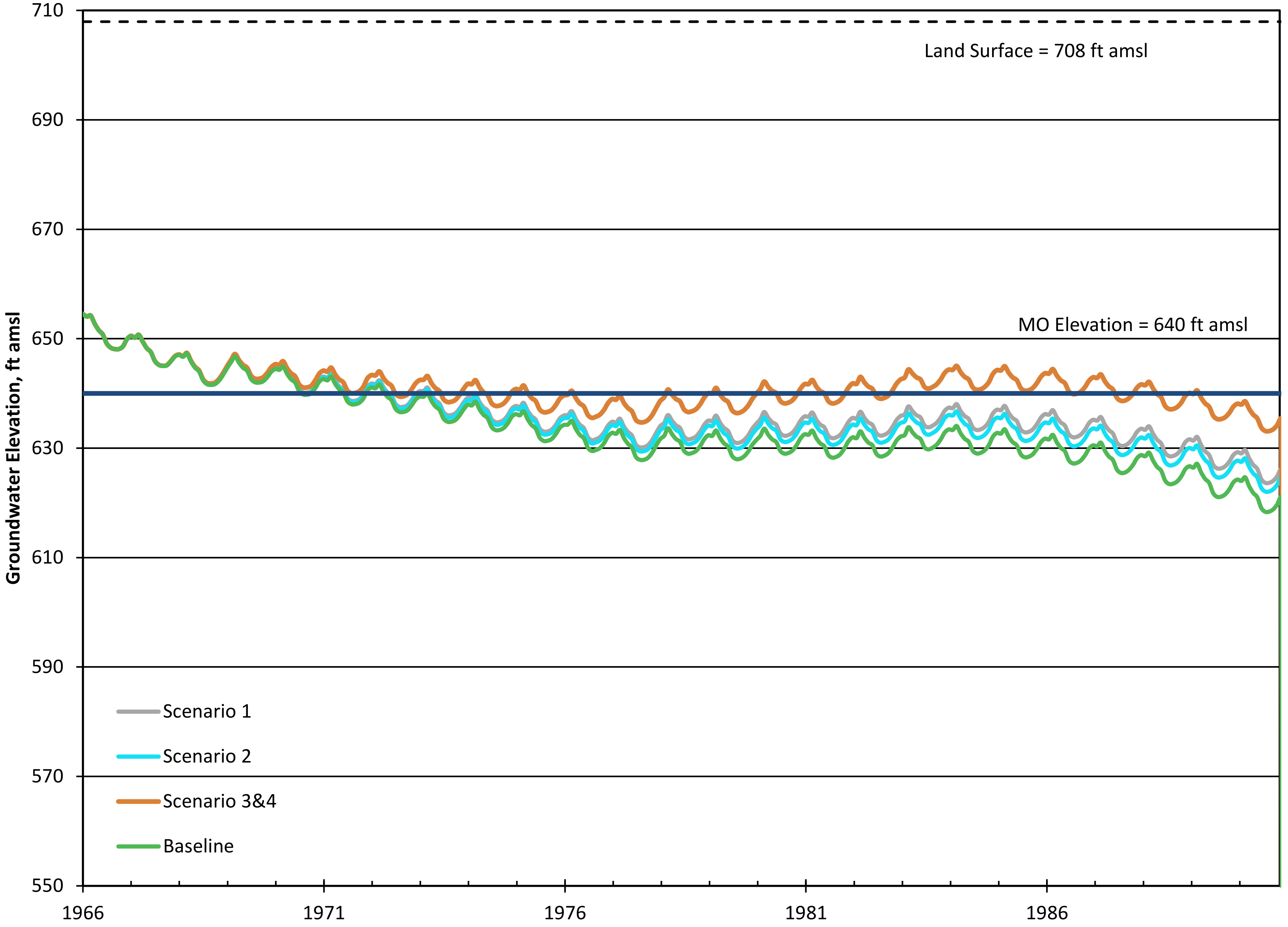


Figure 6-13

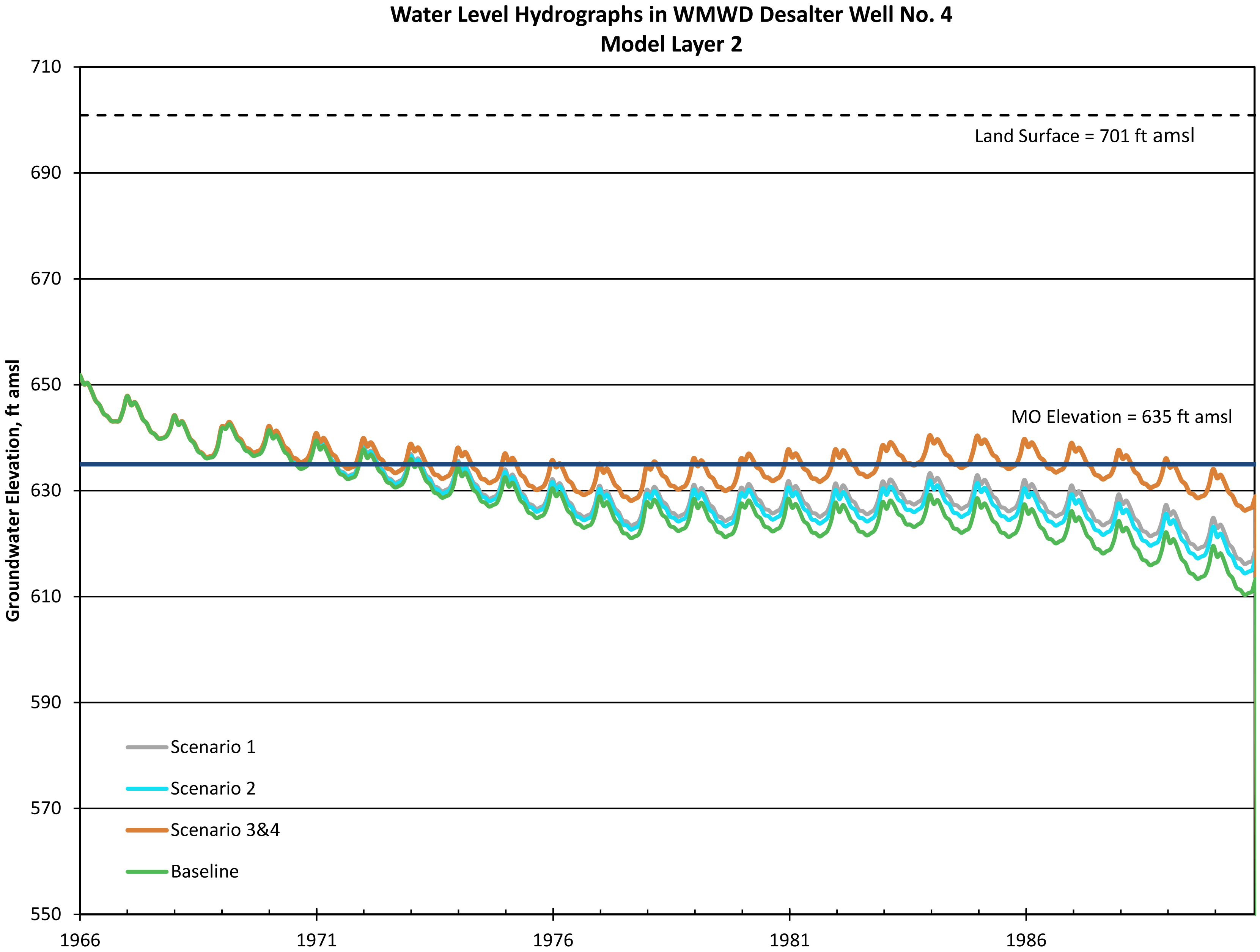

Water Level Hydrographs in WMWD Desalter Well No. 4
Model Layer 2
Groundwater Elevation, ft amsl
710
690
670
650
630
610
590
570
550
1966
1971
1976
1981
1986
Land Surface = 701 ft amsl
MO Elevation = 635 ft amsl
Scenario 1
Scenario 2
Scenario 3&4
Baseline

Figure 6-14

Water Level Hydrographs in WMWD Desalter Well No. 3
Model Layer 2

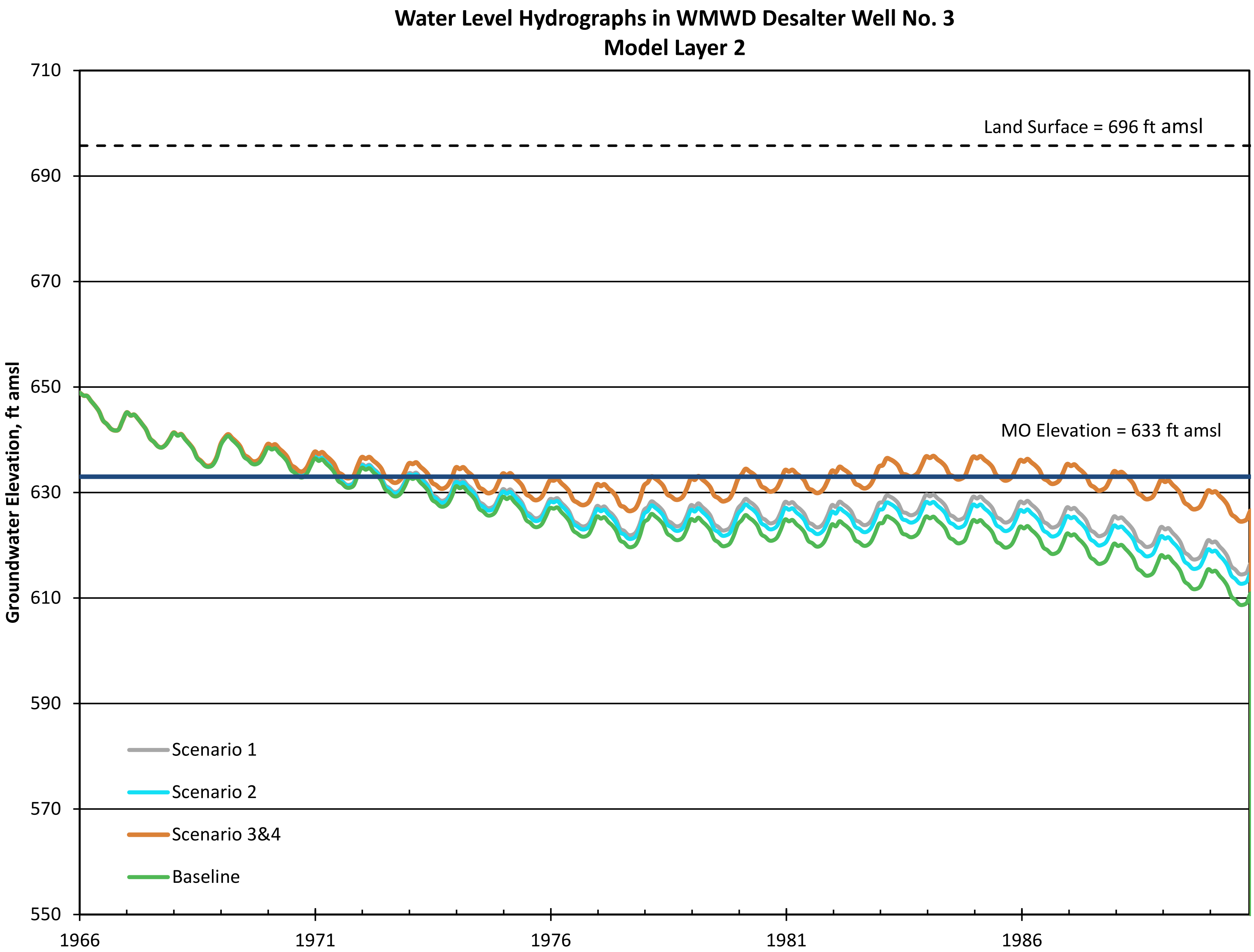


Figure 6-15

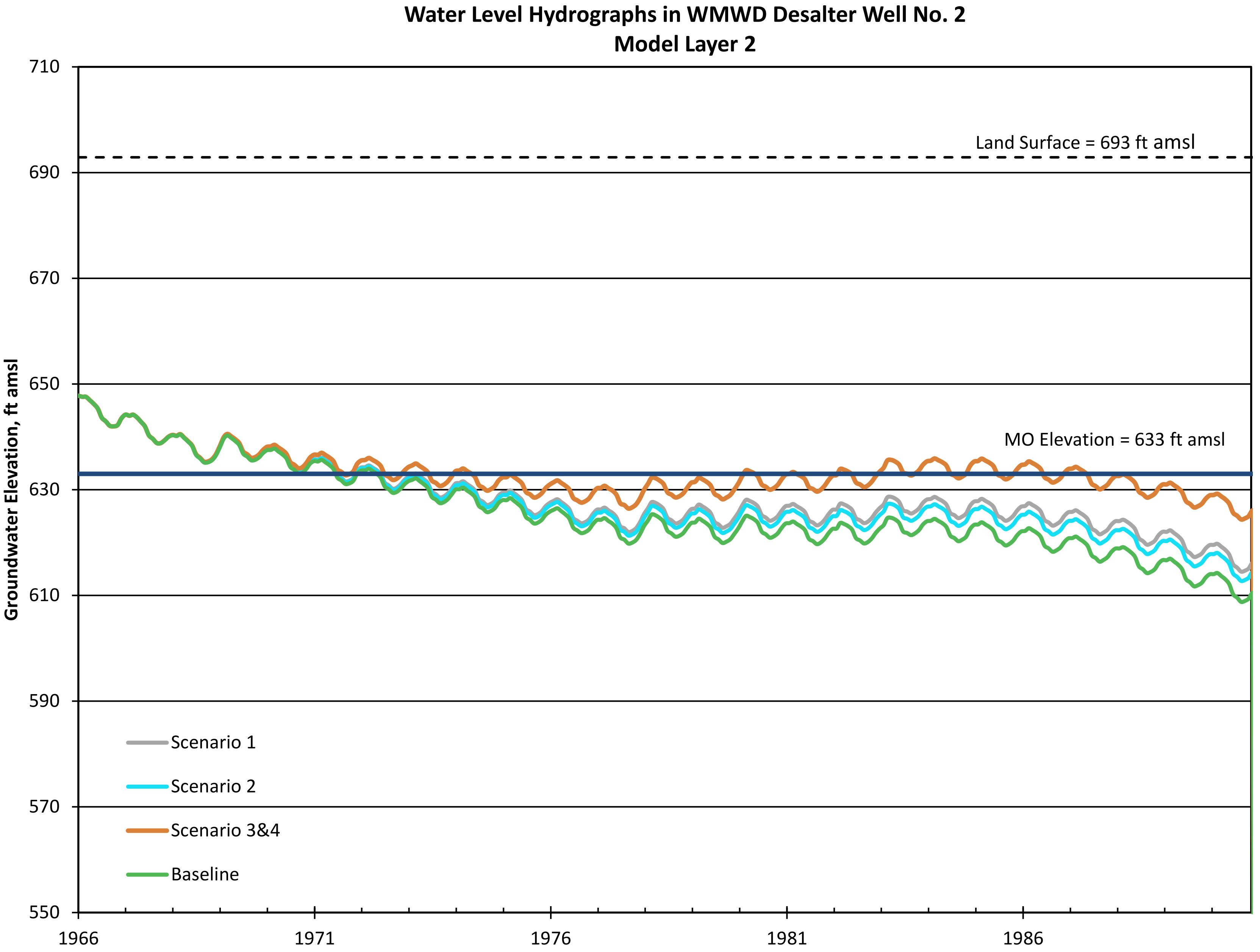

Water Level Hydrographs in WMWD Desalter Well No. 2
Model Layer 2
Groundwater Elevation, ft amsl
710
690
670
650
630
610
590
570
550
1966
1971
1976
1981
1986
Land Surface = 693 ft amsl
MO Elevation = 633 ft amsl
Scenario 1
Scenario 2
Scenario 3&4
Baseline

