The approach taken in this GSP takes into consideration the factors listed above. Section 5.3 discusses how GDEs were identified in the watershed, including both aquatic and riparian habitat types, Section 7 discusses the monitoring program for interconnected surface water and GDEs, and Section 9 discusses the possible measures that will be taken if undesirable results and adverse impacts have or may occur.

Although the GDE areas have experienced changing conditions, the existing condition supports significant habitat values. As detailed above, trigger levels have been established to inform the need for management actions and allow the SCV-GSA to determine if potential impacts are caused by groundwater extraction or other causes before a significant and unreasonable result occurs. Because of the presence of high-value GDEs in the Basin, the GSP classifies the following as an undesirable result that would occur in the form of a significant and unreasonable effect on GDEs:

- Permanent loss or significant degradation of existing native riparian or aquatic habitat due to lowered groundwater levels caused by groundwater extraction.
- In areas that currently provide essential habitat to UTS and native fishes (sensitive aquatic species in the vicinity of I-5 Bridge), cessation of surface flow and pools during low-flow conditions in the river channel caused by groundwater extraction.

It is possible that a sustained drop in groundwater levels below historic lows caused by groundwater extraction would cause loss of GDEs. Monitoring for groundwater levels will be conducted to avoid a long-term decline in the health of the vegetation and eventual permanent habitat loss caused by groundwater extraction. Monitoring of groundwater levels as a proxy to surface flows in these areas is considered important and will be conducted to avoid impacts to UTS and other sensitive aquatic species to the extent caused by groundwater extraction. The monitoring program, in conjunction with the groundwater flow model, will also be used to evaluate changes in groundwater levels that could arise if WRP discharges are reduced in the future (a condition over which the GSA has no control).

In losing reaches, groundwater levels have historically dropped below the river channel during the dry months and during droughts. In these areas, periodic cessation of surface flow in the river channel may not be a significant and unreasonable effect considering the history of past conditions. It should be noted that very low flow conditions have been observed during historical droughts near the I-5 Bridge where UTS and native fishes have been observed. Trigger levels established for this area are intended to result in actions that maintain sufficient flows to avoid impacting sensitive native fishes and UTS populations, if they are present, to the extent loss of surface flows is caused by groundwater extraction.

8.11.2 Minimum Thresholds

Section 354.28(c)(6) of the SGMA regulations states that “The minimum thresholds for depletion of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results.”

During the longest simulated periods of increased pumping from the Saugus Formation, the groundwater model estimates that future depletion could range between 5,000 and 9,500 AFY, which is equivalent to a range of 420 to 790 acre-feet (AF) per month or 7 to 13 cfs. However, this occurs during only 7 years of the 95-year modeled period, based on the frequency and duration of future increased pumping periods that would be expected to occur as determined from DWR’s most recent Delivery Capability Report for the SWP (DWR, 2020). During the remaining 88 years of the 95-year modeled future time period, the future depletion during periodic dry periods averages approximately 1,200 AFY, which is equivalent to 100 AF per month or 1.65 cfs.

In summary, future pumping is expected to create only periodic, rather than chronic, depletion of non-storm (i.e., dry-weather) streamflows and will not be significant and unreasonable in magnitude, especially when factoring in the additional amount of streamflow that arises from storm events. Additionally, direct uses of surface water for recreation, irrigation, or municipal purposes are not present or expected future significant beneficial uses of surface water in the Basin. The Santa Clara River flood plain is very broad in most of its reaches in the lower portions of the Basin and has a braided channel configuration. Surface water flow measurements are very difficult to obtain. In addition, this region is subject to high-flow events that scour out and significantly change the flood plain. This makes installation of additional stream gaging stations for measuring stream depletions technically infeasible. In our opinion, reliance on the County Line gage and the Old Road gage for measuring stream depletions and identifying conditions that could impact GDEs was considered insufficient. For these reasons, groundwater levels measured in multiple reaches and in proximity to the river and tributaries will be used as a proxy for assessing stream depletion in the future. Minimum thresholds have been established at the lowest predicted groundwater level that is estimated to occur at each representative monitoring site under future projected full build-out of land use and water use conditions in the Basin, consistent with the Basin Operating Plan described in Section 6. As with the minimum thresholds for chronic lowering of groundwater levels at other representative monitoring sites, the minimum thresholds for depletion of interconnected surface water are selected using the groundwater flow model simulation for the year 2042 water budget projection, which simulates the predicted future land use and water demands under 95 years of historical climate conditions that are adjusted for a 2030 level of climate change.

Because the minimum thresholds are based on future predicted water levels and are lower than historical levels, a data gap exists regarding the actual response of GDEs to a groundwater elevation that is at or below the historical low water level but above the minimum threshold for interconnected surface water. To provide greater assurance that significant and unreasonable effects on GDEs are avoided, groundwater trigger levels for GDEs are established that are higher in elevation than the minimum thresholds for depletion of interconnected surface water. The GDE trigger levels are incorporated into the monitoring program to provide active monitoring and timely evaluations that are designed to inform management actions that may be needed to avoid permanent loss of habitat or cessation of flow and loss of pools in areas where sensitive aquatic species (e.g., native fishes, including UTS) reside caused by groundwater extraction.

The trigger levels shown in Table 8-6 have been identified by SCV Water and the SCV-GSA as an important component of a GDE monitoring program because of the diverse and complex interaction that occurs between surface water and groundwater, which makes it difficult to distinguish between areas that are sustained primarily by surface water flows versus areas where the flows are partially or completely sustained by groundwater. Given that the current GDEs have survived through a recent drought that saw historical low groundwater levels in local wells, it can be inferred that GDEs are not adversely affected when groundwater levels are at or above those recent historical low levels. As a result, using trigger levels to evaluate groundwater elevation measurements (i.e., depth to groundwater) from existing and future monitoring wells (representative monitoring sites for GDEs) will provide an additional layer of protection for GDEs throughout the upper Santa Clara River and will allow the SCV-GSA to determine whether groundwater extraction is the cause of the potential impacts to GDEs as opposed to various other causes.

Trigger levels that require an evaluation of the GDE conditions are:

- Groundwater levels within GDE areas that are at the lowest historical (within previous 50 years) groundwater levels if caused by groundwater extraction.
- Groundwater levels that are 2 feet above the lowest historical (within previous 50 years) levels where UTS and other native fishes are present (e.g., I-5 Bridge area) that rely on surface flow and pools.

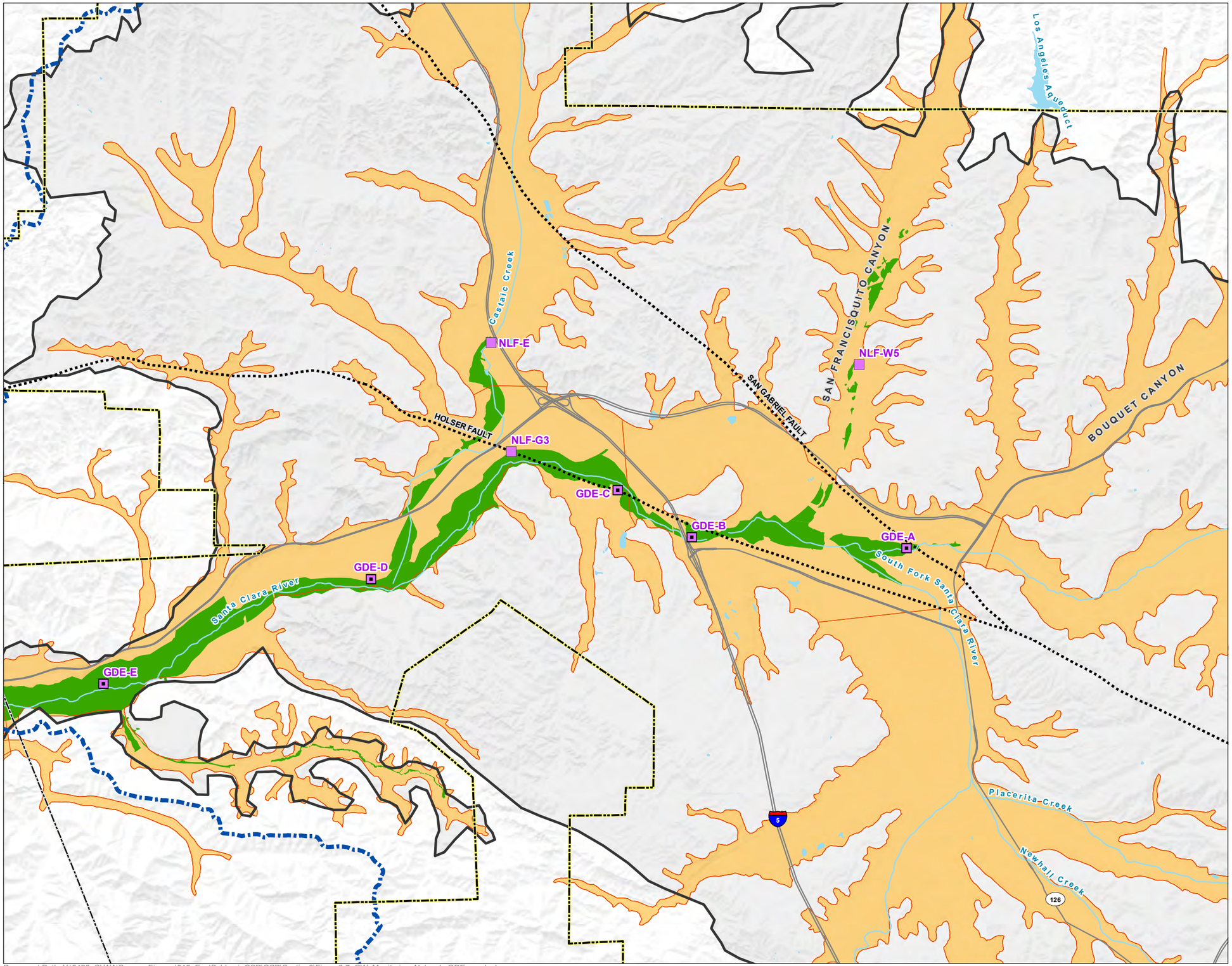
Based on this evaluation, management actions may be implemented as described in Section 9. A discussion of how GDEs were identified, how impacts to GDEs will be defined, trigger levels, and management actions if trigger levels are reached or approached is incorporated into the development of SMCs and is presented in Appendix E. The GSA will consult with applicable landowners to evaluate whether groundwater extraction contributes to possible impacts to GDEs and the nature and extent of possible management actions. See Section 9.5.5 for further discussions of the actions that will be taken if GDE trigger levels are reached.

Figure 8-7 is a map showing the locations of representative monitoring wells within the identified GDE area. There are no monitoring wells in several portions of the GDE area at this time, which is a data gap. For the purposes of setting GDE triggers at each well location in the GDE area, the calibrated groundwater model was used to estimate what the lowest historical groundwater levels were at each location between 1980 and 2019 (the modern-day period corresponding to formal groundwater elevation monitoring in the Basin). Appendix M of the GSP presents hydrographs showing the minimum thresholds and measurable objectives for depletion of interconnected surface water, along with the GDE trigger values (trigger levels) for each monitoring well that will be used to monitor depletion of interconnected surface water and GDEs. For each monitoring location, Table 8-6 lists the GDE trigger levels and the minimum thresholds and measurable objectives that are associated with depletion of interconnected surface water. Once new monitoring wells are installed near these locations, the minimum thresholds, measurable objectives, and trigger levels will be updated as needed to reflect actual groundwater level measurements at each location.

FIGURE 8-7

Groundwater Monitoring Network for GDEs

Santa Clara River Valley
East Groundwater Basin
Groundwater Sustainability Plan



LEGEND

GDE Monitoring Well in the Alluvial Aquifer

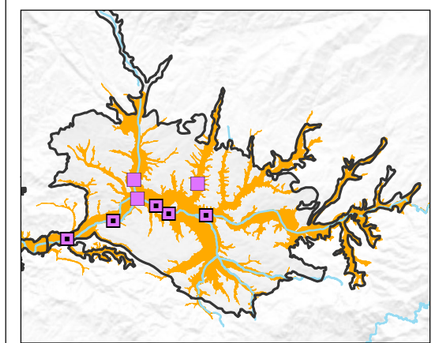
- Existing Observation Well
- New Observation Well (to be constructed)

Phreatophyte Locations

- Riparian Mixed Hardwood

All Other Features

- Santa Clara River Valley Groundwater Basin
- Alluvial Aquifer
- Watershed Boundary
- Service Area Boundary for SCV Water
- Major Road
- Watercourse
- Waterbody



NOTE
SCV Water: Santa Clarita Valley Water Agency

N

0 2,000 4,000 6,000
Feet

Date: December 9, 2021
Data Sources: USGS, DWR Bulletin 118, ESA

GSI Water Solutions, Inc.

Document Path: Y:\0420_CLWA\Source_Figures\019_EastSubbasinGSP\GSP\Section8\Figure8-7_GW_Monitoring_Network_GDEs.mxd, abarry

Table 8-6. Monitoring Locations, Minimum Thresholds, and Measurable Objectives for Depletion of Interconnected Surface Water and GDE Trigger Levels

Location Description	Well Name	Historical Low Depth to Groundwater[2] (feet bgs)	GDE Trigger Level[2] (feet NAVD 88)	Future Low Groundwater Elevation[2] (Minimum Threshold) (feet NAVD 88)	Future Average Groundwater Elevation[2] (Measurable Objective) (feet NAVD 88)
San Francisquito Canyon	NLF-W5[1]	42	1,108	1,087	1,119
Santa Clara River Below Mouth of Bouquet Canyon	GDE-A[1]	42	1,089	1,087	1,103
Santa Clara River at I-5 Bridge	GDE-B	-5	1,062	1,059	1,062
Santa Clara River Near Valencia WRP	GDE-C	8	1,027	1,024.5	1,035
Santa Clara River 1 Mile Downstream of Valencia WRP	NLF-G3	5	975	959	980
Santa Clara River Below Mouth of Castaic Creek	GDE-D	3	932	930	934
Santa Clara River at Mouth of Potrero Canyon	GDE-E	0	860	860	861
Castaic Creek in Lower Castaic Valley	NLF-E[1]	40	981	977	1,000

Notes

[1] May not be within a GDE area.

[2] Historical and future groundwater elevations shown in this table are from simulations conducted using the calibrated groundwater flow model. GDE trigger levels are equal to the historical low groundwater elevation, except at wells GDE-A and GDE-B, where they are set 2 feet higher to avoid loss of surface flow and pools. Native fishes are present at GDE-A and UTS are present at GDE-B (in the I-5 Bridge area).

bgs = below ground surface GDE = groundwater-dependent ecosystem I-5 = Interstate 5 NAVD 88 = North American Vertical Datum of 1988
UTS = unarmored three-spine stickleback WRP = water reclamation plant

8.11.2.1 Relationship between Individual Minimum Thresholds and Other Sustainability Indicators

Because of the interrelationship between groundwater levels, changes in storage, and interconnected surface water, it is possible that one set of thresholds could affect the other set of thresholds for these indicators. The relationship between the depletion of interconnected surface water and the other sustainability indicators is presented below.

- **Avoid Chronic Lowering of Groundwater Levels.** The minimum thresholds for depletion of interconnected surface water are numerically the same as would be calculated at each GDE monitoring location for chronic lowering of groundwater levels, as they are based on the predicted low groundwater elevation from the groundwater flow model simulation for the year 2042 water budget projection. The early-warning trigger levels (groundwater elevations) for evaluating potential effects on GDEs are higher than the minimum thresholds for depletion of interconnected surface water; this means that an evaluation of potentially significant and unreasonable effects on GDEs can be triggered before groundwater levels at the GDE monitoring locations become as low as the minimum threshold values (which are values for both chronic lowering of groundwater levels and depletion of interconnected surface).
- **Avoid Chronic Reduction of Groundwater Storage.** Nothing about the GDE trigger levels or the minimum thresholds for depletion of interconnected surface water promotes pumping in excess of the sustainable yield. Therefore, the minimum thresholds for depletion of interconnected surface water will not result in exceedances of the minimum thresholds for chronic reduction of groundwater storage.
- **Avoid Land Subsidence.** Nothing about the GDE trigger levels or the minimum thresholds for depletion of interconnected surface water promotes a condition that will lead to additional subsidence. Therefore, the minimum thresholds for depletion of interconnected surface water will not result in a significant or unreasonable level of subsidence.
- **Avoid Degraded Groundwater Quality.** The minimum thresholds for depletion of interconnected surface water will not change the groundwater flow directions or rates, and therefore will not result in a significant or unreasonable change in groundwater quality.
- **Avoid Seawater Intrusion.** This sustainability indicator is not applicable to the Basin.

8.11.2.2 Effects of Minimum Thresholds on Neighboring Basins

The Fillmore and Piru Subbasins are hydrologically downgradient of the Basin. Groundwater and surface water generally flow from the Basin into the Piru Subbasin, with the groundwater flowing from the Basin into the Piru Subbasin through a relatively thin layer of alluvium (less than 10 feet thick). The GDE triggers are set to protect habitat and sensitive species in the Basin, and the minimum thresholds are set to prevent significant and unreasonable depletion of interconnected surface water caused by groundwater extraction from occurring.

The minimum thresholds in this GSP are consistent with the groundwater conditions identified in prior modeling studies of the Basin Operating Plan (CH2M HILL and LSCE, 2005; LSCE and GSI, 2009). The Basin Operating Plan was developed and refined through those studies and was developed with input from the UWCD, a significant water provider in Ventura County, under an ongoing memorandum of understanding between SCV Water and UWCD that was executed in 2003. The Basin Operating Plan envisions groundwater extractions that are less than those that occurred prior to the conversion of agricultural lands to municipal uses and the importation of water (LCSE, 2003). Historical stream gaging data demonstrate how urbanization has increased the amount of streamflow in the Santa Clara River in the western portion of the

Basin (particularly below the outfall for the Valencia WRP), which in turn has increased the amount of streamflow to the downstream adjacent basin (the Piru Subbasin).[56]

Lastly, it is anticipated that any physical solution involving the importation of water and/or the control of pumping to manage flows between the upper and lower basins would be reached between UWCD and SCV Water because of the common reliance of these agencies on the SWP and their responsibilities. The SCV-GSA has a cooperative working relationship with the downstream GSA, and the two GSA's will share technical data, develop cooperative monitoring programs and identify sensitive issues.

8.11.2.3 Effects on Beneficial Uses and Land Uses

The GDE triggers levels, GDE evaluation process, and management actions have been selected to identify and evaluate potential impacts to GDEs in the Basin and implement management actions, if necessary, while providing a reliable and sustainable groundwater supply. Groundwater modeling results indicate that future pumping in the Basin during extended droughts could reduce groundwater levels below historically measured levels without causing chronic lowering of groundwater levels or chronic reduction of groundwater in storage. However, because there is a potential for future groundwater production to impact GDEs during extended drought conditions at some locations along the Santa Clara River corridor and in tributaries to the river within the Basin, the *Considerations for Evaluating Effects to Groundwater Dependent Ecosystems in the Upper Santa Clara River Basin* report was prepared. This report is included as Appendix E and presents a GDE monitoring and management program that includes triggers, evaluation, and management actions intended to prevent cessation of flow and loss of pools in areas where native fishes reside and permanent loss of GDEs. This report describes impacts to GDEs that include temporary acute loss of habitat in areas where sensitive species reside (e.g., the I-5 Bridge). Since this report was prepared, the GSA adopted more clear terminology in the GSP that refers to cessation of flow and loss of pools in areas where native fishes reside (e.g., near the I-5 Bridge).

8.11.2.4 Relevant Federal, State, or Local Standards

There are no federal, state, or local regulations related to interconnected surface water depletion other than those that are intended to protect aquatic and terrestrial threatened and endangered species. The GDE trigger levels described in this section and the projects and management actions described in Section 9 are intended to prevent impacts to these species and associated habitats.

8.11.2.5 Methods for Quantitative Measurement of Minimum Thresholds

As a proxy for surface water flow measurements, groundwater levels will be measured in monitoring wells in key locations within the GDE area shown on Figure 8-7. Details of this monitoring program are presented in Section 7.2.

8.11.3 Measurable Objectives

Measurable objectives for depletion of interconnected surface water, which are listed in Table 8-6, use groundwater levels as a proxy because of the lack of surface water gaging stations and because avoiding impacts to GDEs is the focus for this sustainability indicator. Because there is a lack of appropriately located monitoring wells within the GDE area shown on Figure 8-7, initial measurable objectives (in the form of

[56] The estimated total flow into the Piru Subbasin fluctuates over a fairly limited range of volumes on a long-term basis (ranging between approximately 7,000 and 8,000 acre-feet per year [AFY]). This 1,000 AFY range is small compared with annual variations in pumping and the amount of annual climate-driven variation that occurs in several of the water budget terms in the Basin.

groundwater levels) have been estimated at the monitoring sites shown on Figure 8-7 by using the calibrated groundwater flow model to estimate the future average groundwater levels at each monitoring location.

8.11.4 Interim Milestones

Interim milestones show how the GSA anticipates moving from current conditions to meeting the measurable objectives for depletion of interconnected surface water. Interim milestones are set for each 5-year interval following GSP adoption. For this sustainability indicator, there has been no known or documented significant or unreasonable surface water depletion, nor impacts to GDEs, to date, and none are anticipated. Thus, no interim milestones are proposed. The recent historical drought resulted in low groundwater levels and surface water flows. Most certainly, GDEs in the Basin were severely stressed and some trees died. However, the riparian vegetation and habitat in the GDE area has recovered and there is no indication that any impacts to GDEs were a result of groundwater extractions.

8.12 References

CH2M HILL and LSCE, 2005. *Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California*. Prepared by CH2M HILL and Luhdorff & Scalmanini. August 2005.

CDFW. 2019. *Fish & Wildlife Groundwater Planning Considerations.* Prepared by the California Department of Fish and Wildlife Groundwater Program.

DWR. 2017. *Best Management Practices for the Sustainable Management of Groundwater: DRAFT Sustainable Management Criteria.* Prepared by the California Department of Water Resources Sustainable Groundwater Management Program. November 2017.

DWR. 2020. *The Final State Water Project Delivery Capability Report 2019 .* Prepared by the State of California Natural Resources Agency Department of Water Resources. August 26, 2020.

GSSI. 2016. *Final Salt and Nutrient Management Plan, Santa Clara River Valley East Subbasin.* Volumes 1 and 2. Prepared for Castaic Lake Water Agency and Santa Clara River Valley East Subbasin Salt and Nutrient Management Plan Task Force by Geoscience Support Services, Inc. (GSSI). December 8, 2016.

KJ. 2021. *2020 Urban Water Management Plan for Santa Clarita Valley Water Agency (Final).* Prepared for Santa Clarita Valley Water Agency. Prepared by Kennedy/Jenks Consultants, Inc. June 28, 2021.

LARWQCB. 1994. *Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties.* Adopted by the California Regional Water Quality Control Board, Los Angeles Region.

LCSE. 2003. *Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Subbasin, Los Angeles County, California*. Prepared by Luhdorff & Scalmanini, Consulting Engineers (LCSE). December 2003.LCSE and GSI. 2009. *Analysis of Groundwater Supplies and Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin.* Prepared for Santa Clarita Valley Municipal Water Purveyors. Prepared by Luhdorff & Scalmanini and GSI Water Solutions, Inc. August 2009.

9. Management Actions and Projects

9.1 Introduction

This section describes the management actions that will be developed and implemented in the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin) to attain and maintain sustainability in accordance with §§ 354.42 and 354.44 of the Sustainable Groundwater Management Act (SGMA) regulations. Management actions described herein are intended to optimize local groundwater use to avoid undesirable results, consistent with SGMA regulations. The management actions described in this section include:

- Addressing data gaps
- Monitoring, reporting, and outreach
- Promoting best water use practices
- Actions if minimum thresholds are reached or undesirable results confirmed
- Actions if groundwater-dependent ecosystem (GDE) triggers are reached
- Other management actions to promote sustainable groundwater management

This section also describes other groundwater management actions and projects that are considered optional and in concept involve new or improved infrastructure to make new water supplies available to the Basin. These optional projects may be implemented to improve the resiliency of basin groundwater resources to extended drought. The optional projects are based on previous and ongoing feasibility studies conducted by the Santa Clarita Valley Water Agency (SCV Water) and its predecessor agencies or other GSA member agencies.

The need for the management actions that are discussed in this section is based on the following:

- Data gaps exist in the Basin, including groundwater levels within the GDE area, elevation control of well heads and river bottom, domestic well water quality, and subsidence benchmarks. Addressing data gaps will improve the understanding of the Basin and reduce uncertainty regarding decision making.
- Monitoring, in addition to existing programs, is necessary, including for domestic well water quality and water levels, groundwater levels supporting GDEs, subsidence, and non-de minimis pumping. This monitoring will improve the understanding of the Basin and reduce uncertainty regarding decision making.
- Best water use practices should be promoted for municipal, rural domestic, and agricultural groundwater users to reduce any waste and increase water use efficiency.
- Procedures are presented for evaluating and addressing conditions if minimum thresholds are reached.
- Procedures are presented for evaluating and responding to groundwater levels approaching and/or dropping below trigger levels in GDE areas.

Section 354.44 of the SGMA regulations requires that management actions described in a Groundwater Sustainability Plan (GSP) include a discussion about:

- Relevant measurable objectives that would be addressed by a management action or project
- The expected benefits of the action or project
- The circumstances under which management actions or projects will be implemented
- How public notice will be provided

- Relevant regulatory and permitting considerations
- Implementation schedules
- Legal authority required to take the actions
- Estimated costs and how they will be funded
- How pumping and recharge will be managed to ensure recovery of water levels from drought

Groundwater management actions are intended to improve the understanding of groundwater use in the Basin, improve monitoring of groundwater conditions, avoid undesirable results, and address all sustainability indicators described in Section 8. If groundwater levels are sustained without chronic decline, many of the associated undesirable results described in Section 8 will be avoided.

The management actions identified in this GSP will achieve groundwater sustainability by addressing undesirable results should they be observed. This GSP makes no determination of water rights. GSP management actions undertaken to achieve sustainability under SGMA will not result in or be construed as a forfeiture of or limitation on groundwater rights under common law.

9.2 Implementation Approach and Criteria for Management Actions

The amount of groundwater pumping in the Basin has not exceeded (and is not expected to exceed) the estimated sustainable yield of about 52,200 acre-feet per year (AFY) on a long-term (multi-decadal) basis (see Section 6), and groundwater levels have been and are expected to remain stable on a long-term basis. Accordingly, the Groundwater Sustainability Agency (GSA) intends to begin implementation of management actions soon after GSP adoption to ensure that data gaps are addressed and that the improved monitoring program continues to demonstrate that the Basin is being managed sustainably. The GSA will consult with applicable landowners before determining which management actions should be deployed, and how such management actions will be deployed to avoid undesirable results. The effect of the management actions will be reviewed annually, and additional management actions will be implemented as necessary.

The approach to funding implementation of the GSP and any optional actions will be developed by the GSA and its member agencies in accordance with all state laws and applicable public process requirements. Input from the public, interested stakeholders, and groundwater pumpers will be considered and incorporated into the decision-making process.

The GSA will periodically assess the need for required projects and other additional actions in the future should the potential for significant and unreasonable effects be identified. At a minimum, the reassessment process would be conducted as part of the 5-year GSP review and report.

9.3 Authorities Provided to the GSA

Using authorities outlined in §§ 10725 to 10726.9 of the California Water Code, the GSA will exercise local control and flexibility consistent with this GSP to commence management actions. The California Department of Water Resources (DWR) has provided broad authorities to GSAs to manage their respective groundwater basins. GSAs may use provided authorities to manage the basin and authorities include requiring well registration, installation of flowmeters, extraction reporting, paying of extraction fees, monitoring groundwater conditions, limitations on extractions. In addition, SCV Water, whose boundaries encompass most of the Basin, has authority to undertake management actions and projects under the Santa Clarita Valley Water Agency Act, including the power of eminent domain.

9.4 Current Understanding of Groundwater Well Operations

Municipal groundwater extractors include SCV Water and Los Angeles County Waterworks District Number 36. These extractors operate wells in the Alluvial Aquifer and Saugus Formation, and extractions from these wells varies, for example, in 2014 extractions are estimated at 70 percent of total annual groundwater extraction. In the future, it is anticipated that municipal groundwater extractions will increase relative to the total pumping as agricultural lands continue to be fallowed for urban development. The municipal entities measure and report extractions as required. Municipal entities conduct a significant amount of groundwater quality testing throughout each year.

Privately owned and operated wells include agricultural supply, irrigation (agricultural or other), and industrial use. Extractions from these wells varies, for example, in 2014 extractions are estimated at 29 percent total annual groundwater extraction. The GSA understands from well operators that, for the most part, extractions from these wells are metered and reported (for example, they are reported for SCV Water's Annual Water Report and/or to the State Water Resources Control Board [SWRCB]). Less is known about water quality testing from these well operators.

Privately owned and operated de minimis extractors (2 acre-feet [AF] or less groundwater extraction per year) are generally domestic wells. Extractions from these wells is estimated at 1 percent total annual groundwater extraction. The GSA believes that most de minimis extractors do not measure extraction volumes. Less is known about water quality testing from these well operators.

9.5 Basin-Wide Management Actions

The following subsections outline the various basin-wide management actions. The information in Sections 9.5.1 through 9.5.5 is required by § 354.44 of the SGMA regulations. Basin-wide management actions will be implemented that include:

- Addressing data gaps
- Monitoring, reporting, and outreach
- Promoting best water use practices
- Actions if minimum thresholds are reached or undesirable results confirmed
- Actions if GDE triggers are reached
- Other management actions and projects

9.5.1 Addressing Data Gaps

SGMA regulations require identification of data gaps and a plan for filling them (§ 354.38). Monitoring data will be collected and reported for each of the five sustainability indicators that are relevant to the Basin: chronic lowering of groundwater levels, reduction in groundwater storage, degraded water quality, land subsidence, and depletion of interconnected surface water. As noted in Section 7, the approach for establishing the monitoring networks was to leverage existing monitoring programs and, where data gaps existed, incorporate additional monitoring locations that have been made available by basin landowners and stakeholders. Data gaps that have been identified thus far include:

- Water levels within the GDE area
- Reference point elevation for all monitoring locations, including the riverbed in selected areas by GDE monitoring wells
- Domestic well water quality

- Subsidence benchmarks for monitoring land surface elevation
- Upland GDE verification and assessment

9.5.1.1 Installation of Piezometers within the GDE Area

As described in Section 7, GDE monitoring sites are needed within the GDE area (see Figure 8-7 in Section 8) to allow the GSA to monitor groundwater levels and assess whether groundwater pumping has or will cause impacts to GDEs related to lowered groundwater levels and depleted surface water. Eight GDE monitoring sites have been tentatively identified. These sites will consist of shallow (less than 50 feet deep) 2-inch diameter polyvinyl chloride (PVC) piezometers completed within the alluvium, with six of the piezometers located in proximity to the existing Santa Clara River channel, one existing alluvial well located along Castaic Creek, and one existing alluvial well located along San Francisquito Creek, as shown in Figure 8-2. These locations were selected to provide meaningful groundwater level data in reaches of the river and tributaries that are connected to surface water. Exact locations will be determined after consultation with landowners, the California Department of Fish and Wildlife (CDFW), and the Los Angeles County Flood Control District (LACFCD). Six of these locations along the Santa Clara River were previously identified by SCV Water, and funding for their installation has been provided by the 2017 Proposition 1 Sustainable Groundwater Planning Grant from DWR.

9.5.1.2 Reference Point Elevation Survey

A survey of the reference point elevations is needed for all existing and planned new wells that are part of the basin monitoring program. This is needed because not all wells in the program have been surveyed and because different datums have been used in the past. The planned reference point survey will ensure that all groundwater level data are referenced to the same vertical datum in the future. Further, some elevation surveys in the riverbed near GDE monitoring wells will be needed to better determine depth to groundwater beneath the riverbed.

9.5.1.3 Domestic Well Water Quality

Domestic wells are presently not included in existing groundwater quality monitoring programs. Because this group of groundwater users may be affected by groundwater management actions initiated by the GSA in some areas of the Basin, it will be necessary to establish (1) where there are domestic wells that could be affected by groundwater management actions and (2) a water quality sampling program for selected wells to establish a baseline data set for domestic well water quality. Once the baseline has been established, specific needs for future water quality sampling will be better understood.