Figure 6-16

Water Level Hydrographs in WMWD Desalter Well No. 1
Model Layer 2

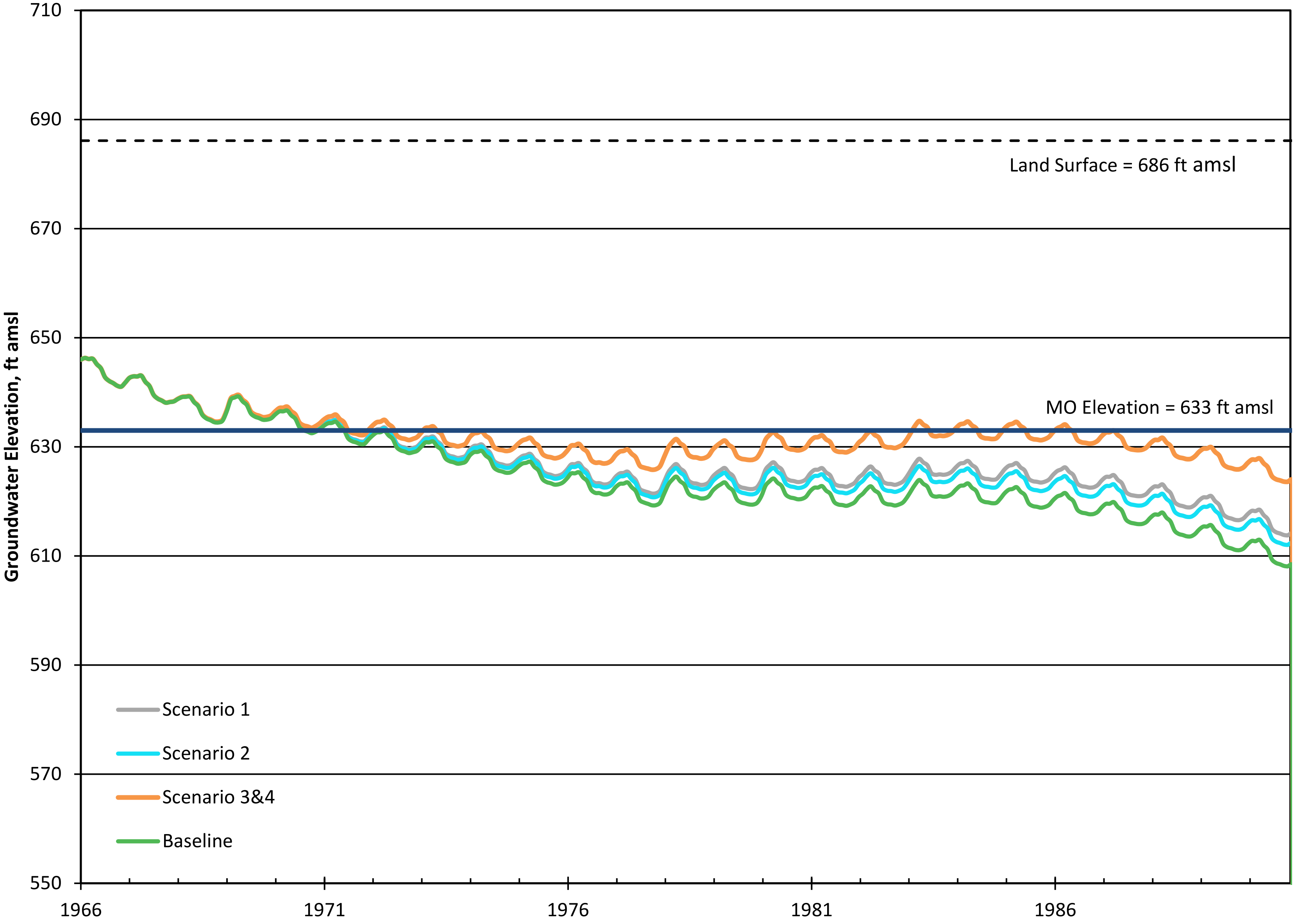


Figure 6-17

Water Level Hydrographs in La Sierra University Well No. 1
Model Layer 2

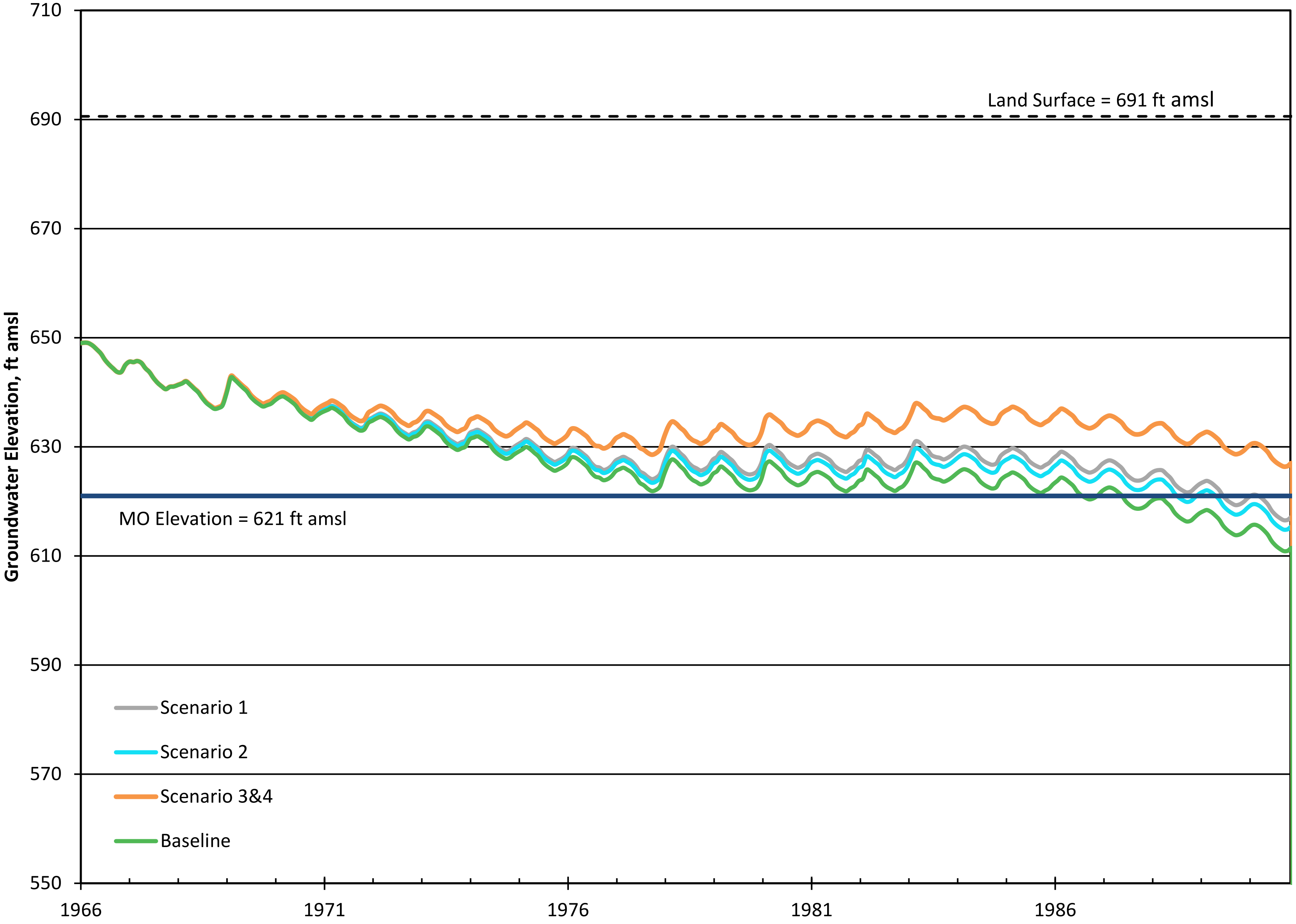


Figure 6-18

Water Level Hydrographs in La Sierra University Well No. 2
Model Layer 2

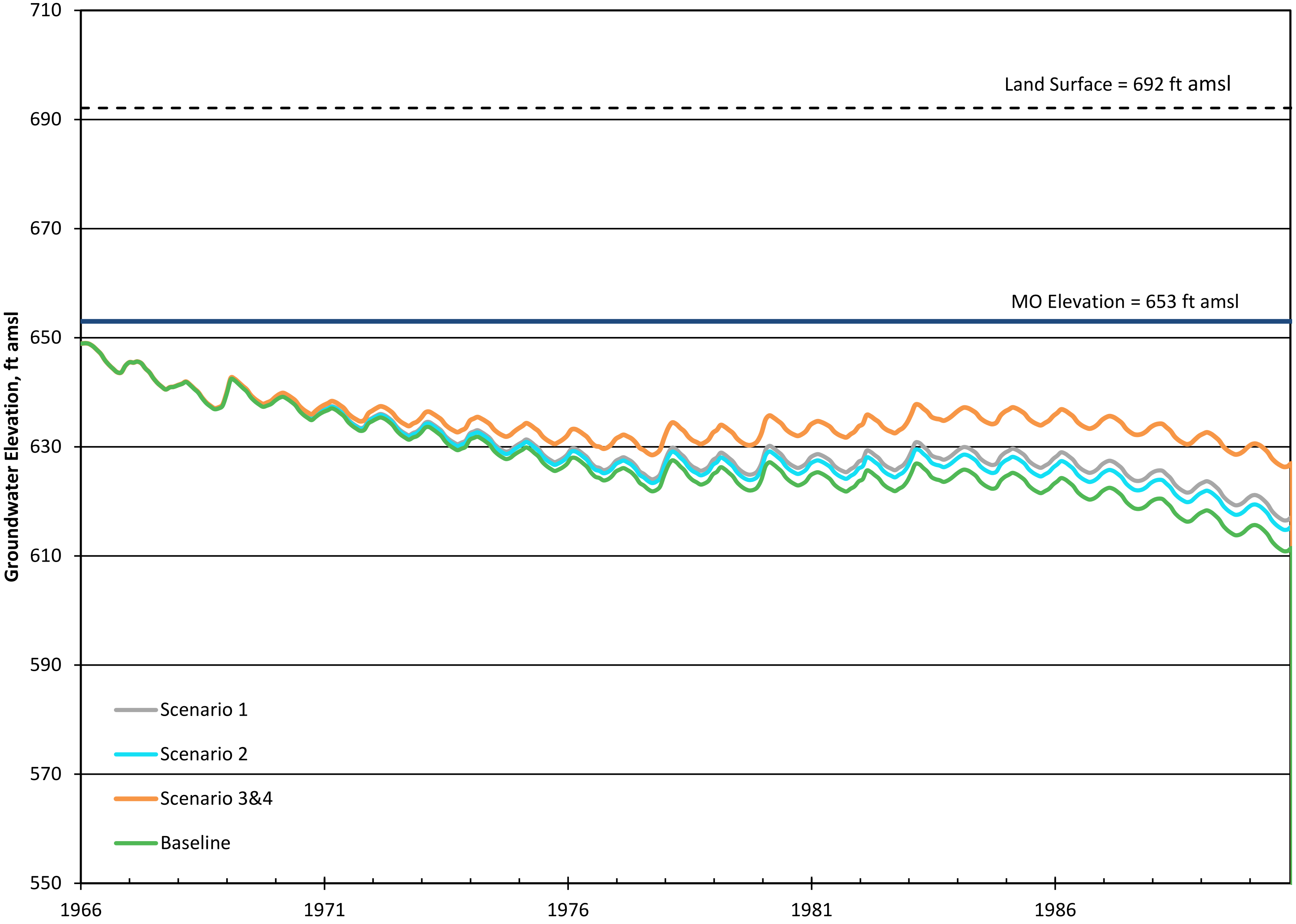


Figure 6-19

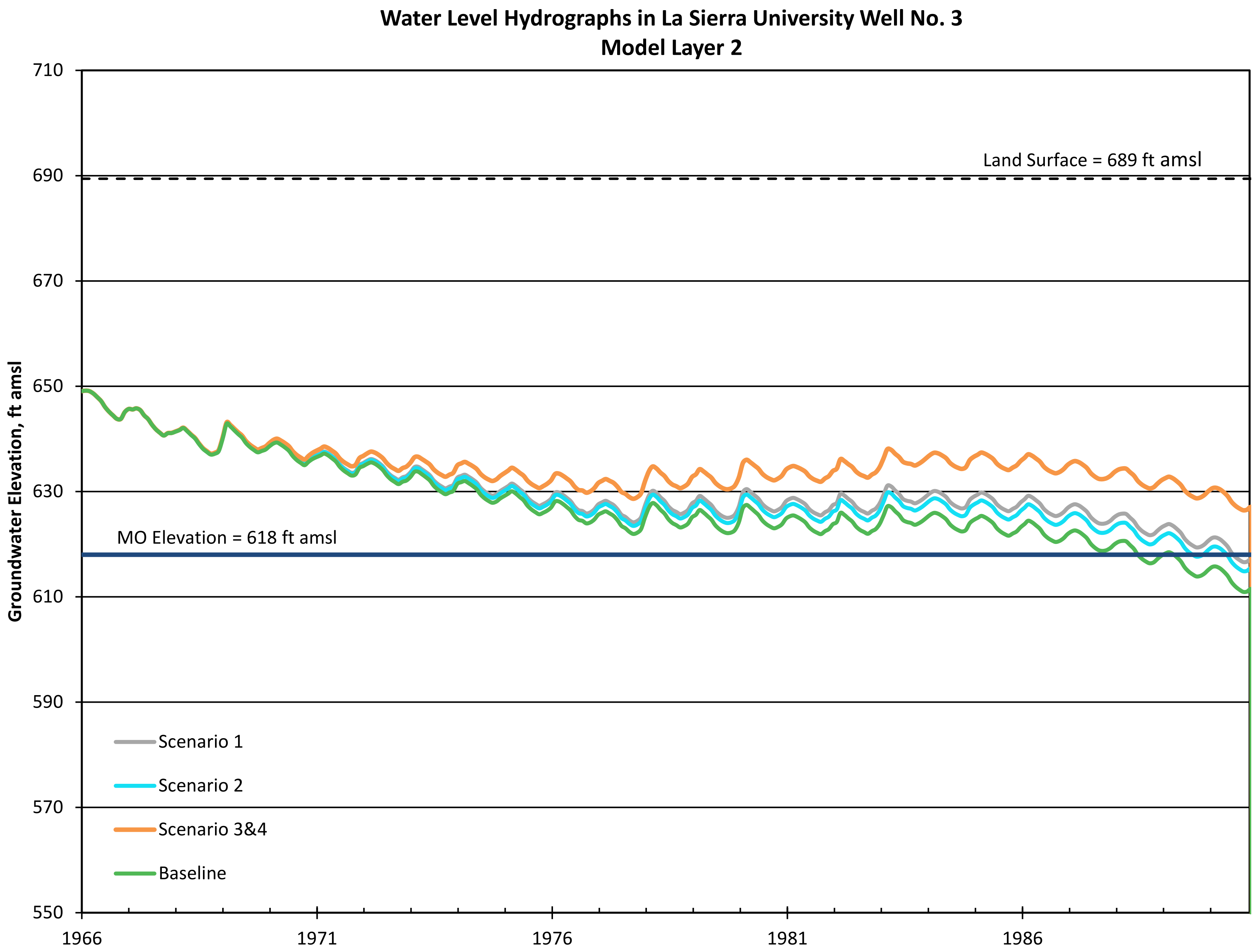

Water Level Hydrographs in La Sierra University Well No. 3
Model Layer 2
Groundwater Elevation, ft amsl
710
690
670
650
630
610
590
570
550
1966
1971
1976
1981
1986
Land Surface = 689 ft amsl
MO Elevation = 618 ft amsl
Scenario 1
Scenario 2
Scenario 3&4
Baseline

Figure 6-20

Summary of Sustainability Indicator Management by Projects and Management Actions

Activity / Project	Sustainability Indicator		
	Reduction of Groundwater in Storage	Chronic Lowering of Groundwater Levels	Degraded Water Quality
Stormwater Capture and Spreading	Groundwater in storage would be increased by enhancing groundwater recharge. Preliminary modeling indicates additional recharge of 440 acre-ft/yr for stormwater capture activies in Victoria spreading basin, which corresponds to an increase in groundwater storage of 220 acre-ft/yr.	Enhanced groundwater recharge and increased groundwater storage are typically associated with increases in groundwater levels. Initial modeling indicates increases in groundwater levels will be greatest in the vicinity of the Arlington Desalter Wells.	Stormwater runoff is typically very good quality water. Capture and infiltration of this water source could provide water quality benefits.
Artificial Recharge using Recycled Water	Groundwater in storage would be increased by enhancing groundwater recharge. Preliminary modeling indicates additional recharge of 350 acre-ft/yr for the artificial recharge of recycled water in Victoria spreading basin, which corresponds to an increase in groundwater storage of 190 acre-ft/yr.	Enhanced groundwater recharge and increased groundwater storage are typically associated with increases in groundwater levels. Initial modeling indicates increases in groundwater levels will be greatest in the vicinity of the Arlington Desalter Wells.	The recharge of recycled water may increase water quality in the Arlington Subbasin since recycled water generated at the RWQCP and WRCWRA is typically has lower TDS and TIN concentrations than current (2018) ambient groundwater conditions. Water quality in the basin will need to continue to be monitored.
Irrigation with Recycled Water	Create supplemental groundwater in storage or increase groundwater in storage by replacing a portion of groundwater pumping for irrigation with recycled water.	Increased groundwater storage and reduced pumping are typically associated with increases in groundwater levels.	The use of recycled water may increase water quality in the Arlington Subbasin since recycled water generated at the RWQCP and WRCWRA is typically has lower TDS and TIN concentrations than current (2018) ambient groundwater conditions. Water quality in the basin will need to continue to be monitored.
Aquifer Storage and Recovery (ASR) / Managed Aquifer Recharge	Groundwater in storage would be increased by enhancing groundwater recharge. Preliminary modeling indicates additional recharge of 1,290 acre-ft/yr using stormwater, recycled water, and groundwater from Riverside South in Victoria spreading basin, which corresponds to an increase in groundwater storage of 620 acre-ft/yr.	Enhanced groundwater recharge and increased groundwater storage are typically associated with increases in groundwater levels. Initial modeling indicates increases in groundwater levels will be greatest (up to 20 ft after 25 years) in the vicinity of the Arlington Desalter Wells.	ASR/managed aquifer recharge in Victoria spreading basins may increase water quality in the Arlington Subbasin. Stormwater runoff is typically very good quality water, recycled water generated at the RWQCP and WRCWRA is typically has lower TDS and TIN concentrations than current (2018) ambient groundwater conditions, and ambient groundwater concentrations in Riverside South are also lower than those in Arlington. Water quality in the basin will need to continue to be monitored.
Metering Infrastructure	Support the refinement of sustainable yield estimate for the subbasin, assisting with sustainable management of groundwater pumping to ensure adequate groundwater in storage.	Support the refinement of sustainable yield estimate for the subbasin, assisting with sustainable management of groundwater pumping to ensure groundwater levels are maintained in such a way to avoid undesirable results.	-
Decreased Evapotranspiration	Removal of high water use, invasive vegetation will reduce evapotranspiration - lessening potential declines of groundwater storage.	Removal of high water use, invasive vegetation will reduce evapotranspiration - lessening potential declines of groundwater levels.	Removal of high water use vegetation may result in a benefit to water quality. Typically, plants take the water and leave the salts behind. Therefore removal of high water use can beneficially impact water quality.
Monitoring of Groundwater Levels and Water Quality Data	Ongoing monitoring will allow the GSA to identify areas trending towards undesirable effects and proactively enact projects and/or management actions as needed to improve management of groundwater resources above management thresholds and help reach management objectives.		
Collection of Pumping Records	Supports the refinement of sustainable yield estimate for the subbasin, assisting with sustainable management of groundwater pumping to ensure adequate groundwater in storage.	Supports the refinement of sustainable yield estimate for the subbasin, assisting with sustainable management of groundwater pumping to ensure groundwater levels are maintained in such a way to avoid undesirable results.	-
Water Transfers / In-Lieu Groundwater Recharge	Create supplemental groundwater in storage or increase groundwater in storage by replacing a portion of groundwater pumping with additional imported water.	Increase groundwater levels by replacing a portion of groundwater pumping with imported water supply.	The use of recycled water may increase water quality in the Arlington Subbasin since imported water and ambient groundwater in Riverside South typically have lower TDS and TIN concentrations than current (2018) ambient groundwater conditions. Water quality in the basin will need to continue to be monitored.
Water Conservation	Water demand reduction and efficient water practices provide opportunities to reduce groundwater pumping, support the ability to maintain and even raise groundwater levels, and allow more groundwater to remain in storage.	Water demand reduction and efficient water practices provide opportunities to reduce groundwater pumping, support the ability to maintain and even raise groundwater levels, and allow more groundwater to remain in storage.	Water conservation activities could cause slight decreases in water quality because less return flow from irrigation activities (using higher quality water than ambient groundwater concentrations) could be realized. Water quality in the basin will need to continue to be monitored.
Groundwater Pumping Curtailment and/or Restrictions	Groundwater pumping curtailment or restrictions halts or lessens the decline of groundwater levels, allowing water levels to recovery and groundwater storage to increase.	Groundwater pumping curtailment or restrictions halts or lessens the decline of groundwater levels, allowing water levels to recovery and groundwater storage to increase.	Groundwater pumping curtailment may lead to increased imported water use, which is typically higher in quality than ambient groundwater in Arlington Basin. This may lead to slight increases in water quality, which would need to continue to be monitored.

Summary of Sustainability Indicator Management by Projects and Management Actions

Activity / Project	Sustainability Indicator		
	Reduction of Groundwater in Storage	Chronic Lowering of Groundwater Levels	Degraded Water Quality
Redistribution of Pumping	-	While redistribution of pumping will not necessarily change the amount of water being withdrawn from the basin (i.e., change groundwater storage), it may help manage local groundwater levels to meet management criteria.	-
Adaptive Groundwater Management	Adaptive management allows the GSA to react to changing groundwater conditions, evaluate the success or failure of projects and management actions, and make management decisions to redirect efforts to achieve sustainability goals more effectively.		
Conjunctive Use	Groundwater in storage would be increased by enhancing groundwater recharge through coordinated use of surface water, imported water, and groundwater.	Enhanced groundwater recharge and increased groundwater storage are typically associated with increases in groundwater levels.	The coordinated use of different water sources may increase water quality in the Arlington Subbasin. Stormwater runoff is typically very good quality water, recycled water generated at the RWQCP and WRCWRA is typically has lower TDS and TIN concentrations than current (2018) ambient groundwater conditions, and ambient groundwater concentrations in Riverside South are also lower than those in Arlington. Water quality in the basin will need to continue to be monitored.
Basin Wide Economic Analysis	Basin-wide economic analysis would provide a cost-benefit anlaysis of the proposed projects and management actions included in this GSP.		

7.0 Plan Implementation

The implementation of this draft Groundwater Sustainability Plan (GSP) for the Arlington Groundwater Basin observes Sustainable Groundwater Management Act (SGMA) regulation §354.8(f)(2) and (3). Described in this section are activities necessary for implementation in the next five years. Also included within this section are the descriptions of both the annual reports and five-year update reports required for submission to the California Department of Water Resources (DWR) by SGMA.

7.1 Monitoring, Reporting, and Public Outreach

During the first years of GSP Implementation, the primary functions will include data collection, through continued monitoring, and evaluation utilizing interim milestones to assess the progress towards sustainability, and ultimately achieving and maintaining sustainability goals. Required reporting will be conducted, along with communication to stakeholders and the public, during the on-going progress to sustainability. The Arlington Basin Groundwater Sustainability Agency (GSA) will hire consultants, negotiate agreements with agencies, and/or hire staff to implement the monitoring and reporting functions.

7.1.1 Monitoring

Monitoring of the five sustainability criteria will be the center of GSP implementation in order to develop the necessary data to evaluate progress. Groundwater elevation data and groundwater quality data has been collected for many years in the Arlington Basin (as described in Section 2 – Plan Area) and will form the backbone for these efforts moving forward.

7.1.1.1 Groundwater Elevation Monitoring

Groundwater level data are collected from wells in the basin and incorporated into regional groundwater level databases maintained by the Santa Ana Watershed Project Authority (SAWPA) and Western Municipal Water District (Western). The details of these databases, as described by Western, include the "Cooperative Well Measuring Program Database, Santa Ana Basin Relational Information Network Application Database, and the Santa Ana Watershed Data Management System." A subset of these wells will comprise the SGMA monitoring program for the Arlington Basin, as described in Section 5 – Monitoring Network. The SGMA monitoring wells will be used to monitor groundwater elevations in the Arlington Basin in the spring and fall of each year.

7.1.1.2 Groundwater Storage Monitoring

Groundwater pumping data is compiled by Western each year and will be used along with the groundwater elevations to evaluate groundwater in storage annually. The GSA will also conduct outreach to enlist de minimis pumpers to accept flow meters and submit records in an effort to more accurately refine annual basin pumping.

7.1.1.3 Groundwater Quality Monitoring

Groundwater quality in the Arlington Basin is considered poor, specifically with respect to total dissolved solids (TDS) and nitrate. Therefore, groundwater quality monitoring data will be annually compiled, reviewed, analyzed, and presented as follows:

- Data will be downloaded from the California Department of Public Health (CDPH) database.
- The data will be checked and verified then uploaded to the Data Management System.
- In overlapping years, data will be reviewed and compared to the SAWPA re-computation analysis for changes in ambient water quality.
- The data will be prepared for summary tables and figures.
- There will be a comparison between the data to Sustainable Management Criteria at the selected representative monitoring sites.
- Water quality data will be analyzed for impacts of projects and management actions.
- A summary of groundwater quality changes with respect to the groundwater sustainability goal will be provided.

Monitoring results will be included in the annual reports to the DWR, as well as summarized for trends in the five-year GSP update report.

7.1.1.4 Interconnected Surface Water Monitoring

As described in Section 4.6 of this GSP, there are no major rivers (creeks or lakes) in the Arlington Basin. There is no current physical evidence that Hole Lake (drainage) is a point of groundwater discharge for groundwater to the Santa Ana River. The discussions of available data in Section 4.6 suggest that it is likely that surface flow in the drainage is from urban nuisance flows and stormwater during periods of precipitation. Based on the available data, groundwater does not supply surface water in the Hole Lake area, therefore Arlington Basin does not exhibit interconnected surface water and groundwater.

7.1.1.5 Land Subsidence and Seawater Intrusion Monitoring

Land Subsidence

There is currently no subsidence monitoring in the groundwater basin and the hydrogeologic conditions, historical groundwater levels and basin lithology, are such that it is unlikely subsidence will occur in the Arlington Basin. Moving forward, as part of SGMA monitoring, interferometric synthetic aperture radar (InSAR) data provided by the DWR, that assesses land subsidence, will be reviewed. The InSAR data will be managed in the following way:

- InSAR data will be downloaded from the DWR website annually.
- The data will be checked and verified for completeness and reasonableness.
- The InSAR data will be used to evaluate whether potential subsidence has occurred and if so, a subsidence map will be prepared and included in the annual and five-year reports.
- Currently there is no sustainability criteria for subsidence. Only if evidence of potential subsidence is detected, will a sustainability goal be proposed and included in the subsequent five-year report.

Seawater Intrusion

Seawater Intrusion cannot occur in the Arlington Groundwater Basin due to the extensive distance and geologic features between the ocean and the groundwater basin. Seawater Intrusion monitoring will not be included in the SGMA monitoring program.

7.1.2 Reporting

SGMA regulations require all reports comply with DWR submittal requirements and be published by DWR, along with all transmittals signed by an authorized party. Data will be organized and made available to the public to document basin conditions relative to the sustainable management criteria provided in Section 6 – Projects and Management Actions. At a minimum, the following reports will be prepared:

Annual Reports

In accordance with SGMA Regulation §356.2, annual reports will be submitted to DWR starting on April 1, 2023. The purpose of the report is to provide monitoring and total groundwater use data to DWR, compare monitoring data to the sustainable management criteria, and adaptively manage actions and projects implemented to achieve sustainability. Annual reports will be available to basin stakeholders.

Five-Year GSP Update Reports

Five-year GSP update reports will be provided to DWR starting in 2027. The Arlington Basin GSA shall evaluate the GSP at least every five years to assess whether it is achieving the sustainability goal in the basin. The assessment will include a description of significant new information that has been made available since GSP adoption or amendment, whether new information or understanding warrants changes to any aspect of the plan, and documentation of any projects or management actions that are being implemented.

GSP Periodic Evaluations and Amendments

Although not required by SGMA regulations, the Arlington Basin GSA anticipates that an amendment to this GSP may be prepared within the first five years to address proposed sustainability goals for interconnected surface water and update water budgets as additional data becomes available. Updates may incorporate additional monitoring data, update the sustainable management criteria, document any projects or management actions that are being implemented, and/or identify adaptive management activities. In addition, when new information is gathered from the monitoring networks it will be included in the annual and five-year reports, as well as in the Arlington Basin Database.

7.1.3 Public Outreach

The Arlington Basin GSA will routinely provide information to the public about GSP implementation, progress towards sustainability, and the need to use groundwater efficiently. The Arlington Basin GSA website will be maintained as a communication tool for posting data, reports, and meeting information.

7.2 Estimation of GSP Implementation Costs

The cost to implement the GSP consist of administrative costs, technical costs, and reporting costs. Table 7-1 summarizes the conceptual planning-level costs for the initial five years of GSP implementation. These costs include previous and anticipated costs for project development and implementation. No fees will be collected by the Arlington Basin GSA for any of the currently planned projects. Additional funding, grants and loans, will be pursued to help pay for future project costs. If and when funding is secured, costs will be adjusted to reflect any updates or changes.

General costs shown in Table 7-1 include routine administrative operations, public outreach, water conservation, plan implementation, monitoring – including data collection and analysis, and annual reporting of sustainability conditions. Specific costs provided include supplemental hydrogeologic investigations and project permitting costs to address data gaps, improvements to the monitoring networks – including installation of two new monitoring wells, and early planning efforts for the recharge of water transferred from Riverside Basin or the procuring and recharging of recycled water. Already included in the costs is the implemented $10 million for feasibility studies, construction, and testing of Victoria Basin – the major project for reaching sustainability in this GSP. Also included are the three offsetting grants totaling $1 million each, provided by the United States Bureau of Reclamation, California DWR, and Riverside County Flood Control. The costs also include an estimated $1 million for the permitting recharge of recycled water at Victoria Basin, should it be deemed necessary by the annual or five-year review to reach basin sustainability.

7.3 Schedule for Implementation

The GSP's general implementation schedule, illustrating an estimated timeline, is shown in Table 7-2. Monitoring activities, tentative schedules for projects and management actions, and a preliminary schedule for administrative and management events are included in Table 7-2. Additional information on the projects and management actions included in the schedule can be found in Section 6 – Projects and Management Actions, in their respective subsections.

As mentioned in Section 6, preliminary models indicate that recharge at Victoria Basin may be capable of bringing the water balance of Arlington Basin into sustainability, especially if multiple sources of groundwater recharge are utilized to maximize water availability throughout the year and reduce the amount of rejected recharge due to groundwater mounding beneath the spreading basin. Continuous basin monitoring and reporting will allow for implementation of supplementary management actions and/or projects, as necessary, after review of feasibility by the GSA.

Table 7-1

Estimated Planning-Level Costs for First Five Years of Implementation

GSP Implementation Activity		Description	Estimated Cost	Cost Unit	Anticipated Timeframe
1.0		GSP Implementation and GSA Management			
1.1	GSA Administration and Legal Support	Update Agreements, Routine Operating Costs (Salaries, Office Space, Equipment, etc.), Update Website and Legal Support	$20,000	Annual	2022-2026
1.2	Stakeholder and Board Engagement	Stakeholder Outreach Costs and GSA Board Engagement Costs	$2,500	Annual	2022-2026
1.3	Public Outreach	Public Outreach Costs	$2,000	Annual	2022-2026
1.4	Water Conservation	Costs included in Public Outreach			2022-2026
1.5	GSP Implementation Program Management	Program Management Costs for GSP Implementation	$5,000	Annual	2022-2026
1.6	Monitoring Program with Data Management	Monitoring Program including Groundwater Levels and Groundwater Quality Monitoring	$12,000	Annual	2022-2026
1.7	Annual Reporting	Data Collection, Analysis, and Reporting - One year	$25,000	Annual	2022-2026
1.8	Five-Year GSP Update	Data Collection, Analysis, and Reporting - GSP Update	$75,000	Every 5 Years	2027
2.0		Projects and Management Actions			
2.1	Installation of Monitoring Wells	Two Additional New Monitoring Wells	$500,000	First 2 Years	2022-2024
2.2	Aquifer Storage and Recovery or Managed Aquifer Recharge*	Victoria Basins Recharge Project[‡] Current Costs Represent Previous Expenditures for Feasibility, Construction, and Testing of Recharge Capacity for Victoria Basins.	$10 M	Completed	2018-2022
2.3	Water Transfer Recharge	Pump Water from Riverside South Groundwater Basin to Victoria Basins for Recharge into the Arlington Basin. Costs include New Well, Equipping, and Infrastructure to Riverside Canal.	$4M	First 5 Years	2022-2026
2.4	Recycled Water Recharge	Studies and Title 22 Permitting for Recharge of Recycled Water to Victoria Basins. Costs include Infrastructure to Transfer Recycled Water to Victoria Basins.	$1M	First 5 Years	2022-2026
2.5	Metering Infrastructure	Outreach and Equipment to De Minimis Pumpers. Voluntary Involvement in Metering Program.	$5,000	First 5 Years	2022-2026

Notes:

* Includes Stormwater Capture and Spreading, and Artificial Recharge with Recycled Water

[‡] The Victoria Basins Recharge Project is currently well along in the development phase and in position for stormwater capture. Future sources considered are recycled water and water transfers from Riverside Basin.

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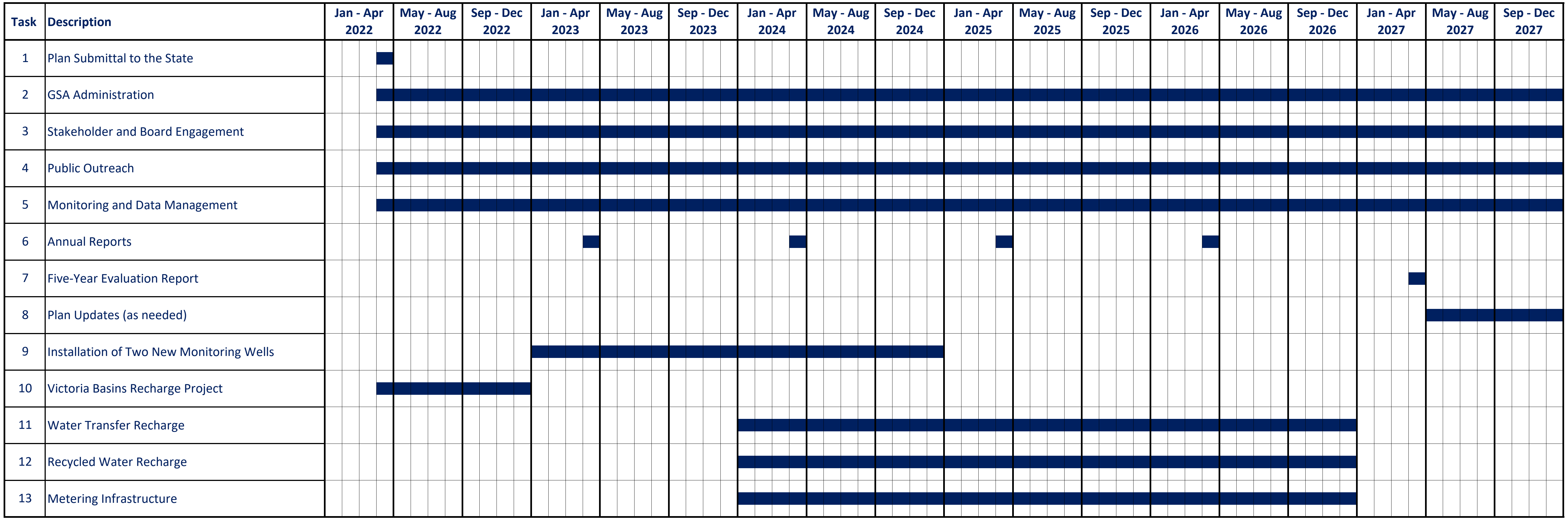
Table 7-2

Estimated Schedule for First Five Years of Implementation



Task	Description	Jan - Apr 2022	May - Aug 2022	Sep - Dec 2022	Jan - Apr 2023	May - Aug 2023	Sep - Dec 2023	Jan - Apr 2024	May - Aug 2024	Sep - Dec 2024	Jan - Apr 2025	May - Aug 2025	Sep - Dec 2025	Jan - Apr 2026	May - Aug 2026	Sep - Dec 2026	Jan - Apr 2027	May - Aug 2027	Sep - Dec 2027
1	Plan Submittal to the State	■																	
2	GSA Administration	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
3	Stakeholder and Board Engagement	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
4	Public Outreach	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
5	Monitoring and Data Management	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
6	Annual Reports				■			■			■			■					
7	Five-Year Evaluation Report																■		
8	Plan Updates (as needed)																	■	■
9	Installation of Two New Monitoring Wells				■	■	■	■	■	■									
10	Victoria Basins Recharge Project	■	■	■															
11	Water Transfer Recharge							■	■	■	■	■	■	■	■	■			
12	Recycled Water Recharge							■	■	■	■	■	■	■	■	■			
13	Metering Infrastructure							■	■	■	■	■	■	■	■	■			

APPENDIX 1A

GSP Checklist

[placeholder]

APPENDIX 2A

Arlington Basin GSP

Communications and Engagement Plan

Arlington Basin GSP
Communications and Engagement Plan (C&E Plan)

Developed by Water Systems Consulting

June 2020

WESTERN
MUNICIPAL
WATER
DISTRICT

Contents

Plan Purpose

This Communication and Engagement Plan (C&E Plan) describes the planned activities for engaging interested parties in the development of a SGMA compliant Groundwater Sustainability Plan (GSP) for the Arlington Basin. It is designed to meet the stakeholder engagement requirements of SGMA and the GSP regulations.

This plan is structured to relay the following as advised by DWR's stakeholder Communication and Engagement Guidance Document:

- Demonstrate how the GSA aims to effectively communicate with and engage relevant Basin stakeholders
- Identify the methods and tools to support communication and engagement
- Identify how the GSA plans to solicit and utilize stakeholder input in the plan development

Target Stakeholder Audiences

ECONOMIC DEVELOPMENT.
Jurupa Community Services District; Rubidoux Community Services District

ENVIRONMENTAL / CONSERVATION GROUPS.
Hidden Valley Wildlife Area; Santa Ana Watershed Project Authority

GENERAL PUBLIC.
Loving Homes Greens Homeowners Association; Riverwalk Master Homeowners Association

HUMAN RIGHTS TO WATER.
Pechanga Cultural Resources

INTEGRATED WATER MANAGEMENT. Bureau of Reclamation; California Department of Water Resources; Chino Basin Watermaster; Riverside County Flood Control and Water Conservation District; Santa Ana Regional Water Quality Control Board

LAND USE.
Riverside County Planning Department; Riverside Local Agency Formation Commission

PRIVATE WATER USERS.
California Baptist University; La Sierra University

TRIBES.
Agua Caliente Band of Cahuilla Indians; Moronga Band of Mission Indians; San Manuel Band of Mission Indians; Soboba Band of Luiseno Indians

URBAN / AGRICULTURE WATER USERS.
City of Corona; City of Norco; City of Rialto; City of Riverside Public Utilities; Elsinore Valley Municipal Water District; Elsinore Valley Municipal Water District; Elsinore Valley Municipal Water District; Home Gardens County Water District; Inland Empire Utilities Agency; Inland Empire Utilities Agency; Riverside Highland Water Company; San Bernardino County; San Bernardino Valley Municipal Water District; Santa Ana River Water Co.; Temescal Valley Water District; West Valley Water District

Plan Goals

- Create a meaningful opportunity for interested Basin stakeholders to participate in the GSP development and in a manner that builds public trust and buy-in for the resulting plan.
- Directly incorporate stakeholder input into the GSP decision-making process.
- Create a public-facing stakeholder feedback loop that identifies what input was collected and how it was used in the development of the GSP.
- Develop a cost-effective, stakeholder-informed GSP supported by defensible technical data and analysis.

Evaluation Metrics

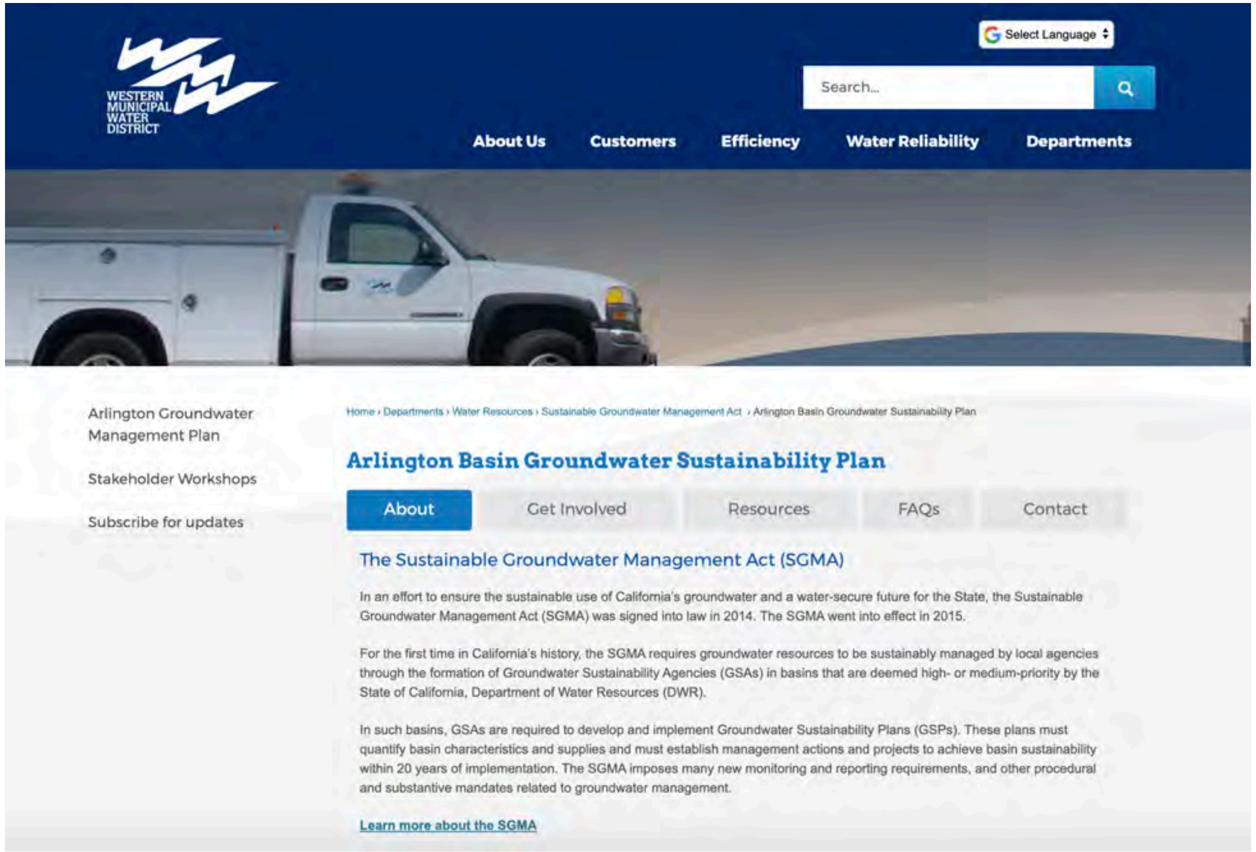
- Volume and diversity of representation at stakeholder workshops related to target segments
- Quality of participation among workshop attendees
- Traffic volume and user behavior onto the Arlington Basin GSP website
- Open and click through rate of project email bulletins

Approach

1. STAKEHOLDER EDUCATION

The project team will provide basic educational content to inform stakeholders about what groundwater is, the requirements of SGMA, why sustainable management of groundwater is important in the Arlington Basin, and how they can get involved in the GSP development. Specific content includes:

- Kick off public meeting presentation (April 2019) that includes an overview of groundwater and the SGMA policy
- Project website with key terms, SGMA requirements with links to more information, frequently asked questions, project timeline and how to get involved



Arlington Basin Groundwater Sustainability Plan

The Sustainable Groundwater Management Act (SGMA)

In an effort to ensure the sustainable use of California's groundwater and a water-secure future for the State, the Sustainable Groundwater Management Act (SGMA) was signed into law in 2014. The SGMA went into effect in 2015.

For the first time in California's history, the SGMA requires groundwater resources to be sustainably managed by local agencies through the formation of Groundwater Sustainability Agencies (GSAs) in basins that are deemed high- or medium-priority by the State of California, Department of Water Resources (DWR).

In such basins, GSAs are required to develop and implement Groundwater Sustainability Plans (GSPs). These plans must quantify basin characteristics and supplies and must establish management actions and projects to achieve basin sustainability within 20 years of implementation. The SGMA imposes many new monitoring and reporting requirements, and other procedural and substantive mandates related to groundwater management.