The GSA will develop a plan that includes the following elements:

- Identifying general areas on a map where domestic wells may be located that could provide useful data and/or be affected by groundwater management actions,
- Outreach to landowners in these areas to solicit domestic well owner participation in the groundwater monitoring,
- Identification of domestic wells for the groundwater monitoring program that will be sampled,
- Selection of water quality constituents for testing,
- Conducting one round of sampling at the selected wells,
- Preparation of a summary report documenting the results, without disclosing specific sampling locations,
- Transmittal of laboratory testing results to individual well owners who participated in the program, and
- Any plan for future monitoring will be prepared with stakeholder input.

9.5.1.4 Subsidence Benchmarks

Section 7 describes the planned subsidence monitoring program for the Basin. A combination of Interferometric Synthetic Aperture Radar (InSAR) data and measured land surface elevation data at selected benchmarks comprise the monitoring locations. As described in Section 7, the GSA intends to use a set of benchmarks that have previously been used by the County of Los Angeles (LA County) to monitor land surface elevations in the Basin (previously at an approximately 6-year recurring survey cycle). The GSA intends to monitor subsidence twice annually at locations where future groundwater level declines could cause subsidence and damage critical infrastructure. Benchmark locations used by LA County will be identified for monitoring ground surface elevations at locations where the largest changes in groundwater levels are expected and where critical infrastructure exists (see Section 7). It will be necessary to work with LA County to determine which benchmarks are most suitable and to establish monitoring protocols that the GSA will follow. In addition, it will be necessary to correlate datums that have been used in the past by LA County with datums established by the GSA so that the two datasets are consistent.

9.5.1.5 Upland GDE Verification and Assessment

Potential GDEs were identified in upland areas (e.g., Placerita Canyon) outside the main Santa Clara River channel and tributaries (refer to Figure 3 in Appendix E). In response to comments from the Stakeholder Advisory Committee, this task includes additional field verification of these areas and assessment of groundwater elevations to assess whether these areas should be included in the ongoing GDE monitoring program.

9.5.1.6 Relevant Measurable Objectives

Addressing data gaps would help achieve measurable objectives for chronic decline in water levels, chronic depletion of storage, degradation of water quality, subsidence, and depletion of interconnected surface water by providing data needed by the GSA to track and monitor sustainability in the Basin so that undesirable results are avoided.

9.5.1.7 Expected Benefits and Evaluation of Benefits

The primary benefit of addressing data gaps is increasing the understanding of basin conditions and how basin management affects those conditions. Addressing the data gaps will result in (1) an improved understanding of groundwater levels in the GDE area, (2) improved accuracy in water level elevations and an improved ability to correlate measurements between measuring sites, (3) an improved understanding of domestic well water quality, (4) and improved monitoring of land surface elevations and subsequent identification of potential land subsidence that could result from groundwater pumping.

9.5.1.8 Circumstances for Implementation

Addressing data gaps will begin upon adoption of the GSP. No other triggers are necessary or required.

9.5.1.9 Public Noticing

Public noticing will not be required for addressing data gaps. Information associated with the monitoring program, which the elements relating to the data gaps are associated with, will be presented on the GSA website and in annual reports.

9.5.1.10 Permitting and Regulatory Process

Siting the GDE monitoring wells requires permission from landowners (the City of Santa Clarita [City] and FivePoint Holdings, LLC [FivePoint]). The GSA will consult with the CDFW to identify sites with the most efficient environmental permitting steps. An agreement has been signed between the City and SCV Water for installation of piezometers on City property. A permit has been granted by LACFCD for installation of piezometers within the floodway. The GSA is working with FivePoint regarding the siting and installation of piezometers on its property.

9.5.1.11 Implementation Schedule

Efforts to address data gaps will begin upon GSP adoption.

9.5.1.12 Legal Authority

The legal authority to address data gaps is included in SGMA. For example, Water Code § 10725.8 authorizes GSAs to require, through their GSPs, that the use of every groundwater extraction facility (except those operated by de minimis extractors) be measured. SGMA also requires that a monitoring program be implemented for each sustainability indicator. Addressing data gaps is integral to meeting this requirement.

9.5.1.13 Estimated Cost

The total estimated cost for addressing the data gaps described above for fiscal year (FY) 2021/22 and 2022/23 is described in Table 9-1.

Table 9-1. Cost Estimate for Addressing Data Gaps

	FY 2021/22	FY 2022/23
Consultant costs for elevation survey (wells and thalweg), domestic well sampling, establishing subsidence benchmarks, upland GDE assessment, and database maintenance[1]	$64,000	$0

Notes

[1] Costs for installation of piezometers and data loggers are included in the GSP development project under a Round 1 and 2 grant and are not included here. SCV Water administrative costs and labor associated with addressing data gaps are included in a separate budget.

FY = fiscal year GDE = groundwater-dependent ecosystem

9.5.2 Monitoring, Reporting, and Outreach

Monitoring, reporting, and outreach are core functions that the GSA will provide to comply with SGMA regulations. The GSA will direct the monitoring programs outlined in Section 7 to track basin conditions related to the five applicable sustainability indicators. Data from the monitoring programs will be routinely evaluated to ensure sustainability is maintained or progress is being made toward sustainability or to identify whether undesirable results are occurring. Data will be maintained in a Data Management System (DMS) operated by SCV Water. Data from the monitoring program will be used (1) by the GSA to guide decisions on management actions and to prepare annual reports to basin stakeholders and DWR, and (2) by individual entities to guide decision-makers. SGMA regulations require that (1) the reports comply with DWR forms and submittal requirements, and (2) all transmittals are signed by an authorized party. Data will be organized and available to the public to document basin conditions relative to sustainable management criteria (SMC) established for the Basin (see Section 8).

9.5.2.1 New Monitoring

As described in Section 7, monitoring of groundwater levels, water quality, and land subsidence has been conducted under several existing programs in the Basin. SCV Water is monitoring groundwater levels, pumping rates and volumes, and water quality at its municipal supply wells in accordance with requirements under existing California Division of Drinking Water programs. FivePoint is conducting monitoring at its agricultural irrigation wells and provides its annual pumping and water use volumes to the LA County Department of Regional Planning. FivePoint also provides its annual pumping volumes and its groundwater level measurement data to SCV Water on an annual basis. Monitoring that is necessary to comply with SGMA, but which is not being fully conducted under an existing program includes:

- Domestic water quality monitoring
- GDE monitoring
- Subsidence monitoring
- Receiving extraction data from non-de minimis well owners
- De Minimis Self-Certification Program

Domestic Well Water Quality Monitoring

As discussed previously, one round of groundwater sampling will be conducted at selected domestic wells in accordance with a domestic well selection and monitoring plan to establish a baseline water quality for these groundwater users. Future monitoring will be evaluated after the baseline data is reviewed.

GDE Monitoring

Monitoring of groundwater levels specifically for evaluating potential impacts to GDEs has not previously been conducted in the GDE area. Section 7 describes the proposed monitoring program for groundwater levels within the GDE area. In addition to groundwater level monitoring, Section 7 describes the ongoing evaluation of groundwater level data within the GDE area and describes the process for assessing the potential for impacts to occur to GDEs should minimum thresholds and trigger levels be approached in the future.

Subsidence Monitoring

Prior to development of this GSP, land subsidence data had not been compiled and evaluated to assess the effects of groundwater extraction on land surface elevations. Land surface elevation data are available from satellite-based data sources (i.e., InSAR) and from LA County for elevation benchmarks located in the Basin

(see Section 5 for a discussion of these data). In the future, the GSA will conduct additional monitoring of land surface elevations at selected key locations on a bi-annual basis (see Section 7). InSAR data, land surface elevation data previously collected by LA County, and the additional subsidence benchmark data will be assessed annually for indications that subsidence is occurring.

Groundwater Extraction Reporting from Non-De Minimis Well Owners

For basin management purposes, it is necessary to measure the quantity of groundwater extractions that are occurring in the Basin. Municipal water providers and some private agricultural groundwater users have water meters and report metered information. Other users may employ electrical/pump performance tests to calculate pumping rates and report annual water use from wells. Non-de minimis users not already reporting extractions will need to be identified so that a metering or extraction reporting program can be implemented for these wells. For this reason, it will be necessary to inventory and categorize all active wells in the Basin.

Non-De Minimis Metering and Reporting Program. This GSP calls for a program that will require all non-de minimis extractors to report extractions annually and use a water-measuring method satisfactory to the GSA in accordance with Water Code § 10725.8. Non-de minimis extractors include, but may not be limited to agricultural wells, golf course wells, and other non-municipal supply wells. It is anticipated that the GSA will develop a policy to implement this program. The information collected will be used to account for pumping, to analyze projected basin conditions, and to complete annual reports and 5-year GSP assessment reports.

Groundwater Extraction Reporting from De Minimis Well Operators

Some well operators are considered de minimis extractors (meaning a person who extracts, for domestic purposes, 2 AF or less per year) and these wells may be excluded from extraction reporting in the Basin if the total number of wells and extraction does not become significant.

De Minimis Self-Certification Program. The number of de minimis extractors in the Basin are not known with a high degree of accuracy but are estimated to reflect approximately 500 AFY extraction. If the GSA determines additional information is needed for groundwater management from de minimis extractors, it may develop a self-certification program for de minimis extractors.

Annual Reports

Annual reports will be submitted to DWR starting on April 1, 2022, to provide required monitoring data, such as for water levels, water quality, extraction volumes and trend analysis. Annual reports will be available to basin stakeholders. Monitoring data also allows the GSA to evaluate trends, compare monitoring data to the SMC, and to report management actions and projects implemented to achieve sustainability. Annual reports allow promotion of best water use practices.

9.5.2.2 Five-Year GSP Updates and Amendments (SGMA Regulation § 356.2)

In accordance with SGMA regulatory requirements (§ 356.4), 5-year GSP assessment reports will be provided to DWR starting in 2027. The GSA will update the GSP at least every 5 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 and whether the new information or understanding warrants changes to any aspect of the plan.

Although not required by SGMA regulations, the GSA may amend the GSP within any 5-year period through the 20-year planning horizon to integrate new information. Updates may include incorporating additional monitoring data, updating the SMC, documenting any projects that are being implemented, and facilitating adaptive management.

9.5.2.3 Relevant Measurable Objectives

Monitoring, reporting, and outreach will help achieve measurable objectives by improving the understanding of basin conditions and by keeping basin groundwater users informed so that actions can be taken to avoid undesirable results.

9.5.2.4 Expected Benefits and Evaluation of Benefits

The primary benefit from monitoring, reporting, and outreach is increasing the understanding of basin conditions and how basin management affects those conditions. Over time, data and analysis is expected to result in fine tuning of SMC including potential modifications to minimum thresholds and GDE triggers. Outreach, public education, and associated community wide increases in knowledge about groundwater sustainability will take place, but exact benefits are difficult to quantify.

Groundwater pumping will be measured directly through the metering and reporting program and recorded in the DMS. Changes in groundwater elevation will be measured with the groundwater level monitoring program. Ground surface elevations collected to monitoring for subsidence will be measured using InSAR data and the additional land surface elevation benchmarks. Changes in groundwater storage will be estimated using changes in groundwater levels (via proxy). Changes in depletion of interconnected surface water will be estimated using changes in groundwater levels (via proxy). Information about the monitoring programs is provided in Section 7. Isolating the effect of monitoring, reporting, and outreach on groundwater levels will be challenging because these additional monitoring programs together comprise only one of several management actions that may be implemented concurrently in the Basin.

9.5.2.5 Circumstances for Implementation

Monitoring, reporting, and outreach will begin upon adoption of the GSP. No other triggers are necessary or required.

9.5.2.6 Public Noticing

Monitoring information and annual reports will be posted on the GSA website to inform the groundwater pumpers and other stakeholders about basin conditions and the need to address undesirable results, if observed. On the GSA website and at regular GSA meetings, groundwater pumpers and interested stakeholders will have the opportunity to provide input and comments regarding how monitoring, reporting and outreach are being implemented in the Basin.

9.5.2.7 Permitting and Regulatory Process

If necessary for groundwater basin management, the GSA may adopt policies governing de minimis self-certification, and flowmeter and extraction reporting for non-de minimis extractors.

9.5.2.8 Implementation Schedule

Monitoring, reporting, and outreach efforts will begin upon GSP adoption.

9.5.2.9 Legal Authority

The legal authority to conduct monitoring, reporting, and outreach is included in SGMA. For example, Water Code § 10725.8 authorizes GSAs to require, through their GSPs, that the use of every groundwater extraction facility (except those operated by de minimis extractors) be measured.

9.5.2.10 Estimated Cost

The total estimated cost for monitoring, reporting, and outreach in FY 2021/22 and 2022/23 is described in Table 9-2.

Table 9-2. Cost Estimate for Monitoring, Reporting, and Outreach[1]

	FY 2021/22	FY 2022/23
Consultant costs for ongoing monitoring, surveying subsidence benchmarks, outreach planning, and database maintenance	$62,000	$93,000
Consultant costs for basin-wide monitoring evaluation, groundwater extraction documentation and reporting, annual report, additional GDE assessment (if needed), and database maintenance	$70,000	$90,000
Total	**$132,000**	**$183,000**

Notes

1 SCV Water administrative costs and labor associated with addressing monitoring, reporting, and outreach are included in a separate budget.

FY = fiscal year GDE = groundwater-dependent ecosystem SCV Water = Santa Clarita Valley Water Agency

9.5.3 Promoting Best Water Use Practices

Seventy percent of groundwater extraction in the Basin is by municipal agencies with strong preexisting conservation programs with clear metrics. The GSA's governing Board also includes seats for the two municipal pumper agencies. This GSP anticipates that the strong municipal water conservation programs already implemented by municipal agencies are sufficiently conservative so as not to require the GSA develop separate municipal water conservation programs. This is not to say however that the GSA Board of Directors would not encourage additional conservation from municipal agencies if the GSA Board of Directors determined it appropriate. Examples of existing municipal water conservation programs include community education and engagement, rebates and incentives, and regulatory mechanisms. In addition to its standing water conservation and water use efficiency communication efforts, SCV Water provides child and adult education supporting water quality, conservation, and water use efficiency practices. Further, SCV Water supports a water use efficiency program portfolio that includes, but is not limited to, rebates and incentives for turf conversion, smart irrigation controllers, irrigation distribution system efficiency upgrades, home and business check-ups, rebates for plumbing fixture upgrades, and water efficiency kits. As needed, SCV Water, through a recently enacted ordinance, may implement enforcement critical to curbing wasteful use of water practices.

Because municipal agencies do not have specific outreach to private well operators regarding water conservation, the GSA will work with private well operators to facilitate workshops or other programs designed to communicate best water use practices for private wells. This GSP calls for the GSA to encourage private pumpers to implement the most effective water use efficiency methods applicable, often referred to as best management practices (BMPs). Effective BMPs could include:

- Efficient irrigation practices in urban and rural areas.
- Implementation of a recycled water program to reduce reliance on groundwater for irrigation.
- Achievement of more optimal irrigation practices by monitoring crop water use with soil and plant monitoring devices and by tying monitoring data to evapotranspiration (ET) estimates.

SCV Water and private pumpers, such as agricultural users, already use BMPs, but improvements can be made. The goals for promoting BMPs are to (1) increase awareness of how water savings can maintain supplies to manage water use through droughts, and (2) broaden the application of BMPs to more groundwater users in the Basin.

De minimis groundwater users will be encouraged to use BMPs as well. Promoting BMPs will include broad outreach to groundwater pumpers in the Basin to emphasize the importance of utilizing BMPs and help groundwater pumpers understand the positive benefits of BMPs for water conservation to help with sustainability.

9.5.3.1 Relevant Measurable Objectives

Conservation programs and BMPs would help achieve the measurable objectives for groundwater elevation, groundwater storage, land subsidence, and interconnected surface water and reduce the potential to impact GDEs.

9.5.3.2 Expected Benefits and Evaluation of Benefits

The primary benefit from continuing conservation programs and initiating BMPs is water conservation which helps manage groundwater supplies so the Basin is better prepared for drought and to improve sustainability. Conservation metrics for municipal water use are well known and regularly reported by municipal agencies, it is unknown how much groundwater conservation will occur from promoting BMPs for private well operators. It is difficult to quantify the expected benefits for private well operators at this time.

Benefits associated with water conservation BMPs are already measured and reported by municipal users. Water conservation benefits from private well operators will be reported as BMPs are incorporated into private well operations.

Changes in groundwater elevation will be measured with the groundwater level monitoring program. Any subsidence will be measured with the satellite-based InSAR monitoring system and an on-the-ground land surface elevation monitoring network. Changes in groundwater storage, and depletion of interconnected surface water, will be estimated using the groundwater level proxy. Information about these monitoring programs is provided in Section 7. Isolating the effect of BMPs on groundwater levels will be challenging because the promotion of best water use practices is only one of several management actions that may be implemented concurrently in the Basin.

9.5.3.3 Circumstances for Implementation

BMPs and related outreach will be promoted soon after adoption of the GSP. No other triggers are necessary or required.

9.5.3.4 Public Noticing

Information about BMPs and programs designed to promote BMPs will be posted on the GSA website and included in mailers to inform groundwater users and pumpers and other stakeholders about basin conditions and the need for BMPs. Groundwater pumpers and interested stakeholders will have the opportunity to provide input and comments on how the BMPs are being implemented in the Basin through the website and at regular GSA meetings. The BMPs will also be promoted through annual GSP reports.

9.5.3.5 Permitting and Regulatory Process

No permitting or regulatory process is needed for promoting BMPs.

9.5.3.6 Implementation Schedule

The GSA envisions that BMPs will be promoted within a year of GSP adoption.

9.5.3.7 Legal Authority

No legal authority is needed to promote BMPs.

9.5.3.8 Estimated Cost

The estimated cost for promoting BMPs and understanding the extent to which they are being implemented in the Basin is primarily included in existing SCV Water programs. The GSA would do additional outreach regarding BMPs in line with its outreach budget.

Table 9-3. Cost Estimate for Promoting Best Management Practices

	FY 2021/22	FY 2022/23
Consultant costs for promoting best management practices for private well operators and database maintenance[1]	$11,000	$11,000

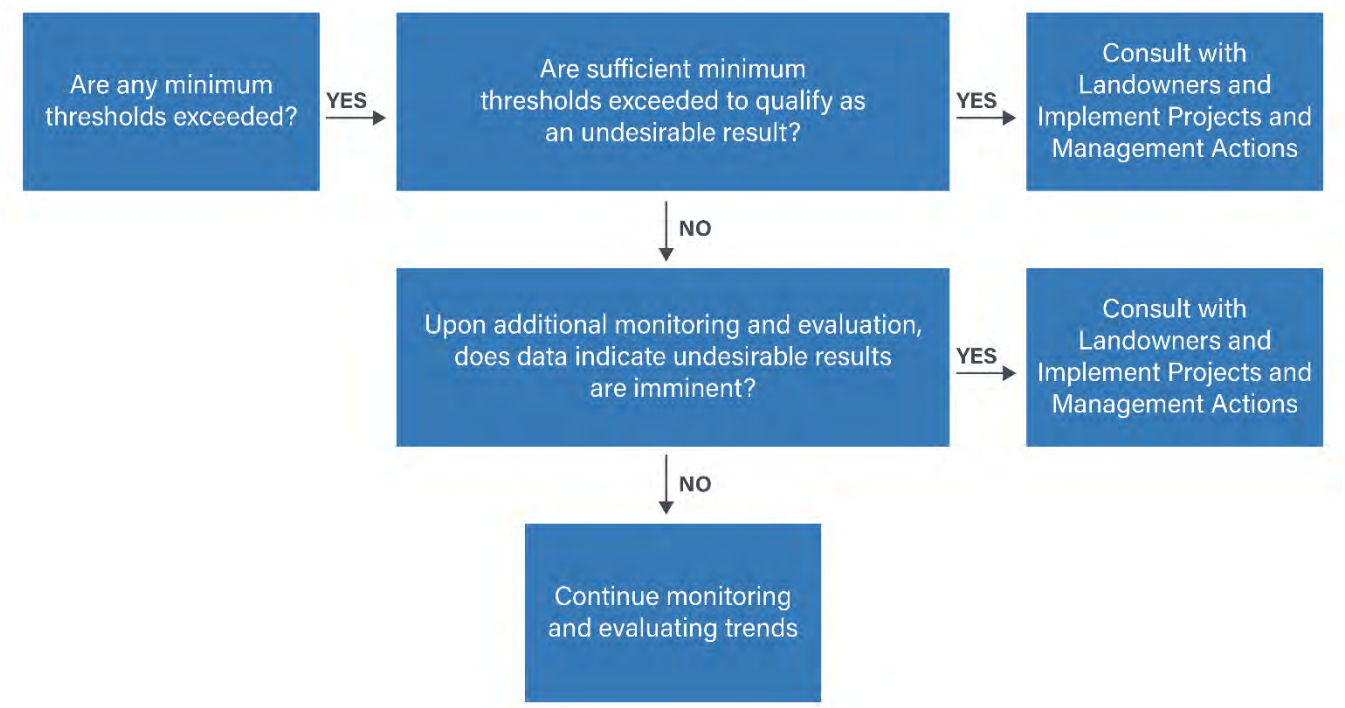
Notes

1 SCV Water administrative costs and labor associated with promoting best management practices are included in a separate budget.

FY = fiscal year SCV Water = Santa Clarita Valley Water Agency

9.5.4 Actions If Minimum Thresholds Are Reached or Undesirable Results Confirmed

The GSA anticipates that if minimum thresholds are reached, the GSA will evaluate the cause. If that evaluation indicates the minimum thresholds were reached due to groundwater extraction and the trend of the data indicate that undesirable results arising out of groundwater extraction are imminent, then management actions would be called upon. If minimum thresholds are exceeded in the representative number of monitoring points over the specified conditions described in Section 8, then an undesirable result would be identified and, after consulting with applicable landowners, the GSA will take management actions as set forth in the diagram that follows.



9.5.4.1 Chronic Lowering of Groundwater Levels and/or Chronic Reduction in Storage

Because these two sustainability indicators are inter-related, the possible responses to reaching the minimum thresholds as well as evaluation of undesirable results are shared. If minimum thresholds are reached in a number of wells less than that required to make a determination of undesirable results, there still may be a potential for undesirable results and so evaluation may be necessary.

Undesirable results related to declining water levels may also be manifested for other indicators, including water quality degradation, depletion of interconnected surface water, and subsidence. For these reasons, the evaluation of what is significant and unreasonable for chronic lowering of groundwater levels and chronic reduction in storage should also consider these other indicators.

The evaluation of what may lead to an undesirable result if minimum thresholds are reached includes the following:

- **Evaluate whether the decline is due to pumping, drought, or both.** Pumping effects upon groundwater elevations should be evaluated in concert with considering if the cumulative departure from mean rainfall indicates a drought condition. Other evaluation steps may include conducting aquifer tests (by pumping or not pumping certain wells) and monitoring water level responses in adjacent wells to determine if the observed water level trend is primarily related to pumping. In addition, the groundwater model can be used to evaluate the relative influences of pumping versus drought conditions on observed water level declines.

- **Evaluate whether the declining water levels are likely to continue.** Historical water level monitoring has shown that water levels go up and down in response to annual and multi-year variations in rainfall across the Basin. This is particularly true in the Alluvial Aquifer. This step of the evaluation involves examining the rate at which water levels have declined compared with historical water levels and whether the trend will likely continue or get worse.
- **Evaluate whether other sustainability indicators are likely to be affected.** Monitoring data associated with the other sustainability indicators should be reviewed to assess whether declining water levels are also showing potential undesirable effects in the other indicators.

If after performing evaluations there is potential for an undesirable result if water levels decline below minimum thresholds, then one or more of the following management actions will be taken, following consultation with applicable landowners, until monitoring data indicate water levels have recovered so that undesirable results have been eliminated.

1. Redistribute pumping away from the affected area.
2. Reduce pumping in nearby wells.
3. Conduct additional releases from Castaic Lake if there is a benefit of doing so.
4. Bring in additional State Water Project water or other imported banked water to make up for reduced groundwater supply.
5. Implement tiered water conservation measures for the Basin.
6. Reduce pumping in the most affected aquifer.

9.5.4.2 Degraded Water Quality

If minimum thresholds for degraded water quality are reached in groundwater, the GSA will perform an evaluation to help determine the cause of degraded groundwater quality and whether it is likely to cause an unreasonable result. Evaluations may include:

1. Reviewing local land use information and activities (e.g., state records of groundwater contamination);
2. Evaluating groundwater extraction information to understand if it may cause migration of poor-quality groundwater associated with a contaminant plume or poor-quality groundwater residing in geologic formations toward other wells, This does not pertain to SCV Water pumping for water supply and SCV Water efforts to contain and treat identified contaminants in the aquifer;
3. Reviewing effect of drought and lower water elevations on water quality constituents;
4. Reviewing groundwater quality monitoring information, and or conducting additional groundwater quality analysis;
5. Considering the role of implementation of a recycled water program upon groundwater quality; or
6. Considering other water management actions not associated with the GSA (e.g., groundwater recharge projects developed by SCV Water, or others, that would have the potential to mobilize degraded groundwater).

The GSA will collaborate with the state regulatory agencies to determine the extent to which groundwater management actions, such as well head treatment, can be used to avoid unreasonable results. The GSA will also collaborate with the California Regional Water Quality Control Board (RWQCB) regarding implementation of the Salt and Nutrient Management Plan (SNMP) for the Basin to ensure that groundwater quality with respect to salts and nutrients does not jeopardize the future ability to use recycled water consistent with the SNMP.

If it is determined that GSA activities or basin pumping affect the groundwater quality degradation, the GSA may take one or more of the following steps to address the issue:

1. Review alternatives for improving groundwater quality in the affected area;
2. Work with affected groundwater users to deploy well head treatment systems;
3. Arrange for alternate water supply;
4. Shift pumping to other locations; and/or
5. Reduce or stop pumping near the affected area.

9.5.4.3 Subsidence

Minimum thresholds for subsidence have been established to avoid damage to critical infrastructure and land uses. As noted in Section 5, subsidence can be caused by activities stemming from groundwater pumping, tectonics, and oil and gas production. Each of these take place in the Basin. While significant and unreasonable subsidence caused from the whole of these activities has not been observed, groundwater pumping may temporarily cause groundwater level declines of up to 150 feet in the future. It is believed the geologic framework in this Basin has limited susceptibility to subsidence resulting from groundwater extraction, but there are data gaps. If the rate of subsidence and the total amount of subsidence exceed minimum thresholds in the future, then an evaluation will first be performed to assess the likely cause. Because reduced groundwater levels are one potential cause of subsidence, this evaluation will be similar to the evaluation described in Section 9.5.3.1 for chronic water level decline. If it is determined that groundwater pumping is the likely cause of the observation and there is likely to be an undesirable result (e.g., damage to critical infrastructure or land uses), then the management actions listed in Section 9.5.3.1 will be implemented until the rate of subsidence is reduced and additional undesirable results are minimized. These management actions may be directed to certain regions of the Basin that are most affected.

9.5.4.4 Depletion of Interconnected Surface Water

Because significant and unreasonable surface water depletion has not been observed within the Basin and no other beneficial uses of surface water other than GDEs exist in the Basin, the thresholds for avoiding depletion of interconnected surface water are set to avoid impacts to GDEs. As discussed in Section 8, the minimum threshold for this sustainability indicator has been established for a maximum allowable amount of surface water depletion that corresponds to the future predicted water level in GDE area monitoring wells completed in the Alluvial Aquifer near the Santa Clara River and in certain locations along Castaic Creek and in San Francisquito Canyon. It is not known if future groundwater levels below the historical low level could cause an impact to GDEs. For this reason, at each GDE monitoring well a trigger level has been established that is equal to the historical low groundwater level at the well site (as derived from historical data at two existing GDE monitoring well sites and from groundwater modeling analyses at the planned sites for six other GDE monitoring wells). The triggers, evaluations, and associated management actions (if needed to avoid undesirable results), will avoid impacts to GDEs. In the vicinity of the Interstate 5 (I-5) Bridge, a trigger level has been established using groundwater levels as a proxy that maintains surface water flow that is necessary to protect sensitive aquatic species in this area. Triggers specific to each area are shown in Table 8-6. The steps for evaluating whether future changes in observed groundwater levels within the GDE area are significant and unreasonable are described in the next section. Likewise, management actions that will be taken if undesirable results are likely to occur are also described in the next section.

9.5.5 Actions If GDE Triggers Are Reached or Approached

9.5.5.1 Evaluation Process When GDE Triggers Are Reached or Approached

Section 8 states that when a trigger is reached or approached, an evaluation process will be initiated to determine whether the lowered groundwater levels and possible surface water depletion are a result of pumping and could result in a significant and unreasonable effect to GDEs. The Monitoring Plan presented in Section 7 includes a process to report the trigger event to the GSA Board as needed with an accompanying Evaluation Report that evaluates the need for management actions to be implemented. Management actions would be implemented quickly (in some cases, in as little as 1 to 2 weeks after completing the evaluation process) if the lowering groundwater levels could result in permanent loss or significant degradation of existing native riparian or aquatic habitat due to groundwater extraction throughout the GDE area or temporary loss of essential habitat to unarmored three-spine stickleback (UTS) (sensitive aquatic species in the vicinity of I-5 Bridge) as a result of cessation of surface flow during low-flow conditions in the river channel caused by groundwater extraction. Several questions have been identified below that may shed light on the significance of lowered groundwater levels. Refer to Figure 7-13 in Section 7 for the locations of the river segments and GDE monitoring sites.

Questions that will be addressed as part of this evaluation process include, but are not limited to, the following:

1. **Is the affected river segment supported by surface flow from water reclamation plant (WRP) discharges? (Surface water may support habitats during temporary periods of lower-than-normal groundwater levels.)**

   Surface water is generally persistent from the Valencia WRP to the basin boundary. The Evaluation Report may document that streamflows are persistent even with lowered groundwater levels. If streamflows are not present downstream of the location of the Valencia WRP outfall, then the Evaluation Report would conclude that surface flows are not sustaining vegetation during the historically low groundwater period, and further evaluation of the following questions may lead to management actions.

2. **Is the historically low groundwater level already below the tree/shrub root depths? (If so, further declines in the same year may not affect GDEs.)**

   The Evaluation Report may rely on topographic data and depth-to-groundwater data from recent monitoring well readings to determine whether groundwater levels are below tree/shrub root depths. The existing vegetation may not be relying on groundwater in areas where temporary drawdowns of the water table to depths of 15 feet or more occur regularly. An elevation survey of the thalweg may be helpful to estimate root zone areas in the affected reach. In areas where groundwater is lowered more than 2 or 3 feet below historically low levels, GDEs may be disconnected from their water source to an unprecedented degree. In these areas, management actions may be warranted.

3. **Will the GDEs survive the temporary loss of access to groundwater? (Depending on the season, groundwater levels may be expected to rise above historically low levels within a month or two, avoiding permanent loss of habitat. When groundwater levels are restored sufficiently quickly in the winter months, effects to GDEs may not be significant.)**

   The Evaluation Report should provide a qualitative assessment of the duration that lower groundwater levels may occur during a specific season, if water levels will recover initially with cooler temperatures in the fall and then more substantially following rain events. If GDE triggers are reached early in the year, then the GDEs may experience more stress than if the triggers are reached late in the hot weather season. The Evaluation Report may recommend initiating vegetation monitoring to assess whether drought stress is visible in the river segment. If vegetation is showing signs of stress that are attributable

to historically low groundwater levels, then the Evaluation Report will be updated, and management actions may be warranted. For the aquatic habitat where sensitive aquatic species are located in Segment 1 (e.g., UTS present near the I-5 Bridge), any temporary loss of surface flow is to be avoided with management actions before it occurs.

4. **Has the GDE trigger been reached often in recent years? Droughts that lower groundwater levels are a natural occurrence, but do not occur every year. To sustain GDEs over the long term, groundwater levels affected by drought conditions must recover sufficiently quickly and remain higher during most years in order to support healthy, sustainable habitats over the long term.**

   The Evaluation Report should report the frequency with which the GDE triggers have been reached. If the triggers have been reached more than two or three times within a 10-year period, the Evaluation Report may recommend initiating vegetation monitoring to assess for recurring stress and gradual degradation of habitat. If a gradual decline in habitat quality is seen because of pumping that may lead to undesirable results, then the Evaluation Report will be updated, and management actions may be warranted.

5. **Are the declines in groundwater levels resulting from pumping?**

   The analysis described in Section 9.5.3.1 will be performed to assess the effect of pumping versus drought conditions. Pumping data from wells that are known to be pumping in the Basin will be compiled. Historical pumping rates will be compared to current pumping rates recorded for the recent past (i.e., in previous months). If current pumping rates are less than or equal to historical pumping rates, then the Evaluation Report may conclude that further reductions in current pumping rates are not warranted because GDEs have survived during historical droughts when higher pumping rates and/or historically lower low water levels were observed. If unprecedented drought conditions or other changes in the water balance of the Basin are contributing to the condition, then the GSA may consider actions that could be taken to further ensure that undesirable results are avoided.

6. **Has new information been obtained that can be used to refine the trigger levels presented in Section 8?**

   The Evaluation Report should provide the context for developing recommendations on future evaluation, monitoring, and action items. If new information becomes available regarding the resilience or sensitivity of the GDEs and the special status species that rely on the habitat values, then the Evaluation Report should identify this updated information and recommend management actions as needed to avoid undesirable results. This may include refining the trigger level over time to better correlate with the potential for undesirable results.

9.5.5.2 Evaluation Report

The information gathered for Section 9.5.5.1 will be discussed in an Evaluation Report. The report will include recommendations for ongoing monitoring, or implementation of management actions and will include justification for the conclusions.

9.5.5.3 Presentation to the GSA Board

Evaluation Reports will be presented to the GSA Board quarterly, or more frequently if necessary.

9.5.5.4 Possible Management Actions If GDE Triggers Are Reached

The Evaluation Report may conclude that the lowered groundwater levels do not represent significant and unreasonable effects to GDEs in areas where GDEs are resilient and where sensitive species would be expected to persist during the drought and fully recover with the return of wet weather. However, there are

priority areas in the river system (e.g., I-5 Bridge area where UTS may be found) that may not be resilient to future unprecedented drought conditions. If these areas are threatened with temporary loss of surface flows for any duration, then management actions would be necessary.

If during future unprecedented multi-year droughts that were not simulated during development of this GSP reduction of pumping does not avoid significant effects and impacts to GDEs, then the GSA will consult with the U.S. Fish and Wildlife Service (USFWS) and CDFW to develop emergency measures to avoid significant effects to sensitive species.

If significant and unreasonable effects are anticipated, then any necessary management actions would be implemented in a timely manner as described below:

1. The GSA in consultation with groundwater pumpers will implement one or more of the following measures:

   - Shift pumping to another location to reduce impact on GDEs, and/or
   - Stop pumping in wells near the GDEs, and/or
   - Increase the quantity of imported water into the Basin

   Should any of the above be a consideration, the groundwater flow model may also be used to determine optimum pumping locations/aquifer most likely to avoid undesirable results.

2. The GSA may coordinate with SCV Water to consider implementing a mandatory water conservation program so that overall pumping in the Basin can be reduced.

3. If the evaluation shows that non municipal production wells are contributing to the problem, then the GSA will conduct outreach up to and including meetings with private well owners and stakeholders to discuss how to best respond to the concern. Ideally, this would occur prior to the time when significant and unreasonable impacts to GDEs are observed. The GSA may request reductions in pumping from private (non-de minimis) wells owners.

4. If monitoring data and weather predictions indicate that undesirable results are likely to persist into the following year and the above actions are not likely to mitigate the impacts, then it may be necessary to develop additional projects designed to increase the amount of water in the river system as described in Section 9.6.3.

9.6 Other Groundwater Management Actions and Projects

Although not specifically funded or managed as part of implementing this GSP, several associated actions will be encouraged by the GSA as part of good groundwater management practices.

9.6.1 Agency Coordination

Groundwater resources within the Basin are an integral part of the upper Santa Clara River watershed and maintaining the health of the Santa Clara River is part of the GSAs Sustainability Goal. To effectively manage the groundwater resources within the Basin, there will be an ongoing need to coordinate with various state and local agencies that have authority over land use, water supply, and water quality in the watershed, including CDFW, the RWQCB, DWR, California Department of Transportation (Caltrans), the SWRCB, LA County, and the City (refer to Section 3.3 for more details). Other opportunities for coordination also exist between the GSA and the Upper Santa Clara River Integrated Regional Water Management process, and the GSAs role as a member of LA County's Safe Clean Water Program. It is anticipated that GSA staff and Board members will maintain regular communication with these entities to discuss issues affecting the watershed and groundwater resource quality and quantity.

9.6.2 Removal of Invasive Species

Invasive plant species, consisting primarily of *Arundo donax* (*Arundo*), have become established within the riparian area along the Santa Clara River and some of its tributaries. A literature review by The Nature Conservancy (TNC) (2019) identified 12 studies of water use by *Arundo*, which together provide water use estimates ranging between 1.8 and 48 AF/acre/year, with mean and median and mean values of 8.3 and 12.3 AF/acre/year, respectively. While not required, the GSA will continue to support efforts by others to raise money for invasive species removal projects.

9.6.3 Optional Managed Aquifer Recharge Projects

Principal aquifers in the groundwater basin are the Alluvial Aquifer and Saugus Formation. Each aquifer accepts natural groundwater recharge in different ways. The Alluvial Aquifer is exposed at the ground surface in the Santa Clara River and its tributaries, but alluvial sediments are also present outside of these areas (a.k.a. "off stream"). The Saugus aquifer is exposed throughout much of the valley where not covered by alluvial sediments. Existing groundwater recharge to these aquifers is provided naturally from precipitation, and from urban processes including dry weather runoff, irrigation, and water reclamation plant discharges.

Managed groundwater recharge can utilize water sources such as stormwater, excess imported water, and/or recycled water to meet multiple goals within the watershed including reducing stormwater runoff, increasing the use of recycled water, and augmenting groundwater supplies for drought. Recharge can be accomplished by distributing water to infiltration areas where it drains by gravity into the soils, or through injection wells where water is pumped to aquifer zones below. Efforts to characterize additional groundwater recharge opportunities in the Basin have been underway for many years and in recent years some field studies have been implemented to test areas for recharge capability.

In 2015, a Water Resources Reconnaissance Study was commissioned by Castaic Lake Water Agency and performed by Carollo Engineers. This study conducted screening of numerous potential recharge areas within the valley. It identified areas with geology suitable for additional groundwater recharge, and it also identified areas that did not have sufficient aquifer material to accept meaningful amounts of recharge.

Informed by this work, additional work has taken place ranging from defining initial concepts to looking at specific sites, conducting environmental review, test well installation, infiltration testing, and monitoring to develop a baseline.

Because undesirable results from groundwater extraction have not been identified, implementation of these kinds of projects is not required and thus are considered optional. A description of these optional projects is presented below.

9.6.3.1 Old Castaic School Site Recharge and/or Potential Eastern Recharge

In response to the findings in the Water Resources Reconnaissance Study, the former Newhall County Water District commissioned Geosyntec, Trussell Technologies, and GSI Water Solutions, Inc. to conduct a focused groundwater recharge feasibility studies in the eastern portion of the valley and near the Castaic Lagoon (completed in 2016/17). Based on the water quality and hydrogeological considerations presented in the feasibility studies, the reports concluded that groundwater recharge using surface spreading in the Upper Santa Clara River Watershed showed promise and warranted further field investigation. In July of 2019, SCV Water contracted GSI Water Solutions, Inc. to assess these potential recharge sites.

Work at the Castaic site to date includes a review for environmental contamination, infiltration testing, aquifer parameter estimates, installation of an observation well, data collection, and estimation of potential recharge amounts, and travel time of infiltrated water to a nearby well. Work in the eastern part of the Basin

has included field reconnaissance, a review for environmental contamination, and review of "off stream" locations.

9.6.3.2 Recharge Using Potable Water in the Vicinity of the Placerita Nature Center

SCV Water operates a potable water supply line delivering water to residents in Placerita Canyon. This water supply is within the right of way of Placerita Canyon nearby Placerita Nature Center. Due to past concerns raised by stakeholders about drought stress and drought caused die-off of oak trees in a limited area of the Nature Center property, SCV Water is considering providing excess potable supply through a pipe and delivery structure to limited areas during drought to mitigate drought effects.

9.6.3.3 Off Stream Recharge Using Recycled Water

In 2016 Castaic Lake Water Agency prepared a draft Recycled Water Master Plan that among other things, considered use of recycled water for groundwater recharge at multiple locations within the valley. A number of sites adjacent to the Santa Clara River were evaluated, including off stream storage south of the river near Via Princessa, and further east in the Basin. The role of recharge with recycled water should continue to be evaluated.

9.6.3.4 Aquifer Storage and Recovery

Injection wells can be used to inject water into aquifers to help recharge aquifers, and also provide water for recovery at a later date. No such projects are under evaluation at this stage, but they may be evaluated in the future by municipal water suppliers. Water for injection could come from excess state water, or banked water.

9.6.3.5 Bouquet Canyon Creek Restoration

Historically, Bouquet Canyon Creek benefited from steady releases of water from the Bouquet Canyon Reservoir. Annually, the releases were approximately 2,000 AFY. This flow benefited creek habitat and groundwater recharge. Several years ago, a debris flow into the creek necessitated a reduction in discharges from the reservoir in order to avoid flooding the adjacent well-traveled road and creating a safety issue. As a result of these reduced discharges, approximately 11,000 AF of reservoir water has been withheld over time, reducing recharge that supplies shallow wells in the canyon and reducing basin recharge. LA County, along with state and federal regulatory agencies, have considered options to restore the creek and ultimately allow full reservoir releases to begin again, but a final solution remains to be arrived at. The GSA will cooperate with LA County, the City of Santa Clarita, CDFW, U.S. Forest Service, landowners, and other stakeholders to facilitate projects that seek the restoration of flows in Bouquet Creek.

9.6.4 Estimated Cost

Because these groundwater management actions and projects are considered optional at this time and have not been fully evaluated, detailed costs for planning, permitting, and development of any specific project are not provided at this time. However, the GSA may choose to investigate these management actions and projects during the next two fiscal years and so an initial budget for feasibility studies, California Environmental Quality Act (CEQA) analysis, preliminary design, and project development is provided in Table 9-4.

Table 9-4. Cost Estimate for Initial Project Development

	FY 2021/22	FY 2022/23
Budget for feasibility studies, CEQA analysis, preliminary design, and project development[1]	$75,000	$50,000

Notes

1 SCV Water administrative costs and labor associated with initial project development are included in a separate budget.

CEQA = California Environmental Quality Act FY = fiscal year

9.7 Demonstrated Ability to Maintain Sustainability

To demonstrate the ability to maintain sustainability, the groundwater model was used to simulate future pumping, future land use at full build-out, and climate conditions (including climate change) through the years 2042 and 2072 (see Section 6). Based on this analysis, the modeling results demonstrated that undesirable results relating to chronic reduction in groundwater levels and chronic reduction of groundwater in storage have not occurred historically and are unlikely to occur in the future under the groundwater operating plan, given the current understanding and assumptions involving future land uses, the water demands for those land uses, and future climate. Groundwater modeling was not used to assess the potential for subsidence. While subsidence is not expected to be significant and unreasonable in the future, a subsidence monitoring program is included in this GSP.

Because the groundwater and river systems are highly interconnected, surface water depletion occurring because of groundwater levels in the Alluvial Aquifer falling below historical levels has the potential to impact GDEs in some areas. For these reasons, the GSP is implementing a robust GDE monitoring and assessment program. Should the monitoring and assessment program indicate that impacts to GDEs are imminent and could be significant, then a series of timely management actions are planned to avoid impacts.

9.8 Management of Groundwater Extractions and Recharge to Ensure Sustainability

This GSP has established processes for monitoring basin conditions, assessing whether potential impacts are significant and unreasonable, and establishing management actions that are intended to avoid undesirable results associated with each of the sustainability indicators. The GSP also identifies and proposes actions to address data gaps and related uncertainties that may affect decision-making. Addressing these data gaps and uncertainties over time will improve the current understanding of basin conditions and improve the basis for decision-making.

9.9 Reference

TNC. 2019. *Enhancing Water Supply through Invasive Plant Removal: A Literature Review of Evapotranspiration Studies on Arundo Donax*. Prepared by The Nature Conservancy (TNC). 6 pp. February 11, 2019. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/TNC_Arundo_ET_Literature_Review_Feb2019.pdf.

10. Groundwater Sustainability Plan Implementation

10.1 Introduction

This section provides a conceptual road map for efforts to implement the Santa Clara River Valley East Groundwater Subbasin Groundwater Sustainability Plan (GSP) during the first 5 years and discusses implementation effects in accordance with the Sustainable Groundwater Management Act (SGMA) regulations § 354.8(f)(2) and (3). A general schedule showing the major tasks and estimated timeline is provided as Figure 10-1. Specific regulations guiding the content of this section were not developed by the California Department of Water Resources (DWR).

This implementation plan is based on current understanding of the Santa Clara River Valley East Groundwater Subbasin (Basin) conditions and anticipated administrative considerations that affect the management actions described in Chapter 9. Understanding of basin conditions and administrative considerations will evolve over time based on future refinement of the hydrogeologic setting, groundwater flow conditions, and input from basin stakeholders.

Implementation of this GSP requires robust administrative and financing structures, with adequate staff and funding to ensure compliance with SGMA. The GSP calls for the Santa Clarita Valley Groundwater Sustainability Agency (GSA) to routinely provide information to the public about GSP implementation and progress towards sustainability and the need to use groundwater efficiently. The GSP calls for a website to be maintained as a communication tool for posting data, reports, and meeting information.

Section 9 presents a number of management actions to implement that will address data gaps and reduce uncertainty, improve understanding of basin conditions and how they may change over time, and actions intended to promote conservation and optimize water use in the Basin. New projects are not proposed at this time, only suggested as optional, because (1) the Basin is in balance and (1) no undesirable results have been observed and are not expected during the future planning horizon. The management actions that are proposed and are the subject of this implementation plan include the following:

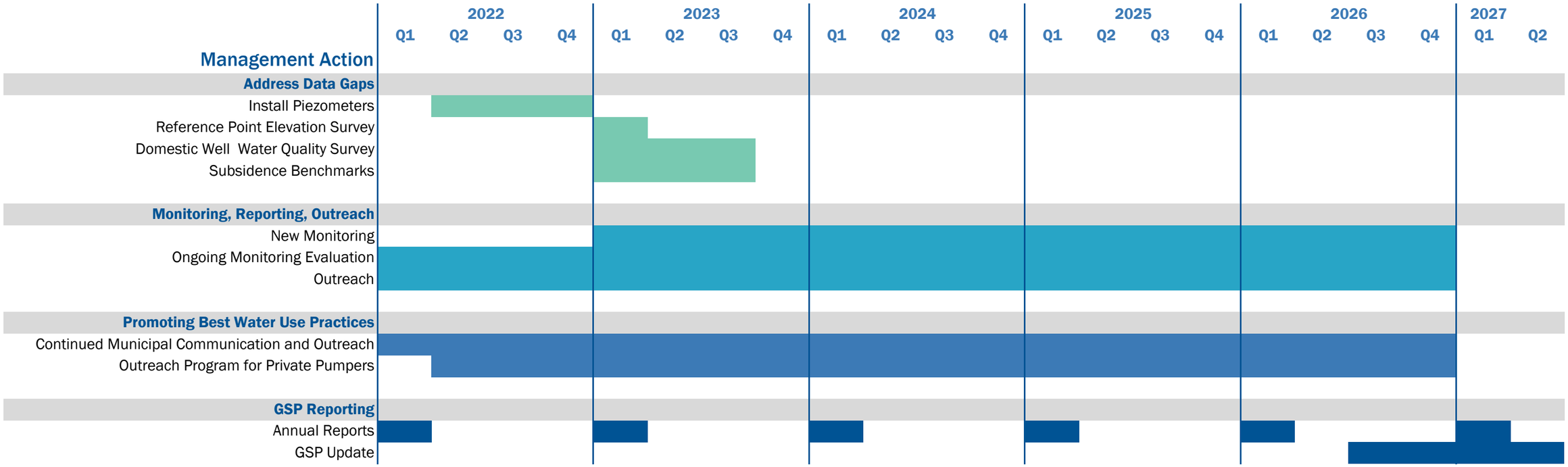
1. Addressing data gaps
2. Monitoring, reporting, and outreach
3. Promoting best water use practices
4. Initial feasibility studies

This section of the GSP describes how these management actions will be implemented, and includes descriptions of the following:

- Administrative approach and implementation timing
- Costs associated with implementing management actions and funding sources
- Effects on existing land uses
- Effects on water supply
- Effects on the local and regional economy

Each topic is discussed in the following sections.

Figure 10-1. Preliminary Schedule for GSP Implementation, Santa Clara River East Subbasin



10.2 Administrative Approach and Implementation Timing

The GSA will likely hire consultant(s), assign a member agency to conduct or manage the effort, and/or hire staff to implement the GSP. If consultants are hired, it is anticipated that qualified professionals will be identified and hired through a competitive selection process. It is also anticipated that the lead for a particular task will keep the GSA informed via periodic updates to the GSA Board and the public. As needed, the GSA would likely conduct specific studies and analyses necessary to improve understanding of basin conditions. The GSA would likely then use new information on basin conditions to identify, evaluate, and/or improve management actions to achieve sustainability. This GSP calls for actions considered by the GSA to be vetted through a public outreach process whereby groundwater pumpers and other stakeholders will have opportunities to provide input to the decision-making process.

The GSA intends to begin implementing the management actions upon adoption of the GSP. Figure 10-1 provides a preliminary schedule for implementing each management action over the next 5 years.

10.3 Costs Associated with Implementing Management Actions and Funding Sources

As summarized in Table 10-1, a conceptual planning-level cost of $282,000 for fiscal year (FY) 2021/2022 and $244,000 for FY 2022/2023 was estimated for planned activities during the first 2 years of implementation.

Table 10-1. Conceptual Planning-Level Cost Estimate for GSP Implementation

Activity	Fiscal Year	
	2021/2022	2022/2023
Address Data Gaps	$64,000	$0
Monitoring, Reporting, and Outreach	$132,000	$183,000
Best Management Practices	$11,000	$11,000
Initial Feasibility Studies, CEQA analysis, Preliminary Design, and Project Development[1]	$75,000	$50,000
TOTAL	**$282,000**	**$244,000**

Notes

[1] SCV Water administrative costs and labor associated with these implementation activities are included in a separate budget.

CEQA = California Environmental Quality Act

This cost estimate reflects consultant costs for addressing data gaps, monitoring, public outreach, promoting best management actions, and the basin-wide and area-specific management actions outlined in Section 9. Costs include contractor/lab costs, equipment costs, and labor costs associated with implementing the efforts.[57] The cost estimate does not include costs associated with complying with the California Environmental Quality Act, legal staff costs, costs for responding to DWR comments, nor does it include costs associated with any other projects undertaken by Santa Clarita Valley Water Agency (SCV Water). SCV Water costs associated with administration and implementation of management actions and projects are not included in this cost estimate and are included in separate GSA budget line items.

[57] For cost estimating purposes, it is assumed that SCV Water staff will manage the effort.

The GSP anticipates implementation will be covered under the terms of the existing Joint Exercise of Powers Agreement (JPA) and Administrative Services Agreement among the member agencies subject to any necessary agreement revisions. Consistent with current practice under the JPA, it is anticipated that an annual operating budget will be established and considered for approval by the GSA Board. The budget information and management action details may be used to conduct a fee study for purposes of developing a fee to cover the costs of implementing the programs described in the GSP.

California Water Code §10730 and § 10730.2 provide GSAs with the authority to impose certain fees, including fees on groundwater pumping. Any imposition of fees, taxes, or other charges would need to follow the applicable protocols outlined in the above sections and all applicable Constitutional requirements based on the nature of the fee. Such protocols would likely include public outreach, notification of all property owners, and at least one public hearing where the opinions and concerns of all parties are heard and considered before the GSA makes a determination to proceed with a fee or other charge. It is assumed that any fee structure adopted by the GSA would be adopted by resolution or ordinance. The GSA intends to apply for GSP implementation grants provided by the DWR and other funding sources (when they become available), to reduce the financial impact of implementation on member agencies and ratepayers.

10.4 Effects on Existing Land Uses

None of the proposed management actions will have an effect on existing land uses. Installation of shallow piezometers and temperature probes are planned in the groundwater dependent ecosystem area near the river. Potential impacts to existing habitat during installation of the piezometers and probes will be minimized and are considered de minimus.

10.5 Effects on Water Supply

The only management action that may have an effect on water supply is promoting best water use practices that will result in reduced water consumption and increase water supply over time. This management action continues the efforts by SCV Water to encourage water conservation through community education and engagement, rebates and incentives, and regulatory mechanisms. The GSA may implement enforcement that would be critical to curbing wasteful use of water practices.

The GSA plans to work with private well operators to facilitate workshops or other programs designed to communicate best water use practices for private well owners. This GSP calls for the GSA to encourage private pumpers to implement the most effective water use efficiency methods (often referred to as best management practices [BMPs]). Effective BMPs could include the following:

- Implementation of efficient irrigation practices in urban and rural areas.
- Implementation of a recycled water program to reduce reliance on groundwater for irrigation.
- Achievement of optimal irrigation practices by monitoring crop water use with soil and plant monitoring devices and by tying monitoring data to evapotranspiration estimates.

SCV Water and private pumpers such as agricultural users already use BMPs, but improvements may be able to be made. The goals for promoting BMPs are to (1) increase awareness of how water savings can maintain supplies to manage water use through droughts, and (2) broaden the application of BMPs to more groundwater users in the Basin.

10.6 Effects on the Local and Regional Economy

The sustainability goal for the Basin emphasizes the importance of managing the groundwater basin in a sustainable manner such that groundwater resources continue to provide a reliable long term water supply and the health of the Santa Clara and associated habitat is maintained. These goals are critical to maintaining and enhancing the livability and quality of life in the Basin. This also ensures that the local economy and businesses continue to thrive and contribute to the local and regional economies. All of the management actions that are contemplated as part of this plan support these values. None are expected to have a detrimental effect on the local or regional economies.

11. Notice and Communication [§ 354.10]

This section details the methods and tactics used to involve individuals and organizations that have a direct interest in management of the Santa Clara River Valley East Subbasin (Basin) in the development of a Groundwater Sustainability Plan (GSP).

Under the Sustainable Groundwater Management Act (SGMA), a critical part of the GSP development is communication with and involvement of the public and stakeholders, including private citizens, well owners, community organizations, environmental groups, tribal communities, and anyone with an interest in the prudent management of groundwater resources. Participation from a variety of stakeholders helps the Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA) make decisions that consider varying needs and interests in the Basin.

This section and Appendix N highlight opportunities for engagement, including the formation of a Stakeholder Advisory Committee (SAC) and specifying the decision-making process, key messages, and schedule for accomplishing communication outreach tasks related to this GSP.

Appendix O includes comment summaries from many meetings leading up to the 60-day public comment period. The appendix also includes a log of all the comments received on the Public Draft GSP as part of the 60-day public comment period from members of the public, California Department of Fish and Wildlife, various public interest groups and environmental organizations, and members of the SAC. Responses to each comment in this table, if warranted, and the location in the GSP where the comment was addressed are also presented.

11.1 Public and Stakeholder Engagement

11.1.1 SGMA Requirements

SGMA requires that the GSA encourage the active involvement of diverse social, cultural, and economic elements of the population in the groundwater basin. SGMA sets out numerous public notice requirements for both local GSAs and the state to accomplish this goal. The requirements include the following:

- Public notice and hearing before establishing a GSA, adopting or amending a GSP, or imposing or increasing a fee.
- Creation and use of an interested persons list for the basin or GSA.
- Participation of federally recognized Indian tribes sharing the interest of the sustainability of the groundwater agency (if tribes choose to participate).
- Development of a written statement describing the manner in which interested parties may participate in the development and implementation of the GSP.

SGMA requires that GSAs consider the interests of all beneficial uses and users of groundwater throughout the GSA and GSP development process. In addition, GSP regulations (§ 354.10) require a communications section to include the following:

- An explanation of the GSA's decision-making process.
- Identification of opportunities for public engagement and a discussion of how public input and response will be used.

- A description of how the GSA encourages the active involvement of diverse social, cultural, and economic elements of the population within the Basin.
- The method the GSA shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.

11.2 SCV-GSA and Decision Making

The SCV-GSA is made up of Santa Clarita Valley Water Agency (SCV Water), City of Santa Clarita, County of Los Angeles (LA County) Department of Regional Planning, and LA County Waterworks District No. 36. Overall direction, funding, and approval for the GSA is made by its Board of Directors. The final GSP will be adopted by its Board of Directors. Meetings of the Board of Directors (Board) are noticed and open to the public.

Public and stakeholder communication is a vital part of the GSP development process. The SCV-GSA communicates with interested individuals and organizations (stakeholders) to share information and obtain input on GSP development. This includes, but is not limited to private citizens, well owners, community organizations, environmental groups, tribal communities, and anyone with an interest in the prudent management of groundwater resources.

Participation from a variety of stakeholders helps the SCV-GSA Board make decisions that consider varying needs and interests in the Basin.

11.3 Opportunities for Public Involvement and Engagement

SCV-GSA is committed to frequent and transparent communication with stakeholders and interested parties. The following opportunities outline the numerous ways SCV-GSA works to engage the public and provide updates in a timely manner.

11.3.1 Meeting Opportunities

Opportunities for public comment are provided at all SCV-GSA Board meetings, advisory group meetings, Board-appointed committee meetings and workshops. Meetings are also an opportunity for stakeholders to stay informed about what is happening with the GSA and the GSP process.

11.3.1.1 Public Notices

Advance notice of meetings has been, and will continue to be, posted on the GSA website.[58] A mailed notice was sent to the City and County prior to the public hearing on the GSP, in compliance with SGMA requirements.

11.3.1.2 Board Meetings and Hearings

The SCV-GSA Board of Directors met on the first Mondays of January, April, July, and October at 2:30 p.m. All meetings were open to the public. During most of 2020 and all of 2021, meetings were held online to comply with the Governor's order regarding COVID safeguards. These meetings were held using the Zoom platform and followed the same protocols used for in-person meetings. In-person meetings, when conducted, took place in the SCV Water Board Room, located at 27234 Bouquet Canyon Road, Santa Clarita, CA, 91350. All agendas and meeting minutes from past meetings are available on the SCV-GSA website.

[58] Available at https://scvgsa.org/. (Accessed July 15, 2021.)

11.3.1.3 Public Workshops

Public meeting and workshop dates, times, locations, and key information are communicated in advance of each meeting. Six public workshops were held during development of the GSP to inform stakeholders of key elements of the GSP and to solicit input on how sustainability criteria should be set, what constitutes undesirable results, and what projects and management actions should be employed to maintain sustainability in the Basin.

11.3.2 Collaborative Opportunities

11.3.2.1 Stakeholder Groups and Stakeholder Advisory Committee

There are a number of stakeholders and basin water users in the Basin, including the following:

- Large water pumpers
- Medium water pumpers
- Small water pumpers
- Environmental groups
- Businesses
- Residences
- Media
- SCV Water
- LA County
- LA County Waterworks District No. 36
- Local cities (i.e., the City of Santa Clarita)
- Agricultural water users

The SCV-GSA created the SAC made up of many of the stakeholders and basin water users listed above. Members of this group provide meaningful insight, support, and expertise from a variety of viewpoints for the SCV-GSA Board to consider. The SAC is strictly advisory and does not vote on Board items, but members represent a number of social, cultural, and economic backgrounds to bring the widest possible perspective.

The outreach consultant, CV Strategies, worked with SCV Water staff to identify potential committee members through local media, social media, and email to the stakeholder list. The SAC is made up of the following committee representatives with up to two members each:

- Two representatives of small pumpers (2 acre-feet or less per year)
- Two representatives of medium pumpers (over 2 and up to 25 acre-feet per year)
- Two representatives of large pumpers (more than 25 acre-feet per year)
- Two representatives of the business community
- Two representatives of environmental interests
- Two members at large

The selected representatives must reflect the interests of their group and be able to effectively communicate the group's opinions and feedback. The qualifications of the candidates were reviewed, and the SAC members were selected by stakeholders who applied for the special interest group they represent.

The members of the SAC were responsible for reviewing drafts of the various sections of the GSP, providing feedback on those drafts, reviewing presentations that were to delivered during workshops and Board meetings, and soliciting input from their respective stakeholders as the plan was being developed.

CV Strategies facilitated the SAC meetings; prepared agendas for the meetings; compiled questions, comments, and responses to comments made in the SAC meetings; prepared supporting materials; and maintained the GSA website. Accommodations were made to ensure the SAC complied with the Brown Act. A total of 29 SAC meetings were held during development of the GSP. The SAC provided input on Public Workshop presentations and collateral materials at regular meetings prior to each Public Workshop, a step that was integral to the creation of the Public Workshop materials. Then, SCV-GSA and the SAC garnered public input on the GSP during the Public Workshop series. And after each workshop, the SAC was debriefed on public feedback received and provided additional input on both the GSP and effectiveness of each Public Workshop.

The work of the SAC concluded in October 2021.

11.3.3 Communication with SCV-GSA

11.3.3.1 Opportunities for Tribal Communities

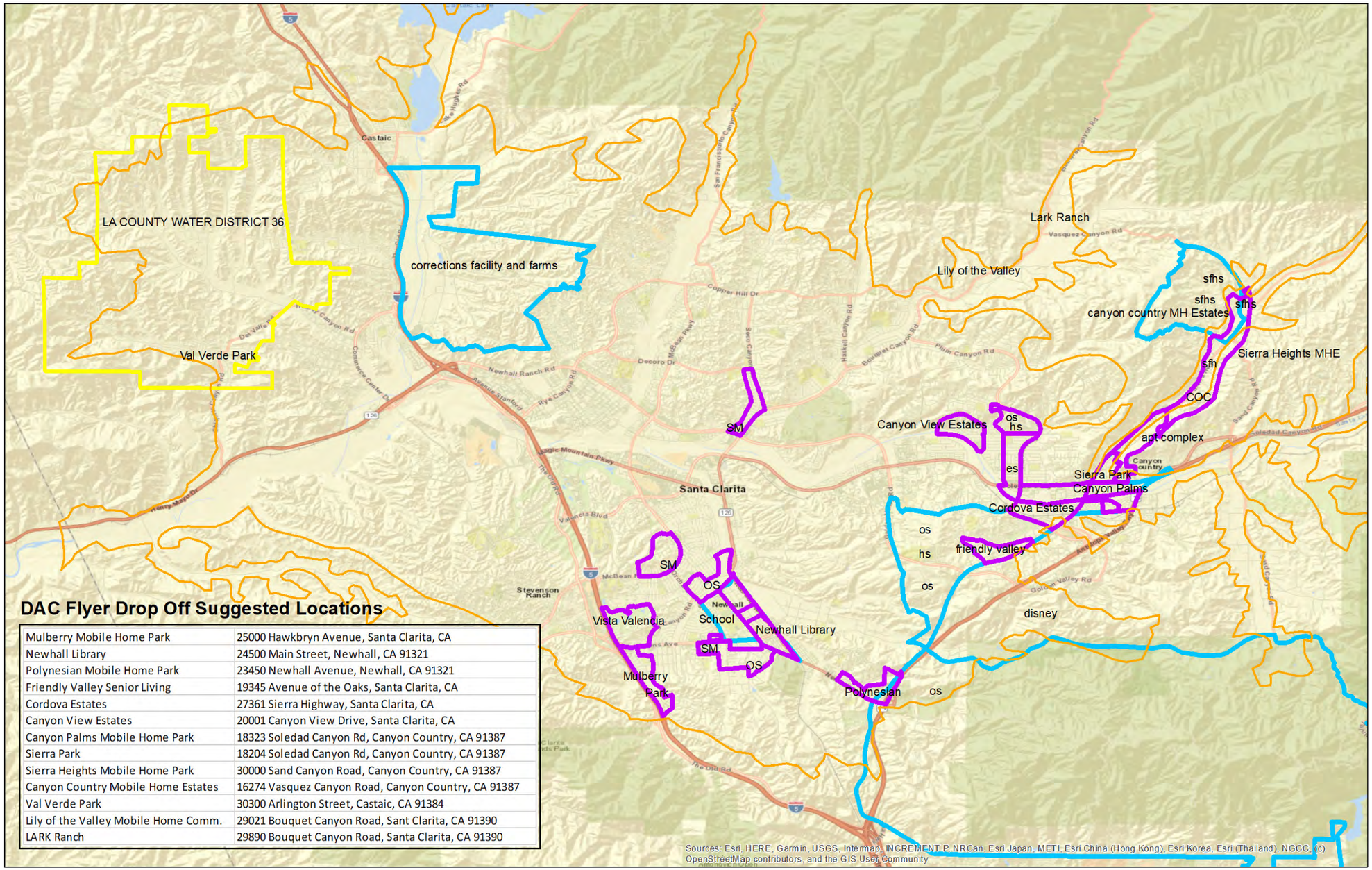
SCV-GSA invited participation of federally recognized Indian tribes sharing the interest of sustainability of the groundwater agency, as required by the SGMA, including the Fernandeño Tataviam Band of Mission Indians.