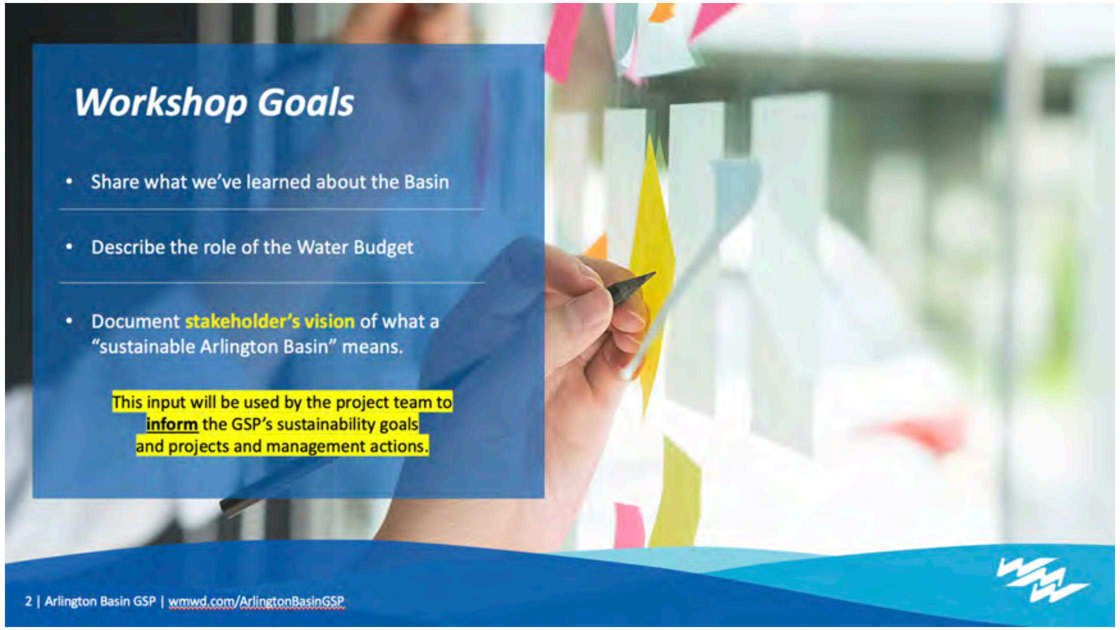
Approach, continued

2. STAKEHOLDER WORKSHOPS

The project team will invite stakeholders to participate in three (3) interactive, virtual workshops held July 2020, August 2020, and September 2020. Each workshop will give stakeholders the opportunity to share their perceptions, opinions and ideas to inform key GSP decisions, including:

1. Setting a shared vision for a "sustainable Arlington Basin"
2. Sustainable goal setting
3. Defining the projects and management actions the Basin's sustainability goals

Input gathered at the workshops will be summarized and published to the project website. Workshops will also be recorded and published to the project website.



Workshop Goals

- Share what we've learned about the Basin
- Describe the role of the Water Budget
- Document **stakeholder's vision** of what a "sustainable Arlington Basin" means.

This input will be used by the project team to **inform** the GSP's sustainability goals and projects and management actions.

2 | Arlington Basin GSP | wmwd.com/ArlingtonBasinGSP

Approach, continued

3. STAKEHOLDER PUBLIC COMMENT PERIOD

Once the full draft of the GSP is developed, the project team will open a public comment period for a minimum of 30 days.

Stakeholder outreach via email bulletins and public notices will be used to advertise the public comment period.

Schedule of Engagement Activities

Step 1.
Establish Governance Structure

April 2019
PUBLIC MEETING
and GSA Formation

Step 2.
Document Basin Setting

July 2020
STAKEHOLDER WORKSHOP:
Building a Shared Vision of a Sustainable Arlington Basin

Step 3.
Set Sustainability Goals

August 2020
STAKEHOLDER WORKSHOP
Sustainable Goal Setting

Step 4.
Develop Plan to Sustainability

September 2020
STAKEHOLDER WORKSHOP
Projects and Management Actions

Step 5.
Adopt the Plan

February 2021
PUBLIC COMMENT PERIOD
Full Draft of GSP

Communication Forums and Tools

PUBLIC WORKSHOPS

July 30, 2020 • Virtual

Building a Shared Vision of a Sustainable Arlington Basin

In this virtual workshop, attendees will help create a shared vision for what a “sustainable Arlington Basin” means. To inform the interactive exercise, the project team will give a brief recap of the purpose of the Groundwater Sustainability Plan (GSP) and the requirements of the Sustainable Groundwater Management Act (SGMA) in easy-to-understand terms. Next, they’ll summarize key takeaways of the Basin Setting work completed to date, which describes the Basin’s unique geological makeup, potential challenges associated with groundwater management, and anticipated future groundwater use in the Basin. Further, they’ll describe the historical and current Water Budget. Stakeholder input documented in this workshop will be shared with the GSA to inform the decisions in the Groundwater Sustainability Plan.

August 27, 2020 • Virtual

Getting to Sustainability

In this virtual workshop, attendees will help determine the preliminary set of sustainability goals for the Arlington Basin and weigh in on the criteria they believe should drive the projects and management actions. To inform the interactive exercises, the project team will recap the shared vision of a sustainable Arlington Basin that stakeholders captured in Workshop #1. Next, they’ll describe the relevant requirements of SGMA, including the role of Sustainable Management Criteria, minimum thresholds, and measurable objectives. Stakeholder input documented in this workshop will be shared with the GSA to inform the decisions in the Groundwater Sustainability Plan.

September 24, 2020 • Virtual

Projects and Management Actions

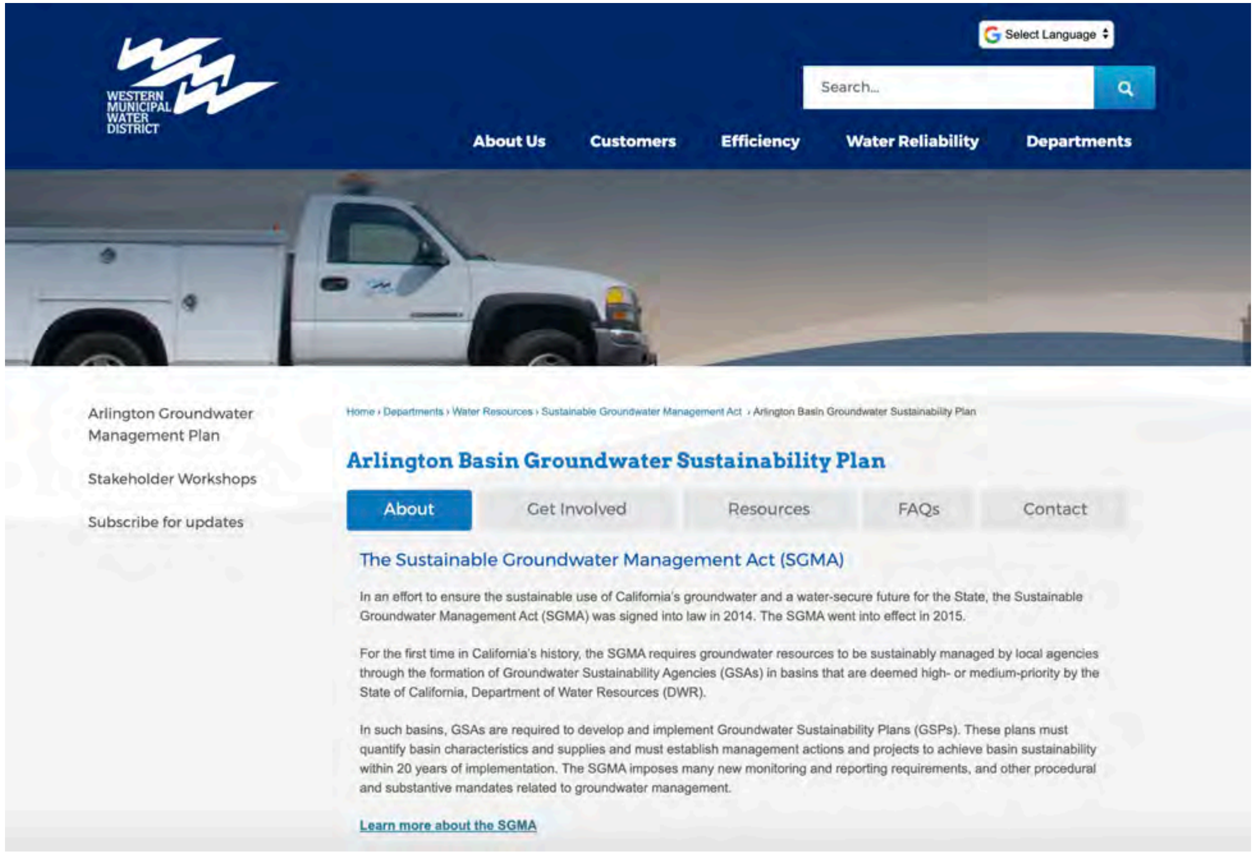
In this virtual workshop, stakeholders will brainstorm and arrive at a preliminary set of projects and management actions that will be used over the next 20 years to reach sustainable groundwater levels in the Arlington Basin. To inform the interactive exercises, the project team will recap (A) the vision for a sustainable Arlington Basin that stakeholders captured in Workshop #1, as well as (B) the sustainability goals, and (C) criteria for projects and management actions that were captured in Workshop #2. Activities will surface considerations for sharing project costs, and an implementation plan that keeps the approach flexible and on track. Stakeholder input documented in this workshop will be shared with the GSA to inform the decisions in the Groundwater Sustainability Plan.

Communication Forums and Tools, continued

PROJECT WEBSITE

Western Municipal Water District (Western) will host a project-specific website that includes basic information about the project, educational content about SGMA and the plan purpose, how stakeholders can participate in the plan development, and access to project-related documents and resources.

wmwd.com/ArlingtonBasinGSP



Arlington Basin Groundwater Sustainability Plan

The Sustainable Groundwater Management Act (SGMA)

In an effort to ensure the sustainable use of California's groundwater and a water-secure future for the State, the Sustainable Groundwater Management Act (SGMA) was signed into law in 2014. The SGMA went into effect in 2015.

For the first time in California's history, the SGMA requires groundwater resources to be sustainably managed by local agencies through the formation of Groundwater Sustainability Agencies (GSAs) in basins that are deemed high- or medium-priority by the State of California, Department of Water Resources (DWR).

In such basins, GSAs are required to develop and implement Groundwater Sustainability Plans (GSPs). These plans must quantify basin characteristics and supplies and must establish management actions and projects to achieve basin sustainability within 20 years of implementation. The SGMA imposes many new monitoring and reporting requirements, and other procedural and substantive mandates related to groundwater management.

Learn more about the SGMA

Communication Forums and Tools, continued

EMAIL BULLETINS

Western Municipal Water District (Western) will manage a project-specific email bulletin subscription list. Anyone can subscribe to the list from the project website at **wmwd.com/ArlingtonBasinGSP**.

Email bulletins will be used to notify subscribes about:

- Upcoming opportunities to participate in the GSP development, including public workshops, meetings and/or the GSP public comment period
- New information added to the project website

Communication Forums and Tools, continued

PUBLIC NOTICES

Western Municipal Water District (Western) will publish timely public notices about upcoming public meetings and/or public workshops in accordance with Brown Act requirements.

Communication Forums and Tools, continued

MASTER GRAPHICS — PROJECT TIMELINE

Step 1. Establish Governance Structure

The details of how the plan will be managed and enforced by the GSA.

Jan ‘19 – Apr ‘19

Step 2. Document Basin Setting

Profile the Basin geology, groundwater use, and all factors affecting future groundwater demand and management.

Apr ‘19 – Jul ‘20

Step 3. Set Sustainability Goals

Set measurable goals per SGMA requirements and the systems/networks to monitor progress.

Jul ‘20 – Sep ‘20

Step 4. Develop Plan to Sustainability

Identify the projects and management actions to be taken to meet the sustainability goals.

Sep ‘20 – Nov ‘20

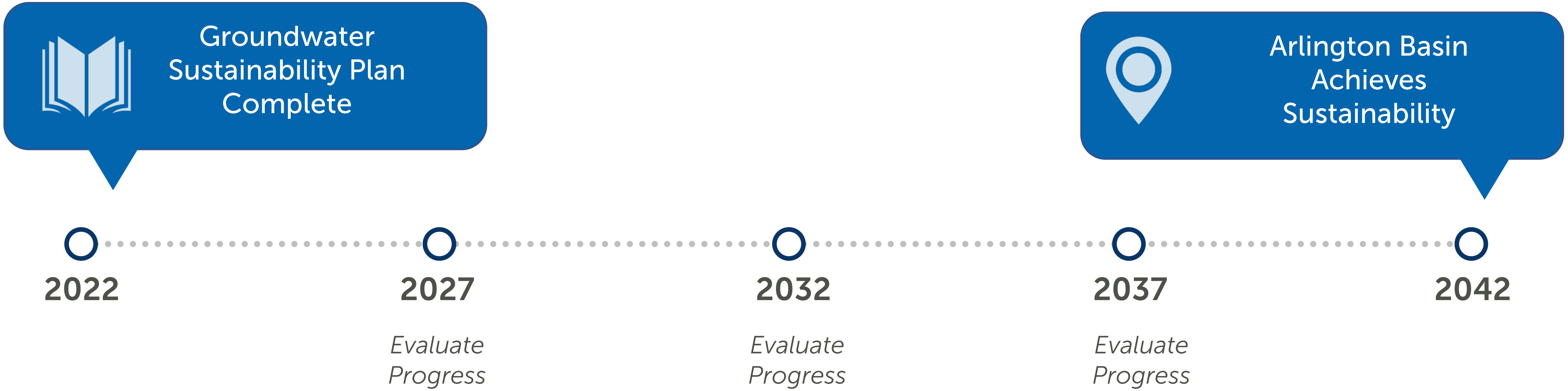
Step 5. Adopt the Plan

The GSA votes to adopt the Groundwater Sustainability Plan (GSP).

Nov ‘20 — Feb ‘21

Communication Forums and Tools, continued

MASTER GRAPHICS — SGMA DEADLINES



Groundwater Sustainability Plan Complete

Arlington Basin Achieves Sustainability

2022

2027

Evaluate Progress

2032

Evaluate Progress

2037

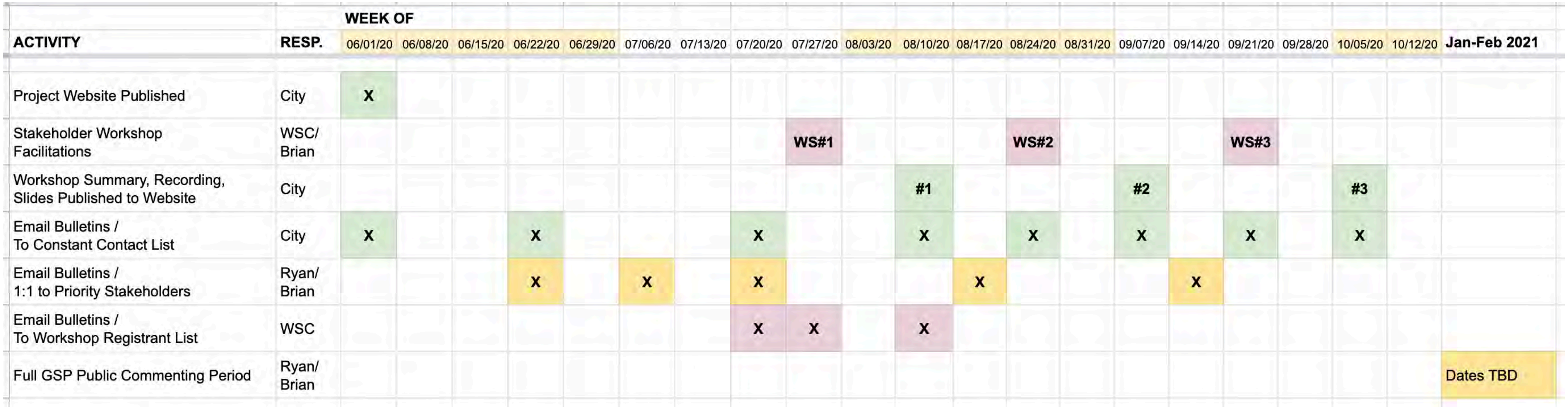
Evaluate Progress

2042

Communication Forums and Tools, continued

MASTER GRAPHICS — BASIN MAP

Workplan Schedule



		WEEK OF																				
ACTIVITY	**RESP.**	06/01/20	06/08/20	06/15/20	06/22/20	06/29/20	07/06/20	07/13/20	07/20/20	07/27/20	08/03/20	08/10/20	08/17/20	08/24/20	08/31/20	09/07/20	09/14/20	09/21/20	09/28/20	10/05/20	10/12/20	**Jan-Feb 2021**
Project Website Published	City	**X**																				
Stakeholder Workshop Facilitations	WSC/ Brian									**WS#1**				**WS#2**				**WS#3**				
Workshop Summary, Recording, Slides Published to Website	City											**#1**				**#2**				**#3**		
Email Bulletins / To Constant Contact List	City	**X**			**X**				**X**			**X**		**X**		**X**		**X**		**X**		
Email Bulletins / 1:1 to Priority Stakeholders	Ryan/ Brian				**X**		**X**		**X**				**X**				**X**					
Email Bulletins / To Workshop Registrant List	WSC								**X**	**X**		**X**										
Full GSP Public Commenting Period	Ryan/ Brian																					Dates TBD

APPENDIX 3A

Well Logs used for Cross-Section Development

035/05W-07C01 S

FORM 115

INVESTIGATION

DIVISION OF WATER RESOURCES

DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

SHEET 1

NUMBER E-1741

WELL LOG

LOCAL DESIGNATION

16957E

LOCATION 0.1 mi. N.W. of Garfield St., 1/4 mi. S.W. of Jackson St., Arlington

1050' 1300'

OWNER Ferguson

DATE COMPLETED Feb. 1935

DIAMETER OF CASING

DRILLED BY Brockman

SOURCE OF INFORMATION

INSPECTED WHILE DRILLING SEE FILE NO.

SURFACE ELEVATION

SKETCH

DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL	THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
0- 30		Soil and clay				
30- 52		Gray clay				
52- 60		Sand				
60- 61		Clay				
61- 70		Fine sand				
70- 71		Clay				
71- 77		Gravel and clay				
77- 82		Clay				
82-135		Coarse gravel and boulders				
		Cut 75-135'				

ELEV
755
135
620

FOR FIELD COPIES USE ALTERNATE LINES

LOG OBTAINED BY DATE

97588 9-32 15M CALIFORNIA STATE PRINTING OFFICE

ORIGINAL
File with DWR

DEC 10 1971

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do Not Fill In

№ 64364

State Well No. [illegible]

Other Well No.

(1) OWNER:

Name Sherman Indian High School
Address Riverside, California

(2) LOCATION OF WELL:

County Riverside Owner's number, if any
Township, Range, and Section
Distance from cities, roads, railroads, etc. 1000' South of Magnolia and 150' East of Jackson

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Other ☐

(6) CASING INSTALLED:

STEEL: OTHER:
SINGLE ☒ DOUBLE ☐

From ft.	To ft.	Diam.	Gage or Wall	If gravel packed: Diameter of Bore	From ft.	To ft.
0	190	12 3/4	43.8#	20	0	190

Size of shoe or well ring: Bull Nose Size of gravel: 50% S-320 X
50% G 3/8
Describe joint Butt Joint with collar

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen Type 304 Stainless/Louvred

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
120'	180'	12	10	5/32 X 2 1/2

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 60' ft.
Were any strata sealed against pollution? Yes ☐ No ☐ If yes, note depth of strata
From ft. to ft.
From ft. to ft.
Method of sealing 22" Dia. Conductor Cemented in Place

(9) WATER LEVELS:

Depth at which water was first found, if known ft.
Standing level before perforating, if known ft.
Standing level after perforating and developing 56 ft.