11.3.3.2 Opportunities for Disadvantaged Communities

There are no specific named disadvantaged communities (DACs) in the Basin with specific representatives; therefore, SCV-GSA and its member agencies (such as SCV Water and the City of Santa Clarita) continue broad outreach efforts and more specific outreach to reach DACs through the Proposition 1 Disadvantaged Community Involvement Program.

In addition to the broader outreach, a map of DACs was developed to identify these areas and to determine if they are served by a public water supply or by private wells. CV Strategies used the map to create handouts announcing the Public Draft GSP and upcoming meetings. Handouts were left at the addresses below, located in or around the identified DACs:

- Von's, 24160 Lyons Avenue
- Newhall Library
- Polynesian Mobile Home Park
- Stater Bros, 26900 Sierra Hwy
- Cordova Estates
- Canyon View Estates
- Canyon Palms Mobile Home Park
- Sierra Heights Mobile Home Park
- Canyon Country Mobile Home Estates
- Val Verde Park
- Lily of the Valley Mobile Home Comm.
- LARC Ranch
- Canyon Country Jo Anne Darcy Library
- Bodhi Leaf, 26910 Sierra Hwy
- Canyon Country Community Center, 18410 Sierra Hwy



DAC Flyer Drop Off Suggested Locations

Mulberry Mobile Home Park	25000 Hawkbryn Avenue, Santa Clarita, CA
Newhall Library	24500 Main Street, Newhall, CA 91321
Polynesian Mobile Home Park	23450 Newhall Avenue, Newhall, CA 91321
Friendly Valley Senior Living	19345 Avenue of the Oaks, Santa Clarita, CA
Cordova Estates	27361 Sierra Highway, Santa Clarita, CA
Canyon View Estates	20001 Canyon View Drive, Santa Clarita, CA
Canyon Palms Mobile Home Park	18323 Soledad Canyon Rd, Canyon Country, CA 91387
Sierra Park	18204 Soledad Canyon Rd, Canyon Country, CA 91387
Sierra Heights Mobile Home Park	30000 Sand Canyon Road, Canyon Country, CA 91387
Canyon Country Mobile Home Estates	16274 Vasquez Canyon Road, Canyon Country, CA 91387
Val Verde Park	30300 Arlington Street, Castaic, CA 91384
Lily of the Valley Mobile Home Comm.	29021 Bouquet Canyon Road, Sant Clarita, CA 91390
LARK Ranch	29890 Bouquet Canyon Road, Santa Clarita, CA 91390

Figure 11-1. Disadvantaged Communities Map

11.3.4 Additional Outreach Efforts

Outreach included the following efforts:

- Media outreach
- Stakeholder email
- Online news and resources
- Collateral materials
- Social media
- Advertising
- Webpage development
- Video production

Media outreach included preparation of press releases in the local paper (*The Signal*), on Instagram and Twitter feeds, print ads in the local paper, digital banner ads, and emails to stakeholders. These activities and outreach statistics are presented below.

Table 11-1. Outreach Activities and Statistics

Activity	Outreach Statistic
Facebook engagement, including agency page and promos on *The Signal* local newspaper page (reach)	119,035
Instagram and Twitter (reach)	2,173
Email distribution (recipients of five emails)	59,601
GSA website visits	1,441
Press releases (five sent; published each time in three media outlets)	15
Print ads in *The Signal*	7
Digital banner ads through *The Signal* (impressions)	1,152,480

Note

Statistics reported as of July 16, 2021.

The basin stakeholder list was developed from a number of sources, including lists of SCV Water customers, City government representatives, members of environmental groups, and state and county agencies. Those on the email list received news and updates about the GSA process and details about stakeholder forums and workshops. Additional opportunities were sought during development of the GSP to grow and expand the email subscription list and the type of information distributed.

Substantial effort was put into maintaining the GSA website that provided Board meeting agendas, minutes, and materials presented at each meeting and workshop. The outreach effort also included collateral materials, such as descriptions of the GSP development process, draft sections of the GSP for review, fact sheets, and videos presenting easily understandable descriptions of groundwater-related concepts.

11.3.5 Communication about Progress Toward Implementing the Plan

The GSA intends to inform the public, including key stakeholder groups, about progress toward implementing the GSP, including monitoring results and the status of projects and actions. This information will be disseminated through several means, including the following:

- The GSA website.
- GSA Board meetings, where information will be presented, and the public will be invited to comment.
- Annual reports describing monitoring results and progress toward implementing the plan and meeting sustainability goals.
- GSP updates submitted to the California Department of Water Resources every 5 years. Basin stakeholders will be asked to review and comment on the update report.

In addition, the SCV-GSA will conduct public outreach and engagement throughout the implementation period to provide timely information to stakeholders about GSP implementation progress as well as monitored and modeled subbasin conditions.

To meet the requirements of SGMA, the GSA will communicate any potential changes in administration and management in a public process with stakeholders. The SCV-GSA website will be maintained as a communication tool for posting data, including reports, meeting information, technical updates, and data analyses. Other outreach will include regular meetings; government-to-government communication; focused stakeholder briefings; paid and earned media coverage; press releases; periodic newsletters; and email blasts.

APPENDIX A

Groundwater Sustainability Agency Member Resolutions, Memorandum of Understanding, and Joint Exercise of Powers Agreement

This page intentionally left blank.

RESOLUTION NO. 3162

RESOLUTION OF THE BOARD OF DIRECTORS OF THE CASTAIC LAKE WATER AGENCY TO APPROVE THE MEMORANDUM OF UNDERSTANDING TO FORM THE SANTA CLARITA VALLEY GROUNDWATER SUSTAINABILITY AGENCY AND FINDING APPROVAL OF THE MEMORANDUM OF UNDERSTANDING EXEMPT FROM REVIEW UNDER THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

WHEREAS, the Sustainable Groundwater Management Act of 2014, California Water Code section 10720 et. seq. (SGMA), went into effect on January 1, 2015; and

WHEREAS, the legislative intent of SGMA is to provide for the sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible while minimizing state intervention; and

WHEREAS, SGMA requires that California groundwater basins and subbasins designated by the California Department of Water Resources as high priority or medium priority be managed by one or more Groundwater Sustainability Agencies (GSAs) and that such management be accomplished pursuant to one or more approved Groundwater Sustainability Plans (GSPs) for the basin; and

WHEREAS, California Water Code Section 10721(j) defines a GSA as one or more local agencies that implement the provisions of SGMA; and

WHEREAS, any local public agency that has water supply, water management, or land use responsibilities within a groundwater basin may decide to become a GSA over that basin (California Water Code Sections 10721 and 10723); and

WHEREAS, SGMA provides that a combination of local agencies may form a GSA by a joint powers agreement, a memorandum of agreement, or other legal agreement (Water Code Section 10723.6); and

WHEREAS, Castaic Lake Water Agency overlies a portion of the Santa Clara River Valley East Subbasin, groundwater basin number 4-4.07 per the State of California, Department of Water Resources (DWR) Groundwater Bulletin 118, which has been designated by the State of California as a high priority basin; and

WHEREAS, Castaic Lake Water Agency has water supply and water management responsibilities within the Santa Clara River Valley East Subbasin; and

WHEREAS, it is beneficial to the health, safety, and water supply reliability of the Santa Clarita Valley for Castaic Lake Water Agency to retain local jurisdiction over groundwater resources within the Santa Clara River Valley East Subbasin; and

WHEREAS, Castaic Lake Water Agency has been working cooperatively with other local agencies that also plan to manage groundwater in compliance with SGMA, including Newhall County Water District, Los Angeles County Waterworks District No. 36, the Santa Clarita Water Division, the City of Santa Clarita, and the County of Los Angeles; and

WHEREAS, Castaic Lake Water Agency, along with its regional partners Newhall County Water District, Los Angeles County Waterworks District No. 36, the Santa Clarita Water Division, the City of Santa Clarita, and the County of Los Angeles intend to jointly form the Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA) through a Memorandum of Understanding to work collaboratively to manage groundwater resources in the Santa Clara River Valley East Subbasin and to comply with SGMA; and

WHEREAS, Castaic Lake Water Agency staff evaluated the proposed Memorandum of Understanding and formation of the SCV-GSA in light of the proposed standards for environmental review outlined in the California Environmental Quality Act ("CEQA") and the California Code of Regulations (Cal. Code Regs., tit. 14, §§ 15000 et seq.) ("State CEQA Guidelines"); and

WHEREAS, based on that review, staff determined that the proposed Memorandum of Understanding and the formation of the SCV-GSA would not constitute a project within the meaning of CEQA or the State CEQA Guidelines; and

WHEREAS, even assuming the proposed Memorandum of Understanding and formation of the SCV-GSA constitutes a project within the meaning of CEQA, staff has evaluated the proposed actions and determined that each, individually and in the aggregate, would be exempt from CEQA review pursuant to State CEQA Guidelines sections 15307, 15308, and 15061(b)(3); and

WHEREAS, prior to adopting a resolution of intent to establish Castaic Lake Water Agency as a member of the SCV-GSA, Water Code Section 10723 requires Castaic Lake Water Agency to hold a public hearing, after publication of notice pursuant to California Government Code Section 6066, on whether to become a GSA; and

WHEREAS, pursuant to Government Code Section 6066, notices of a public hearing on whether or not to adopt a resolution to establish the SCV-GSA through a Memorandum of Understanding were published on May 10, 2017 and May 17, 2017; and

WHEREAS, all other legal prerequisites to the adoption of this Resolution have occurred.

NOW, THEREFORE, BE IT RESOLVED that the Board of Directors of the Castaic Lake Water Agency does hereby resolve as follows:

1. The Board hereby finds and determines that the approval of the Memorandum of Understanding and formation of the SCV-GSA is not a project pursuant to CEQA. Specifically, the Board finds that, because these actions do not approve any projects, or authorize any further activities, they do not constitute the approval of any project within the meaning of CEQA that would contain enough meaningful information for environmental assessment. In the alternative, and assuming the approval of the Memorandum of Understanding and formation of the SCV-GSA constitutes a project under CEQA, the Board finds that these actions, individually and in the aggregate, are exempt from CEQA pursuant to State CEQA Guidelines sections 15307 and 15308, each of which exempts actions, as authorized by state law, taken by regulatory agencies that are designed to assure the maintenance, restoration, enhancement, or protection of the environment or a natural resource where the regulatory process involves procedures for protection of the environment. In addition, the Board finds that these actions are

exempt from further review under CEQA because it can be seen with certainty that there is no possibility that these actions may have a significant effect on the environment pursuant to State CEQA Guidelines section 15061(b)(3).

2. The Board hereby elects that Castaic Lake Water Agency will participate as a member of the SCV-GSA to manage groundwater within the boundaries of the Santa Clara River Valley East Subbasin pursuant to the Memorandum of Understanding to Form the Santa Clarita Valley Groundwater Sustainability Agency; and

3. The Board hereby authorizes the General Manager to execute the "Memorandum of Understanding to Form the Santa Clarita Valley Groundwater Sustainability Agency," a copy of which is attached hereto as **Exhibit A**; and

4. The Board hereby authorizes the General Manager or his designee to coordinate with the other members of the SCV-GSA to provide a copy of this resolution, Notice of Intent, and all other necessary documentation to DWR within 30 days of full execution of the Memorandum of Understanding and to otherwise comply with the requirements of Water Code Section 10723.8; and

5. The Board hereby authorizes the General Manager or his designee to coordinate with the other members of the SCV-GSA to maintain a list of interested parties regarding the newly formed SCV-GSA pursuant to Water Code Section 10723.4.

6. The Chairperson of the Board shall sign this Resolution and the Secretary of the Board shall certify this Resolution was duly and properly adopted by the Board.

7. The documents and materials that constitute the record of proceedings on which these findings have been based are located at Castaic Lake Water Agency's office located at 27234 Bouquet Canyon Road, Santa Clarita, CA 91350. The custodian for these records is the Board Secretary.

President

ATTEST:

Secretary

I, the undersigned, hereby certify: That I am the duly appointed and acting Secretary of the Castaic Lake Water Agency, and that at a regular meeting of the Board of Directors of said Agency held on May 24, 2017, the foregoing Resolution No. 3162 was duly and regularly adopted by said Board, and that said resolution has not been rescinded or amended since the date of its adoption, and that it is now in full force and effect.

DATED: May 24, 2017

CASTAIC LAKE WATER AGENCY INCORPORATED APRIL 28, 1962

Secretary

RESOLUTION NO. 2017-4

RESOLUTION OF THE BOARD OF DIRECTORS OF NEWHALL COUNTY WATER DISTRICT TO APPROVE THE MEMORANDUM OF UNDERSTANDING TO FORM THE SANTA CLARITA VALLEY GROUNDWATER SUSTAINABILITY AGENCY

WHEREAS, the Sustainable Groundwater Management Act of 2014, California Water Code section 10720 et. seq. (SGMA), went into effect on January 1, 2015; and

WHEREAS, the legislative intent of SGMA is to provide for the sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible while minimizing state intervention; and

WHEREAS, SGMA requires that California groundwater basins and subbasins designated by the California Department of Water Resources as high priority or medium priority be managed by one or more Groundwater Sustainability Agencies (GSAs) and that such management be accomplished pursuant to one or more approved Groundwater Sustainability Plans (GSPs) for the basin; and

WHEREAS, California Water Code Section 10721(j) defines a GSA as one or more local agencies that implement the provisions of SGMA; and

WHEREAS, any local public agency that has water supply, water management, or land use responsibilities within a groundwater basin may decide to become a GSA over that basin (California Water Code Sections 10721 and 10723); and

WHEREAS, SGMA provides that a combination of local agencies may form a GSA by a joint powers agreement, a memorandum of agreement, or other legal agreement (Water Code Section 10723.6); and

WHEREAS, Newhall County Water District overlies a portion of the Santa Clara River Valley East Subbasin, groundwater basin number 4-4.07 per the State of California, Department of Water Resources (DWR) Groundwater Bulletin 118, which has been designated by the State of California as a high priority basin; and

WHEREAS, Newhall County Water District has water supply and water management responsibilities within the Santa Clara River Valley East Subbasin; and

WHEREAS, it is beneficial to the health, safety, and water supply reliability of the Santa Clarita Valley for Newhall County Water District to retain local jurisdiction and control over groundwater resources within the Santa Clara River Valley East Subbasin; and

WHEREAS, Newhall County Water District has been working cooperatively with other local agencies that also plan to manage groundwater in compliance with SGMA, including Castaic Lake Water Agency, Los Angeles County Waterworks District No. 36, the Santa Clarita Water Division, the City of Santa Clarita, and the County of Los Angeles; and

WHEREAS, Newhall County Water District, along with its regional partners Castaic Lake Water Agency, Los Angeles County Waterworks District No. 36, the Santa Clarita Water Division, the City of Santa Clarita, and the County of Los Angeles intend to jointly form the Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA) through a

Memorandum of Understanding (Exhibit A) to work collaboratively to manage groundwater resources within their respective service areas in the Santa Clara River Valley East Subbasin and to comply with SGMA; and

WHEREAS, prior to adopting a resolution of intent to establish Newhall County Water District as a member of the SCV-GSA, Water Code Section 10723 requires Newhall County Water District to hold a public hearing, after publication of notice pursuant to California Government Code Section 6066, on whether to become a GSA; and

WHEREAS, pursuant to Government Code Section 6066, notices of a public hearing on whether or not to adopt a resolution to establish the SCV-GSA through a Memorandum of Understanding were published on [May 4, 2017] and [May 11, 2017];

NOW, THEREFORE, BE IT RESOLVED that the Newhall County Water District approves the Memorandum of Understanding creating the SCV-GSA and establishing the District as a member of the GSA.

FURTHER RESOLVED, adoption of this Resolution does not constitute a project under the California Environmental Quality Act because it does not result in any direct or indirect physical change in the environment.

PASSED AND ADOPTED at a regular meeting of the Board of Directors of Newhall County Water District held on May 18, 2017. Resolution No. 2017-4 was approved by the following vote:

AYES:

NOES:

ABSTAIN:

Maria Gutzeit
President of Board of Directors of Newhall County Water District

ATTEST:

Rochelle Patterson
Secretary of the Board of Directors of Newhall County Water District

ENCLOSURE C

RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF LOS ANGELES, CALIFORNIA, APPROVING THE MEMORANDUM OF UNDERSTANDING TO FORM THE SANTA CLARITA VALLEY GROUNDWATER SUSTAINABILITY AGENCY

WHEREAS, the Sustainable Groundwater Management Act of 2014, California Water Code section 10720 et. seq. (SGMA), went into effect on January 1, 2015; and

WHEREAS, the legislative intent of SGMA is to provide for the sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible while minimizing state intervention; and

WHEREAS, SGMA requires that California groundwater basins and subbasins designated by the California Department of Water Resources as high priority or medium priority be managed by one or more Groundwater Sustainability Agencies (GSAs) and that such management be accomplished pursuant to one or more approved Groundwater Sustainability Plans for the basin; and

WHEREAS, California Water Code Section 10721(j) defines a GSA as one or more local agencies that implement the provisions of SGMA; and

WHEREAS, any local public agency that has water supply, water management, or land use responsibilities within a groundwater basin may decide to become a GSA over that basin (California Water Code Sections 10721 and 10723); and

WHEREAS, SGMA provides that a combination of local agencies may form a GSA by a joint powers agreement, a memorandum of agreement, or other legal agreement (Water Code Section 10723.6); and

WHEREAS, County of Los Angeles and Los Angeles County Waterworks District No. 36, Val Verde, overlies a portion of the Santa Clara River Valley East Subbasin, groundwater basin number 4-4.07 per the State of California, Department of Water Resources Groundwater Bulletin 118, which has been designated by the State of California as a high priority basin; and

WHEREAS, County of Los Angeles and Los Angeles County Waterworks District No. 36, Val Verde, has water supply and water management responsibilities within the Santa Clara River Valley East Subbasin; and

WHEREAS, it is beneficial to the health, safety, and water supply reliability of the Santa Clarita Valley for the County of Los Angeles and Los Angeles County Waterworks District No. 36, Val Verde, to retain local jurisdiction and control over groundwater resources within the Santa Clara River Valley East Subbasin; and

WHEREAS, County of Los Angeles and Los Angeles County Waterworks District No. 36, Val Verde, has been working cooperatively with other local agencies that also plan to manage groundwater in compliance with SGMA; and

WHEREAS, County of Los Angeles and Los Angeles County Waterworks District No. 36, Val Verde,, along with its regional partners, Castaic Lake Water Agency, Newhall County Water District, the Santa Clarita Water Division, and the City of Santa Clarita intend to jointly form the Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA) through a Memorandum of Understanding to work collaboratively to manage groundwater resources within their respective service areas in the Santa Clara River Valley East Subbasin and to comply with SGMA; and

WHEREAS, prior to adopting a resolution of intent to establish County of Los Angeles and Los Angeles County Waterworks District No. 36, Val Verde as a member of the SCV-GSA, Water Code Section 10723 requires County of Los Angeles and Los Angeles County Waterworks District No. 36, Val Verde to hold a public hearing, after publication of notice pursuant to California Government Code Section 6066, on whether to become a GSA; and

WHEREAS, pursuant to Government Code Section 6066, notices of a public hearing on whether or not to adopt a resolution to establish the SCV-GSA through a Memorandum of Understanding were published on [date] and [date]; and

WHEREAS, adoption of this Resolution does not constitute a project under the California Environmental Quality Act because it does not result in any direct or indirect physical change in the environment;

NOW, THEREFORE, BE IT RESOLVED, that the Board of Supervisors of the County of Los Angeles, and as the Board of Directors of Los Angeles County Waterworks District No. 36, Val Verde does hereby:

1. Elect that County of Los Angeles and Los Angeles County Waterworks District No. 36, Val Verde will participate as a member of the SCV-GSA to manage groundwater within its statutory boundaries of the Santa Clara River Valley East Subbasin pursuant to the Memorandum of Understanding to Form the Santa Clarita Valley Groundwater Sustainability Agency; and

2. Authorize the Director of the Department of Regional Planning or his designee and the Director of Public Works or his designee to execute the "Memorandum of Understanding to Form the Santa Clarita Valley Groundwater Sustainability Agency," on behalf of the County of

Los Angeles and Los Angeles County Waterworks District No. 36, Val Verde, respectively, a copy of which is attached hereto; and

3. Authorize the Director of the Department of Regional Planning or his designee and the Director of Public Works or his designee to coordinate with the other members of the SCV-GSA to provide a copy of this resolution, a Notice of Intent, and all other necessary documentation to Department of Water Resources within 30 days and to otherwise comply with the requirements of Water Code Section 10723.8; and

4. Authorize the Director of the Department of Regional Planning or his designee and the Director of Public Works or his designee to coordinate with the other members of the SCV-GSA to maintain a list of interested parties regarding the newly formed SCV-GSA pursuant to Water Code Section 10723.4.

//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//
//

The foregoing resolution was on the 23rd day of May, 2017, adopted by the Board of Supervisors as the governing body of the County of Los Angeles and the Los Angeles County Waterworks District No. 36, Val Verde.

LORI GLASGOW
Executive Officer of the
Board of Supervisors of
the County of Los Angeles

By _____
Deputy

APPROVED AS TO FORM:

MARY C. WICKHAM
County Counsel

By _____
Deputy

RESOLUTION NO. 17-34

RESOLUTION OF THE CITY OF SANTA CLARITA, CALIFORNIA, TO APPROVE THE MEMORANDUM OF UNDERSTANDING TO FORM THE SANTA CLARITA VALLEY GROUNDWATER SUSTAINABILITY AGENCY

WHEREAS, the Sustainable Groundwater Management Act of 2014, California Water Code section 10720 et. seq. (SGMA), went into effect on January 1, 2015; and

WHEREAS, the legislative intent of SGMA is to provide for the sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible while minimizing state intervention; and

WHEREAS, SGMA requires that California groundwater basins and subbasins designated by the California Department of Water Resources as high priority or medium priority be managed by one or more Groundwater Sustainability Agencies (GSAs) and that such management be accomplished pursuant to one or more approved Groundwater Sustainability Plans for the basin; and

WHEREAS, California Water Code Section 10721(j) defines a GSA as one or more local agencies that implement the provisions of SGMA; and

WHEREAS, any local public agency that has water supply, water management, or land use responsibilities within a groundwater basin may decide to become a GSA over that basin (California Water Code Sections 10721 and 10723); and

WHEREAS, SGMA provides that a combination of local agencies may form a GSA by a joint powers agreement, a memorandum of understanding, or other legal agreement (Water Code Section 10723.6); and

WHEREAS, the City of Santa Clarita overlies a portion of the Santa Clara River Valley East Subbasin, groundwater basin number 4-4.07 per the State of California, Department of Water Resources (DWR) Groundwater Bulletin 118, which has been designated by the State of California as a high priority basin; and

WHEREAS, the City of Santa Clarita has land use responsibilities within the Santa Clara River Valley East Subbasin; and

WHEREAS, it is beneficial to the health, safety, and water supply reliability of the Santa Clarita Valley to retain local jurisdiction and control over groundwater resources within the Santa Clara River Valley East Subbasin; and

WHEREAS, the City of Santa Clarita has been working cooperatively with other local agencies that also plan to manage groundwater in compliance with SGMA, including Castaic Lake Water Agency, Newhall County Water District, Los Angeles County Waterworks District No. 36, the Santa Clarita Water Division, and the County of Los Angeles; and

WHEREAS, the City of Santa Clarita, along with its regional partners Castaic Lake Water Agency, Newhall County Water District, Los Angeles County Waterworks District No. 36, the Santa Clarita Water Division, and the County of Los Angeles intend to jointly form the Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA) through a Memorandum of Understanding to work collaboratively to manage groundwater resources within their respective service areas in the Santa Clara River Valley East Subbasin and to comply with SGMA; and

WHEREAS, prior to adopting a resolution of intent to establish the City of Santa Clarita as a member of the SCV-GSA, Water Code Section 10723 requires the City of Santa Clarita to hold a public hearing, after publication of notice pursuant to California Government Code Section 6066, on whether to become a GSA; and

WHEREAS, pursuant to Government Code Section 6066, notices of a public hearing on whether or not to adopt a resolution to establish the SCV-GSA through a Memorandum of Understanding were published on April 25, 2017, and May 2, 2017; and

WHEREAS, adoption of this Resolution does not constitute a project under the California Environmental Quality Act because it does not result in any direct or indirect physical change in the environment;

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Santa Clarita does hereby:

SECTION 1. Elect that the City of Santa Clarita will participate as a member of the SCV-GSA to manage groundwater within its statutory boundaries of the Santa Clara River Valley East Subbasin pursuant to the Memorandum of Understanding to form the Santa Clarita Valley Groundwater Sustainability Agency.

SECTION 2. Authorize the City Manager or his designee to execute the Memorandum of Understanding to form the Santa Clarita Valley Groundwater Sustainability Agency.

SECTION 3. Authorize the City Manager or his designee to coordinate with the other members of the SCV-GSA to provide a copy of this resolution, a Notice of Intent, and all other necessary documentation to DWR within 30 days and to otherwise comply with the requirements of Water Code Section 10723.8.

SECTION 4. Authorize the City Manager or his designee to coordinate with the other members of the SCV-GSA to maintain a list of interested parties regarding the newly formed SCV-GSA pursuant to Water Code Section 10723.4.

SECTION 5. The City Clerk shall certify to the adoption of this Resolution.

PASSED, APPROVED AND ADOPTED this 9th day of May 2017.

MAYOR

ATTEST:

CITY CLERK

DATE: 5/24/17

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss.
CITY OF SANTA CLARITA)

I, Mary Cusick, City Clerk of the City of Santa Clarita, do herby certify that foregoing Resolution was duly passed and adopted by the City Council of Santa Clarita at a regular meeting, thereof, held on the 9th day of May 2017, by the following vote:

AYES:	COUNCILMEMBERS:	McLean, Kellar, Weste, Miranda, Smyth
NOES:	COUNCILMEMBERS:	None
ABSENT:	COUNCILMEMBERS:	None

CITY CLERK

MEMORANDUM OF UNDERSTANDING TO FORM THE SANTA CLARITA VALLEY GROUNDWATER SUSTAINABILITY AGENCY

Parties

This Memorandum of Understanding (MOU), dated 5/24/17, is entered into among Castaic Lake Water Agency, Newhall County Water District, Los Angeles County Waterworks District No. 36, the Santa Clarita Water Division, the City of Santa Clarita, and the County of Los Angeles, individually and collectively referred to as "Party" and "Parties" to form the Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA) as created herein.

The Parties to this MOU shall be the members of the SCV-GSA.

The SCV-GSA is formed pursuant to the Sustainable Groundwater Management Act to be the Groundwater Sustainability Agency (GSA) for the Santa Clara River Valley East Subbasin, groundwater basin number 4-4.07 per the State of California, Department of Water Resources (DWR) Groundwater Bulletin 118.

Recitals

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act (SGMA), codified in Part 2.74 of Division 6 of the California Water Code, commencing with Section 10720;

WHEREAS, SGMA went into effect on January 1, 2015;

WHEREAS, various clarifying amendments to SGMA were signed in 2015 and became effective on January 1, 2016, including Senate Bills 13 and 226 and Assembly Bills 617 and 939;

WHEREAS, the legislative intent of SGMA is to provide sustainable management of California's groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to provide local agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater;

WHEREAS, the legislative intent of SGMA does not enable local public entities to grant groundwater entitlements to any person, agency or entity, as such entitlements arise from the common law, statutory law, and are determined by judicial findings in groundwater adjudications;

WHEREAS, the Parties are local public agencies, as defined by SGMA, with management authority in the Santa Clara River Valley East Groundwater Subbasin (Basin), as further depicted in **Exhibit A** to this MOU, each respectively having water supply, water management, and/or land use

responsibilities in at least some portion of the Basin and the statutory authority to become GSAs for the Basin;

WHEREAS, the Basin, identified and designated by the Bulletin 118 as Subbasin No. 4-4.07, is a high priority basin and therefore, is subject to the requirements of SGMA;

WHEREAS, SGMA Section 10735.2 requires the formation of one or more GSAs to manage the Basin by June 30, 2017;

WHEREAS, SGMA Section 10723.6 authorizes multiple local agencies in a basin to form a GSA by way of memorandum of agreement or other legal agreement;

WHEREAS, SGMA Section 10720.7 requires the Basin, which is not designated as subject to critical conditions of overdraft, to be managed by one or more Groundwater Sustainability Plans (GSP) by January 31, 2022;

WHEREAS, SGMA Section 10727 authorizes (1) a single GSP covering an entire basin developed and implemented by one GSA, (2) a single GSP covering an entire basin developed and implemented by multiple GSAs, and (3) multiple GSPs covering an entire basin developed and implemented by multiple GSAs and coordinated pursuant to a single coordination agreement that covers an entire basin;

WHEREAS, the Parties wish to use the authorities granted to them under SGMA and utilize this MOU to memorialize the roles and responsibilities and shared intent, desire, and interests in forming a GSA to cover the entire Basin and to cooperate and coordinate in subsequently preparing and implementing one or more GSPs for sustainable management of the Basin;

WHEREAS, the Parties will consider the interests of all beneficial uses and users of groundwater in the Basin, as set forth in SGMA Section 10723.2, when carrying out the policy, purposes, and requirements of SGMA throughout the Basin; and

WHEREAS the Parties have conducted outreach to beneficial users, including conducting interviews, holding local public meetings, and inviting the public to attend meetings held by the Parties to develop this MOU.

NOW, THEREFORE, in consideration of the promises, terms, conditions, and covenants contained herein, it is mutually understood and agreed as follows:

Agreement

I. Incorporation of Recitals

The recitals stated above are incorporated herein by reference.

II. Creation of Agency

A. Creation of the Santa Clarita Valley Groundwater Sustainability Agency. In accordance with Water Code Section 10723.8, it is the intent of the Parties to create a GSA which shall be known as the Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA) on the date the Parties execute this MOU. The members of the SCV-GSA are Castaic Lake Water Agency, the Santa Clarita Water Division, Newhall County Water District, Los Angeles County Waterworks District No. 36, the City of Santa Clarita, and the County of Los Angeles.

B. Purpose. The purpose of this MOU is to form the SCV-GSA pursuant to the applicable provisions and requirements of SGMA, including but not limited to SGMA Section 10723.6(a)(2), for the entire Basin and for the Parties to cooperate and coordinate in later preparing and implementing one or more GSPs for the entire Basin and to carry out the policy, purposes, and requirements of SGMA throughout the Basin.

C. It is each Party's intent, goal, and objective to maintain complete control and autonomy over any and all surface water supplies, groundwater supplies, water facilities, water operations, water management, and water supply matters to which each Party and each Party's constituents are currently producing or are legally entitled to by law, diversion, permit, entitlement, or contract, and to maintain sole authority and discretion over any and all of their individual financial matters.

D. Additionally, the Parties may prepare a Joint Powers Agreement and create a Joint Powers Authority to take on the role of SCV-GSA. By this MOU, the Parties agree to cooperate and explore the Joint Powers Authority option provided by SGMA Section 10723.6(a)(1).

III. Definitions

The following terms, whether used in the singular or plural, and when used with initial capitalization, shall have the meanings specified herein. The Parties intend that these definitions be consistent with SGMA's definitions, and in the event of a discrepancy, SGMA controls.

A. **Basin** refers to the Santa Clara River Valley East Groundwater Subbasin, groundwater basin number 4-4.07 per Bulletin 118, as further depicted in **Exhibit A** to this MOU.

B. **DWR** means the California Department of Water Resources.

C. **GSA** means Groundwater Sustainability Agency, as defined by SGMA, that implements the provisions of SGMA.

D. **GSP** means Groundwater Sustainability Plan, as defined by SGMA, proposed or adopted by a GSA pursuant to SGMA.

E. **Memorandum of Understanding** or **MOU** refers to this Memorandum of Understanding.

F. **Party** or **Parties** refers to Castaic Lake Water Agency, Newhall County Water District, Los Angeles County Waterworks District No. 36, the Santa Clarita Water Division, the City of Santa Clarita, and the County of Los Angeles, the signatories to this MOU.

G. **SGMA** refers to the Sustainable Groundwater Management Act as defined in the Recitals.

H. **SCV-GSA** refers to the Santa Clarita Valley Groundwater Sustainability Agency and consists of the following members: Castaic Lake Water Agency, Santa Clarita Water Division, Newhall County Water District, Los Angeles County Waterworks District No. 36, the City of Santa Clarita, and the County of Los Angeles.

IV. Coordination and Cooperation

A. Continued Cooperation. The Parties to this MOU will continue to meet, confer, coordinate, and collaborate to carry out the purpose of this MOU as set forth in section II.B and to discuss and develop technical, managerial, financial, and other criteria and procedures for the preparation, governance, and implementation of one or more GSPs and to carry out the policy, purposes, and requirements of SGMA in the Basin.

B. Points of Contact. Each Party shall designate a principal contact person for that Party, who may be changed from time to time at the sole discretion of the designating Party. The principal contact person for each Party shall be responsible for coordinating with the principal contact persons for the other Parties in scheduling meetings and other activities under this MOU.

C. Management Areas. The Parties acknowledge that SGMA and provisions of the SGMA GSP regulations promulgated by DWR authorize the establishment of management areas for the development and implementation of sustainable groundwater management within the boundaries of the Basin, including but not limited to Section 354.20 of the SGMA GSP Regulations (23 C.C.R. § 354.20); and accordingly, the Parties acknowledge that the establishment of management areas within the Basin is a governance alternative that the Parties may explore.

V. Roles and Responsibilities

A. The Parties will jointly establish their roles and responsibilities for developing and implementing a GSP or coordinated GSPs for the Basin in accordance with SGMA.

B. The Parties will work in good faith and coordinate all activities to carry out the purpose of this MOU. The Parties shall cooperate with one another and work together in the pursuit of all activities and decisions described in the MOU.

C. Each of the Parties will provide expertise, guidance, and data on those matters for which it has specific expertise or statutory authority, as needed to carry out the purpose of this MOU.

D. The Parties shall cause all applicable noticing and submission of required information to DWR regarding formation of the SCV-GSA.

E. As provided in Section IV, *supra*, the Parties to this MOU will continue to meet, confer, coordinate, and collaborate to discuss and develop governance, management, technical, and other issues, including respective roles and responsibilities for issues such as, but not limited to:

i. Modeling;
ii. Metering program;
iii. Monitoring;
iv. Hiring consultants;
v. Developing and maintaining list of interested persons under SGMA Section 10723.4;
vi. Budgeting (see also Section VI, *infra*); and
vii. Other initial tasks as determined by the Parties.

F. The Parties will consider the interests of groundwater beneficial users located in the Basin pursuant to SGMA Section 10723.2.

G. The Parties will appoint a governing board for SCV-GSA. The duties of the governing board, the appointment of its representatives, meetings, and voting procedures shall be determined by the Parties. Details and procedures shall be determined by the Parties and adopted by resolution. The governing board will include all local agencies, as defined by SGMA, willing to serve. The governing board may include voting and non-voting members. The governing board may from time to time appoint one or more advisory committees or establish *ad hoc* committees representing beneficial uses to assist in carrying out the purpose of the SCV-GSA.

VI. Funding

Each Party's participation in this MOU is at that Party's sole cost and expense. The Parties agree to cooperate and coordinate in pursuing State grant and loan funding opportunities that may apply to carrying out SGMA in the Basin. The Parties shall mutually develop a budget and cost sharing agreement for the work to be undertaken by the SCV-GSA pursuant to this MOU. Such agreement will be as an amendment to this MOU or be incorporated herewith. Both the budget and cost sharing agreement shall be developed and executed prior to any financial expenditures or

incurrence of any financial obligations or liabilities by the SCV-GSA, and no Party can incur, or cause to incur, any financial obligation upon any other Party, without the express consent of the Party whom is undertaking the financial obligation. In the absence of such express consent, any such purported financial obligation is void.

VII. Consideration of Interests of All Beneficial Uses and Users of Groundwater

A. The Parties will participate in outreach to and engagement of the public, including beneficial users of groundwater, including, without limitation, those identified in SGMA Section 10723.2.

B. The Parties expressly acknowledge and agree that the preparation, adoption, and implementation of one or more GSPs for the Basin may involve cooperation with one or more federal agencies.

VIII. Term, Termination, and Withdrawal

A. Term. This MOU shall continue and remain in effect unless and until terminated by the unanimous mutual written consent of the Parties or as otherwise authorized by law.

B. Withdrawal. Any Party may decide, in its sole discretion, to withdraw from this MOU by providing thirty (30) days' written notice to the other Parties. A Party that withdraws from this MOU shall remain obligated to pay its share of expenses incurred under this MOU as outlined in the budget and any other cost sharing arrangements or agreements incurred or accrued up to the date the Party provided notice of withdrawal. Withdrawal by a Party shall not cause or require the termination of this MOU or the existence of the SCV-GSA with respect to the non-withdrawing Parties.

IX. Notice Provisions

All notices required by this MOU will be deemed to have been given when made in writing and delivered, mailed, or faxed to the respective representatives of the Parties at their respective addresses as follows:

Castaic Lake Water Agency
Matt Stone, General Manager
27234 Bouquet Canyon Road
Santa Clarita, California 91350
Phone: 661-297-1600
Fax: 661-297-1611

Santa Clarita Water Division
Keith Abercrombie, Retail Manager
26521 Summit Circle
Santa Clarita, CA 91350-3049
Phone: 661-259-2737
Fax: 661-286-4333

Newhall County Water District
Stephen L. Cole, General Manager
23780 North Pine Street
Newhall, CA 91321
Phone: 661-702-4439
Fax: 661-259-9673

Los Angeles County Waterworks District No. 36
Adam Ariki, Assistant Deputy Director
900 South Fremont Avenue
Alhambra, CA 91803
Phone: 626-300-3300
Fax: 626-300-3385

City of Santa Clarita
Kenneth Striplin, City Manager
23920 Valencia Boulevard, Suite 300
Valencia, CA 91335
Phone: 661-255-4907
Fax: 661-259-8125

County of Los Angeles
Mitch Glaser, Assistant Administrator
320 West Temple Street
Los Angeles, CA 90012
Phone: 213-974-4971
Fax: 213-626-0434

Any Party may change the address to which such communications are to be given by providing the other Parties with written notice of such change at least fifteen (15) calendar days prior to the effective date of the change.

All notices will be effective upon receipt and will be deemed received through delivery if personally served or served by fax, or on the fifth (5^{th}) day following deposit in the mail if sent by first class mail.

X. Amendments

Amendments to this MOU require unanimous written consent of all Parties and a written instrument duly signed and executed by all Parties.

XI. Hold Harmless

No Party, nor any officer or employee of a Party, shall be responsible for any damage or liability occurring by reason of anything done or omitted to be done by another Party under or in connection with this MOU. The Parties further agree, pursuant to California Government Code Section 895.4, that each Party shall fully indemnify and hold harmless each other Party and its agents, officers, employees, and contractors from and against all claims, damages, losses, judgments, liabilities, expenses, and other costs, including litigation costs and attorney fees, arising out of, resulting from, or in connection with any work delegated to or action taken or omitted to be taken by such Party under this MOU. This provision shall survive termination of MOU or withdrawal by any Party.

XII. General Terms

A. Successors and Assigns. The terms of this MOU shall be binding on all successors in interest and assigns of each Party.

B. Compliance with Law. In performing their respective obligations under this MOU, the Parties shall comply with and conform to all applicable laws, rules, regulations, and ordinances.

C. Waiver. The waiver by any Party or any of its officers, agents, or employees, or the failure of any Party or its officers, agents, or employees to take action with respect to any right conferred by, or any breach of any obligation or responsibility of this MOU, will not be deemed to be a waiver of such obligation or responsibility, or subsequent breach of same, or of any terms, covenants, or conditions of this MOU, unless such waiver is expressly set forth in writing in a document signed and executed by the appropriate authority of the Parties.

D. Authorized Representatives. The persons executing this MOU on behalf of the Parties hereto affirmatively represent that each has the requisite legal authority to enter into this MOU on behalf of their respective Party and to bind their respective Party to the terms and conditions of this MOU. The persons executing this MOU on behalf of their respective Party understand that the Parties are relying on these representations in entering into this MOU.

E. Exemption from CEQA. Neither this MOU nor the preparation of a GSP constitute a "project" or approval of a project under the California Environmental Quality Act (CEQA) and State CEQA guidelines and both are expressly exempt from CEQA review pursuant to SGMA Section 10728.6.

F. Jurisdiction and Venue. This MOU shall be governed by and construed in accordance with the laws of the State of California. Any suit, action, or proceeding brought under the scope of this MOU shall be brought and maintained to the extent allowed by law in the County of Los Angeles, California.

G. Attorney's Fees, Costs, and Expenses. In the event of a dispute among the Parties arising under this MOU, each Party shall assume and be responsible for its own attorney's fees, costs, and expenses.

H. Entire Agreement/Integration. This MOU constitutes the sole, entire, integrated, and exclusive agreement among the Parties regarding the contents herein. Any other contracts, agreements, terms, understandings, promises, or representations not expressly set forth or referenced in this writing are null and void and of nor force and effect.

I. Construction and Interpretation. The Parties agree and acknowledge that this MOU has been developed through negotiation, and that each Party has had a full and fair opportunity to revise the terms of this MOU. Consequently, the normal rule of construction that any ambiguities are to be resolved against the drafting Party shall not apply in construing or interpreting this MOU.

J. Severability. The provisions of this MOU are severable, and the adjudicated invalidity of any provision or portion of this MOU shall not in and of itself affect the validity of any other provision or portion of this MOU, and the remaining provisions of the MOU shall remain in full force and effect, except to the extent that the invalidity of the severed provisions would result in a failure of consideration or would materially adversely affect any Party's benefit of its bargain. If a court of competent jurisdiction were to determine that a provision of this MOU is invalid or unenforceable and results in a failure of consideration or materially adversely affects any Party's benefit of its bargain, the Parties agree to promptly use good faith efforts to amend this MOU to reflect the original intent of the Parties in the changed circumstances.

K. Force Majeure. No Party shall be liable for the consequences of any unforeseeable force majeure event that (1) is beyond its reasonable control, (2) is not caused by the fault or negligence of such Party, (3) causes such Party to be unable to perform its obligations under this MOU, and (4) cannot be overcome by the exercise of due diligence. In the event of the occurrence of a force majeure event, the Party unable to perform shall promptly notify the other Parties. It shall further pursue its best efforts to resume as quickly as possible and shall suspend performance only for such period of time as is necessary as a result of the force majeure event.

L. Execution in Counterparts. The Parties intend to execute this MOU in counterparts. It is the intent of the Parties to hold one (1) counterpart with single original signatures to evidence the MOU and to thereafter forward other original counterparts

on a rotating basis for all signatures. Thereafter, each Party shall be delivered an originally executed counterpart with all Party signatures.

M. No Third Party Beneficiaries. This MOU is not intended, and will not be construed, to confer a benefit or create any right on a third party or the power or right to bring an action to enforce any of its terms

N. Construction, References, Captions. It being agreed the Parties or their agents have participated in the preparation of this MOU, the language of this MOU shall be construed simply, according to its fair meaning, and not strictly for or against any Party. Any term referencing time, days, or period for performance shall be deemed calendar days and not work days. The captions of the various articles and paragraphs are for convenience and ease of reference only, and do not define, limit, augment, or describe the scope, content, or intent of this MOU.

IN WITNESS WHEREOF, the Parties hereto have executed this MOU as of the day and year first above written.

CASTAIC LAKE WATER AGENCY

By:_____

NEWHALL COUNTY WATER DISTRICT

By:_____

SANTA CLARITA WATER DIVISION

By:_____

CITY OF SANTA CLARITA

By:_____

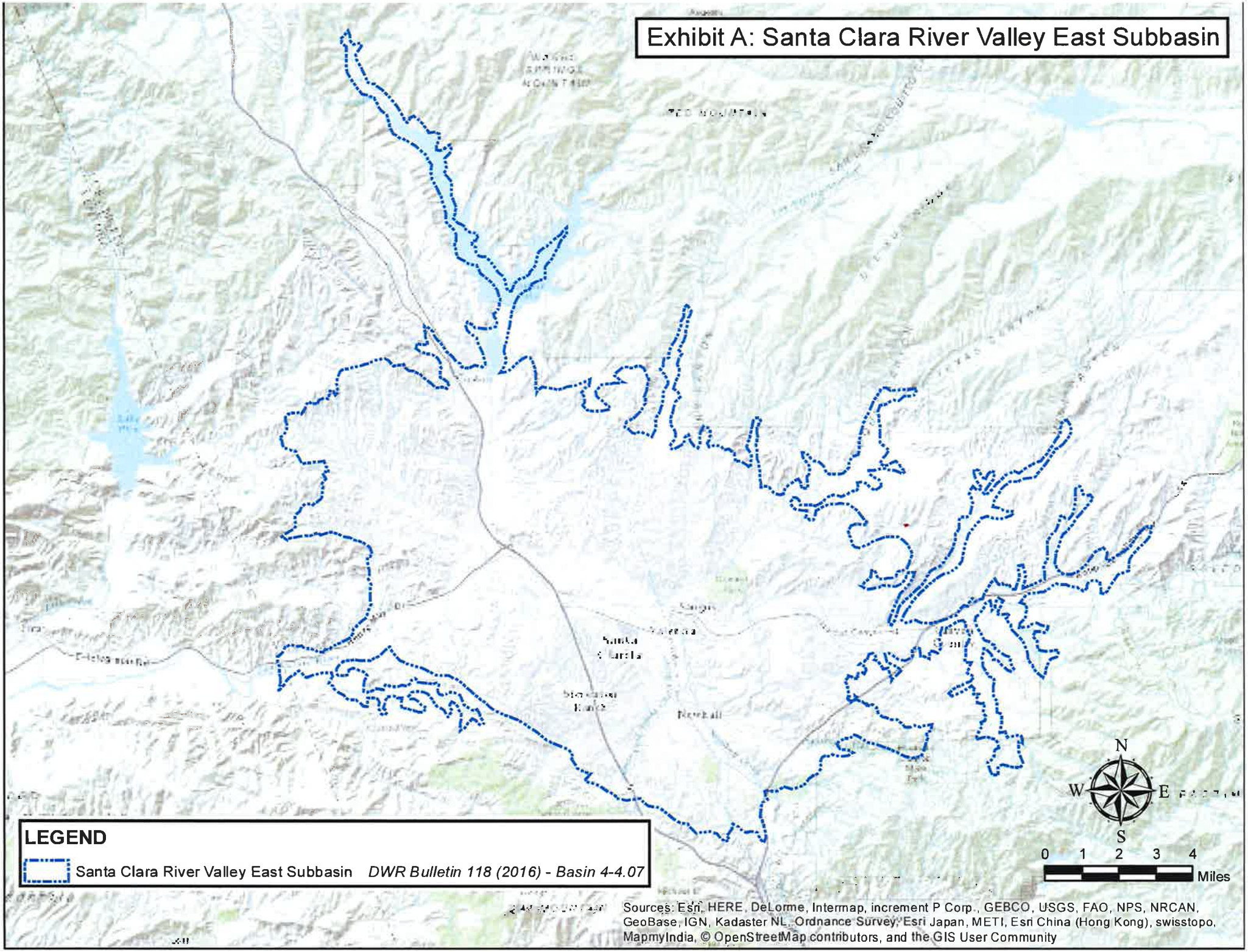
COUNTY OF LOS ANGELES

By:_____

LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 36

By:_____

Exhibit A: Santa Clara River Valley East Subbasin



RESOLUTION NO. SCV-54

RESOLUTION OF THE BOARD OF DIRECTORS OF THE SANTA CLARITA VALLEY WATER AGENCY AUTHORIZING THE GENERAL MANAGER TO EXECUTE A GRANT AGREEMENT ON BEHALF OF THE SANTA CLARITA VALLEY GROUNDWATER SUSTAINABILITY AGENCY (SCV-GSA) WITH THE CALIFORNIA DEPARTMENT OF WATER RESOURCES FOR PREPARATION OF PORTIONS OF A GROUNDWATER SUSTAINABILITY PLAN (GSP)

WHEREAS, Castaic Lake Water Agency (CLWA), along with the City of Santa Clarita, the County of Los Angeles, Los Angeles County Waterworks District No. 36, Newhall County Water District and the Santa Clarita Water Division jointly formed the Santa Clarita Valley Groundwater Sustainability Agency (SCV-GSA) through a Memorandum of Understanding (MOU) on May 24, 2017; and

WHEREAS, the MOU requires that the parties cooperate and coordinate in pursuing State of California grant and loan funding opportunities that may apply to carrying out the Sustainable Groundwater Management Act (SGMA); and

WHEREAS, in November 2017, following adoption of Resolutions by the SCV-GSA and CLWA, CLWA applied for a Proposition 1 grant on behalf of the SCV-GSA for preparation of portions of a Groundwater Sustainability Plan (GSP) that would be made part of a SCV-GSA adopted Final GSP; and

WHEREAS, the grant provides significant funding for critical portions of the GSP and also requires that the full GSP be completed; and

WHEREAS, on January 1, 2018, the Santa Clarita Valley Water Agency (SCV Water) was formed and is the successor to Castaic Lake Water Agency, the Santa Clarita Water Division, and Newhall County Water District, pursuant to Senate Bill 634, Chapter 833 (SB 634); and

WHEREAS, the members to the MOU are now SCV Water, the City of Santa Clarita, the County of Los Angeles, and Los Angeles County Waterworks District No. 36; and

WHEREAS, on April 4, 2018, the Department of Water Resources notified CLWA that its application for grant funds on behalf of the SCV-GSA was conditionally awarded $416,106; and

WHEREAS, the members to the MOU have developed a Joint Powers Agreement and Administrative Services Agreement to form the SCV-GSA Joint Powers Authority; and

WHEREAS, under the Administrative Services Agreement, SCV Water will administer the conditions of the grant on behalf of the SCV-GSA Joint Powers Authority; and

WHEREAS, with creation of SCV Water and formation of the SCV-GSA Joint Powers Authority, DWR has requested SCV Water and the SCV-GSA prepare revised resolutions to authorize execution the grant agreement; and

WHEREAS, on October 1, 2018, the SCV-GSA Board of Directors adopted a Resolution authorizing SCV Water, consistent with the Joint Powers Agreement and Administrative Services Agreement, to execute and administer the Proposition 1 grant for preparation of portions of a GSP, which also requires completion of a SCV-GSA Board adopted final GSP, and provision of the local cost share; and

WHEREAS, SCV-Water commits to administering the grant and funding the local cost share consistent with the fully executed Joint Powers Agreement and Administrative Services Agreement.

NOW, THEREFORE, BE IT RESOLVED, by the Board of Directors, the governing body of the Santa Clarita Valley Water Agency, resolves and orders as follows:

The General Manager is authorized and directed to enter into and execute an agreement with DWR to receive a grant under the 2017 Sustainable Groundwater Planning Grant pursuant to the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) (Water Code Section 79700 et. seq.) for project components supporting planning and development of the GSP and requiring completion of a SCV-GSA Board adopted final GSP.

President

I, the undersigned, hereby certify: That I am the duly appointed and acting Secretary of the Santa Clarita Valley Water Agency, and that at a regular meeting of the Board of Directors of said Agency held on October 2, 2018, the foregoing Resolution No. SCV-54 was duly and regularly adopted by said Board, and that said resolution has not been rescinded or amended since the date of its adoption, and that it is now in full force and effect.

DATED: October 2, 2018

Secretary

SANTA CLARITA VALLEY WATER AGENCY
ESTABLISHED
JANUARY 1, 2018
CALIFORNIA

JOINT EXERCISE OF POWERS AGREEMENT

by and among

SANTA CLARITA VALLEY WATER AGENCY,

THE CITY OF SANTA CLARITA,

LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 36, VAL VERDE,

and

THE COUNTY OF LOS ANGELES

modifying and assuming the role of

THE SANTA CLARITA VALLEY

GROUNDWATER SUSTAINABILITY AGENCY

2018

TABLE OF CONTENTS

Page

ARTICLE 1. DEFINITIONS 3
ARTICLE 2. CREATION OF THE AUTHORITY 4
ARTICLE 3. TERM 4
ARTICLE 4. POWERS 4
ARTICLE 5. MEMBERSHIP 6
ARTICLE 6. BOARD OF DIRECTORS 7
ARTICLE 7. OFFICERS 8
ARTICLE 8. DIRECTOR MEETINGS 8
ARTICLE 9. VOTING 9
ARTICLE 10. STAFF AND SERVICES 9
ARTICLE 11. BYLAWS 10
ARTICLE 12. COMMITTEES 10
ARTICLE 13. ACCOUNTING PRACTICES 10
ARTICLE 14. BUDGET AND EXPENSES 10
ARTICLE 15. LIABILITIES 11
ARTICLE 16. WITHDRAWAL AND TERMINATION 12
ARTICLE 17. SPECIAL PROJECTS 13
ARTICLE 18. MISCELLANEOUS PROVISIONS 14

JOINT EXERCISE OF POWERS AGREEMENT

THE SANTA CLARITA VALLEY GROUNDWATER SUSTAINABILITY AGENCY

This Joint Exercise of Powers Agreement ("JPA" or "Agreement") is made and effective on the last date executed ("Effective Date"), by and among the Santa Clarita Valley Water Agency ("SCV-Water"), the City of Santa Clarita, Los Angeles County Waterworks District No. 36,Val Verde, and the County of Los Angeles, sometimes referred to herein individually as a "Member" and collectively as the "Members" for purposes of modifying and assuming the role of the Santa Clarita Valley Groundwater Sustainability Agency ("SCV-GSA") and setting forth the terms pursuant to which the SCV-GSA shall operate. Capitalized defined terms used herein shall have the meanings given to them in Article 1 of this Agreement.

The SCV-GSA was formed pursuant to the Sustainable Groundwater Management Act to be the Groundwater Sustainability Agency (GSA) for the Santa Clara River Valley East Subbasin, groundwater basin number 4-4.07 ("Basin"), per the State of California, Department of Water Resources (DWR) Groundwater Bulletin 118.

RECITALS

A. On September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act (SGMA), codified in Part 2.74 of Division 6 of the California Water Code, commencing with Section 10720.

B. SGMA became effective on January 1, 2015, and various clarifying amendments to SGMA, including Senate Bills 13 and 226 and Assembly Bills 617 and 939, were signed in 2015 and became effective on January 1, 2016.

C. The legislative intent of SGMA is to provide sustainable management of California's groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to provide local agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater.

D. The Members are all local public agencies with water supply, water management, and/or land use responsibilities in at least some portion of the Basin and as a result, each has the statutory authority to participate in GSAs for the Basin. A map of the basin and the service area boundary of each Member is included in **Exhibit A.**

E. The Basin, identified and designated by Department of Water Resources Bulletin 118 as Subbasin No. 4-4.07, is a high priority basin and therefore, is subject to the requirements of SGMA.

F. SGMA Section 10735.2 required the formation of one or more GSAs to manage the Basin by June 30, 2017. SGMA Section 10723.6 authorizes multiple local agencies in a basin to form a GSA by way of memorandum of agreement or other legal agreement.

G. Castaic Lake Water Agency, Newhall County Water District, Los Angeles County Waterworks District No. 36, Val Verde, the Santa Clarita Water Division, the City of Santa Clarita, and the County of Los Angeles formed the SCV-GSA by Memorandum of Understanding (MOU) dated May 24, 2017. The parties to the MOU set forth their intention and reserved the right to prepare a joint powers agreement to assume the role of the SCV-GSA.

H. Santa Clarita Valley Water Agency (SCV Water) is the successor to Castaic Lake Water Agency, the Santa Clarita Water Division, and Newhall County Water District, which were dissolved, pursuant to Senate Bill 634, Chapter 833 (SB 634). In addition, SB 634 required SCV Water to dissolve Valencia Water Company, a large private retail water provider in the area whose stock was owned by SCV Water, and transfer its assets into SCV Water. This transfer was accomplished in January 2018 and as a result, the Valencia Water Division is operated as a retail service division and is part of the public agency, SCV Water.

I. Under SGMA and pursuant to Government Code Section 6500, et seq., a combination of local agencies may form a GSA through a joint exercise of powers agreement.

J. The Members have determined that the sustainable management of the Basin pursuant to SGMA may best be achieved through the cooperation of the Members operating through a joint powers agreement.

K. The Joint Exercise of Powers Act of 2000 ("Act") authorizes the Members to create a joint powers authority and to jointly exercise any power common to the Members and to exercise additional powers granted under the Act.

L. The Act, including the Marks-Roos Local Bond Pooling Act of 1985 (Government Code sections 6584, et seq.), authorizes an entity created pursuant to the Act to issue bonds, and under certain circumstances, to purchase bonds issued by, or to make loans to, the Members for financing public capital improvements, working capital, liability and other insurance needs or projects whenever doing so would result in significant public benefits, as determined by the Members. The Act further authorizes and empowers a joint powers authority to sell bonds so issued or purchased to public or private purchasers at public or negotiated sales.

M. Based on the foregoing legal authority, as well as the authority granted in SGMA, the Members desire to create a joint powers authority for the purpose of taking all actions deemed necessary by the joint powers authority to ensure sustainable management of the Basin as required by SGMA.

N. The governing board of each Member has determined it to be in the Member's best interest and in the public interest that this Agreement be executed.

O. This Agreement supersedes and terminates the previously executed MOU and the joint powers authority created herein herby assumes the role of the SCV-GSA.

TERMS OF AGREEMENT

In consideration of the mutual promises and covenants herein contained, the Members agree as follows:

ARTICLE 1.
DEFINITIONS

The following terms have the following meanings for purposes of this Agreement:

1.1 "Act" means The Joint Exercise of Powers Act, set forth in Chapter 5 of division 7 of Title 1 of the Government Code, sections 6500, et seq., including all laws supplemental thereto.

1.2 "Agreement" has the meaning assigned thereto in the Preamble.

1.3 "Auditor" means the auditor of the financial affairs of the SCV-GSA appointed by the Board of Directors pursuant to Section 13.3 of this Agreement.

1.4 "Basin" means the Santa Clara River Valley East Groundwater Subbasin, groundwater basin number 4-4.07 per Bulletin 118, as further depicted in **Exhibit A** to this MOU.

1.5 "Board of Directors" or "Board" means the governing body of the SCV-GSA as established by Article 6 of this Agreement.

1.6 "Director" and "Alternate Director" shall mean a director and alternate director appointed pursuant to Article 6 of this Agreement.

1.7 "DWR" means the California Department of Water Resources.

1.8 "Effective Date" has the meaning assigned thereto in the Preamble.

1.9 "GSA" means Groundwater Sustainability Agency, as defined by SGMA, that implements the provisions of SGMA.

1.10 "GSP" means Groundwater Sustainability Plan, as defined by SGMA, proposed or adopted by a GSA pursuant to SGMA.

1.11 "Member" has the meaning in the Preamble and further means each party to this Agreement that satisfies the requirements of Section 5.1 of this Agreement, including any new members as may be approved by the Members pursuant to Section 5.2 of this Agreement.

1.12 "Officer(s)" means the Chair, Vice Chair, and Secretary to be appointed by the Board of Directors pursuant to Section 7.1 of this Agreement.

1.13 "SCV-GSA" means the Santa Clarita Groundwater Sustainability Agency and consists of the following members: Santa Clarita Valley Water Agency, the City of Santa Clarita, Los Angeles County Waterworks District No. 36 Val Verde, and the County of Los Angeles.

1.14 "SGMA" refers to the Sustainable Groundwater Management Act as defined in the Recitals.

1.15 "State" means the State of California.

1.16 "Supermajority Vote" means five (5) affirmative votes.

ARTICLE 2.
CREATION OF THE AUTHORITY

2.1 Creation of Authority. There is hereby created pursuant to the Act a joint powers authority, which shall be a public entity separate from the Members to this Agreement. This Agreement terminates the MOU and the joint powers authority hereby assumes the role of the SCV-GSA and shall be known as the SCV-GSA. Within ten (10) days after the Effective Date of this Agreement, the SCV-GSA shall cause a statement of the information concerning the SCV-GSA, required by Government Code section 53051, to be filed with the office of the California Secretary of State and with the County Clerk for the County of Los Angeles, setting forth the facts required to be stated pursuant to Government Code section 53051(a). Within thirty (30) days after the Effective Date of this Agreement and after any amendment, the SCV-GSA shall cause a notice of this Agreement or amendment to be prepared and filed with the office of the California Secretary of State containing the information required by Government Code section 6503.5. Within thirty (30) days after the Effective Date, the SCV-GSA shall send a copy of this Agreement to DWR.

2.2 Purpose of the Joint Powers Authority. Each Member to this Agreement has in common the power to study, plan, develop, finance, acquire, construct, maintain, repair, manage, operate, control, and govern water supply projects and exercise groundwater management authority within the Basin either alone or in cooperation with other public or private non-member entities, and each is a local agency eligible to serve as the GSA, either alone or jointly through a joint powers agreement as provided for by SGMA. This Agreement is being entered into in order to jointly exercise some or all of the foregoing common powers, as appropriate, and for the exercise of such additional powers as may be authorized by law in the manner herein set forth, in order to effectuate the purposes of this Agreement. The purpose of the SCV-GSA is to serve as the GSA for the Basin and to develop, adopt, and implement the GSP for the Basin pursuant to SGMA and other applicable provisions of law.

ARTICLE 3.
TERM

This Agreement shall become effective upon its execution by each of the Members and shall remain in effect until terminated pursuant to the provisions of Article 16 (Withdrawal of Members) of this Agreement.

ARTICLE 4.
POWERS

The SCV-GSA shall possess the power in its own name to exercise any and all common powers of its Members reasonably related to the purposes of the SCV-GSA, including but not limited to the following powers, together with such other powers as are expressly set forth in SGMA and as it may be amended in the future. For purposes of Government Code section 6509, the powers of the SCV-GSA

shall be exercised subject to the restrictions upon the manner of exercising such powers as are imposed on SCV Water, and in the event of the withdrawal of SCV Water as a Member under this Agreement, then the manner of exercising the SCV-GSA's powers shall be those restrictions imposed on the County of Los Angeles.

4.1 To exercise all powers afforded to the SCV-GSA under SGMA, including without limitation:

4.1.1 To adopt rules, regulations, policies, bylaws, and procedures governing the operation of the SCV-GSA.

4.1.2 To develop, adopt, and implement a GSP for the Basin, and to exercise jointly the common powers of the Members in doing so.

4.1.3 To obtain rights, permits, and other authorizations for, or pertaining to, implementation of a GSP for the Basin.

4.1.4 To collect and monitor data on the extraction of groundwater from, and the quality of groundwater in, the Basin.

4.1.5 To acquire property and other assets by grant, lease, purchase, bequest, devise, gift, or eminent domain, and to hold, enjoy, lease or sell, or otherwise dispose of, property, including real property, water rights, and personal property, necessary for the full exercise of the SCV-GSA's powers.

4.1.6 To establish and administer a conjunctive use program for the purposes of maintaining sustainable yield in the Basin consistent with the requirements of SGMA.

4.1.7 To exchange and distribute water.

4.1.8 To regulate groundwater extractions as permitted by SGMA.

4.1.9 To spread, sink, and inject water into the basin to recharge the groundwater Basin.

4.1.10 To store, transport, recapture, recycle, purify, treat, or otherwise manage and control water for beneficial use.

4.1.11 To develop and facilitate market-based solutions for the use, sale, or lease, and management of water rights.

4.1.12 To impose assessments, groundwater extraction fees, or other charges, and to undertake other means of financing the SCV-GSA as authorized by Chapter 8 of SGMA, commencing at section 10730 of the Water Code.