(10) WELL TESTS:

Was pump test made? Yes ☒ No ☐ If yes, by whom? McCalla Bros.
Yield: 1000 gal./min. with 94 ft. drawdown after 54 hrs.
Temperature of water - Was a chemical analysis made? Yes ☒ No ☐
Was electric log made of well? Yes ☒ No ☐ If yes, attach copy

(11) WELL LOG:

3S/5W·7J2

Total depth 190 ft. Depth of completed well 190 ft.
Formation: *Describe by color, character, size of material, and structure*

0 to	4	Top Soil ft.
4	40	Sand and D.G.
40	80	Sandy Clay
80	83	Sand and Gravel
83	90	Sandy Clay
90	97	Sand and Gravel
97	100	Clay
100	140	Sand and D.G.
140	143	Clay
143	169	Sand
169	190	Gravel/Hard

TEST PUMP DATA

GPM	vs	Pumping Level
600		96'
650		100'
800		120'
1000		150'

CONFIDENTIAL - NOT FOR PUBLIC RELEASE

Work started 10-6-71 19 Completed 11-9-71 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME McCalla Bros., Inc.
(Person, firm, or corporation) (*Typed or printed*)

Address 3819 West First Street
Santa Ana, Calif. 92703

[SIGNED]
(*Well Driller*)

License No. 196824 Dated November 18, 19 71

SKETCH LOCATION OF WELL ON REVERSE SIDE

25179-950 9-68 50M TRIP ΔD OSP

CLIPPED

FORM 115

INVESTIGATION

2 copies

3S/5W-17D1, S

SHEET 1

DIVISION OF WATER RESOURCES
DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

NUMBER

WELL LOG

LOCAL DESIGNATION

LOCATION 1530' ~~.29~~ mi SE'ly along Jackson St from Indiana Ave thence 55' SWly at right angle   Arlington

Loc. # 16968 -

OWNER Riverside Grove Co.

DATE COMPLETED 7-30-18

DIAMETER OF CASING 15"

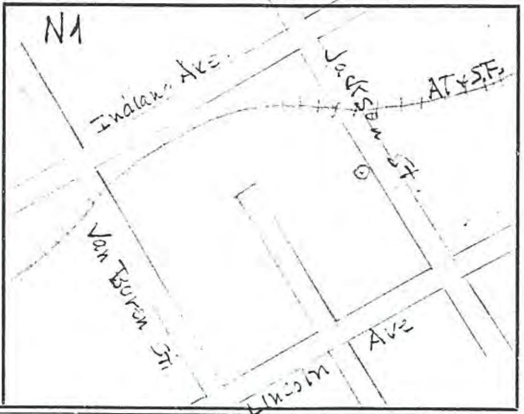
DRILLED BY W.A.Rice

SOURCE OF INFORMATION W.A.Rice

INSPECTED WHILE DRILLING No   SEE FILE NO.

SURFACE ELEVATION 860 topo

SKETCH



FOR FIELD COPIES USE ALTERNATE LINES

DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL	THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
Surface -11		Soil				
11-26		Dry Sand				
26-40		Sandy clay				
40-80		Clay				
80-88		Gravel with some clay				
88-110		Gravel				
110-124		Disintegrated Granite				
124-130		" " and rock				
130-205		Boulders				
205-230		Disintegrated Granite and small boulders				
230-236		Cement and small boulders				
236-242		Some blue clay and Disintegrated Granite				
242-245		Cemented Sand				
245-278		" " and small gravel				
278-285		Cemented sand				
285-287		" " and small boulders				
287-294		" "				
294-297		" " " " "				
297-306		" "				
306-307		Rock				
307-308		Silty Clay				
308-311		Cemented sand and some small gravel				
311-314		Small boulders and sand cemented				
314-316		~~Silty clay~~				
316-326		~~Gravel and sand cemented~~				
326-328		~~Cemented sand~~				
328-352		~~Blue sandy clay~~				
352-372		~~Disintegrated gray granite~~				
372-376		" " " and small gravel				
376-382		~~Blue granite boulders~~				
382-420		~~Blue granite with crevices~~ - hot water				
420-421		~~At 420 drilled thru ½" hard cement, had a run of coarse sand and finished on hard blue granite~~ at 421.				

476 BR

LOG OBTAINED BY Clifton W.Johnson   DATE 3-30-31

3s/5w-17D1

FORM 115
INVESTIGATION

35/5W-17K1

DIVISION OF WATER RESOURCES

DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

SHEET 1

NUMBER E 183

WELL LOG

LOCAL DESIGNATION 3S/5W

Loc # 16979 -

LOCATION 1800' S. E. of Victoria Ave.; 100' S. W. of Jackson St., Arlington

OWNER The Riverside Trust Company

DATE COMPLETED January, 1911

DIAMETER OF CASING

DRILLED BY N. S. Rice

SOURCE OF INFORMATION W. A. Rice

INSPECTED WHILE DRILLING SEE FILE NO.

SURFACE ELEVATION 920 topo

SKETCH

16978

Group 16978

DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL	THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
0-52		Soil and clay soil 10' sc 42'				
52-56		Sand and Water s	4			
56-80		Sandy clay sc	24			
80-94		Gravel g	14			
94-98		Clay and rock gc	4			
98-115		Granite and rock BC	/			
		Blue granite in bottom				
		Perf. 76-100				

MICROFILMED

FOR FIELD COPIES USE ALTERNATE LINES

LOG OBTAINED BY

FORM 115

INVESTIGATION

2 - copies

DIVISION OF WATER RESOURCES

DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

3S/6 13N2 SHEET 1

NUMBER E-169e

WELL LOG

LOCAL DESIGNATION Well #2

Loc. # 16939C

LOCATION 1200 SW'ly along Magnolia Ave & 1240' SE'ly at right angle Arlington ← from Polk st.

OWNER E. H. Daly

DATE COMPLETED —

DIAMETER OF CASING —

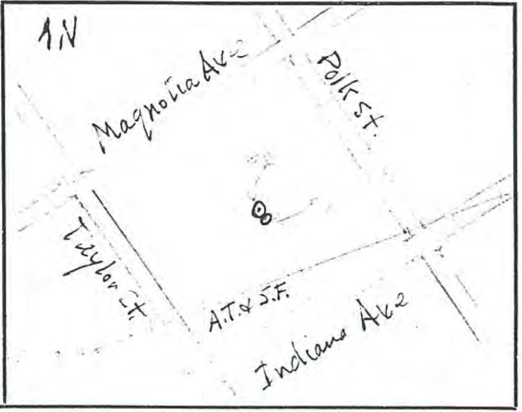
DRILLED BY —

SOURCE OF INFORMATION E. H. Daly

INSPECTED WHILE DRILLING No SEE FILE NO.

SURFACE ELEVATION

SKETCH



DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL	THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
1-12		Soil				
12-22		Clay				
22-32		Sand				
32-46		Clay				
46-66		Fine sand				
66-88		Water gravel		Cut		
88-94		Sand				
94-111		Water gravel		"		
111		Granite in bottom				

MICROFILMED

FOR FIELD COPIES USE ALTERNATE LINES

LOG OBTAINED BY DATE

83781 3-31 5M

2

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 277445 2

…e of Intent No. ______
Local Permit No. or Date ______

035/06W-14 Q02 S

State Well No. [illegible]
Other Well No. ______

(1) OWNER: Name Santa Anna Watershed Proj.
Address 3600 Tyler Street, Suite 207
City Riverside, CA ZIP 92503

(2) LOCATION OF WELL (See instructions):
County Riverside Owner's Well Number (5)
Well address if different from above ______
Township T2S Range R6W Section 19
Distance from cities, roads, railroads, fences, etc. Well is on Magnolia Ave. in Riverside, CA between Pierce St. and LaSierra St.

~~LAT 33 53 5~~
LAT 33 54 8.17
LONG 117 28 38.5

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 8X16
Diameter of bore 26"
Packed from 65' to 180' ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen S.S.-16"-Louver

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
+2	80'	16"	.250	80'	130'	0.050
130'	150'	16"	.250			
0'	60'	30"	.325			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth ______ ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ______ ft.
Method of sealing Pumped 6 Sack sand grout.

(10) WATER LEVELS:
Depth of first water, if known ______ ft.
Standing level after well completion ______ ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? WDC
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 18.49' ft. At end of test 33.37' ft.
Discharge 1013 gal/min after 24 hours Water temperature 20°C
Chemical analysis made? Yes ☐ No ☐ If yes, by whom? ______
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 180' ft. Completed depth 150' ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	5	Sand
5	7	No sample
7	16	Clay
16	17	Sand
17	24	Sand,clay
24	33	Sand,clay
33	37	Sand
37	47	Sand
47	54	Sand
54	60	Sand,gravel
60	68	Sand,gravel
68	84	Sand
84	97	Sand,gravel
97	99	Clay
99	117	Sand,grAvel
117	129	Sand,gravel
129	131	Sand,gravel,minor clay
131	134	Clay
134	137	Clay
137	139	Clay,sand,gravel
139	145	Sandstone,clay
145	149	Clay,sand,gravel
149	165	Decomposed granite
165	180	Decomposed granite

Work started 9-25 1989 Completed 10-4 1989

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed ______ (Well Driller)
NAME Water Development Corporation
(Person, firm, or corporation) (Typed or printed)
Address 1202 Kentucky Ave.
City Woodland, CA ZIP 95695
License No. 283326 Date of this report 8-2-90

DWR 188 (REV. 12-86)

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

State No. 35/6W-14Q2

WELL DATA

BRANCH

Owner Santa Ana Watershed Project Auth
Address 11615 Sterling Ave. Riverside
Tenant
Address

State No.
Other No.

Type of Well: Hydrograph ☐ Key ☐ Index ☐ Semiannual ☐
Location: County Riverside Basin No.
U.S.G.S. Quad. Riverside West Quad. No.
¼ ¼ Section 14, Twp. 35, Rge. 6W MD [✓ SB] H Base & Meridian
Description

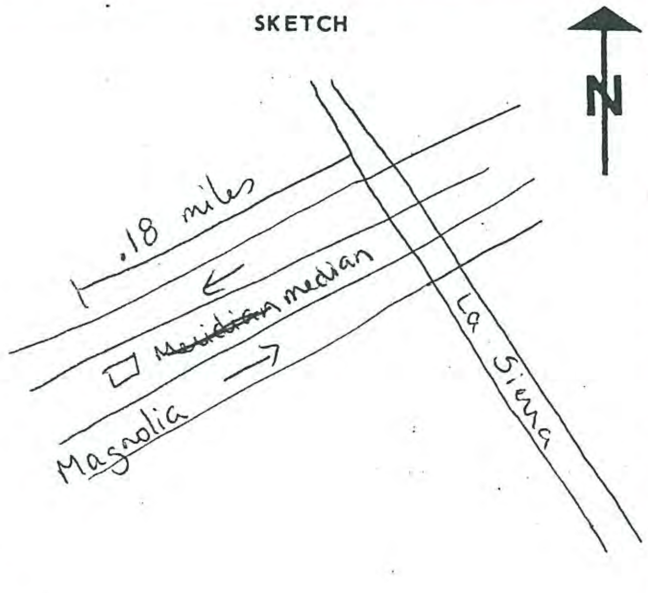
Reference Point description located .18 miles Sothwest of La Sierra in ~~Meridian~~ of Magnolia Ave median strip

which is ft. above/below land surface. Ground Elevation ft.
Reference Point Elev. ft. Determined from
Well: Use Municiple Condition Depth ft.
Casing, size 18-24" in., perforations

Measurements By: DWR ☐ USGS ☐ USBR ☐ County ☐ Irr. Dist. ☐ Water Dist. ☐ Cons. Dist. ☐
Chief Aquifer: Name Depth to Top Aq. Depth to Bot. Aq.
Type of Material Perm. Rating Thickness
Gravel Packed? Yes ☐ No ☐ Depth to Top Gr. Depth to Bot. Gr.
Supp. Aquifer Depth to Top Aq. Depth to Bot. Aq.
Driller
Date drilled 1990 Log, filed open (1) confidential (2)
Equipment: Pump, type Turbine make
Serial No. Size of discharge pipe in.
Power, Kind Make
H. P. Motor Serial No.
Elec. Meter No. Transformer No.
Yield G.P.M. Pumping level ft.

Water Analysis: Min. (1) San. (2) H.M. (3)
Water Levels available: Yes (1) No
Period of Record: Begin End
Collecting Agency:
Prod. Rec. (1) Pump Test (2) Yield (3)

SKETCH



REMARKS

AS 92 1/5/93

Loc 01 RW, CW

SAWPA well #5

faucet sample port

Triazines; Simazine Atrazine, Bromacil Prometon, Diuron.

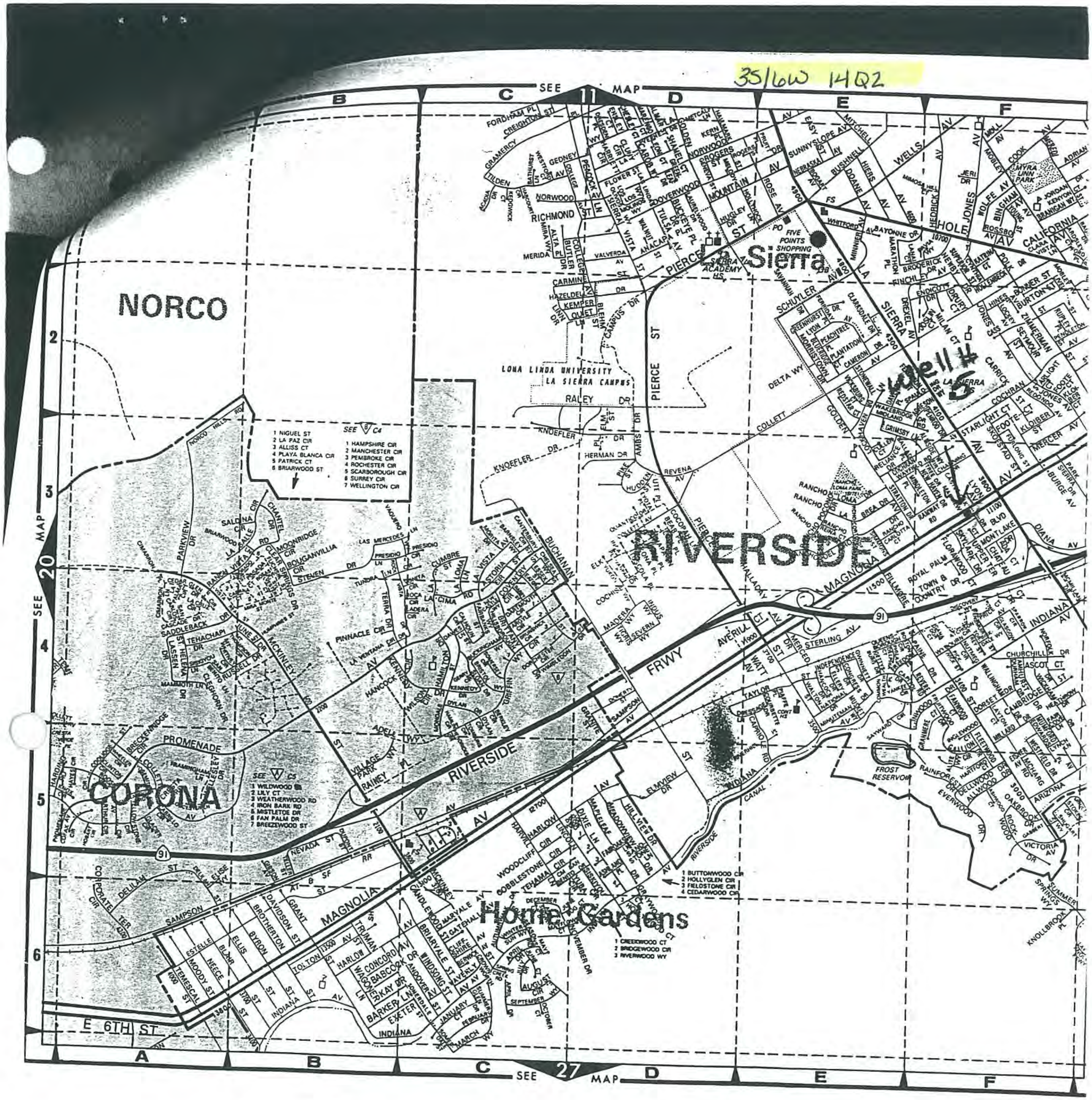
Other Municiple wells located in Meridian strip of Magnolia st.

Recorded by:
Date

DWR 429

Riverside West Quad
65-57
03S/06W/-14

35/6W 14Q2



...ng 10 years not required.) ...ethod used in determining quantity for the following calendar years.

Calendar year	EXTRACTIONS		USE		
	Annual extractions in acre-feet or .... specify unit	Method of measurement or of estimate: (Specify)	When use is for irrigation		When use is other than irrigation
			Crops served	Acreage supplied	Nature and extent of use, i.e., population, products manufactured, number and kind of stock watered
1990					
19					
19					
19					
19					
19					
19					
19					
19					
19					

Complete a separate notice for each well

STATE OF CALIFORNIA—THE RESOURCES AGENCY
STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS

Recordation Number

State Well Number

Please do not mark in the above space

FIRST NOTICE
GROUND WATER EXTRACTIONS

(Pursuant to Part 5, Division 2 of the Water Code)

Item

1. Name of person filing this notice Western Municipal Water District
   Address P. O. Box 5286, Riverside CA 92517-5286
   Street address or P. O. Box number — City — State

2. Name of person extracting ground water, if different than Item 1
   Address
   Street address or P. O. Box number — City — State

3. Names and addresses of other persons claiming an interest in or a right to extract water from this well:
   Santa Ana Watershed Project Authority (SAWPA)
   3600 Tyler Street,
   Riverside CA 92503

WELL LOCATION

4. Owner's designation of well Well #5 (Name and/or Number) 5. County Riverside

6. Describe location of well (a) to the nearest 40-acre quarter section or (b) by reference to streets or local landmarks. A complete street address is acceptable.
   (a) SW ¼, of SE ¼, Section 14, Township 3S, Range 6W, S.B. B.&M.
   (b) 3S6W14Q03S01 was assigned by the Department of Water Resources. Should be 3S6W14Q02S
   Location of well should be indicated by sketch in the space provided in Item 22. ??

WATER USE

7. Describe the Place of Use: (If sketch is required please use space under Item 22.)
   SAWPA's Arlington Desalter.

8. Quantity and Use of water extracted and method used in determining quantity for the following calendar years. (Extractions prior to preceding 10 years not required.)

Calendar year	EXTRACTIONS		USE		
	Annual extractions in acre-feet or .... specify unit	Method of measurement or of estimate: (Specify)	When use is for irrigation		When use is other than irrigation
			Crops served	Acreage supplied	Nature and extent of use, i.e., population, products manufactured, number and kind of stock watered
1990					
19					
19					
19					
19					
19					
19					
19					
19					
19					

DUPLICATE
File Original, Duplicate and Triplicate with the
DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

CONFIDENTIAL
Sec. 7076.1, State Water Code

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA—DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

* Do Not Fill In 904
State Well No. 3S/6W-22 A1
Other Well No.
Region

(1) DRILLER: (person, firm, or corporation)
Name Peerless Welding & Mach. Shop
Address P. O. Box 295
Corona, Calif.

OWNER:
Name La Sierra College
Address La Sierra Station
Arlington

(2) Proposed Use (Check)
Domestic ☒ Industrial ☐
Irrigation ☒ Test Well ☐
Municipal ☐ Other ☐

Equipment
Rotary ☒
Cable ☐
Dug Well ☐
Other ☐

(3) CASING:
35 ft. of 26 in 10 lb./ga. casing 35 left in well
202 " 14 " 1/4 " " 202 " " "
Type and size of shoe or well ring Bull nose

(4) PERFORATIONS:
Type of perforator used Torch Cut
Perforated 102 ft. to 202 ft. 7 holes per 12 in.
Diameter of perforations 1/4 in., length 4 in.

(5) WATER LEVELS:
Was electric log made of well? ☐ Yes ☒ No If yes, attach copy.
Depth at which water was first found 26 ft.
Standing level before perforating 26 ft.
Standing level after perforating 26 ft.
Note your observation of any change in water level while drilling no
Was a surface sanitary seal provided? 35 ft yes

(6) WELL PUMPING TEST:
Capacity gal./min. ft. draw down
Was well gravel packed? yes
Were any strata sealed against pollution? top
Temperature Was a chemical analysis made? Attach copy
If abandoned was well capped?