4.1.13 To exercise the common powers of its Members to develop, collect, provide, and disseminate information that furthers the purposes of the SCV-GSA, including but not limited to the operation of the SCV-GSA and adoption and implementation of a GSP for the Basin to the Members' legislative, administrative, and judicial bodies, as well as the public generally.

4.1.14 To perform other ancillary tasks relating to the operation of the SCV-GSA pursuant to SGMA, including without limitation, environmental review, engineering, and design.

4.2 To apply for, accept, and receive licenses, permits, water rights, approvals, agreements, grants, loans, contributions, donations, or other aid from any agency of the United States, the State of California, or other public agencies or private persons or entities necessary for the SCV-GSA's purposes.

4.3 To make and enter contracts necessary to the full exercise of the SCV-GSA's power.

4.4 To employ, designate, or otherwise contract for the services of agents, officers, employees, attorneys, engineers, planners, financial consultants, technical specialists, advisors, and independent contractors.

4.5 To incur debts, liabilities, or obligations, to issue bonds, notes, certificates of participation, guarantees, equipment leases, reimbursement obligations, and other indebtedness, as authorized by the Act.

4.6 To cooperate, act in conjunction, and contract with the United States, the State of California, or any agency thereof, counties, municipalities, public and private corporations of any kind (including without limitation, investor-owned utilities), and individuals, or any of them, for any and all purposes necessary or convenient for the full exercise of the powers of the SCV-GSA.

4.7 To sue and be sued in the SCV-GSA's own name. Third parties must comply with the requirements of the Government Claims Act prior to filing any action for money or damages against the SCV-GSA.

4.8 To provide for the prosecution of, defense of, or other participation in, actions or proceedings at law or in public hearings in which the Members, pursuant to this Agreement, have an interest and employ counsel and other expert assistance for these purposes.

4.9 To accumulate operating and reserve funds for the purposes herein stated.

4.10 To invest money that is not required for the immediate necessities of the SCV-GSA, as the SCV-GSA determines is advisable, in the same manner and upon the same conditions as Members, pursuant to Government Code section 53601, as that section now exists or may hereafter be amended.

4.11 To undertake any investigations, studies, and matters of general administration.

4.12 To perform all other acts necessary or proper to carry out fully the purposes of this Agreement.

ARTICLE 5.
MEMBERSHIP

5.1 Members. The Members of the SCV-GSA shall be the Santa Clarita Valley Water Agency, the City of Santa Clarita, Los Angeles County Waterworks District No. 36 Val Verde, and the

County of Los Angeles, as long as they have not, pursuant to the provisions hereof, withdrawn or been terminated from this Agreement.

5.2 New Members. It is recognized that a public agency that is not a Member on the Effective Date of this Agreement may wish to participate in the SCV-GSA. Additional public agencies or mutual water companies may become members of the SCV-GSA upon such terms and conditions as established by the Board of Directors and upon the unanimous consent of the existing Members, evidenced by the execution of a written amendment to this Agreement signed by all of the Members, including the additional public agency or mutual water company. The addition of new Members shall not affect any rights of existing Members without the consent of all affected Members.

ARTICLE 6.
BOARD OF DIRECTORS

6.1 Formation of the Board of Directors. The SCV-GSA shall be governed by a Board of Directors ("Board of Directors" or "Board"). The Board shall consist of seven (7) Directors who shall be appointed in the manner set forth as follows:

6.1.1 Four (4) Directors appointed by the Board of Directors for the Santa Clarita Valley Water Agency, which is the successor entity to the Castaic Lake Water Agency, the Newhall County Water District, the Santa Clarita Water Division, and the Valencia Water Company.

6.1.2 One (1) Director appointed by the City Council for the City of Santa Clarita.

6.1.3 One (1) Director appointed by the County of Los Angeles Board of Supervisors.

6.1.4 One (1) Director appointed by Los Angeles County Waterworks District No. 36, Val Verde.

6.2 Initial Directors. The six (6) individuals who were appointed to the predecessor SCV-GSA pursuant to the MOU by a Member or a predecessor in interest to a Member are hereby deemed by the Members to be appointed to the Board of Directors. Consistent with Section 6.1.1 above, the Santa Clarita Valley Water Agency shall appoint one additional director so it has a total of four appointed Directors.

6.3 Alternate Directors. Each Member may also appoint Alternate Directors for its members of the Board of Directors. Unless appearing as a substitute for a Director due to absence or conflict of interest, Alternate Directors shall have no vote, and shall not participate in any discussions or deliberations of the Board. In such instances, Alternate Directors are not prohibited from attending meetings and may participate in public comment. If a Director is not present, or if a Director has a conflict of interest which precludes participation by the Director in any decision-making process of the Board, the Alternate Director appointed to act in his/her place shall assume all rights of the Director, and shall have the authority to act in his/her absence, including casting votes on matters before the Board.

6.4 Duties of the Board of Directors. The business and affairs of the SCV-GSA, and all of the powers of the SCV-GSA, including without limitation all powers set forth in Article 4 (Powers), are reserved to and shall be exercised by and through the Board of Directors, except as may be expressly delegated pursuant to this Agreement, bylaws, or by specific action of the Board of Directors.

6.5 Director Terms and Removal. Each Director shall be appointed to serve for a term of two years. A Member's Director may be removed during his or her term or reappointed for multiple terms at the pleasure of the Member that appointed him or her. No individual Director may be removed in any other manner, including by the affirmative vote of the other Directors. The term of an Initial Director shall begin on the date this Agreement becomes effective.

6.6 Vacancies. A vacancy on the Board of Directors shall occur when a Director resigns, is removed, or at the end of the Director's term as set forth in Section 6.5. Upon the vacancy of a Director, the seat shall remain vacant until a replacement Director is appointed as set forth in Section 6.1. Replacement Directors who are appointed to fill vacant seats before the term of such seats have concluded shall inherit the term of the Director they are replacing. Members shall submit any changes in Director positions to the Board Secretary by written notice signed by an authorized representative of the Member.

ARTICLE 7.
OFFICERS

7.1 Officers. Officers of the SCV-GSA shall be a chair, vice chair, and secretary. A treasurer shall be appointed consistent with the provisions of Section 13.3. The vice chair shall exercise all powers of the chair in the chair's absence or inability to act.

7.2 Appointment of Officers. Officers shall be appointed annually by, and serve at the pleasure of, the Board of Directors. The initial Officers shall be those that were selected as officers by the members of the predecessor SCV-GSA pursuant to the MOU. Officers shall be appointed thereafter at the first Board meeting following January 1st of each year. Any Officer may resign at any time upon written notice to the Board.

7.3 Principal Office. The principal office of the SCV-GSA shall be established by the Board of Directors, and may thereafter be changed by a simple majority vote of the full Board. The principal office of the SCV-GSA shall be located within the jurisdictional boundaries of one or more of the Members.

ARTICLE 8.
DIRECTOR MEETINGS

8.1 Initial Meeting. The initial meeting of the Board of Directors shall be held in the County of Los Angeles, California within sixty (60) days of the Effective Date of this Agreement.

8.2 Time and Place. The Board of Directors shall meet at least quarterly, at a date, time and place set by the Board within the jurisdictional boundaries of one or more of the Members, and at such times as may be determined by the Board.

8.3 Meetings. All meetings of the Board of Directors, including special meetings, shall be noticed, held, and conducted in accordance with the Ralph M. Brown Act (Government Code sections 54950, et seq.). The Board may use teleconferencing in connection with any meeting in conformance with and to the extent authorized by applicable law.

8.4 Local Conflict of Interest Code. The Board of Directors shall adopt a local conflict of interest code pursuant to the provisions of the Political Reform Act of 1974 (Government Code sections 81000, et seq.) at the first meeting following the appointment of the Directors.

ARTICLE 9.
VOTING

9.1 Quorum. A quorum of any meeting of the Board of Directors shall consist of a majority of the Directors. In the absence of a quorum, any meeting of the Directors may be adjourned by a vote of a simple majority of Directors present, but no other business may be transacted. For purposes of this Article, a Director shall be deemed present if the Director appears at the meeting in person or participates telephonically or by other electronic means, provided the telephone or electronic appearance is consistent with the requirements of the Ralph M. Brown Act.

9.2 Director Votes. Voting by the Board of Directors shall be made on the basis of one vote for each Director.

9.3 Affirmative Decisions of the Board of Directors - Simple Majority Vote. Except as otherwise specified in this Agreement, all decisions of the Board of Directors shall require the affirmative vote of at least four (4) Directors.

9.4 Matters Requiring Supermajority Vote. Decisions concerning the following matters shall require a supermajority vote of the Directors in order to pass: (1) the adoption of the GSP and any amendments thereto; (2) any amendments to the bylaws; (3) approval of the annual budget; (4) the adoption of any groundwater regulatory or extraction fees; (5) the adoption of any taxes, fees or assessments subject to Proposition 218; (6) a decision to initiate or settle litigation; (7) a decision to commence eminent domain proceedings; and (8) the approval of any agreement between the SCV-GSA and any Member.

ARTICLE 10.
STAFF AND SERVICES

10.1 Staff and Services. The SCV-GSA may employ full-time and/or part-time employees, assistants, and independent contractors who may be necessary from time to time to accomplish the purposes of the SCV-GSA, subject to the approval of the Board of Directors. The SCV-GSA may contract with a Member or other public agency or private entity for various services, including without limitation, those related to the SCV-GSA's finances, purchasing, risk management, information technology, and human resources. A written agreement shall be entered between the SCV-GSA and the Member or other public agency or private entity contracting to provide such service, and that agreement shall specify the terms on which such services shall be provided, including without limitation, the compensation, if any, that shall be made for the provision of such services.

10.2 Initial Administration and Staffing. Unless otherwise determined by the Board, SCV Water will manage the administrative operations of the SCV-GSA and the development of the GSP. In connection with this role and pursuant to a separate agreement between SCV Water and the SCV-GSA, SCV Water will provide staff resources to administer the operations of the SCV-GSA and will be authorized to contract directly with consultants and other parties, including the State of California, as required to carry out the direction of the SCV-GSA Board. Unless otherwise provided by the Board,

any procurement, purchasing, and contracting shall be done in accordance with SCV Water's adopted policies. The separate agreement between SCV Water and the SCV-GSA contemplated in this Section shall address the reimbursement of costs and expenses incurred by SCV Water in fulfilling its role and may be reviewed by the Board at any time. A draft of this separate agreement is attached.

ARTICLE 11.
BYLAWS

11.1 The Board of Directors may adopt bylaws of the SCV-GSA to govern the day-to-day operations of the SCV-GSA.

ARTICLE 12.
COMMITTEES

12.1 Board Committees. The Board of Directors may from time to time establish one or more standing or ad hoc committees consisting of Directors to assist in carrying out the purposes and objectives of the SCV-GSA, including but not limited to a Budget and Finance Committee, Planning Committee, and an Executive Committee. The Board of Directors shall determine the purpose and need for such committees. Meetings of standing committees shall be subject to the requirements of the Brown Act.

12.2 Other Committees. The Board may from time to time and in its discretion establish any other committees to assist in carrying out the purposes and objectives of the SCV-GSA.

ARTICLE 13.
ACCOUNTING PRACTICES

13.1 General. The Board of Directors shall establish and maintain such funds and accounts as may be required by generally accepted public agency accounting practices. The SCV-GSA shall maintain strict accountability of all funds and report all receipts and disbursements of the SCV-GSA.

13.2 Fiscal Year. Unless the Board of Directors decides otherwise, the fiscal year for the SCV-GSA shall run concurrent with the fiscal year of SCV Water.

13.3 Appointment of Treasurer and Auditor; Duties. The Treasurer shall be the Chief Finance Officer of SCV Water and the Auditor shall be appointed by the Board in the manner, and shall perform such duties and responsibilities, specified in sections 6505, 6505.5 and 6505.6 of the Act. The Treasurer shall be bonded in accordance with the provisions of section 6505.1 of the Act.

ARTICLE 14.
BUDGET AND EXPENSES

14.1 Budget. Within one hundred twenty (120) days after the first meeting of the Board of Directors, and thereafter prior to the commencement of each fiscal year, the Board shall adopt a budget for the SCV-GSA for the ensuing fiscal year. In the event that a budget is not so approved, the prior year's budget shall be deemed approved for the ensuing fiscal year, and any groundwater extraction fee or assessment(s) of contributions of Members, or both, approved by the Board during the prior fiscal year shall again be assessed in the same amount and terms for the ensuing fiscal year.

14.2 SCV-GSA Funding and Initial Contributions.

14.2.1 Funding Account. For the purpose of funding the expenses and ongoing operations of the SCV-GSA, the Board of Directors shall maintain a funding account in connection with the annual budget process. The Board of Directors may fund the SCV-GSA as provided in Chapter 8 of SGMA, commencing with section 10730 of the Water Code.

14.2.2 Annual Member Contributions. In order to fund the SCV-GSA and continue to develop the GSP, prior to the adoption and approval of a GSP, the Members must and hereby agree to contribute a non-reimbursable twenty thousand dollars ($20,000) each fiscal year to the SCV-GSA for the first five fiscal years. After the fifth fiscal year, the Board shall consider the appropriate level of annual payments. The first payment of twenty thousand dollars ($20,000) shall be paid to the SCV-GSA within thirty (30) days of the execution of this Agreement for fiscal year 2017-18. Payments for subsequent fiscal years shall be paid to the SCV-GSA within thirty (30) days after the start of each fiscal year thereafter. These contributions shall be used for any purpose authorized for payment from fees imposed pursuant to California Water Code Section 10730, including administrative and consulting costs.

14.3 Issuance of Indebtedness. The SCV-GSA may issue bonds, notes, or other forms of indebtedness, as permitted under Section 4.5, provided such issuance be approved at a meeting of the Board.

14.4 Future Member Contributions. In the event the cost of the ongoing administration of the SCV-GSA and/or the development, adoption, and ongoing administration of the GSP exceeds the Members' initial contributions, the Board may, by a super-majority vote, adopt a resolution requiring each of the Members to provide additional non-reimbursable funding, above the annual contributions, to the SCV-GSA and demonstrating in detail (1) the need for funding and (2) the purposes for which additional funding will be utilized. Upon receipt of the resolution requiring additional funding, the Members may meet and confer regarding the resolution. However, each Member shall consider and act upon the resolution no later than ninety (90) days following the adoption of the resolution by the Board unless otherwise extended by the Board. Failure by a Member to affirm the resolution may be grounds for termination pursuant to Section 16.2.

14.5 Voluntary Member Contributions. Nothing in this Agreement shall prohibit a member from making voluntary monetary or in-kind contributions to the SCV-GSA at any time. To the extent the SCV-GSA is able to secure other funding sources, and to the extent permitted by law, the SCV-GSA shall reimburse voluntary Member contributions provided pursuant to this Section 14.5. The SCV-GSA's authority to reimburse such contributions shall be considered a cost of the SCV-GSA's groundwater sustainability program. Notwithstanding the SCV-GSA's obligation to reimburse voluntary Member contributions pursuant to this Section 14.5, a Member who makes a voluntary contribution may, in its discretion, elect to make any such voluntary contribution non-reimbursable.

ARTICLE 15.
LIABILITIES

15.1 Liability. In accordance with Government Code section 6507, and as authorized by Government Code Section 6508.1, the debt, liabilities, and obligations of the SCV-GSA shall be the debts, liabilities, and obligations of the SCV-GSA alone, and not the Members.

15.2 Indemnity. To the fullest extent permitted by law, funds of the SCV-GSA may be used to defend, indemnify, and hold harmless the SCV-GSA, each Member, each Director, and any officers, agents, and employees of the SCV-GSA for their actions taken within the course and scope of their duties while acting on behalf of the SCV-GSA. To the fullest extent permitted by law, the SCV-GSA agrees to save, indemnify, defend, and hold harmless each Member from any liability, claims, suits, actions, arbitration proceedings, administrative proceedings, regulatory proceedings, losses, expenses or costs of any kind, whether actual, alleged or threatened, including attorney's fees and costs, court costs, interest, defense costs, and expert witness fees, where the same arise out of, or are in any way attributable in whole or in part, to acts or omissions of the SCV-GSA or its employees, officers or agents or negligent acts or omissions (not including gross negligence or wrongful conduct) of the employees, officers or agents of any Member, while acting within the course and scope of a Member relationship with the SCV-GSA. In addition, to the fullest extent permitted by law, the SCV-GSA shall indemnify, defend and hold harmless, each Member from any liabilities incurred as a result of handling, receipt, use, or disposal of hazardous materials, hazardous substances, and hazardous wastes however defined under Federal, State, or local laws, ordinances, or regulations.

15.3 Privileges and Immunities. All of the privileges and immunities from liability, exemption from laws, ordinances and rules, all pension, relief, disability, workers compensation, and other benefits which apply to the activity of officers, agents, or employees of any of the Members when performing their respective functions shall apply to them to the same degree and extent while engaged in the performance of any of the functions and other duties under this Agreement. None of the officers, agents, or employees appointed by the Board of Directors shall be deemed, by reason of their employment by the Board of Directors, to be employed by any of the Members or, by reason of their employment by the Board of Directors to be subject to any of the requirements of such Members.

15.4 Liability Insurance. The Board of Directors shall obtain, and maintain in effect, appropriate liability insurance to cover the activities of the SCV-GSA's Directors and staff in the ordinary course of their duties.

15.5 Bond – Property of the Agency. Whomever is designated to be responsible for the handling of SCV-GSA property shall be required to file an official bond in an amount to be determined by the Board consistent with Government Code section 6505.1. SCV-GSA shall pay for the required bond.

ARTICLE 16.
WITHDRAWAL AND TERMINATION

16.1 Unilateral Withdrawal. Any Member may unilaterally withdraw from this Agreement without causing or requiring termination of this Agreement, effective upon one hundred eighty (180) days written notice. Such notice shall be provided to the Board Secretary, the Board of Directors, and each of the Members. If a Member withdraws, this Agreement will continue in full force and effect among the remaining Members.

16.2 Termination of Members. As an alternative to pursuing litigation against a Member for failure to meet its obligations as set forth in this Agreement or as may be adopted by the Board from time to time, the Board may vote to terminate such Member. Termination may be effected by the vote of all but one of the current Directors. In the event of a termination, this Agreement shall continue in full force and effect among the remaining members.

16.3 Rescission or Termination of SCV-GSA. This Agreement may be rescinded and the SCV-GSA terminated by unanimous written consent of all Members, except during the outstanding term of any SCV-GSA indebtedness.

16.4 Effect of Withdrawal or Termination. Upon termination of this Agreement, unilateral withdrawal, or termination of a Member, a Member shall remain obligated to pay its share of all debts, liabilities, and obligations required of the Member pursuant to terms of this Agreement, and that were incurred or accrued prior to the effective date of such termination or withdrawal, including, without limitation, those debts, liabilities, and obligations pursuant to Sections 4 and 14. For purposes of this Agreement, annual contributions are incurred or accrued as of the effective date of this Agreement and the first day of every fiscal year thereafter. Any Member who withdraws or is terminated from the SCV-GSA shall have no right to participate in the business and affairs of the SCV-GSA or to exercise any rights of a Member under this Agreement or the Act, but shall continue to share in reimbursements, if any, from the SCV-GSA on the same basis as if such Member had not withdrawn, provided that a Member that has withdrawn from the SCV-GSA shall not receive reimbursements, if any, in excess of the reimbursable contributions made to the SCV-GSA while a Member.

16.5 Return of Contribution. Upon termination of this Agreement, any surplus money on-hand shall be returned to the Members in proportion to their contributions made. To the extent permitted by law, the Board of Directors shall first offer any property, works, rights, and interests of the SCV-GSA for sale to the Members on terms and conditions determined by the Board of Directors. If no such sale to Members is consummated, the Board of Directors shall offer the property, works, rights, and interest of the SCV-GSA for sale to any non-member for good and adequate consideration. The net proceeds from any sale shall be distributed among the Members in proportion to their contributions made.

ARTICLE 17.
SPECIAL PROJECTS

17.1 Special Projects and Committees. In addition to the general activities undertaken by all Members of the SCV-GSA, the SCV-GSA may initiate Special Projects and form Special Project Committees that involve fewer than all Members. No Member shall be required to be involved in a Special Project that involves fewer than all Members.

17.2 Special Project Agreement. With the unanimous approval of the Directors, Members may undertake Special Projects in the name of the SCV-GSA. Prior to undertaking a Special Project, the Members electing to participate in the Special Project shall enter into an activity agreement. Such activity agreement shall provide that (i) no Special Project undertaken pursuant to such agreement shall conflict with the terms of this Agreement; and (ii) the Members to the activity agreement shall indemnify, defend, and hold the SCV-GSA, and the SCV-GSA's other Members, harmless from and against any liabilities, costs, or expenses of any kind resulting from the Special Project described in the

activity agreement. All assets, rights, benefits, debts, liabilities, and obligations attributable to a Special Project shall be assets, rights, benefits, debts, liabilities, and obligations solely of the Members that have entered into the activity agreement for that Special Project, in accordance with the terms of the activity agreement, and shall not be the assets, rights, benefits, debts, liabilities, and obligations of those Members that have not executed the activity agreement. Members not electing to participate in the Special Project shall have no rights, benefits, debts, liabilities, or obligations attributable to such Special Project.

ARTICLE 18.
MISCELLANEOUS PROVISIONS

18.1 No Predetermination or Irretrievable Commitment of Resources. Nothing herein shall constitute a determination by the SCV-GSA or any of its Members that any action shall be undertaken or that any unconditional or irretrievable commitment of resources shall be made, until such time as the required compliance with all local, state, or federal laws, including without limitation the California Environmental Quality Act, National Environmental Policy Act, or permit requirements, as applicable, has been completed.

18.2 Public Involvement. The SCV-GSA shall comply with all of the requirements in SGMA regarding public outreach and involvement, including but not limited to Water Code sections 10723.2 and 10723.4.

18.3 Notices. Notices to a Director or Member hereunder shall be sufficient if delivered to the Board Clerk, City Clerk, or Board Secretary of the respective Director or Member and addressed to the Director or Member. Delivery may be accomplished by U.S. Postal Service, private mail service, or electronic mail.

18.4 Amendments to Agreement. This Agreement may be amended or modified at any time only by subsequent written agreement approved and executed by all of the Members.

18.5 Agreement Complete. The foregoing constitutes the full and complete Agreement of the Members. This Agreement supersedes all prior agreements and understandings, whether in writing or oral, related to the subject matter of this Agreement that are not set forth in writing herein.

18.6 Severability. Should any part, term or provision of this Agreement be decided by a court of competent jurisdiction to be illegal or in conflict with any applicable federal law or any law of the State of California, or otherwise be rendered unenforceable or ineffectual, the validity of the remaining parts, terms, or provisions of this Agreement shall not be affected thereby, provided, however, that if the remaining parts, terms, or provisions do not comply with the Act, this Agreement shall terminate.

18.7 Withdrawal by Operation of Law. Should the participation of any Member to this Agreement be decided by the courts to be illegal or in excess of that Member's authority or in conflict with any law, the validity of this Agreement as to the remaining Members shall not be affected thereby.

18.8 Assignment. The rights and duties of the Members may not be assigned or delegated without the written consent of all Members. Any attempt to assign or delegate such rights or duties in contravention of this Agreement shall be null and void.

18.9 Binding on Successors. This Agreement shall inure to the benefit of, and be binding upon, the successors, and assigns of the Members, whose assignments have complied with Section 18.7 herein.

18.10 Dispute Resolution. In the event that any dispute arises among the Members relating to (i) this Agreement, (ii) the rights and obligations arising from this Agreement, (iii) a Member proposing to withdraw from membership in the SCV-GSA, or (iv) a Member proposing to initiate litigation in relation to legal rights to groundwater within, or the management of, the Basin, the aggrieved Member or Members proposing to withdraw from membership shall provide written notice to the other Members of the controversy or proposal to withdraw from membership. Within thirty (30) days after such written notice, the Members shall attempt in good faith to resolve the controversy through informal means. If the Members cannot agree upon a resolution of the controversy within thirty (30) days from the providing of written notice specified above, the dispute shall be submitted to mediation prior to commencement of any legal action or prior to withdrawal of a Member proposing to withdraw from membership. The mediation shall be no less than a full day (unless agreed otherwise among the Members) and the cost of mediation shall be paid in equal proportion among the Members. The mediator shall be either voluntarily agreed to, or, if the parties cannot agree upon a mediator, appointed by the Superior Court upon a suit and motion for appointment of a neutral mediator. Upon completion of mediation, if the controversy has not been resolved, any Member may exercise all rights to bring a legal action relating to the controversy or withdraw from membership as otherwise authorized pursuant to this Agreement. The SCV-GSA shall also participate in mediation upon request by a Director concerning a dispute alleged by the Director concerning the management of the Basin or rights to extract groundwater from the Basin, with the terms of such mediation to be conducted in the same manner provided for in this Section 18.9 for disputes between or among Members.

18.11 Counterparts. This Agreement may be executed in counterparts. No counterpart shall be deemed to be an original or presumed delivered unless and until the counterpart executed by the other Members to this Agreement is in the physical possession of the Member seeking enforcement thereof.

18.12 Singular Includes Plural. Whenever used in this Agreement, the singular form of any term includes the plural form and the plural form includes the singular form.

18.13 Member Authorization. The governing bodies of the Members have each authorized execution of this Agreement, as evidenced by the respective signatures below.

IN WITNESS WHEREOF, the Members hereto have executed this Agreement by authorized officials thereof on the dates indicated below, which Agreement may be executed in counterparts.

[Signatures on Following Pages]

SANTA CLARITA VALLEY WATER AGENCY

DATED: 9-18-18

By: Matthew D

Title: GENERAL MANAGER

APPROVED AS TO FORM:

By: Joseph Byrne

Title: General Counsel

CITY OF SANTA CLARITA

DATED: 9.27.18

By: _____

Title: Assistant City Manager

APPROVED AS TO FORM:

By: _____

Title: CITY ATTORNEY

COUNTY OF LOS ANGELES
OFFICE OF THE COUNTY COUNSEL
648 KENNETH HAHN HALL OF ADMINISTRATION
500 WEST TEMPLE STREET
LOS ANGELES, CALIFORNIA 90012-2713

TELEPHONE
(213) 893-0924
FACSIMILE
(213) 687-7337
TDD
(213) 633-0901

MARY C. WICKHAM
County Counsel

September 18, 2018

VIA EXPRESS MAIL

Rick Viergutz
26521 Summit Circle
Santa Clarita, California 91350-3049

Re: Santa Clarita Valley Water Agency Joint Exercise of Power Agreement

Dear Mr. Viergutz,:

Pursuant to Michael Moore's instructions enclosed herein are the signatures pages for the Santa Clarita Valley Water Agency Joint Exercise of Power Agreement. If you have any questions or comments, please contact me.

Very truly yours,

MARY C. WICKHAM
County Counsel

By Rocio Murillo
ROCIO MURILLO
Legal Office Support Assistant I
Public Works Division

RM:rm

Enclosure

LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 36, VAL VERDE

DATED: 9.17.18

By: _____

Title: Assistant Deputy Director

APPROVED AS TO FORM:

By: _____ FOR A.M.

Title: Deputy

THE COUNTY OF LOS ANGELES

DATED: 9/13/18

By: _____

Title: DIRECTOR OF REGIONAL PLANNING

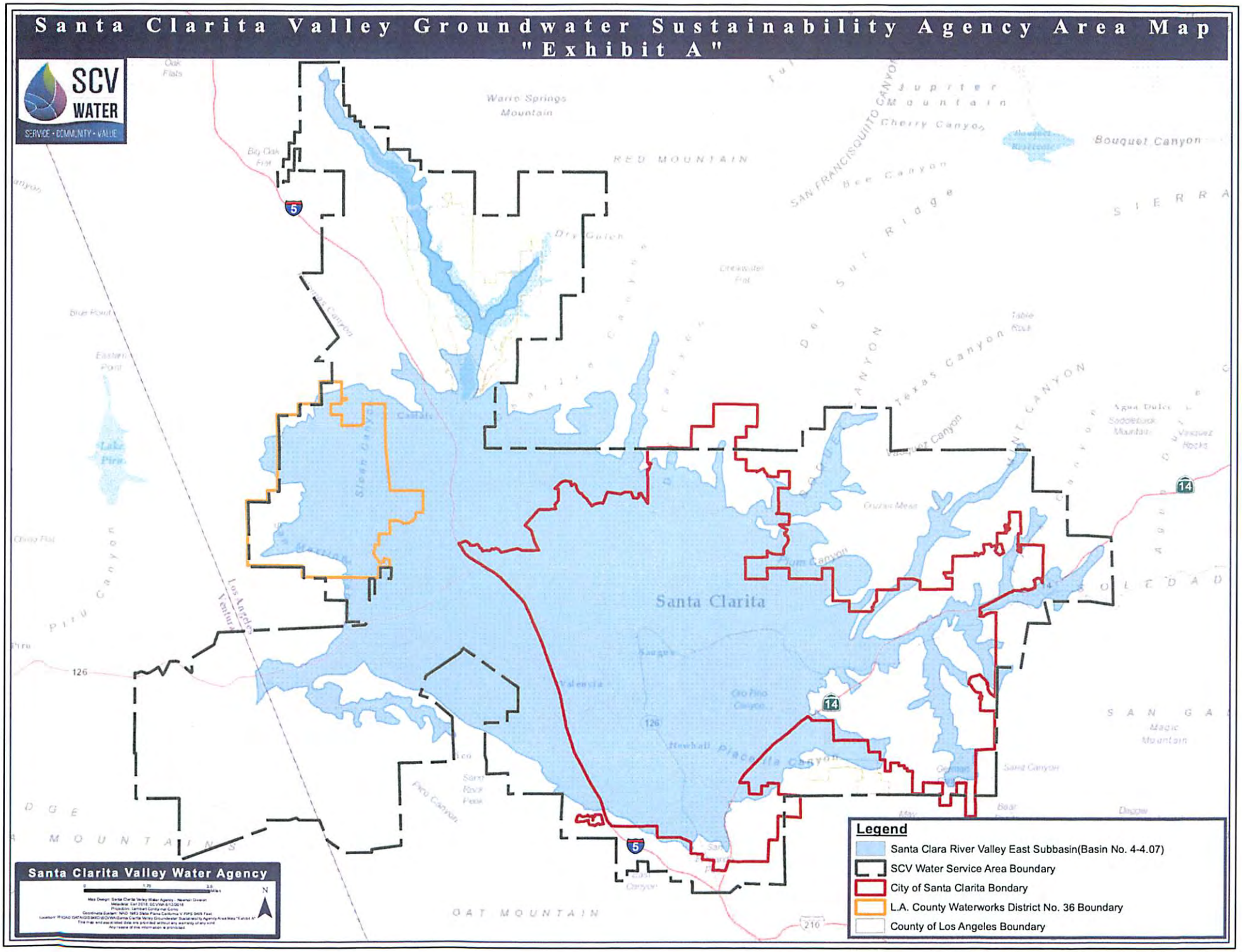
APPROVED AS TO FORM:

By: _____ FOR MICHAEL MOORE

Title: DEP. COUNTY COUNSEL

EXHIBIT "A"

Santa Clarita Valley Groundwater Sustainability Agency Area Map
"Exhibit A"



APPENDIX B

Hydrogeologic Conceptual Model: Geologic Framework and Principal Aquifers, Prepared by Richard C. Slade & Associates LLC

This page intentionally left blank.

Technical Memorandum

Hydrogeologic Conceptual Model: Geologic Framework and Principal Aquifers

Santa Clara River Valley Groundwater Basin
East Subbasin
Groundwater Sustainability Plan
Santa Clarita Valley Groundwater Sustainability Agency

Prepared for
GSI Water Solutions, Inc.

Prepared by
Richard C. Slade & Associates LLC
May 2021

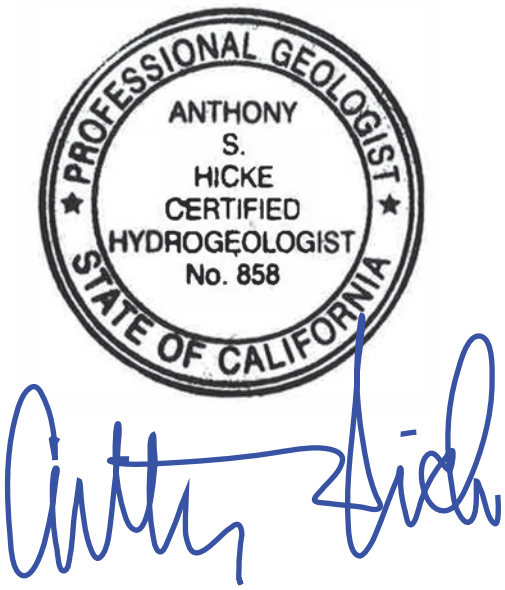
RICHARD C. SLADE & ASSOCIATES LLC
CONSULTING GROUNDWATER GEOLOGISTS

Contents

SECTION 1: 1.0 Hydrogeologic Conceptual Model 1
1.1 Basin Setting 1
1.1.1 Topography and Boundaries 1
1.1.2 Soil Infiltration Potential 2
1.1.2.1 Soil Types in the Basin 2
1.1.2.2 Soil Infiltration Rates 3
1.1.3 Regional Geology 4
1.1.3.1 Geologic Formations within the Basin 4
1.1.3.2 Geologic Formations Surrounding the Basin 8
1.1.3.3 Regional Geologic Structures 10
1.1.4 Principal Aquifer Systems 11
1.1.4.1 Alluvial Aquifer System 11
1.1.4.2 Saugus Formation Aquifer System 12
1.1.4.3 Aquifer Properties 14
1.1.5 Cross Sections 19
1.1.5.1 Cross Section Preparation 19
1.1.5.2 Cross Section Traces 20
1.1.5.3 Geologic Structures 20
1.1.5.4 Well Log Analysis & Interpretation 21
1.1.5.5 Cross Section FF-FF' 22
1.2 Groundwater Recharge and Discharge Areas within the Basin 23
1.2.1 Groundwater Recharge 23
1.2.1.1 Alluvial Aquifer System 23
1.2.1.2 Saugus Aquifer System 24
1.2.2 Groundwater Discharge 25
1.2.2.1 Alluvial Aquifer System 25
1.2.2.2 Saugus Aquifer System 26
SECTION 2: REFERENCES REVIEWED 27

Figures

1-1 Location Map
1-2 NRCS Soil Classifications
1-3 Soil Infiltration Rates, LA County
1-4 Geologic Map Showing Cross Sections
1-5 Generalized Saugus Formation Stratigraphy
1-6 Cross Section AA-AA'
1-7 Cross Section BB-BB'
1-8 Cross Section CC-CC'
1-9 Cross Section DD-DD'
1-10 Cross Section EE-EE'
1-11 Cross Section FF-FF'
1-12 Detailed Stratigraphic Interpretation



SECTION 1: 1.0 Hydrogeologic Conceptual Model

Provided in this Technical Memorandum (TM) is a description of the hydrogeologic conceptual model of the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin). The purpose of this TM is to describe the physical characteristics of the Basin as they relate to groundwater occurrence in the aquifers. This TM has been prepared as part of the ongoing efforts by the Santa Clarita Valley Water Agency (SCV Water) on behalf of the Santa Clarita Valley Groundwater Sustainability Agency to prepare a Groundwater Sustainability Plan (GSP) for the Basin. Data and interpretations compiled herein are based on the long term experience of Richard C. Slade & Associates LLC (RCS) performing hydrogeologic services for various water agencies and private parties in the Basin, coupled with information from a number of publicly available resources.

Note that as part of ongoing GSP development, an updated groundwater flow model will be utilized to further quantify ranges of key terms listed below.

1.1 Basin Setting

1.1.1 Topography and Boundaries

Figure 1-1, "Location Map", shows the boundary of the local groundwater basin superimposed on a topographic map of the area, and the locations of select wells that are known to exist or to have existed in the region. Topographically, the area surrounding the groundwater basin is defined by higher elevations on the north, south, and east, and lower elevations on the west. This topography defines the watershed of the Santa Clara River, which has its headwaters in Soledad Canyon, and this watershed has a drainage area of several hundred square miles. The Santa Clara River provides regional drainage in an east to west direction across the groundwater basin and it continues westerly across Ventura County and into the Pacific Ocean. In general, the local groundwater basin is oriented along the Santa Clara River.

Principal tributaries draining the northern side of the groundwater basin include, from east to west, Mint Canyon, Bouquet Canyon, San Francisquito Canyon, and Castaic Creek Canyon. Principal tributaries draining the southern side of the basin include, from east to west, Oak Spring Canyon, Sand Canyon, and Potrero Canyon. The South Fork of the Santa Clara River, which drains in a

northerly direction toward its confluence with the main reach of the Santa Clara River (located just west of Bouquet Junction), has Placerita Creek Canyon, Newhall Creek Canyon, and Pico Canyon as its main tributaries.

DWR-defined boundaries of the groundwater basin are based on ground surface exposures of the two main aquifers that comprise the local groundwater basin: the alluvial aquifer, and the Saugus Formation aquifer (Slade, 1988, 2001). Depending on the location of the boundary, the boundary of the Basin is either defined as the geologic contact of the Saugus Formation with other geologically older, nonwater-bearing formations, or the contact of the alluvium of the Santa Clara River and its tributaries with geologically older, nonwater-bearing formations. The same is true for the "bottom" of the Basin in the subsurface: in some instances, the alluvial aquifer is in contact with non-water bearing sediments where no Saugus Formation is present (as in the western portion of the groundwater basin), and in areas where the Saugus Formation is relatively thick, the Basin is defined as its contact with the underlying Pico Formation, or even other older, nonwater-bearing formations. Additional discussions of the nature of these geologic contacts are discussed below.

1.1.2 Soil Infiltration Potential

Soil infiltration is defined as the ability of a soil to allow water movement through the soil profile. The infiltration rate of a soil is the velocity or speed at which water enters and flows into the soil under gravimetric forces. Publicly available databases of soil types and estimated infiltration rates of these soils were reviewed, and are summarized below.

1.1.2.1 *Soil Types in the Basin*

Soils in the region have been mapped and described by the Natural Resources Conservation Service (NRCS, 1999), a division of the United States Department of Agriculture (USDA). Figure 1-2, "NRCS Soil Map," shows the locations of soil groups within the boundaries of the Basin and the surrounding region. Four groups of soil types are shown to exist within the boundaries of the Basin on Figure 1. Below is a description of these four soil groups as adapted from the NRCS (1999), shown in order of relative abundance within the Basin:

- Entisols are the most prevalent soil group within the Basin, and are exposed throughout the Basin. Entisols are comprised of mineral soils that have not yet developed distinct soil horizons. Because entisols have no diagnostic horizons, these soils appear unaltered

from their parent material, which can be unconsolidated sediment or rock. Entisols are the most abundant soil order on earth, occupying about 16% of the global ice-free land area.

- Inceptisols are the second most prevalent soil group and are exposed primarily in the western portion of the Basin. These soils are comprised of freely draining soils in which the formation of distinct horizons is not far advanced. By definition, Inceptisols are more developed than Entisols, but have no accumulation of clays or organic matter. Inceptisols develop more rapidly from parent material than do Entisols,
- Alfisols are similar in abundance to inceptisols, but occur primarily in the eastern portion of the Basin. Alfisols consist of a group of leached basic or slightly acidic soils, exhibiting clay-enriched subsoils with a relatively high native fertility. These subsoils are considered mineral soils and contain higher concentrations of aluminum (Al) and iron (Fe) than other soils. Alfisols typically are found to have formed on late-Pleistocene aged geologic deposits.
- Mollisols are the least abundant soil type within the Basin, generally found along the Santa Clara River. These soils are commonly very dark colored, base-rich, mineral soils and contain high concentrations of calcium and magnesium. These soils typically develop under grassland cover.

1.1.2.2 *Soil Infiltration Rates*

To help provide a general understanding of estimated infiltration capacity of the soils within the boundaries of the Basin, infiltration rates for these soils were compiled from the Los Angeles County Department of Public Works (LACDPW) Hydrology Manual (LACDPW, 2006). Infiltration rates throughout Los Angeles County were obtained by LACDWP by performing double ring infiltrometer tests of various soil types (LADPW, 2006). Results of these infiltration tests were reportedly used by LACDPW to produce runoff coefficient curves of the tested soil type, from which infiltration rates were interpreted. Compiled results from the LADPW infiltration tests are presented in Figure 1-3, “Infiltration Rates, LA County.” Reported infiltration rates ranged from 0.1 to 1.0 inch(es) per hour (in/hr). Lower infiltration rates of 0.1 in/hr were observed in individual areas located in the southern portion of the Basin. Spatially, an infiltration of 0.3 in/hr was more prevalent than others.

1.1.3 Regional Geology

The regional geologic conditions in and around the Basin consist predominantly of continental to marine deposits of clay, silt, sand and gravel divided amongst several formations ranging in geologic age from late-Tertiary (approximately 25 million years old) through the present. The oldest of these Formations lies unconformably (a separation of two or more units by a geologic time gap) upon basement complex rock, which consist of undifferentiated crystalline granitic rocks and metamorphic-type rocks of late Mesozoic age (greater than 66 million years old). Figure 1-4, "Geologic Map Showing Cross Sections," shows the locations and lateral extents of these various earth materials as mapped at ground surface by others. This map, which provides the basis for the following discussion of the geologic conditions of the region, has been adapted from geologic maps published by Slade (Slade, 1986, 1988). Those maps by Slade were created by updating interpretation on various geologic mapping efforts by others combined with subsurface interpretation of geologic materials derived over time during the drilling of deep boreholes. Among the geologic references used by Slade (1986, 1988) were those by Oakeshott (1958), Dibblee (1991), and others. For Figure 1-4, various crystalline rocks have been simplified and grouped into a single unit named "basement complex," and no distinction is provided between the various rock types of which those crystalline rocks are comprised. Also, alluvial deposits are shown as one unit, although Quaternary mapping efforts by others in the past have separated those into more discrete units based on slight differences in age or location. The legend to the map provides information on the names and basic earth materials of each formation shown on that map. The locations of several geologic faults are also shown on the Figure 1-4 map; these faults are discussed later in this text. It should be noted that the locations of the faults have been somewhat simplified for this study. In some cases, faults actually exist as en echelon faults within a fault zone, with a number of approximately parallel, similarly trending smaller faults. For this study, however faults are represented by a single line-trace on Figure 1-4. For the geologic cross sections (discussed in Section 1.1.5), where data support the interpretation, multiple fault line traces may be shown for a single-named fault. Also shown on Figure 1-4 are the alignments of several geologic cross sections which are discussed later in this text.

1.1.3.1 *Geologic Formations within the Basin*

There are three relatively young geologic formations that comprise the local Basin, namely: Alluvium, Terrace Deposits and the Saugus Formation. These formations, except for the Terrace

Deposits, are generally utilized by high-capacity water production wells for municipal-supply purposes by SCV Water and the County Waterworks District and, thus, provide a major portion of the water-supply to valley residents. Privately owned wells that utilize these formations (primarily the Alluvial aquifer) are owned by FivePoint (formerly Newhall Land and Farming Company), the Disney Company, multiple golf courses, and others for agricultural irrigation, turf irrigation or local domestic purposes. The spatial distribution of the extraction, and general rates of those extractions are described in later Technical Memoranda.

1.1.3.1.1 Alluvium

The Quaternary Alluvium (Qa) is of Holocene (Recent) geologic age, ranging from 10,000 years in age to the present. These recent alluvial deposits consist primarily of stream channel and floodplain materials along the course of the Santa Clara River and its tributaries. The alluvial sediments are composed of complexly interlayered and interfingered beds of unconsolidated gravel, sand, silt, and clay containing variable concentrations of cobbles and boulders. The source material for this alluvium is from weathering and erosion of the surrounding hills and mountains bordering the Santa Clarita Valley. In general, alluvium along the main reach of the Santa Clara River ranges from medium-grained sand in the west, to cobbly- or gravelly-sand in the east. The maximum thickness of the alluvium varies along the course of the Santa Clara River, but can attain a maximum thickness of ± 200 feet. Typically, the alluvium tends to be thickest near the central portion of the river channel and thins or pinches out as the base of the adjoining hills is approached.

The alluvium in the tributary canyons is generally thinner than that along the main river valley. Larger watershed areas such as Castaic Creek and Bouquet Canyon are typically underlain by more extensive and thicker accumulations of alluvium than what exists within the smaller tributaries, such as the Oak Spring or Pico canyons. In these latter canyons, the maximum alluvial thickness occurs near the confluence with the main river valley, where it may be from 75 to 125 feet in thickness.

1.1.3.1.2 Terrace Deposits

Terrace deposits (Qt) are isolated remnants of what was, during the late Pleistocene (129,000 years or less in age), a continuous blanket of alluvial material covering the entire floor of the Santa Clara River Valley (Winterer and Durham, 1962). Tectonic uplift of the valley floor led to

downcutting and incision of this somewhat geologically older alluvial material by the Santa Clara River, leaving the terrace deposits restricted to platforms or benches that are topographically higher than the Santa Clara River, and hence above the regional water table. Sediments comprising the terrace deposits include crudely stratified, poorly consolidated reddish-brown gravel, sand and silt (Winterer and Durham, 1962). Terrace deposits are sometimes weakly cemented by iron oxides, clay minerals, or calcium carbonate.

Terrace deposits may be up to 200 feet thick in some areas, but because of the limited areal extent of these deposits and because they are generally above the regional water table, they are not a viable source for the development of groundwater resources. However, limited zones of perched groundwater may be locally present in some areas on a seasonal basis within these terrace deposits.

1.1.3.1.3 Saugus Formation

The Saugus Formation (QTs), of late-Pliocene to early-Pleistocene geologic age (ranging from approximately 3.6 to 1.8 million years in age), has traditionally been divided into two stratigraphic units: a lower, geologically older Sunshine Ranch Member (QTsr) of mixed marine to terrestrial origin; and an overlying, upper portion of the formation (QTsu) which is entirely terrestrial (non-marine) in origin (Winterer & Durham, 1962). Figure 1-5. "Generalized Saugus Formation Stratigraphy", graphically illustrates these two stratigraphic units and the overall characteristics of each. Ground surface exposures of the Saugus Formation shown on Figure 1-4 are labeled as undifferentiated Saugus Formation (QTs) because data necessary to distinguish the upper portion (QTsu) from the Sunshine Ranch Member (QTsr) are not available for all areas of the basin. For the Cross Sections (discussed in Section 1.1.5), the upper portion of the Saugus Formation (QTsu) and the Sunshine Ranch Member (QTsr) are labeled discretely where data allow for interpretation of the contact between the members; otherwise, the same undifferentiated Saugus Formation (QTs) label is used.

The Upper stratigraphic unit of the Saugus Formation consists of terrestrial fluvial and floodplain deposits that are composed of slightly cemented, interfingered and interbedded conglomerate, sandstone and clay/mudstone layers. These deposits generally extend to a maximum depth of 5,300 feet in the local groundwater basin, based on an electric log (E-log) for a deep oil well[1]

[1] Badger Oil Co. Magic Mountain No. 1 - 04N/16W-17Ka

located in the approximate center of the basin; these depths vary in other parts of the basin. This deep wildcat (exploratory) oil well was drilled near the east end of a prominent topographic high (called Round Mountain), which is an isolated outcrop of the Saugus Formation, just southeast of Rye Canyon Rd and Avenue Stanford, within the course of the Santa Clara River.

Strata within the Saugus Formation tend to become coarser-grained and generally more permeable in an upward direction, which is from the older and less permeable beds within the Sunshine Ranch Member to the coarser and somewhat younger beds within the main part of the formation. The formation consists mainly of lenticular beds of light-gray and brown sandstone and conglomerate intercalated with lesser amounts of reddish-brown sandy mudstone. These terrestrial sediments were deposited in stream channels, floodplains and alluvial fans of an ancestral drainage system in the Santa Clarita Valley. The coarser-grained sand and gravel beds of the Saugus Formation were deposited in the main channels of the ancient drainage system, and these more permeable beds constitute the principal, potential water-bearing materials within the present-day Saugus Formation. As the locations of the ancestral drainage channels changed during the approximately 3 million-year period of deposition of the Saugus Formation strata, the distribution of the coarse-grained channel deposits also changed, both laterally and vertically (in space and time).

In contrast, the underlying and older Sunshine Ranch Member of the formation is comprised of interfingered, fine-grained, shallow marine, brackish-water to non-marine deposits of generally thinly interbedded gray to greenish-gray sandstone and siltstone. The base of this member occurs at a depth of approximately 7,700 feet below ground surface (bgs) and attains a maximum thickness of approximately 2,400 feet in the central part of the local groundwater basin.

Because of the marine origin and the fine-grained nature and relatively low-permeability of the Sunshine Ranch Member, it is not considered to be a target for groundwater exploration or production. Wells drilled near the periphery of the Saugus Formation surface exposures in the Santa Clarita River Valley (i.e., in those areas where the Sunshine Ranch Member is at or very near to ground surface) have typically produced groundwater at rates too low for municipal-supply purposes, but may provide sufficient water for small capacity domestic supply wells, depending on water quality. Evidence from oilfield E-logs suggests that the groundwater in much of the Sunshine Ranch Member may be brackish and hence not useful for municipal supply purposes.

1.1.3.2 *Geologic Formations Surrounding the Basin*

There are a number of geologically older formations that underlie the Alluvium and the Saugus Formation and that occur outside of the Basin; refer to Figure 1-4 for DWR-derived boundaries of this local groundwater basin. Each of these older formations are considered to be non-water bearing for large scale water-supply purposes (i.e., high-volume production wells), though groundwater in these formations could possibly be utilized for small-scale residential or landscape purposes (depending on water quality). Because they are not a significant source of groundwater for municipal water-supply purposes, these essentially non-water bearing formations will only be discussed briefly in this section. As noted above, none of these older geological formations lie within the local groundwater basin as defined by DWR Bulletin 118, update 2016 (DWR, 2016).

The formations that are present differ slightly on the north and south sides of the San Gabriel Fault as defined in Figures 2 and 3 of the report by Oakeshott (1958). Many of the named formations in those figures are not exposed at ground surface in the Basin and some of their names have been reassigned to other formations or have been renamed by others over time. Thus, the formations discussed below are in accordance with, and confined to, only those depicted on the surface geology shown on Figure 1-4 within the Basin.

1.1.3.2.1 South of the San Gabriel Fault

South of the San Gabriel Fault, the Saugus Formation lies conformably and gradationally upon the Pico Formation of late-Pliocene to Pleistocene geologic age (ranging approximately from 3 to 1.8 million years old). The Pico Formation is of marine origin and consists of gray clay, siltstone, fine-grained sandstone and light-colored sandstone and conglomerate. The Pico Formation is present at or near ground surface on the west end of the Basin where the Saugus Formation ceases to exist (or "pinches out"). Local residents sometimes refer to an area called "blue cut", which is a location where the Santa Clara River has incised into the Pico Formation; sediments in the Pico Formation often exhibit a blue-colored hue.

Conformably underlying the Pico Formation (Tp) is the Towsley Formation (Tt) of late-Miocene to early-Pliocene geologic age, approximately 6 to 3(?) million years in age. This unit is composed of terrestrial fluvial deposits consisting of well consolidated to cemented and interbedded shales, siltstones, sandstones and conglomerates. The Towsley Formation is, in turn, unconformably underlain by sedimentary rocks of the Modelo Formation (Tms) of middle- to late-Miocene age,

ranging from approximately 16 to 7 million years ago, and consisting chiefly of cemented sandstone and siliceous, diatomaceous shales.

The above-described bedrock units unconformably overlie pre-Tertiary basement complex rocks (bc) of the San Gabriel Mountains. These geologically old materials consist of the crystalline rocks of quartz diorite, hornblende diorite gabbro and gneiss; they were likely emplaced during the Cretaceous period; i.e. approximately 145 to 90 million years before the present.

1.1.3.2.2 North of the San Gabriel Fault

North of the San Gabriel Fault, the formations below the Saugus Formation are not the same as those on the south side of the fault. Movement along the fault during and following formation of the Basin-area sediments caused the Saugus Formation to be deposited on top of different, but geologically-older formations. On the north side of the fault, the Saugus Formation unconformably overlies Miocene-aged (ranging from 23 to 5.2 million years ago) terrestrial sediments of the Castaic (Tc), Tick Canyon (Tt), Mint Canyon (Tm), Vasquez (Tv) formations and the Violin Breccia (Tvb, located northwest of Castaic Lake); refer to Figure 1-4. These older formations that underlie the water-bearing alluvium and Saugus Formation (within the local groundwater basin) tend to be well-consolidated and cemented and have relatively low porosity and permeability. The Violin Breccia, in particular, of late Miocene age, is considered to be a facies of the Ridge Basin Group and is an assemblage of hard sand, gravel and breccia derived from basement rocks southwest of the San Gabriel Fault (Dibblee, 1997a). These rocks were deposited as debris flows, talus and alluvial fans accumulating along the San Gabriel Fault scarp (Link & Osborne, 1978, Link, 2003), during development of the San Gabriel Fault at that time.

These older rocks essentially form the local bedrock and are not considered water-bearing in terms of their ability to supply groundwater in useable quantities and of acceptable quality for municipal or agricultural supply purposes. Wells and test holes drilled into these bedrock materials have typically encountered low groundwater production rates and sometimes less than favorable water quality.

The assemblage of bedrock units, discussed above, also unconformably overlie all pre-Tertiary basement complex rocks of the San Gabriel Mountains. The rocks in this area of the mountains consist of crystalline, intrusive igneous rock granite and metamorphic rocks of the Pelona Schist,

both of late Mesozoic age (approximately 80 to 66 million years in geologic age) and augen gneiss, of Pre-Cambrian geologic age (approximately 1.65 billion years old).

1.1.3.3 *Regional Geologic Structures*

The Quaternary alluvium along the Santa Clara River and its tributaries generally overlies the older terrace deposits and the Saugus Formation in the area. As such, a significant unconformity (a separation of two or more units by a geologic time gap) occurs between those two older formations and the alluvium. The alluvium appears to be undeformed by any recent tectonic activity (occurring since the beginning of the Holocene period), such as folding or faulting. To some extent this is also the case for the terrace deposits, although they have been tectonically uplifted in some areas and are slightly folded. One such fold has been mapped in an area where the terrace deposits crop out in the hills east of San Fernando Road and the South Fork of the Santa Clara River

However, the alluvium generally exhibits sedimentary structures associated with deposition by the typical mode of meandering rivers and streams. Examples of such sedimentary structures are cross-bedding (where one set of sediments have been laid at an angle to previously deposited sediments) and cut and fill structures (where one stream bed has cut into underlying previously deposited sediments and then subsequently filled in by more recent material).

The general overall structure of the slightly geologically older Saugus Formation is one of an isolated “bowl” that has been cut (at least in part) by two major faults, namely the San Gabriel Fault and the Holser Fault, and also folded along a number of generally east-west trending folds. The sedimentary layering in the Saugus Formation and in the underlying bedrock dips (i.e., the beds are inclined) generally toward the center of the “bowl” from all locations along the outer (perimeter) contact of the Saugus Formation. However, there is some degree of localized folding of the layers along the San Gabriel Fault, resulting in small and large anticlinal and synclinal structures with axes trending from the northwest to the southeast (Dibblee, 1996a).

The San Gabriel Fault system and the Holser Fault generally cut across the Saugus Formation and all older formations in the region. The San Gabriel Fault system has a relative right-lateral movement (where land on one side or the other moves to the right, relative to the other side); whereas the Holser Fault is considered to have left lateral movement However, these two faults also show some vertical component of movement. The San Gabriel fault is theorized to have a

horizontal displacement on the order of 20 miles, and vertical displacement of 1,400 feet (Crowell, 1954) . Displacement on the Holser Fault has been estimated to be roughly four miles horizontally, and perhaps 3,000 to 5,000 feet vertically (Slade, 1988). Further, these two faults divide the Saugus Formation into three distinct fault-bounded blocks, sometimes referred to as the South, Central and Northern blocks.

1.1.4 Principal Aquifer Systems

1.1.4.1 *Alluvial Aquifer System*

The alluvial aquifer system overlies the Saugus Formation and serves as one major source of groundwater to groundwater users in the region. Data from the numerous shallow wells in the valley show that the maximum thickness of alluvium varies along the Santa Clara River and it appears to reach a maximum depth to 200 feet bgs in several wells in the approximate center of the valley. The alluvial sediments generally thin and pinch out traversing from the valley center and progressing outward towards the surrounding hills. The alluvial aquifer is replenished/recharged chiefly by rainfall and infiltration of surface water runoff in the Santa Clara River and its tributaries, as evidenced by static water level changes shown on hydrographs from the numerous wells in the valley that obtain groundwater solely from this aquifer. Those hydrographs (presented here in the Groundwater Conditions Technical Memorandum, by others) show that static water levels exhibit rapid responses and large fluctuations during rainfall events and intervening drought periods. The alluvial aquifer along the main-stem of the river is also replenished from discharge of treated wastewater from the Saugus and Valencia Water Reclamation Plants (WRPs).

1.1.4.1.1 *Exclusion of Portrero Canyon from GSP Management*

Potrero Canyon lies in an unincorporated portion of Los Angeles County west, of Interstate 5 and south of the Santa Clara, and just west of the Los Angeles/Ventura county line (see Figure 1-1). The canyon is nearly four miles long, extends westward from its headwaters near Stevenson Ranch to its outlet just south of the Santa Clara River, about one mile upstream of the County line and the western terminus of the groundwater basin. Because the floor of the canyon is shallowly underlain by Alluvium, it is included as part of the DWR-defined groundwater basin shown on Figure 1-1. However, for the reasons described below, Potrero Canyon will not be included as an area that is subject to management under this GSP.

Available geologic and water quality data indicate that groundwater in the alluvium of Potrero Canyon and the underlying Pico Formation bedrock is saline. Furthermore, those earth materials do not readily transmit groundwater to wells. As shown on Figure 1-4, the principal geologic units in the canyon are shallow Alluvium (Qa) and the underlying Pico Formation (Tp). As noted in Section 1.1.3.2, the Pico Formation is considered to be non-water bearing for large-scale water supply purposes. Within Portrero Canyon, the alluvium is also fine grained and contains saline groundwater (Slade, 2002). No water supply wells are currently present in the Potrero Canyon area. Available water quality data in Potrero Canyon indicate that alluvial groundwater and surface water are saline, likely because the alluvium is derived from the weathering, transport, and redeposition in the Potrero Canyon watershed of Pico Formation strata, which are of marine origin (Slade, 2002).

Potrero Canyon is largely undeveloped and is owned by FivePoint. A cattle ranching operation was formerly present in the canyon, but is not currently in operation. No agricultural or other irrigation-dependent activities are present or are known to have existed in the past, except for domestic outdoor use at the existing ranch (now owned by FivePoint). The limited water use in the canyon has been mainly for domestic purposes and has been supplied by a pipeline that imports water from a water well located outside of Potrero Canyon.

Three sensitive plant communities have been identified by others in Potrero Canyon: the riparian strip along the main stream channel in the canyon, the Salt Grass community, and the Mesic Meadow. Shallow saline groundwater is supporting each of the sensitive plant communities in the canyon. Because the local groundwater has high concentrations of total dissolved solids, the predominant plant species living in the Salt Grass and Mesic Meadow areas (e.g., those that are characteristic of a cismontane alkali marsh) are salt tolerant. Evapotranspiration processes occurring in and around these plant communities also tend to concentrate salts in the upper soil profile, and as a result salt is visible at the ground surface in some locations.

1.1.4.2 *Saugus Formation Aquifer System*

Depending on location within the local basin groundwater basin, the Saugus Formation may exist under confined, semi-confined or even unconfined conditions. This formation serves as the other major source of groundwater in the region. In the center of the valley, the sedimentary layering of the formation is nearly horizontal and some confining layers of low permeability (fine-grained

silts and clays) may limit groundwater movement in an upward or downward direction. Consequently, groundwater occurs under pressure within the intervening sand and gravel units, and water levels in Saugus Formation water wells tend to be above the top of the perforated casing intervals that intersect these coarse-grained aquifer units, thereby providing evidence that groundwater is under confined or semi-confined conditions.

In contrast, near the outer perimeter of the Saugus Formation, near the boundaries of the groundwater basin, the sedimentary layering is tilted downward toward the center of the "bowl" and the permeable sand and gravel beds of the formation are in direct contact with either the ground surface or with highly permeable alluvial or terrace deposit materials. In these areas, the Saugus Formation aquifer may be essentially under unconfined, water table conditions.

Virtually all known existing and historic Saugus Formation water wells have been drilled south of the San Gabriel Fault. Only one known attempt has been made to drill and construct a Saugus Formation water well into the lower and geologically older Sunshine Ranch Member of the Saugus Formation, which predominates in the area north of the San Gabriel Fault. That well did not produce groundwater in sufficient quantities or acceptable quality for municipal-supply purposes, and it was subsequently destroyed.

As discussed above, the San Gabriel and Holser faults divide the Saugus Formation into three distinct blocks: the South, Central and North blocks. These fault blocks control the geographic distribution of potential sand and gravel aquifers within the Saugus formation; wherein the Central block contains the thickest accumulation of potentially water-bearing sediments, the South block has the second greatest accumulation of such sediments, and the North block has the thinnest accumulation of sediments. Details regarding the sediment thickness of the Saugus Formation within each block are described below under "Depth to Base of Fresh Water."

Slade (2002) identified an important stratigraphic zone of coarse-grained sediments near the base of the Upper Saugus Formation through the correlation of E-Logs of several existing oil wells and water wells. This correlated stratigraphic zone was informally termed the Santa Clarita Aquifer Zone by Slade (2002). This zone in the subsurface can be identified on E-Logs of wells over a wide area of the Basin and generally occurs at depths ranging from 800 to 1,500 feet bgs. Existing Saugus Formation water wells with the highest pumping rates generally tend to produce groundwater from within and stratigraphically above this Santa Clarita Aquifer Zone.

1.1.4.3 *Aquifer Properties*

1.1.4.3.1 Alluvial Aquifer

The alluvial aquifer generally consists of unconsolidated and intercalated (i.e., interfingering lenticular beds) deposits of clay, silt, sand and gravel. Groundwater within the alluvial aquifer in the study area occurs under unconfined (i.e., water table conditions) and groundwater within this aquifer is generally contained within the interstitial pore spaces (known as porosity). Moreover, the degree of interconnectedness of these pore spaces is a measure of its permeability, which is the ability of the material to transmit water. Permeability values are generally used in groundwater flow and transport modeling studies.

Groundwater in the alluvial aquifer system, because it is under the direct influence of atmospheric conditions of pressure (water table conditions), moves (flows) from higher to lower elevations via the force of gravity. Thus, the slope of the water table surface is known as the hydraulic gradient and is governed by both elevation and the amount of groundwater moving through the alluvium. In addition, because of the unconsolidated nature of the aquifer materials, the permeability (hydraulic conductivity) of the alluvial aquifer is relatively higher than that of the underlying Saugus Formation. As such, wells perforated in the alluvial aquifer system tend to be relatively efficient, compared to that in the less permeable aquifer systems in the underlying Saugus Aquifer system.

1.1.4.3.1.1 Porosity & Specific Yield

The porosity of the alluvial aquifer system may range from 10% to 30%, or slightly greater, depending on the grain size distribution in the type of earth materials present; an average value of 20% is often assumed for the purposes of evaluating aquifer characteristics. The porosity of the alluvial sediments is governed by the type of earth materials present in the aquifer system. Generally, clays tend to have the highest porosities whereas sands and gravels tend to have lower porosity values. However, porosity values for the alluvial sediments of the Santa Clarita Valley were estimated based on a review of over 300 driller's logs for historic alluvial water-supply wells throughout the basin. These porosities were estimated by Slade (1986) to range from 9% to 16%.

Specific yield is a measure of the amount of groundwater that can flow to a well under gravity drainage only. For unconsolidated alluvial sediments, the porosity is approximately equal to the

specific yield. Thus, the specific yield for the alluvium is estimated to be in that aforementioned range of 9% to 16%.