(7) TYPE OF WORK (check):
New well ☒ Reconditioning of well ☐
Deepening existing well ☐

(8) LOCATION OF WELL: Riverside West
County Riverside
R. F. D. or Street No.
2500 ft. So of Corner of
Collett and Kasilof

(9) WELL LOG:
Total depth of well 202
Formation: Mention size of water gravel—

0	ft. to	5	ft.	top soil.
5	"	41	"	grey clay.
41	"	61	"	sand & gravel
61	"	84	"	sandy brown cla
84	"	88	"	boulders
88	"	97	"	sandy brown cla
97	"	104	"	gravel & boulders
104	"	115	"	sandy brown clay
115	"	122	"	gravel & boulders
122	"	155	"	sand & gravel
155	"	167	"	boulders
167	"	183	"	sandy clay
183	"	195	"	sand & gravel
195	"	202	"	boulders

190 Clay
202 ck

CONFIDENTIAL - NOT FOR PUBLIC RELEASE

MICROFILMED

Work started 2/28/1957 Completed 3/20/1957
Date of Report 4/10/1957

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[SIGNED] Peerless Welding & Mach
(Well Driller)
By Charles
License No. 113737 Classification C-57
Dated 8/49, 19

46370 7-51 30M QUIN SPO

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

DWR 274

WELL DATA

Key ☐ Hyd. ☐ Key & Hyd. ☐ Index ☐ Other ☐

Owner La Sierra College

Address Arlington, Calif.

Tenant

Address

State No. 3S/6W-22A1

Other No.

SWRB 904

Location: County 33 Area

Region 8 Basin

USGS Quad. Riverside West Quad. No.

T. 3S. R. 6W. Sec. 22 1/4 S.B. B.&M.

Description Well in aluminum house near south end of Kaselack St.

4930 feet North and 400 feet West of SE Sec. Cor.

MICROFILMED

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 277446

State Well No. 3S/06W/22 H01S
Other Well No.

…ice of Intent No.
…ocal Permit No. or Date

035/06W-22H01 S

(1) OWNER: Name Santa Anna Watershed Proj.
Address 3600 Tyler Street, Suite 207
City Riverside, CA ZIP 92503

(2) LOCATION OF WELL (See instructions):
County Riverside Owner's Well Number (1)
Well address if different from above
Township T2S Range R6W Section 19
Distance from cities, roads, railroads, fences, etc. Well is on Magnolia Ave. in Riverside, CA between Pierce St. and LaSierria St.

~~LAT [illegible] 42.52~~
~~LONG 117° 29' 23.55" W~~
~~elev 790ft~~
LAT 33 53 44.26
LONG 117 29 20.29
per Toposcout

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size Lonestar 8 Mesh
Diameter of bore 26"
Packed from 65' to 246' ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen S.S.-16"-Louver

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0'	60'	30"	.325	95'	195	0.050
+2	95'	16"	.250			
195'	215'	16"	.250			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 65' ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing 9 Sack sand grout

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? WDC
…of test Pump ☒ Bailer ☐ Air lift ☐
…h to water at start of test 17.45' At end of test 39.76' ft.
…scharge 1488 gal/min after 24 hours Water temperature 20°C
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 246' ft. Completed depth 215' ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	10	Silt,sand,minor gravel
10	15	As above tan color
15	20	Silt,clay
20	23	Clay,silt
23	25	Clay,minor silt
25	33	Clay,silt,gravel
33	39	Silt,clay
39	46	Sand,silt
46	48	Sand
48	50	Sand
50	52	Very coarse sand,coarse,
		sorted,subangular,angular.
52	53	Gravel,sand
53	60	Sand
60	70	Sand,minor gravel
70	79	Sand,gravel
79	89	Sand,minor gravel
89	94	Sand
94	99	Sand,minor gravel
99	114	Cobbles,gravel,sand
114	116	Sand,clay,minor cobbles
116	119	Cobbles,sand
119	133	Clay,medium brown,sticky,
		slightly plastic
133	136	Clay,sand
136	139	Sand,gravel,cobbles
139	147	Cobbles,sand,gravel
147	149	Sand,clay
149	179	Sand,cobbles,gravel,clay
		stringers
179	197	Sand,cobbles,some gravel
197	208	Minor,medium brown,sticky,
208	216	Clay,sand W/cobbles,gravel
216	219	Sand,cobbles,gravel
219	231	Decomposed granite
231	236	Clay,sand,gravel
236	239	Clay,sand,gravel
239	246.5	Decomposed granite

Work started 7-27 1989 Completed 8-6 1989

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

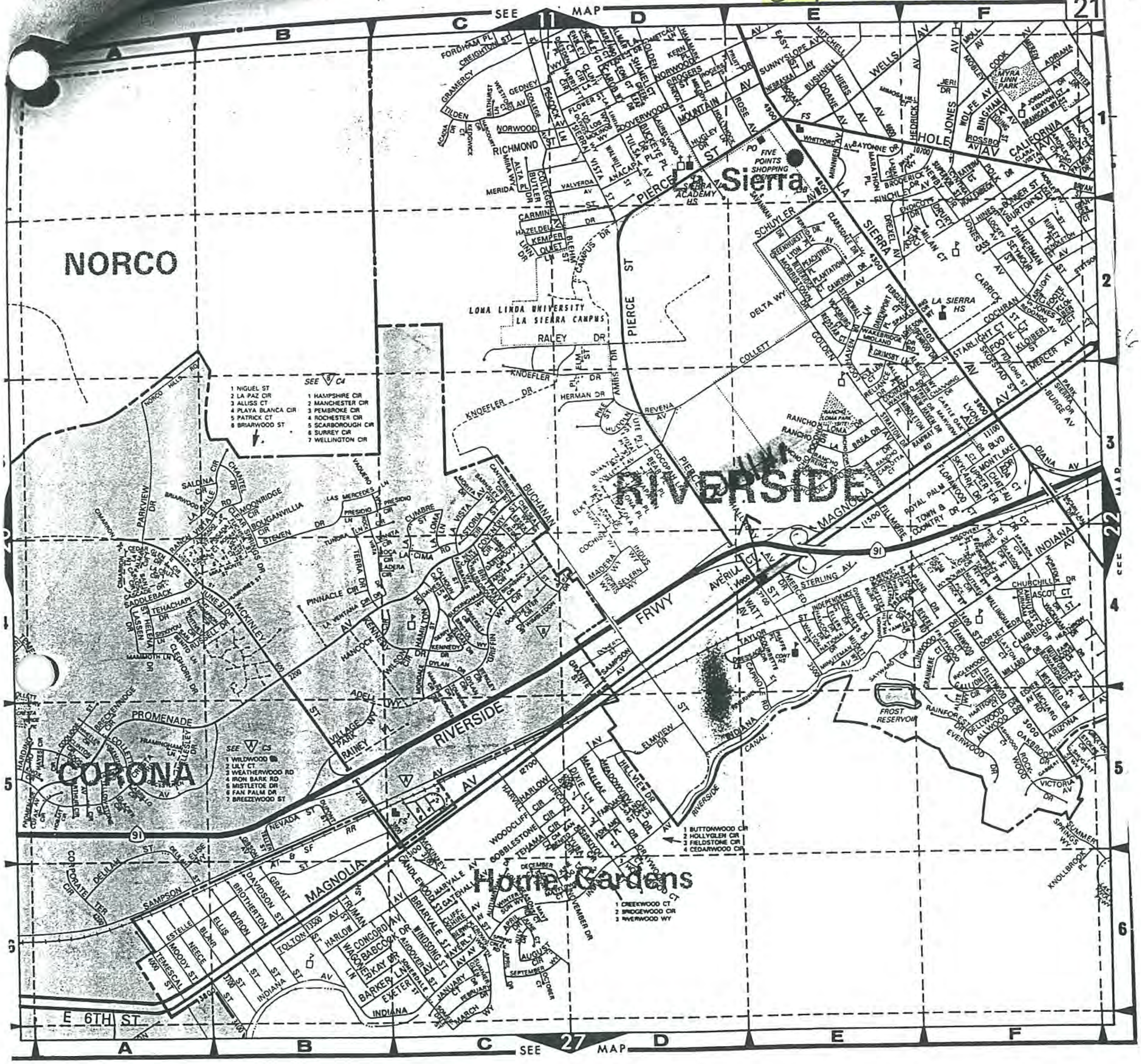
Signed (Well Driller)
NAME Water Development Corporation
(Person, firm, or corporation) (Typed or printed)
Address 1202 Kentucky Ave.
City Woodland, CA ZIP 95695
License No. 283326 Date of this report 8-2-90

DWR 188 (REV. 12-86)

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

35/06W 22H01 S



	or.................... specify unit	or of estimate: (Specify)	Crops served	Acreage supplied	...when use is other than irrigation Nature and extent of use, i.e., population, products manufactured, number and kind of stock watered
1990					
19					
19					
19					
19					
19					
19					
19					
19					
19					

Complete a separate notice for each well

STATE OF CALIFORNIA—THE RESOURCES AGENCY
STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS

Recordation Number

State Well Number

Please do not mark in the above space

FIRST NOTICE
GROUND WATER EXTRACTIONS

(Pursuant to Part 5, Division 2 of the Water Code)

Item

1. Name of person filing this notice Western Municipal Water District

   Address P.O. Box 5286, Riverside CA 92517-5286
   Street address or P. O. Box number City State

2. Name of person extracting ground water, if different than Item 1

   Address
   Street address or P. O. Box number City State

3. Names and addresses of other persons claiming an interest in or a right to extract water from this well:

   Santa Ana Watershed Project Authority (SAWPA)
   3600 Tyler St.
   Riverside 92503

WELL LOCATION

4. Owner's designation of well Well #1
   Name and/or Number

5. County Riverside

6. Describe location of well (a) to the nearest 40-acre quarter section or (b) by reference to streets or local landmarks. A complete street address is acceptable.

   (a) NE ¼, of NE ¼, Section 22, Township 3S, Range 6W, SB B.&M.

   (b) 3S6W22A02 S as assigned by Dept of Water Resour

   Should be 3S6W22H01 S.
   ? ?

   Location of well should be indicated by sketch in the space provided in Item 22.

WATER USE

7. Describe the Place of Use: (If sketch is required please use space under Item 22.)

   SAWPA's Arlington Desalter.

8. Quantity and Use of water extracted and method used in determining quantity for the following calendar years. (Extractions prior to preceding 10 years not required.)

Calendar year	EXTRACTIONS		USE		
	Annual extractions in acre-feet or .... specify unit	Method of measurement or of estimate: (Specify)	When use is for irrigation		When use is other than irrigation
			Crops served	Acreage supplied	Nature and extent of use, i.e., population, products manufactured, number and kind of stock watered
1990					
19					
19					
19					
19					
19					
19					
19					
19					
19					

WRCB 502 (1-7

INVESTIGATION South Coastal Basin

DIVISION OF WATER RESOURCES
DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

WELL LOG

3S/6W-22L1

SHEET 1

NUMBER E-298-

LOCAL DESIGNATION

LOCATION 63' north of Magnolia Ave. and 62' west of Buchanan St. Southwest of Arlington.

Location #16000B

OWNER C. W. Main

DATE COMPLETED May 1929

DIAMETER OF CASING 16"

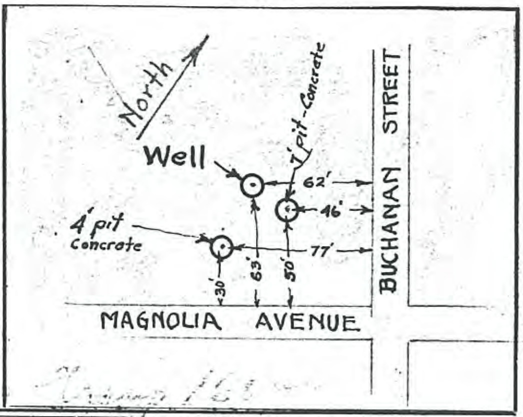
DRILLED BY

SOURCE OF INFORMATION Owner

INSPECTED WHILE DRILLING SEE FILE NO.

SURFACE ELEVATION 680 WATER ANALYSIS

SKETCH



DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL	THICKNESS FEET	% VOIDS P	T ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
0- 24		Soil and clay soil 10 clay 14		[illegible]	[illegible]	
24- 40		Fine sand 6+s	16	50	800	
40- 68		Clay c	10+18	0	0	
68- 85		Gravel g	17	100	1700	
85- 95		Fine sand f+s	10	50	500	
95-100		Blue clay c	5	[illegible]	0	
100-120		Sand +s	20	50	1000	
120-140		Gravel g	20	100	2000	
140-155		Sand and gravel sg	10+5	100	1500	
155-181		Heavy gravel +g	26	100	2300	

Lower 110' perforated with large cuts. Number of cuts not known.

Well with 7' dia.pit is same depth as well above. ~~Length~~ Depth of other well not known.

MICROFILMED

FOR FIELD COPIES USE ALTERNATE LIN

LOG OBTAINED BY

DATE

83781 3-31 5M
CALIFORNIA STATE PRINTING OFFICE

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in
No. 277444

035/06W-23 C02S

Notice of Intent No. ____
Local Permit No. or Date ____
State Well No. ____
Other Well No. ____

(1) OWNER: Name Santa Anna Watershed Proj.
Address 3600 Tyler Street, Suite 207
City Riverside, CA ZIP 92503

(2) LOCATION OF WELL (See instructions):
County Riverside Owner's Well Number (4)
Well address if different from above ____
Township T2S Range R6W Section 19
Distance from cities, roads, railroads, fences, etc. Well is on Magnolia Ave. in Riverside, CA between Pierce St. and LaSierria St.

LAT. 33 54 2.1
LONG. 117 28 48.84

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☒ Size 8X16
Diameter of bore 26"
Packed from 65' to 190' ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS: S.S.-16-Louver
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
+2'	80'	16"	.250	80'	160'	0.050
160'	180'	16"	.250			
0'	60'	30"	.325			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 65' ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ____ ft.
Method of sealing Pumped 9 sack sand grout.

(10) WATER LEVELS:
Depth of first water, if known ____ ft.
Standing level after well completion ____ ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? WDC
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 20.25' ft. At end of test 31.18' ft.
Discharge 1037 gal/min after 24 hours Water temperature 21°C
Chemical analysis made? Yes ☐ No ☐ If yes, by whom? ____
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 187' ft. Completed depth 180' ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	12	Silt,minor sand
12	20	Silt,sand,gravel
20	32	Sand,silt
32	35	Clay,minor silt
35	44	Sand,interbedded clay
44	54	Sand,interbedded silt
54	60	Sand
60	70	Gravel
70	80	Gravel
70	GRAB	Sand,gravel
80	GRAB	Sand
80	81	Sand
81	90	Gravel,sand-80%gravel,white, gravel
94	GRAB	Sand,gravel
90	100	Gravel,sand
105	GRAB	Sand
100	110	Sand,gravel
110	120	Sand,gravel
120	125	Sand,gravel
125	129	Sand,gravel
129	131	Sand,gravel
131	132	Cobbly sand
132	137	Sand,gravel,clay
137	140	Sand,gravel
140	143	Sand,gravel,clay
143	150	Sand,gravel,minor silt,clay
150	157	Sand,gravel
157	160	Decomposedd granite
160	166	Decomposed granite
166	179	Decomposed granite
179	181	Decomposed granite
181	187	Decomposed granite

Work started 9-9 1989 Completed 9-14 1989

WELL DRILLER'S STATEMENT:

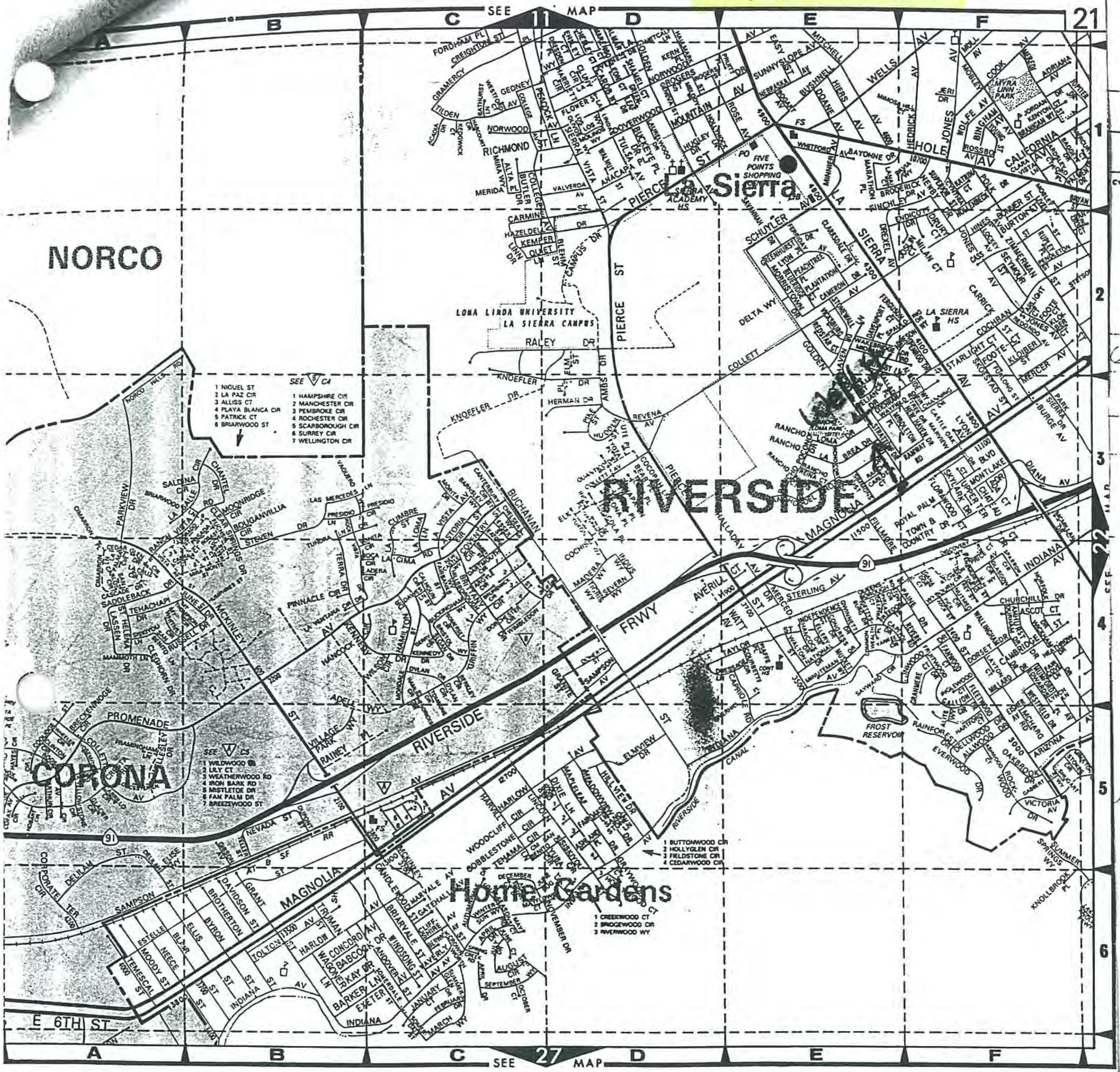
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed ____ (Well Driller)
NAME Water Development Corporation
(Person, firm, or corporation) (Typed or printed)
Address 1202 Kentucky Ave.
City Woodland, CA ZIP 95695
License No. 283326 Date of this report 8-2-90

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

035/06W 23C25



year	[illegible] or........ specify unit	Method of measurement or of estimate: (Specify)	When use is for irrigation: Crops served	Acreage supplied	When use is other than irrigation: Nature and extent of use, i.e., population, products manufactured, number and kind of stock watered
1990					
19					
19					
19					
19					
19					
19					
19					
19					
19					

Complete a separate notice for each well

STATE OF CALIFORNIA—THE RESOURCES AGENCY
STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS

Recordation Number

State Well Number

Please do not mark in the above space

FIRST NOTICE

GROUND WATER EXTRACTIONS

(Pursuant to Part 5, Division 2 of the Water Code)

Item

1. Name of person filing this notice Western Municipal Water District

Address P.O. Box 5286 Riverside CA 92517-5286
Street address or P. O. Box number City State

2. Name of person extracting ground water, if different than Item 1

Address
Street address or P. O. Box number City State

3. Names and addresses of other persons claiming an interest in or a right to extract water from this well:

Santa Ana Watershed Project Authority (SAWPA)
3600 Tyler Street
Riverside CA 92503

WELL LOCATION

4. Owner's designation of well Well #4
Name and/or Number

5. County Riverside

6. Describe location of well (a) to the nearest 40-acre quarter section or (b) by reference to streets or local landmarks. A complete street address is acceptable.

(a) SW ¼, of SE ¼, Section 14, Township 3S, Range 6W, B.&M.

(b) 3S6W14 Q02 S as assigned by the Department
23C
of Water Resources. Should be 3S6W23C01 S.
??

Location of well should be indicated by sketch in the space provided in Item 22.

WATER USE

7. Describe the Place of Use: (If sketch is required please use space under Item 22.)

SAWPA's Arlington DeSalter.

8. Quantity and Use of water extracted and method used in determining quantity for the following calendar years. (Extractions prior to preceding 10 years not required.)

Calendar year	EXTRACTIONS		USE		
	Annual extractions in acre-feet or .... specify unit	Method of measurement or of estimate: (Specify)	When use is for irrigation: Crops served	When use is for irrigation: Acreage supplied	When use is other than irrigation: Nature and extent of use, i.e., population, products manufactured, number and kind of stock watered
1990					
19					
19					
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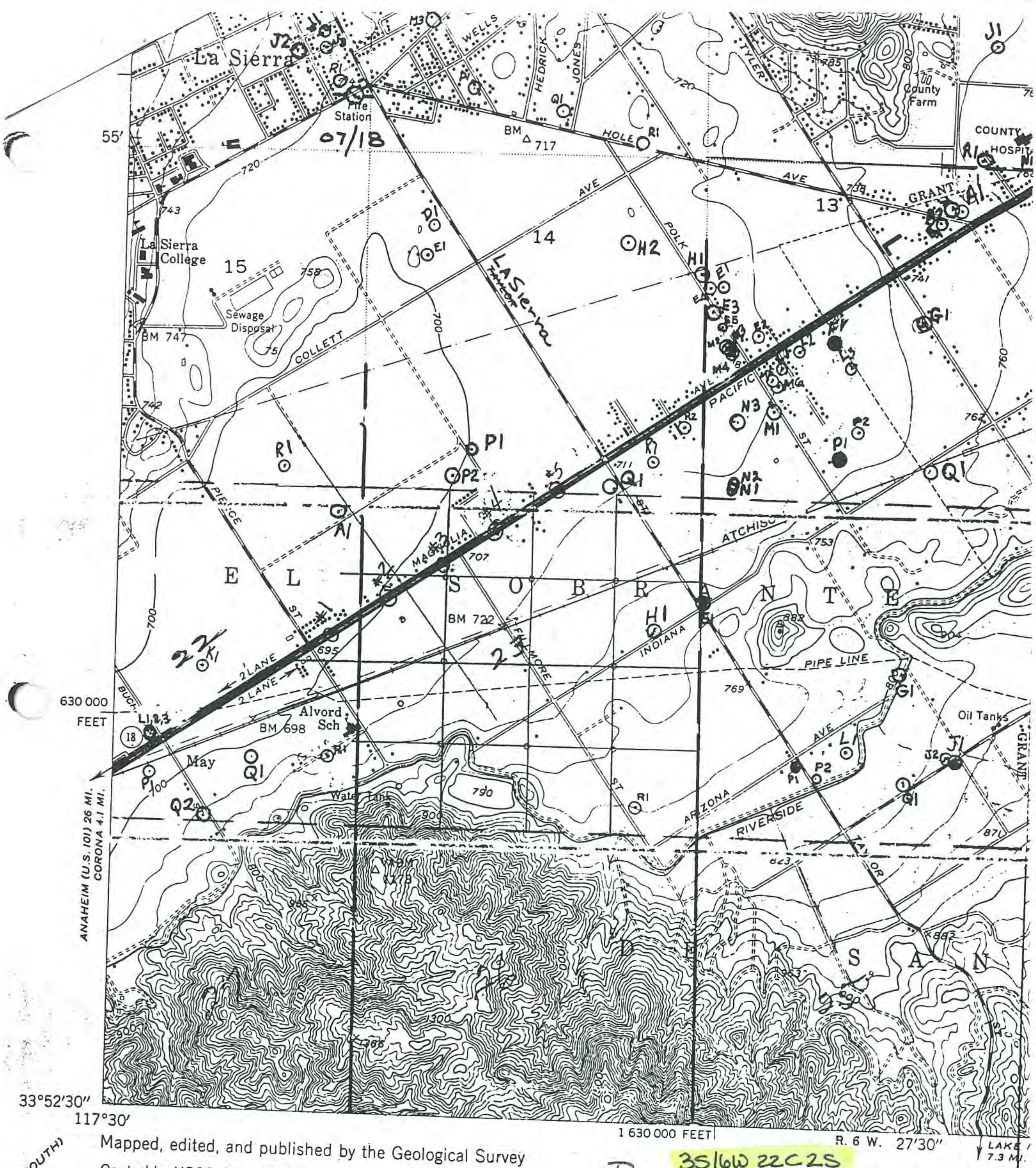
19					
19					
19					
19					
19					
19					



Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and
Metropolitan Water District of Southern California

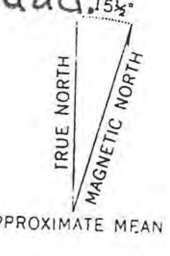
Topography from aerial photographs by multiplex methods
and by plane-table surveys 1939.
Aerial photographs taken 1948 and 1951. Field check 1953

Polyconic projection. 1927 North American datum
10,000-foot grid based on California coordinate system, zone 6

Dashed land lines indicate approximate locations
Dotted land lines were established by private survey

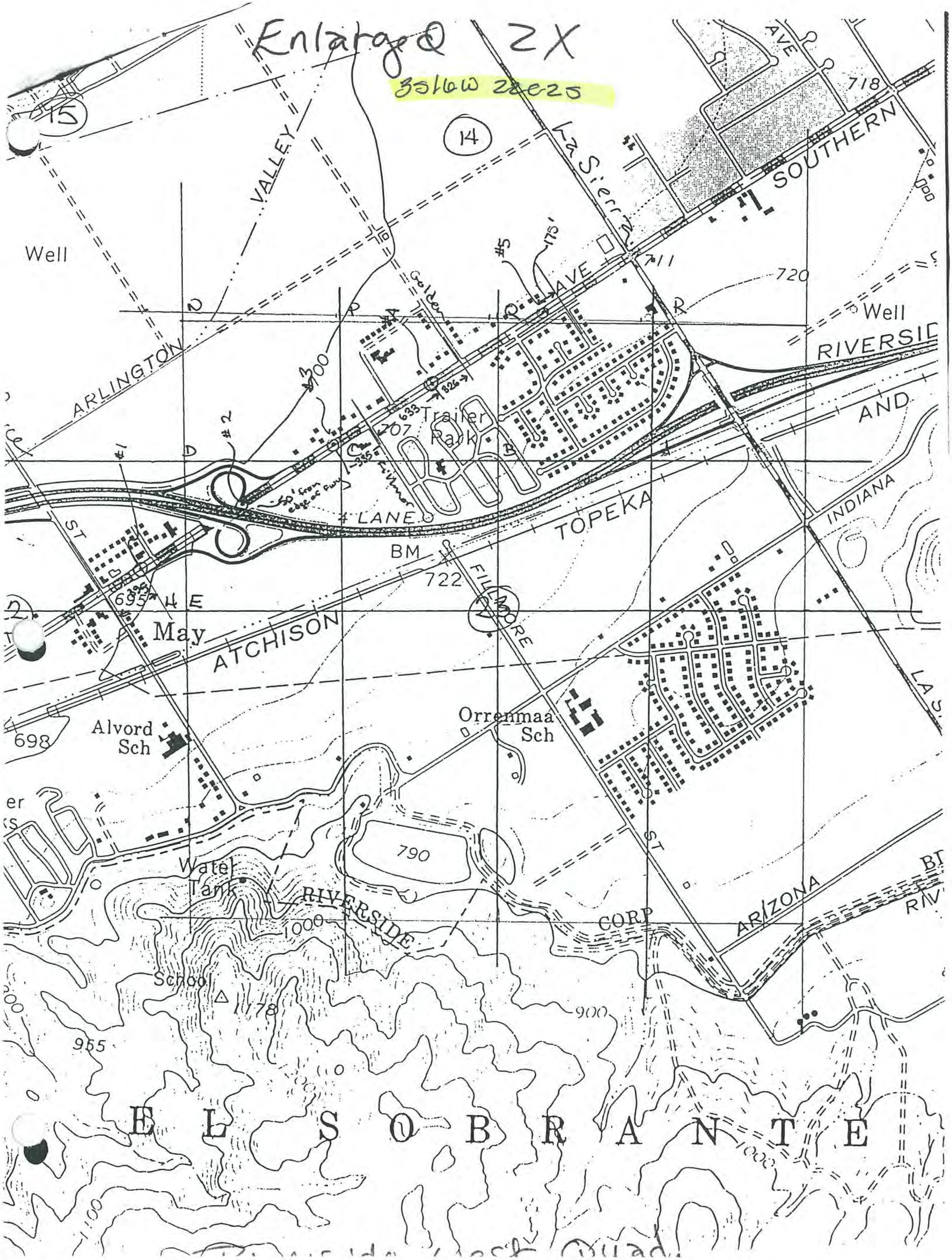
Red tint indicates areas in which only landmark buildings are shown

3S/6W 22C2S
Riverside West R.6W
Quad.



Enlarged 2X

35/6W 22e25



Riverside West Quad.

STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

State No. 3S/6W-23C1

WELL DATA

BRANCH ____

wner ~~SAWPA~~ Santa Ana Watershed Project Auth
Address 11615 Sterling Av. Riverside 92503
Tenant ____
Address ____

State No. ____
Other No. ____

Type of Well: Hydrograph ☐ Key ☐ Index ☐ Semiannual ☐
Location: County Riverside Basin ____ No. 33
U.S.G.S. Quad. Riverside West Quad. No. 65-57
____ ¼ ____ ¼ Section 23, Twp. 03S, Rge. 06W MD [✓ SB] H Base & Meridian
Description ____

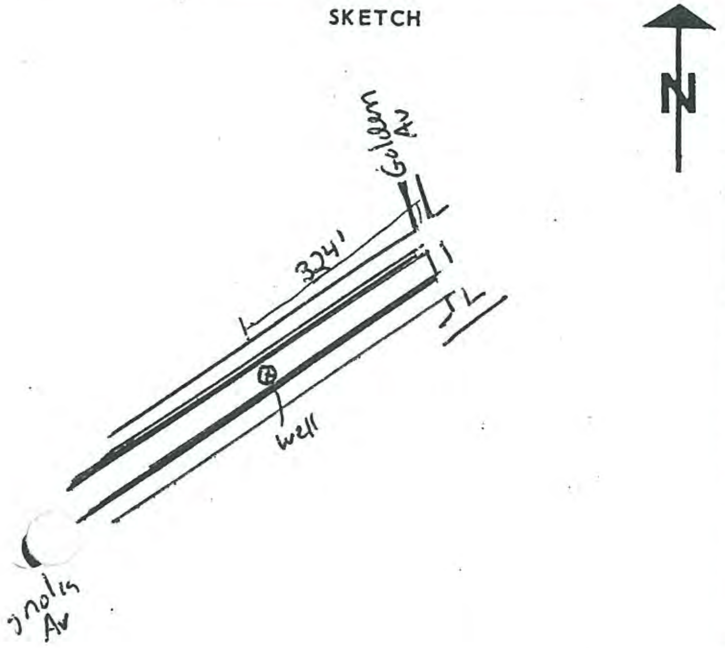
Reference Point description 324' South of Golden St. on Magnolia Ave Median Strip

which is ____ ft. above / below land surface. Ground Elevation ____ ft.
Reference Point Elev. ____ ft. Determined from ____
Well: Use Municipal Condition ____ Depth ____ ft.
Casing, size 18" in., perforations ____

Measurements By: DWR ☐ USGS ☐ USBR ☐ County ☐ Irr. Dist. ☐ Water Dist. ☐ Cons. Dist. ☐
Chief Aquifer: Name ____ Depth to Top Aq. ____ Depth to Bot. Aq. ____
Type of Material ____ Perm. Rating ____ Thickness ____
Gravel Packed? Yes ☐ No ☐ Depth to Top Gr. ____ Depth to Bot. Gr. ____
Supp. Aquifer ____ Depth to Top Aq. ____ Depth to Bot. Aq. ____
iller ____
ate drilled ____ Log, filed ____ open (1) ____ confidential (2) ____
Equipment: Pump, type Turbine make ____
Serial No. ____ Size of discharge pipe ____ in.
Power, Kind ____ Make ____
H. P. ____ Motor Serial No. ____
Elec. Meter No. ____ Transformer No. ____
Yield ____ G.P.M. Pumping level ____ ft.

Water Analysis: Min. (1) ____ San. (2) ____ H.M. (3) ____
Water Levels available: Yes (1) ____ No ____
Period of Record: Begin ____ End ____
Collecting Agency: ____
Prod. Rec. (1) ____ Pump Test (2) ____ Yield (3) ____

SKETCH

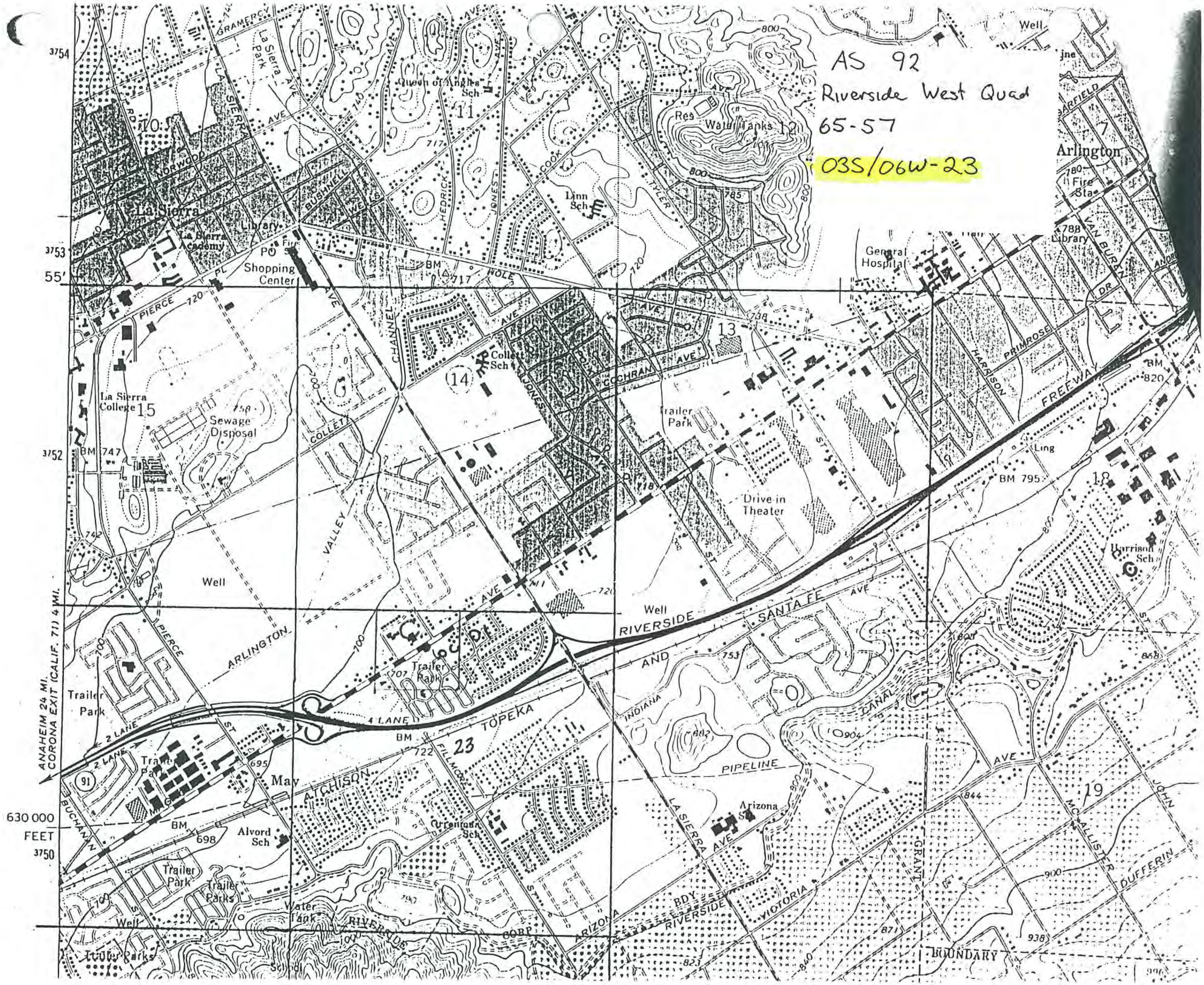


REMARKS

AS 92 . Riverside Co. 1/5/93
03S/06W . 23
CN, PW
A, S, D, P, B
Faucet before tank

Recorded by: ____
Date ____

DWR 429



AS 92
Riverside West Quad
65-57
03S/06W-23

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in
No. 277443

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

Notice of Intent No. ______
Local Permit No. or Date ______
035/06W-23 D02S
State Well No. ______
Other Well No. ______

(1) [redacted]
Ad
Cit

(2) LOCATION OF WELL (See instructions):
County Riverside   Owner's Well Number (3)
Well address if different from above ______
Township T2S   Range R6W   Section 19
Distance from cities, roads, railroads, fences, etc. Well is on Magnolia Ave. in Riverside, CA between Pierce St. and LaSierria St.

LAT. 33 53 55.16
LONG. 117 29 1

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 8X16
Diameter of bore 26"
Packed from 65' to 232' ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen S.S.-16"-Louver

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
+2	80'	16"	.250	80'	180'	0.050
180'	200'	16"	.250			
0	60	30"	.325			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth ______ ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ______ ft.
Method of sealing 9 Sack cement grout.

(10) WATER LEVELS:
Depth of first water, if known ______ ft.
Standing level after well completion ______ ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? WDC
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 18.24' At end of test 35.45' ft.
Discharge 1561 gal/min after 24 hours Water temperature 21 °C
Chemical analysis made? Yes ☐ No ☐ If yes, by whom? ______
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 232' ft. Completed depth 200' ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	- 10	Silt, minor sand, rock
10	- 18	Silt, minor sand, rock
18	- 31	Clay, silt
31	- 36	Clay, gravel
36	- 40	Sand, gravel
40	- 45	Sand, silt
45	- 47	Sand, silt
47	- 54	Sand, silt
54	- 60	Sand, gravel
60	- 70	Sand, gravel
70	- 80	Cobbles, sand, gravel
80	- 94	Sand, gravel, cobbles
94	- 95	Clay
95	-100	Sand, gravel, cobbles
100	-112	Sand, gravel, cobbles
112	-113	Sand, minorgravel
113	-120	Gravel, sand
120	-130	Sand, gravel, cobbles
130	-131	Clay
131	-141	Clay, silt
141	-150	Interbedded sand, gravel, clay
150	-160	Sand
160	-170	Sand, gravel
170	-180	Sand, gravel
180	-184	Sand, gravel
184	-200	Sand, gravel, decomposed granite
200	-210	Sand, gravel, decomposed granite
210	-232	Sand, gravel, cobbles, decomposed granite.

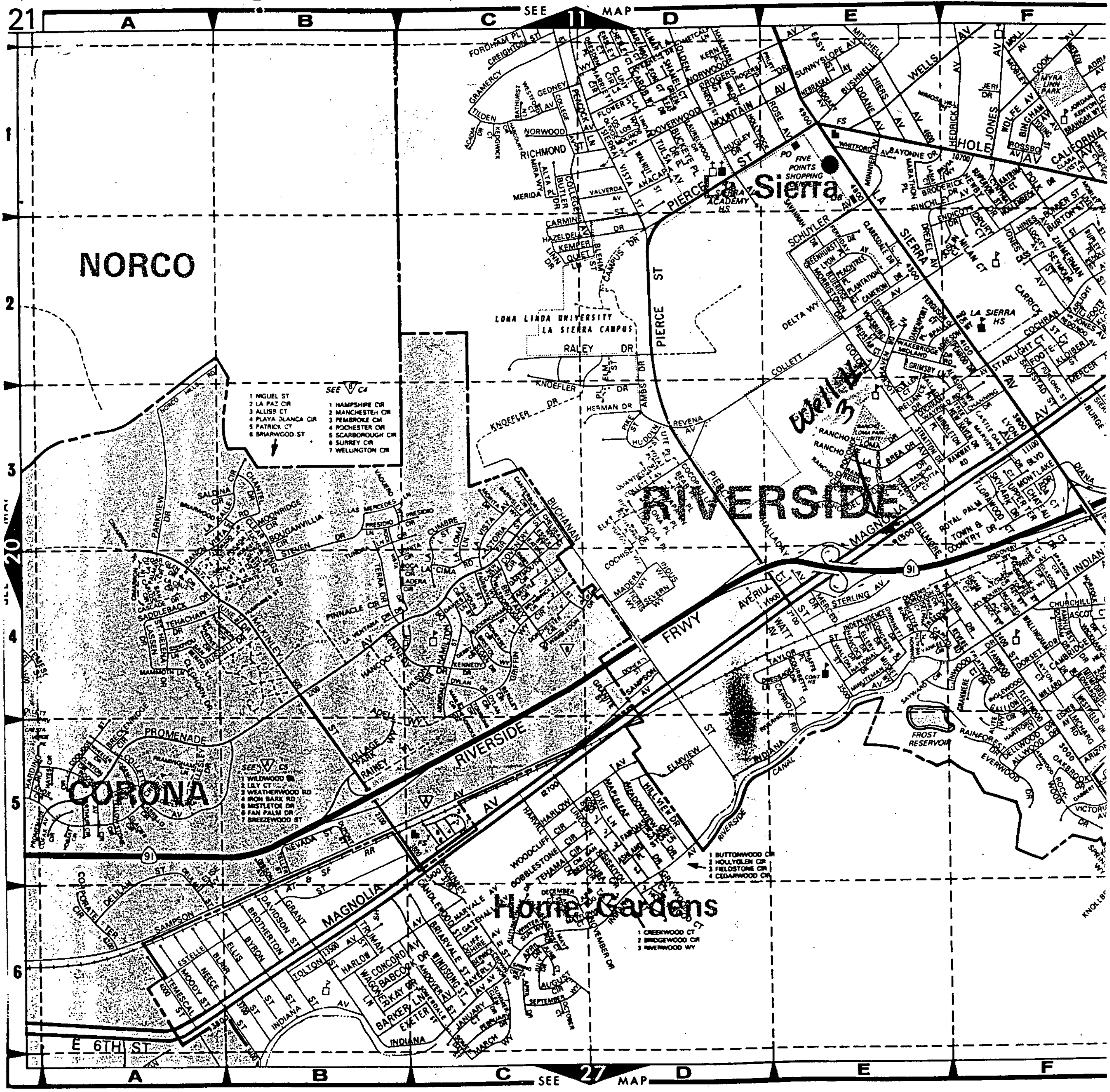
Work started 8-10 1989 Completed 8-20 1989

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Signed ______ (Well Driller)
NAME Water Development Corporation (Person, firm, or corporation) (Typed or printed)
Address 1202 Kentucky Ave.
City Woodland, CA ZIP 95695
License No. 283326 Date of this report 8-2-90

DWR 188 (REV. 12-86)
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM
86 96355

3

277443


21
A
B
C
D
E
F
SEE 11 MAP
SEE 27 MAP
1
2
3
4
5
6
NORCO
CORONA
RIVERSIDE
La Sierra
Home Gardens
Well #3
LOMA LINDA UNIVERSITY
LA SIERRA CAMPUS
PO
FIVE POINTS SHOPPING
LA SIERRA HS
FROST RESERVOIR
PIERCE ST
LA SIERRA AV
MAGNOLIA AV
RIVERSIDE FRWY
91
COLLETT
SAMPSON AV
MCKINLEY
INDIANA AV
E 6TH ST
SEE 6 C4
1 NIGUEL ST
2 LA PAZ CIR
3 ALLISS CT
4 PLAYA BLANCA CIR
5 PATRICK CT
6 BRIARWOOD ST
1 HAMPSHIRE CIR
2 MANCHESTER CIR
3 PEMBROKE CIR
4 ROCHESTER CIR
5 SCARBOROUGH CIR
6 SURREY CIR
7 WELLINGTON CIR
SEE 7 C5
1 WILDWOOD
2 LILY CT
3 WEATHERWOOD RD
4 IRON BARK RD
5 MISTLETOE DR
6 FAN PALM DR
7 BREEZEWOOD ST
1 BUTTONWOOD CIR
2 HOLLYGLEN CIR
3 FIELDSTONE CIR
4 CEDARWOOD CIR
1 CREEKWOOD CT
2 BRIDGEWOOD CIR
3 RIVERWOOD WY

5

9

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

ORIGINAL
File with DWR

WATER WELL DRILLERS REPORT

Do not fill in

No. 277442 E

ce of Intent No. ______
Local Permit No. or Date ______

035/06W-23E01S

State Well No.
Other Well No.

(1) OWNER: Name Santa Anna Watershed Proj.
Address 3600 Tyler Street, Suite 207
City Riverside, CA ZIP 92503

(2) LOCATION OF WELL (See instructions):
County Riverside Owner's Well Number (2)
Well address if different from above ______
Township T2S Range R6W Section 19
Distance from cities, roads, railroads, fences, etc. Well is on Magnolia Ave. in Riverdide, CA between Pierce St. and LaSierria St.

LAT 33 53 50.45
LONG 117 29 9.61

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 8X16
Diameter of bore 26"
Packed from 65' to 180' ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
+2	80'	16"	.250
150'	170'	16"	.250
0'	60'	30"	.325

(8) PERFORATIONS:
Type of perforation or size of screen S.S.-16"-Louver

From ft.	To ft.	Slot size
80'	150'	0.050

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 65 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ______ ft.
Method of sealing 9 Sack Sand Grout.

(10) WATER LEVELS:
Depth of first water, if known ______ ft.
Standing level after well completion ______ ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? WDC
e of test Pump ☒ Bailer ☐ Air lift ☐
n to water at start of test 17.99' ft. At end of test 32.76' ft.
Discharge 1488 gal/min after 24 hours Water temperature 20°C
Chemical analysis made? Yes ☐ No ☐ If yes, by whom? ______
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 180' ft. Completed depth 170' ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	9	Silt,minor sand
9	20	Silt,clay
20	27	Silt
27	33	Clay,minor silt
33	43	Sand,silt
43	45	Silt,sand interbedded
45	54	Sand
54	60	Silt,sand
60	70	Sand,gravel
70	78	Sand,gravel
78	83	Clay
83	90	Sand,gravel
90	100	Minor clAY lenses
100	110	Coarse,gravel,cobbles
110	120	Coarse,gravel,cobbles
120	130	Boulders,fine sand
130	143	Boulders,fine sand
143	150	Decomposed granite,sand,gravel
150	157	Decomposed granite,sand,gravel
157	160	Decomposed granite,sand
160	170	Decomposed granite,sand,gravel
170	180	Decomposed granite

Work started 8-24 1989 Completed 8-30 1989

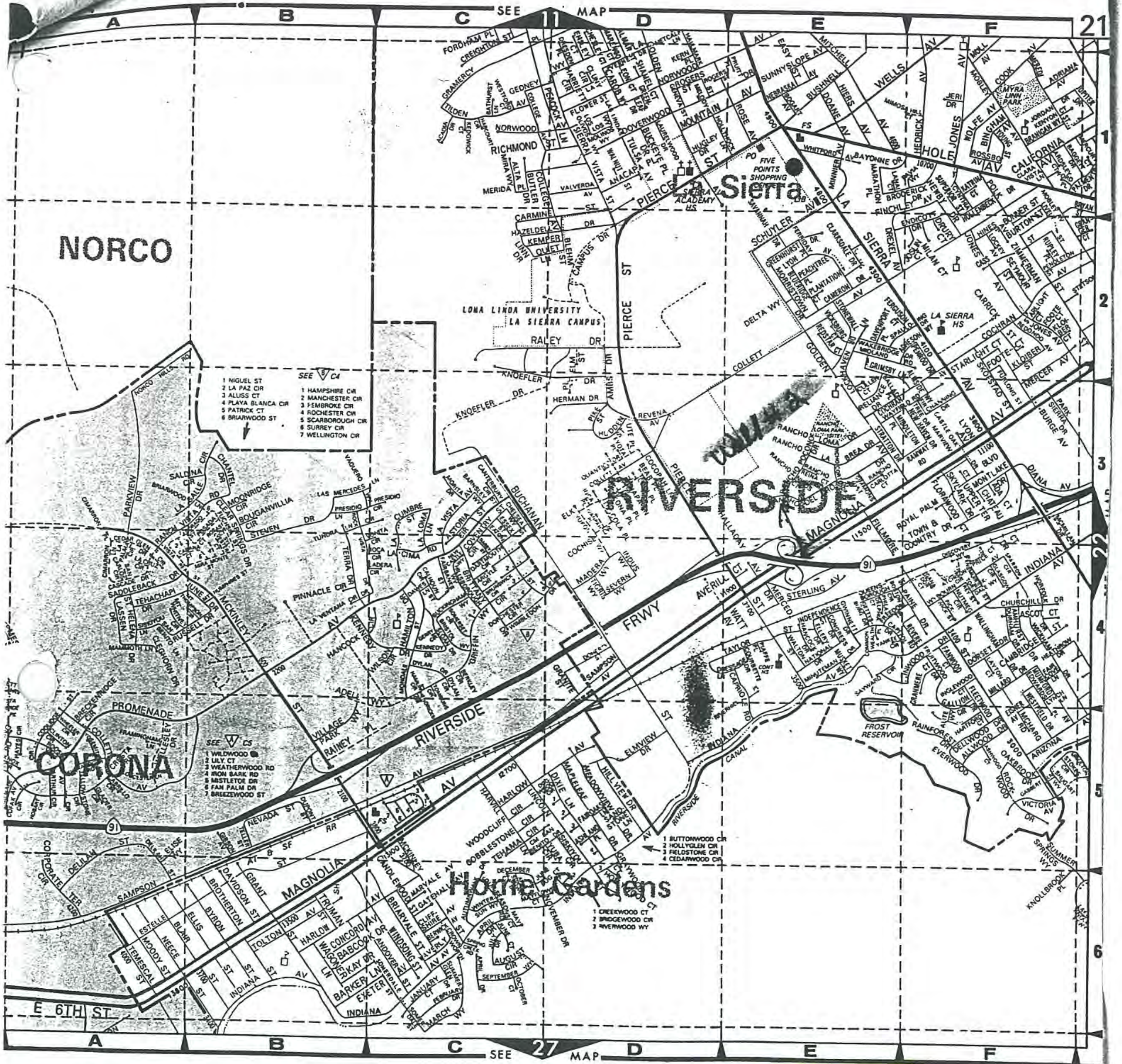
WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed ______ (Well Driller)
NAME Water Development Corporation (Person, firm, or corporation) (Typed or printed)
Address 1202 Kentucky Ave.
City Woodland, CA ZIP 95695
License No. 283326 Date of this report 8-2-90

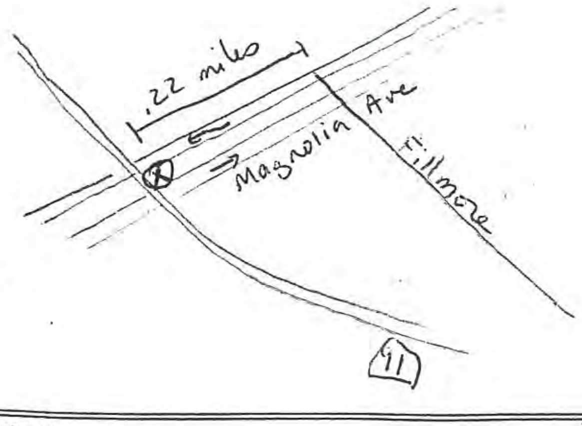
DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

3E



3S/6W 23E1S



faucet sample port

Simazin, Atrazine, Bromacil, Prometon, Diuron

Underground in cement housing

Samp

Recorded by:

Date

STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

State No. 3S/6W-23E1
LS

WELL DATA

BRANCH

Owner SANTA ANA WATERSHED PROJ AUTHORITY
Address 11615 Sterling Ave Riverside
Tenant
Address

State No.
Other No.

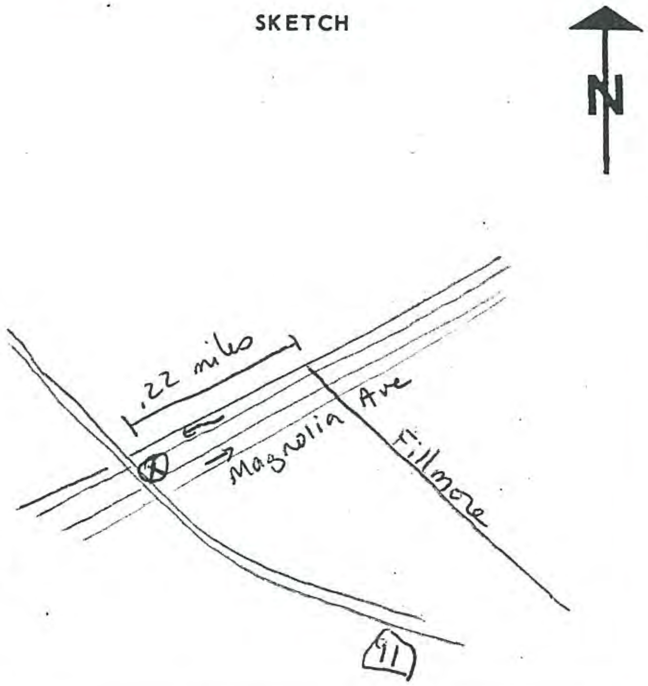
Type of Well: Hydrograph ☐ Key ☐ Index ☐ Semiannual ☐
Location: County Riverside Basin No.
U.S.G.S. Quad. Riverside West Quad. No.
¼ ¼ Section 23, Twp. 03S, Rge. 06W MD SB H Base & Meridian
Description
Loc

Reference Point description located .22 miles southwest of Fillmore street in middle of Magnolia Ave ~~meridian~~ median strip Under overpass of hwy 91
which is ft. above below land surface. Ground Elevation ft.
Reference Point Elev. ft. Determined from
Well: Use Municiple Condition Depth ft.
Casing, size 18"-77 in., perforations

Measurements By: DWR ☐ USGS ☐ USBR ☐ County ☐ Irr. Dist. ☐ Water Dist. ☐ Cons. Dist. ☐
Chief Aquifer: Name Depth to Top Aq. Depth to Bot. Aq.
Type of Material Perm. Rating Thickness
Gravel Packed? Yes ☐ No ☐ Depth to Top Gr. Depth to Bot. Gr.
Supp. Aquifer Depth to Top Aq. Depth to Bot. Aq.
Driller
Date drilled Log, filed open (1) confidential (2)
Equipment: Pump, type turbine make
Serial No. Size of discharge pipe in.
Power, Kind Make
H. P. Motor Serial No.
Elec. Meter No. Transformer No.
Yield G.P.M. Pumping level ft.

Water Analysis: Min. (1) San. (2) H.M. (3)
Water Levels available: Yes (1) No
Period of Record: Begin End
Collecting Agency:
Prod. Rec. (1) Pump Test (2) Yield (3)

SKETCH



REMARKS

AS92 1/5/93
Loc 02 PW, C

SAWPA well # 2

faucet sample port

Simazine, Atrazine, Bromacil, Prometon, Diuron

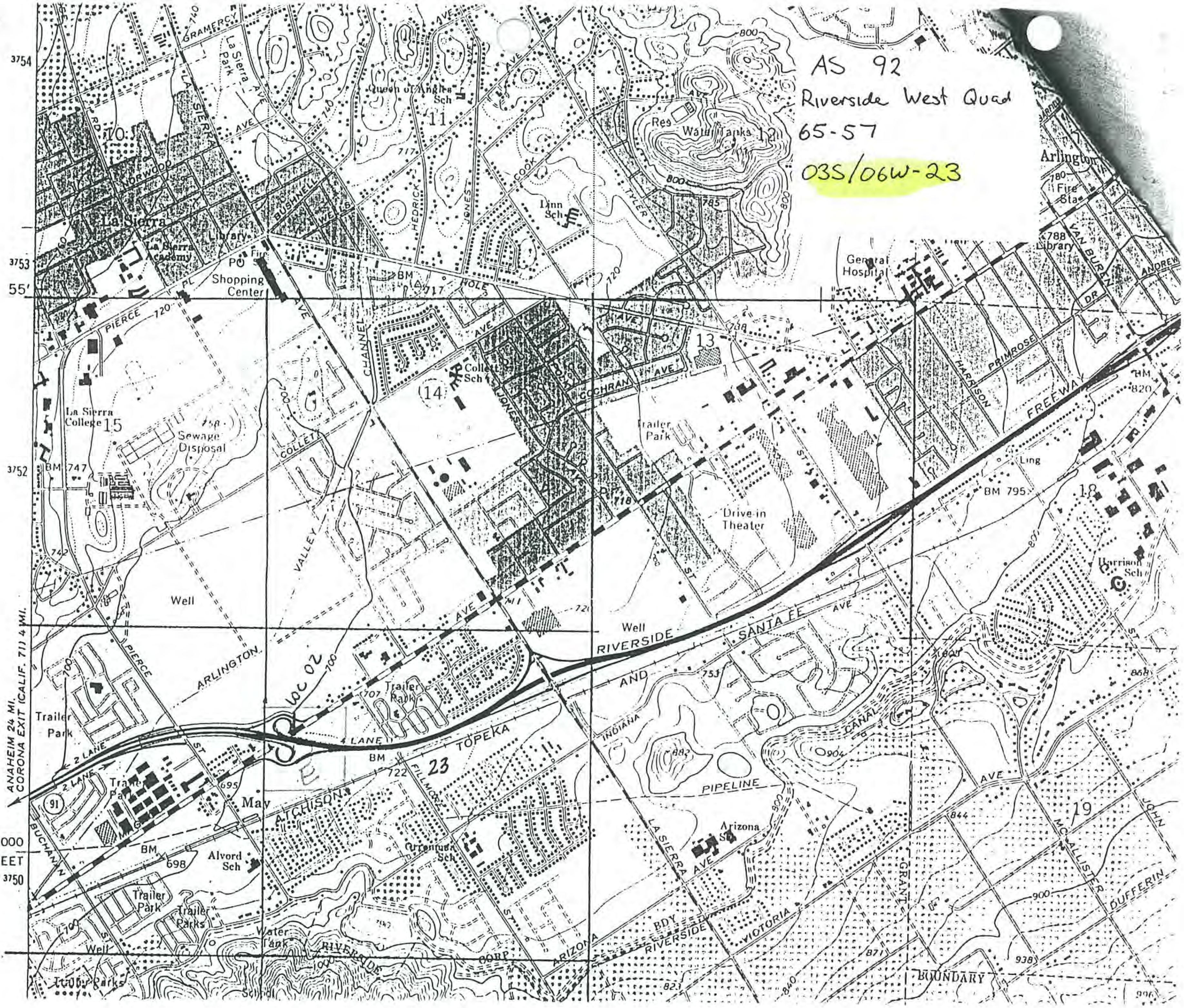
Underground in cement housing

Samp

Recorded by:
Date

DWR 429

AS 92
Riverside West Quad
65-57
03S/06W-23



Complete a separate notice for each well

STATE OF CALIFORNIA—THE RESOURCES AGENCY
STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS

Recordation Number

State Well Number

Please do not mark in the above space

FIRST NOTICE
GROUND WATER EXTRACTIONS

(Pursuant to Part 5, Division 2 of the Water Code)

Item

1. Name of person filing this notice Western Municipal Water District

Address P.O. Box 5286 Riverside CA 92517-5286
Street address or P. O. Box number City State

2. Name of person extracting ground water, if different than Item 1

Address
Street address or P. O. Box number City State

3. Names and addresses of other persons claiming an interest in or a right to extract water from this well:

Santa Ana Watershed Project Authority (SAWPA)
3600 Tyler Street
Riverside CA 92503

WELL LOCATION

4. Owner's designation of well Well #2
Name and/or Number

5. County

6. Describe location of well (a) to the nearest 40-acre quarter section or (b) by reference to streets or local landmarks. A complete street address is acceptable.

(a) NW ¼, of NW ¼, Section 23, Township 3S, Range 6W, SB B.&M.

(b) 3S6W23D01 S as assigned be DWR.

Should be 3S6W23E01 S.
= ??

Location of well should be indicated by sketch in the space provided in Item 22.

WATER USE

7. Describe the Place of Use: (If sketch is required please use space under Item 22.)

SAWPA's Arlington Desalter

8. Quantity and Use of water extracted and method used in determining quantity for the following calendar years. (Extractions prior to preceding 10 years not required.)

Calendar year	EXTRACTIONS		USE		
	Annual extractions in acre-feet or .... specify unit	Method of measurement or of estimate: (Specify)	When use is for irrigation		When use is other than irrigation
			Crops served	Acreage supplied	Nature and extent of use, i.e., population, products manufactured, number and kind of stock watered
1990					
19					
19					
19					
19					
19					
19					
19					
19					
19