1.1.4.3.1.2 Hydraulic Conductivity, Transmissivity, & Storativity Values

As noted above, hydraulic conductivity is a measure of the ability of geologic media to transport water through the pore spaces in the sediments of an aquifer system. Generally, clays have the lowest hydraulic conductivities whereas gravels tend to display the highest values. This character is usually determined through aquifer testing of wells, although values can be estimated using empirical relationships. Based on the results of aquifer testing, calculation of the aquifer coefficients of transmissivity (T) and storativity (S) can be made. The parameter T is a measure of the transmitting property of an aquifer and can expressed in units of square feet per day (ft^2/day). The parameter S is a measure of the volume of water that can be released from an aquifer per unit area of the aquifer and per unit reduction in hydraulic head (water level change). This value is usually expressed in cubic feet per square foot per foot, ft^3/ft^3 and thus is a dimensionless quantity. In alluvial aquifer systems, S can be considered to be equal to the specific yield. Hydraulic conductivity, which is a measure of the velocity at which groundwater moves through a formation, is expressed as k, in units of feet per day, ft/day). This parameter can be calculated directly from T values, by dividing T by the saturated thickness of the aquifer section perforated in a well. As such, calculated k values reflect the intrinsic property of the aquifer and do not change, whereas T values could change, based on the differences in the saturated thickness of the aquifer system.

For the alluvial aquifer system, Slade (1986, Plate 7 and updated with results of constant rate pumping test data from numerous alluvial wells constructed between 1986 and 2009) provided values for T and k values. These values tend to vary spatially in the alluvial aquifer system. The following table summarizes the ranges of those T and k values for the alluvial aquifer system along the Santa Clara River and its tributary watersheds, from the west (near the Ventura County Line) to the east (near Lang):

RIVER SECTION	k VALUES (ft/day)	T VALUES (ft^2/day)
Dell Valle to Castaic Junction	40 to 735	2,850 to 67,300
Castaic Valley Tributary	25 to 710	1,778 to 60,600
San Francisquito Canyon Tributary	11 to 285	1,000 to 22,000
Castaic Junction to Bouquet Junction	3 to 460	3,000 to 29,400
Bouquet Canyon Tributary	10 to 440	700 to 55,200
Bouquet Junction to Newhall (South Fork of Santa Clara River)	2 to 47	1,400 to 19,300
Saugus to Solemint	<7 to 935	<670 to 84,600
Solemint to Lang	<7 to 930	<670 to 67,600

The above table shows that both T and k values in the alluvium tend to show a great degree of variability. Such variability is likely due to local lithologic differences in the alluvial sediments between different well locations, methods of well construction, depth interval of the perforated section(s) of the well, degree of plugging of the casing perforations, and/or differences between the efficiency of the well, or a combination of some or all of these factors.

1.1.4.3.1.3 Historic Groundwater in Storage Calculations

The amount (i.e., the total volume) of groundwater contained within pore spaces within the alluvial sediments that is present at any one particular time is known as the groundwater in storage. The amount of groundwater in storage in the alluvial aquifer system depends on the following:

- the total volume of the alluvial sediments in the defined alluvial aquifer system of the local groundwater basin;
- the specific yield of those sediments;
- the proportion of those sediments that is saturated with groundwater at a specific water level monitoring date.

Because the volume of sediments and specific yield of an aquifer do not generally change over time, the amount of groundwater in storage in the alluvial aquifer is directly related to its saturated

thickness (i.e., to a specific water level monitoring date for wells in the alluvium). This is indicated by measured groundwater levels at a specific date in water wells within the alluvial sediments. A rising water table increases the thickness of the saturated water-bearing section, thereby increasing the volume of groundwater in storage; the converse is true for a declining water table.

Groundwater levels in the alluvial aquifer are highly influenced by local rainfall and recharge (a highly variable factor in southern California). The amount of groundwater in storage in the alluvial aquifer has varied considerably over the past 50 to 60 years as the local climate has experienced periods of both higher than average rainfall (wet years) and lower than average rainfall (dry years). Slade (1986 & 2002) estimated the volume of groundwater in storage (in units of acre feet, AF) for years 1945, 1965, 1985, and 2000; those volumes ranged from 100,000 AF to 200,000 AF. As part of the GSP development, current groundwater storage estimates will be calculated using a groundwater flow model, and reported in forthcoming Technical Memoranda.

1.1.4.3.2 Saugus Aquifer System

Groundwater moves slowly through the Saugus Formation because it is slightly more consolidated, in comparison to that in the overlying alluvial sediments, and groundwater must travel through more restricted pore spaces within the individual sand and gravel aquifer units in the Saugus Formation. The groundwater velocity at any location within this formation depends on the hydraulic conductivity (permeability) of the aquifer materials, which differs from one individual sand and gravel unit to the next, and on the hydraulic gradient that drives the groundwater movement. The hydraulic gradient is defined as the slope of the water level surface (or more correctly, the slope of the piezometric surface where the formation is under confined conditions), and this slope will vary on both seasonal and longer-term cycles over time.

1.1.4.3.2.1 Hydraulic Conductivity, Transmissivity, & Storativity Values

T and k values of the Saugus Formation sediments also show some degree of variation across the local groundwater basin. T values determined from aquifer (pumping) tests in several Saugus Formation wells located in different parts of the local groundwater basin have generally ranged from 400 ft^2/day to as high as 24,300 ft^2/day (Slade, 1988, 1989, 2001). Calculated k values for wells exhibiting these T values ranged from 1 ft/day to 34 ft/day. Only a few additional Saugus Formation wells have been constructed since 1988. Testing of these more recently-constructed deep wells have yielded T values of 3,300 ft^2/day and 8,300 ft^2/day (VWD-207 and VWD-206,

respectively). Values of k for these two wells were 1 ft/day to 34 ft/day, respectively. The distribution of the T and k values in the wells indicates a general trend from lower transmissivity values near the southeastern edge of where the Saugus Formation is exposed at ground surface to higher transmissivity values near the center of the local groundwater basin.

Storativity, which is a term typically used for confined aquifer systems, is a dimensionless measure of the volume of water that will be discharged from an aquifer per unit area of the aquifer and per unit reduction in hydraulic head. These values for wells in the Saugus Formation are on the order of 1.0×10^{-4}.

1.1.4.3.2.2 Depth to the Base of Freshwater and Santa Clarita Zone

Groundwater in the Saugus Formation is classified into two basic divisions, depending upon water quality conditions. These conditions exist where the groundwater grades from freshwater, considered to be 3,000 parts per million (ppm) or less in salinity, to brackish and saline groundwater which may display salinity values above 3,000 ppm. Estimation of the maximum depth to which fresh groundwater occurs within the Saugus Formation, defined as the base of fresh water, had been performed with some degree of accuracy through an evaluation of both water well and oil well E-Logs. More than 250 of these E-Logs, located throughout the river valley, were utilized in previous studies (Slade 1988, 2002), as a part of the effort to define the base of fresh water within the local groundwater basin. On some E-Logs, the vertical transition from the overlying fresh water to the underlying saline water is very abrupt and unambiguous, and thus can be identified at a specific depth. On other E-logs, the transition from fresh water to saline water is gradual and may occur over a vertical distance of hundreds of feet. In such cases, and in order to be conservative, the base of fresh water was chosen, insofar as possible, at the top of the zone of transition from fresh water to saline water (Slade, 1988, 2002).

The depth and thickness of the water bearing deposits in each of the fault blocks in the valley are as follows:

- North Block. Northeast of the San Gabriel fault, the maximum depth to the base of fresh water within the Saugus Formation is approximately 1,500 ft. By comparison, the maximum total thickness of the Saugus Formation, based on E-Logs, is on the order of 2,000 ft in this area. In this fault block, the Santa Clarita Aquifer Zone does not exist and, instead, only deposits of the underlying Sunshine Ranch Member are considered to occur.

- Central Block. In the wedge-shaped central fault block between the San Gabriel fault and the Holser fault, the maximum depth to the base of fresh water within the Saugus Formation is approximately 5,500 ft. In this area, the maximum total thickness of the Saugus Formation is approximately 8,500 ft. The top of the Santa Clarita Aquifer Zone in this fault block was determined to occur at a depth ranging from 100 ft in the north-northwestern portion of the block, to 1,500 ft in the southeastern corner of the block adjacent to the San Gabriel fault, and to as great as 2,900 ft bgs in the central (deepest) portion of this block.
- South Block. Southwest of the Holser fault, the maximum depth to the base of fresh water within the Saugus Formation is approximately 5,000 ft. The Saugus Formation obtains a maximum total thickness on the order of 7,500 ft in this block. The depth to the top of the Santa Clarita Zone is estimated to be roughly 2, 200 ft bgs.

1.1.4.3.2.3 Confining Beds

The Saugus Formation generally contains disconnected and interbedded layers of clay, silt, sand and gravel. The interbedded clay layers may act as local aquitards (confining beds), thereby providing at least a partial barrier to the vertical migration of groundwater. Interbedded clay layers range in thickness from 10 ft to as much as 50 ft. However, the depths and thicknesses of these clay layers have not been defined to date in any studies of the groundwater basin, but, depending on the locations of a well in the basin, there is likely to be several such clay layers dispersed throughout a vertical section of the formation.

1.1.5 Cross Sections

As part of the geologic and hydrostratigraphic characterization of the basin, five geologic cross-sections have been prepared by RCS to further describe and illustrate the vertical and lateral extent of the aforementioned geologic formations and units. Figure 1-4, "Geologic Map showing Cross Sections," illustrates the ground surface traces and alignments of these cross sections plotted on a geologic map of the Basin. These five, RCS-prepared Cross sections (AA-AA' through EE-EE') are presented in Figures 1-6 through 1-10, respectively and illustrate the subsurface interpretation based on a comparative review of available geologic data and electric log data.

1.1.5.1 *Cross Section Preparation*

Preparation of the five RCS cross sections utilized a step-wise multifaceted approach combining previous studies with additional more recent geologic data. Cross section data were obtained from previous basin wide studies completed by RCS (1986, 1988, 2001, & 2002), as well as from

review of published geologic maps and geophysical well logs (E-logs) from the Geologic Energy Management Division (CalGEM) well database. Some data were reinterpreted, and prior interpretations were updated based on the availability of newer subsurface data that were available in some areas of the local groundwater basin.

1.1.5.2 *Cross Section Traces*

Cross section traces were selected to illustrate the stratigraphy and general geologic structure of the groundwater basin. Section line traces AA-AA', DD-DD', EE-EE' (see Figure 1-4) extend past opposite basin boundaries in a semi-orthogonal orientation to provide representative subsurface illustrations of the long and short axes of the Basin. Obliquely oriented cross sections BB-BB' and CC-CC' illustrate subsurface conditions along the Santa Clara River and the southeastern zone of the basin, respectively. Each of these sections is presented at the same vertical scale, but due to the small horizontal scales of the sections, the sections are vertically exaggerated, as shown on the Figures. Cross Section FF-FF', Figure 1-11 (the section trace is shown on Figure 1-4 for reference), was created by Geosyntec Consultants, Inc (Geosyntec) using different methodology than that used by RCS and for a separate purpose (to be covered in a separate Technical Memorandum to be prepared by others), and does not possess the same horizontal or vertical scale as the five other cross sections discussed herein. Specific discussion of Section FF-FF' is provided in Section 1.1.5.5.

1.1.5.3 *Geologic Structures*

Construction of the five cross-sections required derivation and correlation of geologic formations in the subsurface using various data and methods. First, shallow formation contacts were interpreted and derived from mapped surface contacts and structural geology features. Surface mapped contacts and bedding orientations were plotted and projected from surface to depth, allowing for an initial starting point to correlate geologic formations.

Additional review of regional geologic structures was conducted with respect to previous studies. Fault traces and contact planes were compared to available geographic information system (GIS) data sets. Similarly, local fold structures, escarpments, and topography GIS data sets were reviewed to provide a summary representation of local fault structures and geologic contacts. As discussed in Section 1.1.3, a majority of the fault traces depicted in the figures created for this

document have been simplified to be represented by single-line traces, and not by a series of en echelon faults within various fault zones.

1.1.5.4 *Well Log Analysis & Interpretation*

After plotting surficial contacts and regional structural features, formation depth intervals were derived from analysis of available groundwater and oil/ gas well E-logs. Formation identification and interpretation based on E-logs is a common method and is a practice that is routinely used in the energy and resource sectors. The process involves comparing different geophysical logs such as gamma-ray, spontaneous potential, resistivity, and density-neutron in combination with other geologic data gathered during drilling (core, cuttings, drilling progression, etc.) to help identify formations and changes in subsurface materials. For further detail on well logging see, for example, Asquith and Krygowski (2004).

Due to the nature and availability of E-logs from the CalGEM database, short and long normal resistivity logs were primarily used to identify and correlate the respective formations within the Basin. To demonstrate how the well log and E-log information was correlated, Figure 1-12, "Detailed Stratigraphic Interpretation," plots three sequential (west to east) resistivity logs that were used to correlate formation contacts in cross-section AA-AA'. Higher resistivity values (ohm meters per meter) plotted in Figure 1-12 infer higher porosity within the local subsurface material, which can be inferred to be "coarser grained" strata. Thus, the vertical resistivity profile can show a stratigraphic package(s) of geologic units (and may even suggest depositional environments) when coupled with drill hole cuttings and core logs. These geologic or stratigraphic packages or units were correlated with similar geologic units in selected E-logs to infer the subsurface extent and continuity of each respective formation as shown on the cross sections.

Additionally, lithologic interpretation of the resistivity logs shown in Figure 1-12 was also conducted to show sedimentary variance within the Saugus Formation. Interpretation of lithology based on resistivity is provided in a color sequence in Figure 1-12. Lithologic comparison between resistivity logs of wells VWD-160 and VWD-203 show correlative units of coarser grained sediments but with varying intensity of resistivity. The lithology logs show finer grained (lower resistivity) units are interbedded with coarser-grained units within both well logs as documented in previous studies (Winterer & Durham, 1962). Moreover, resistivity signatures in the well log for the wildcat oil well Magic Mountain 1 indicate coarser grained sediments at the same elevation

where finer grained sediments are correlated in well VWD-160, further indicating lateral formation variation within the Saugus Formation.

1.1.5.5 *Cross Section FF-FF'*

As discussed above, Cross Section FF-FF' (Figure 1-11) was created by Geosyntec using different methodology than that used by RCS to create the other five cross sections shown on Figure 1-4 and therefore does not possess the same horizontal or vertical scale as the other five cross sections presented on Figures 1-6 through 1-10. Further, Section FF-FF' was created by Geosyntec to help evaluate the interaction of groundwater between the shallow alluvium of the Santa Clara River, the Saugus Formation, and the Pico Formation.

Cross Section FF-FF' is aligned along the approximate center of the Santa Clara River channel, traversing approximately east to west, beginning in the vicinity of an outcrop of the Saugus Formation known as "Round Mountain". From there, this cross section continues westerly to a point outside of the western boundary of the groundwater basin (See Figure 1-4) that coincides with the edge of the existing MODFLOW model boundary; the MODFLOW model is discussed in other technical memoranda prepared by others.

To create Cross Section FF-FF', Geosyntec incorporated the five RCS-prepared cross sections (AA-AA' through EE-EE') into the Leapfrog Geological Modeling software package. Geologic contacts on those sections were digitized and interpolated across the model domain by Geosyntec. Sections AA-AA', DD-DD', and EE-EE' (Figures 1-6, 1-9, and 1-10, respectively) reportedly provided the most influence on lithologic interpretations by Geosyntec along the central and eastern portions of Section FF-FF'. Depth of alluvium on those three Cross Sections serve as the primary drivers for depth of alluvium in the central and eastern potions of Section FF-FF'. Section A-A' from the Slade (1988) report was also used to support the interpreted depth of alluvium in the eastern portion of FF-FF' by Geosyntec.

Because the ground-surface profile of Cross Section FF-FF' is relatively shallow compared to the that on each of the other five Cross Sections, Geosyntec used a high-resolution Lidar survey to supplement the existing 1/3-arcsecond digital elevation model (DEM) from USGS that was used to create the ground surface profiles for Sections AA-AA' through EE-EE'. The high-resolution Lidar survey was conducted by others along the Santa Clara River in the vicinity of FF-FF', and provided for a more accurate ground surface profile of Section FF-FF'. Lidar Survey data were

down-sampled to 0.5-meter resolution in order to maintain a manageable file size and were converted from their native coordinate system (NAD83 2011 UTM Zone 11 North) into the Leapfrog model projection (NAD83 CA State Plane V).

Alluvium depths shown on Section FF-FF' that were interpreted using the RCS Cross Sections and the Leapfrog Modeling software were calibrated using a series of surface geophysical transects that were performed by Geosyntec in February and March 2007. Data from four seismic refraction lines were collected in the vicinity of "blue cut" perpendicular to Henry Mayo Drive (near the west end of the groundwater basin). Data collected were used to digitize the survey profiles into the Leapfrog model and were calibrated using the existing 0.5-meter resolution DEM (created using the Lidar data). The depth of alluvium interpreted from each of the four seismic refraction surveys was used to establish control points along each profile and interpolated between adjacent transects. Those data were then used to adjust the alluvial depths shown on Section FF-FF'.

1.2 Groundwater Recharge and Discharge Areas within the Basin

1.2.1 Groundwater Recharge

1.2.1.1 *Alluvial Aquifer System*

Groundwater in the alluvial aquifer is recharged by both natural and artificial (man-made) sources. The relative volume of each of the recharge sources discussed below is variable depending on a number of factors, including annual variations in precipitation and temperature.

Sources of natural recharge to the sediments of this aquifer include:

- Streamflow infiltration from runoff along the Santa Clara River and its tributaries.
- Deep percolation of direct rainfall.
- Subsurface groundwater inflow from upstream areas along the Santa Clara River or its tributaries.
- Upward groundwater flow from certain portions of the Saugus Formation where it is overlain by alluvium. This interaction between the alluvium and the underlying Saugus Formation is discussed in the 2003 Groundwater Management Plan for the Basin (LSCE 2003). In general, groundwater moves from the Saugus Formation aquifers to the alluvial aquifer in areas west of Bouquet Canyon (LSCE, 2003).

Sources of anthropogenic (man-made) recharge to the sediments of this aquifer include:

- Recharge to the alluvium also occurs from deep percolation of irrigation water and is obtained from urban irrigation (landscape irrigation) in the developed areas of the groundwater basin and from areas that are farmed. Agricultural irrigation was historically widespread in the valley; current irrigated acreage is on the order of 1250 acres.
- Recharge also occurs indirectly as a result of the infiltration of reclaimed water that is actively treated by and discharged from two water reclamation plants (WRPs) in the area, namely: the Saugus WRP, placed into operation in 1962, and located east of the intersection of Cinema Drive and Bouquet Canyon Road; and the Valencia WRP, in operation since 1967, and located west of the intersection of Rye Canyon Road and the Old Road. Both plants are operated by the Los Angeles County Sanitation Districts, and together discharge approximately 18 million gallons of treated water per day to the Santa Clara River, with an average annual discharge of approximately 20,000 AF/Y. The treated water from the Saugus WRP is either discharged to the Santa Clara River north west of the intersection of Bouquet Canyon Road and Valencia Boulevard, or conveyed to the Valencia WRP for additional treatment and then released to the Santa Clara River west of Interstate 5.
- Artificial recharge of the alluvial aquifer system, via spreading basins or injection wells, has not been conducted within the Santa Clarita Valley; however, SCV Water is presently conducting studies to evaluate the feasibility of managed aquifer recharge.

1.2.1.2 *Saugus Aquifer System*

Direct natural recharge to the Saugus Formation occurs via deep percolation of rainfall within and around the perimeter of the outcrop area where the permeable sand and gravel beds are either exposed at ground surface or lie directly beneath the relatively thin, permeable alluvial and terrace deposits. Natural recharge to the Saugus Formation also takes place in the eastern end of the outcrop area due to leakage from overlying portions of the saturated alluvium, as originally discussed by Slade (1988). Groundwater recharge from the alluvium to the Saugus Formation generally occurs in areas east of Bouquet Junction where the alluvium overlies the Saugus (LSCE, 2003).

Anthropogenic sources of recharge to the Saugus Formation chiefly include deep percolation of landscape irrigation water in existing areas, and areas subject to future development, where the

Saugus Formation crops out at the surface. Agricultural returns are not likely to contribute significant amounts of recharge, as agricultural operations have generally been situated over alluvial areas.

To date, artificial recharge of the Saugus Formation via injection wells or highland spreading basins has not been undertaken in the region (RCS, 2001). However, an injection and recovery study carried out in 2000 at Saugus Formation well VWD-205 located in the vicinity of McBean Parkway and Valencia Blvd (Slade 2001) demonstrated that it is feasible to conduct and operate an aquifer storage and recovery (ASR) program in the Saugus Formation.

1.2.2 Groundwater Discharge

1.2.2.1 *Alluvial Aquifer System*

Discharges from the alluvial aquifer system occurs primarily through pumping extraction for municipal-supply use by the water purveyors and for agricultural-supply use by others. As previously noted, FivePoint farms utilizes irrigation-supply water wells in the western end of the basin. In the eastern end of the Basin, other agricultural operations and golf courses extract water. There are also an unknown number of other privately-owned wells that utilize groundwater from the alluvial aquifer system for private irrigation and/or domestic use.

Evapotranspiration by phreatophyte vegetation is also a significant component of discharge of groundwater from the alluvium. Phreatophytes are plants such as willows and cottonwoods, as well as invasive species such as Arundo and Tamarisk, that root directly into the water table in areas of shallow groundwater.

The westernmost part of the basin is also an area of groundwater discharge from the alluvium to the Santa Clara River. The amount of flow into the river will depend largely on water levels within the alluvium. Groundwater also flows out of the basin into Ventura County, but this occurs solely as underflow from groundwater present within relatively thin alluvium at the Los Angeles-Ventura County Line. The only other water to flow from the valley into Ventura County is via surface water flow along the Santa Clara River, including releases from Castaic Reservoir into Castaic Creek that flows into the Santa Clara River and WRP discharges to the River, and from direct discharge via an agricultural supply line operated by FivePoint, which is supplied via their alluvial wells located at the western end of the valley.

1.2.2.2 *Saugus Aquifer System*

Discharge from the Saugus Aquifer System has historically occurred primarily through pumping of the several municipal-supply water wells in the Saugus Formation that are situated throughout the central portion of the valley. At the time of this study, there are only a limited number of wells that extract groundwater from the Saugus Formation for agricultural-supply or landscape irrigation purposes. Saugus Formation wells currently in operation for irrigation purposes are located at Vista Valencia Golf Course and Valencia Country Club. Agricultural irrigation using groundwater pumped from the Saugus Formation also occurs at the Disney Company property in the southeastern portion of the groundwater basin, east of the Whitney Canyon fault. An additional natural discharge source occurs at the west end of the valley where Saugus Formation groundwater is considered to flow upward into the overlying alluvium in the western portion of the Saugus Formation (LSCE, 2003).

SECTION 2: REFERENCES REVIEWED

Asquith, George & Krygowski, Daniel, 2004 Basic Well Log Analysis - Second Edition AAPG Methods in Exploration Series 16

Crowell, J.C., 1954, Strike-Slip Displacement of the San Gabriel Fault, Southern California. In, Geology of Southern California, California Division of Mines and Geology Bulletin 1970. Jahns, R.H, Ed. Chapter IV, Structural Features, Paper 6. Pp.49-59.

California Department of Water Resources Bulletin 118, Update 2016

Dibblee, T.W., Jr., 1991, *Geologic Map of the San Fernando and North ½ Van Nuys Quadrangles*, Los Angeles County, California. Dibblee Geology Center Map #DF-33. Scale: 1:24,000

_____,1992, *Geologic Map of the Oat Mountain and Canoga Park (North ½) Quadrangles*, Los Angeles County, California. Dibblee Geology Center Map #DF-36. Scale: 1:24,000

_____,1993, *Geologic Map of the Val Verde Quadrangle, Los Angeles County, California*. Dibblee Geology Center Map #DF-50. Scale: 1:24,000

_____,1996a, *Geologic Map of the Newhall Quadrangle, Los Angeles County, California*. Dibblee Geology Center Map #DF-56. Scale: 1:24,000

_____,1996b, *Geologic Map of the Mint Canyon Quadrangle, Los Angeles County, California*. Dibblee Geology Center Map #DF-57. Scale: 1:24,000

_____,1996c, *Geologic Map of the Aqua Dulce Quadrangle, Los Angeles County, California*. Dibblee Geology Center Map #DF-58. Scale: 1:24,000

_____,1997a, *Geologic Map of the Whitaker Peak Quadrangle, Los Angeles County, California*. Dibblee Geology Center Map #DF-62. Scale: 1:24,000

_____,1997b, *Geologic Map of the Warm springs Mtn Quadrangle, Los Angeles County*, California. Dibblee Geology Center Map #DF-64. Scale: 1:24,000

_____,1997c, *Geologic Map of the Green Valley Quadrangle, Los Angeles County, California*. Dibblee Geology Center Map #DF-65. Scale: 1:24,000

GSI Water Solutions, Inc., March 2016, *Hydrogeologic Analysis for a Groundwater Basin Boundary Adjustment in the Santa Clara River Valley East Subbasin (DWR Bulletin 118 Basin 4-4.07, Santa Clarita Valley, California).* Prepared for Castaic Lake Water Agency, 8 pp, 3 plates

Link, M.H. & Osborne, R.H, 1978, *Lacustrine Facies in the Pliocene Ridge Basin Group: Ridge Basin, California*. Wiley Online Library. https://doi.org/10.1002/9781444303698.ch9.

Link, M.H., 2003, *Depositional systems and sedimentary facies of the Miocene-Pliocene Ridge Basin Group, Ridge Basin, Southern California*, in Crowell, J. C., ed., Evolution of Ridge Basin, southern California: An interplay of sedimentation and tectonics: Boulder, Colorado, Geological Society of America Special Paper 367, p. 17-87. 0 2003 Geological Society of America

Los Angeles County Department of Public Works (LACDPW), January 2006. *Hydrology Manual - Water Resources Division*, January 2006, 432 p.

Luhdorff & Scalmanini Consulting Engineers (LSCE), December 2003. *Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Subbasin, Los Angeles County, California.* Prepared for Castaic Lake Water Agency.

Natural Resources Conservation Service (NRCS), United States Department of Agriculture (USDA), 1999. *Soil Taxonomy, A Basic System of Soil Classification for Making and Interpreting Soil Surveys, Second Edition*. 871 pp, 14 plates.

Oakeshott, G.B., February 1958, *Geology and Mineral Deposits of the San Fernando Quadrangle, Los Angeles County, California*. California Division of Mines Bulletin 172. 147 pp., 5 plates.

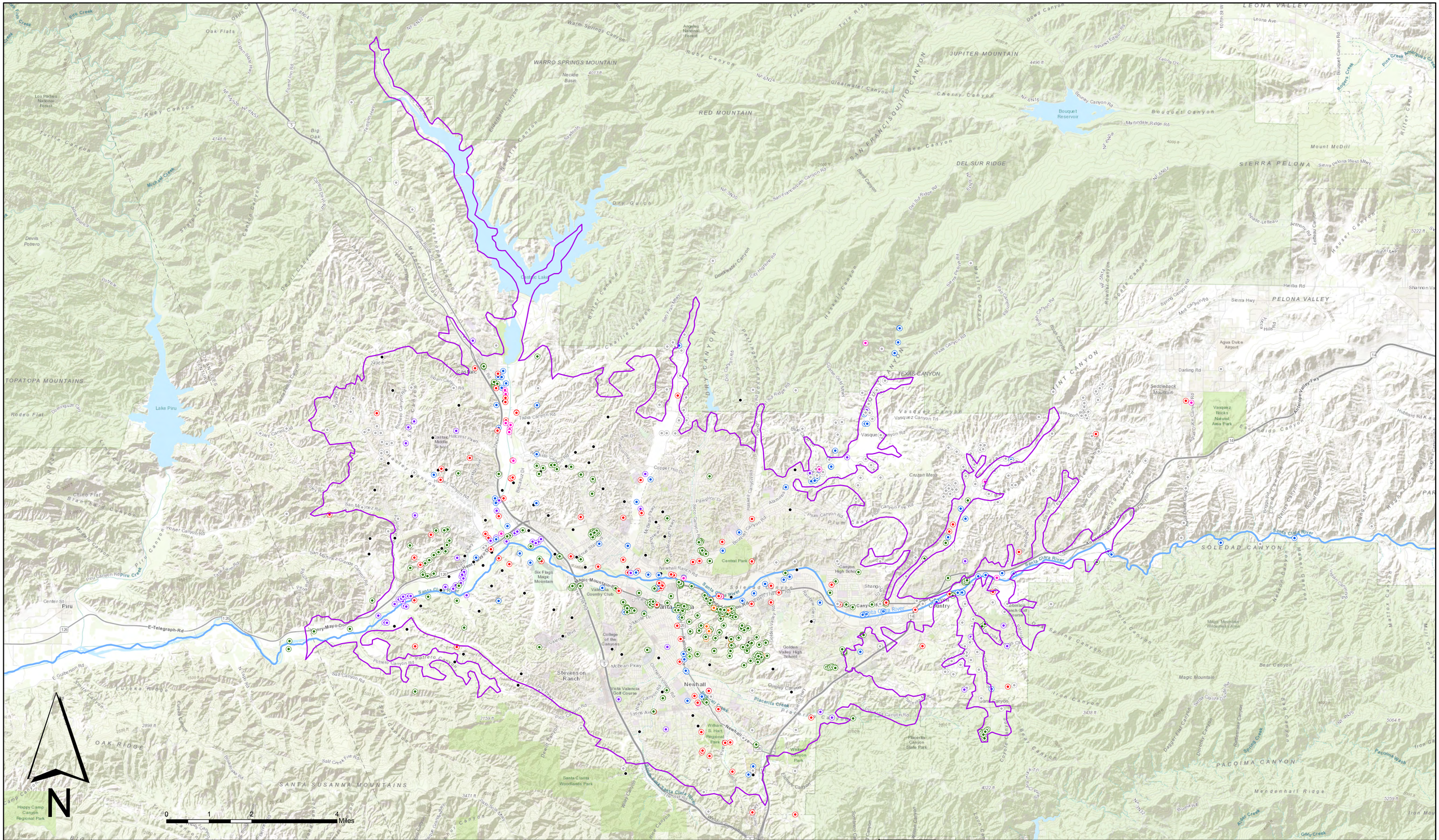
Slade, R.C. & Associates, December 1986, *Hydrogeologic Investigation, Perennial Yield and Artificial Recharge Potential of the Alluvial Sediments in the Santa Clarita River Valley of Los Angeles County, California*. Unpublished Consultant's Report to the Upper Santa Clara River Water Committee. 120 pp., 17 plates.

_____, February 1988, *Hydrogeologic Assessment of the Santa Clara Valley of Los Angeles County, California*. Unpublished Consultant's Report to the Santa Clarita Valley Water Purveyors. 115 pp., 10 Plates in Volumes 1 and 2.

Slade, R.C. & Associates LLC, February 2001. *Assessment of the Hydrogeologic Feasibility of Injection and Recovery of Water in the Saugus Formation, Santa Clarita Valley, California*; prepared for Newhall Ranch Company.

_____, July 2002, *Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems*. Published Consultant's Report to the Santa Clarita Valley Water Purveyors.98 pp., 17 plates in Volumes 1 and 2.

Winterer E.L. and Durham, D.L., 1962, *Geology of Southeastern Ventura Basin, Los Angeles County, California*. U.S. Geological Survey Professional Paper 332-H, pages 275 to 366. 96 pp., 6 plates.



LEGEND

RCS

FIGURE 1-1
LOCATION MAP

RCS Job No. 693-LAS01

May 2021

LEGEND

- Santa Clara River Valley Groundwater Basin, East Subbasin
- Santa Clara River

USDA Taxonomic Soil Order

- Alfisols
- Entisols
- Inceptisols
- Mollisols
- Vertisols
- No Soil
- Data Not Available

N

0 1 2 4 Miles

RCS

FIGURE 1-2
NRCS SOIL CLASSIFICATIONS

RCS Job No. 693-LAS01

May 2021

LEGEND

- Santa Clara River Valley Groundwater Basin, East Subbasin
- Santa Clara River

Infiltration Rates
inches per hour

- ≤0.10
- ≤0.20
- ≤0.30
- ≤0.60
- ≤1.00

N

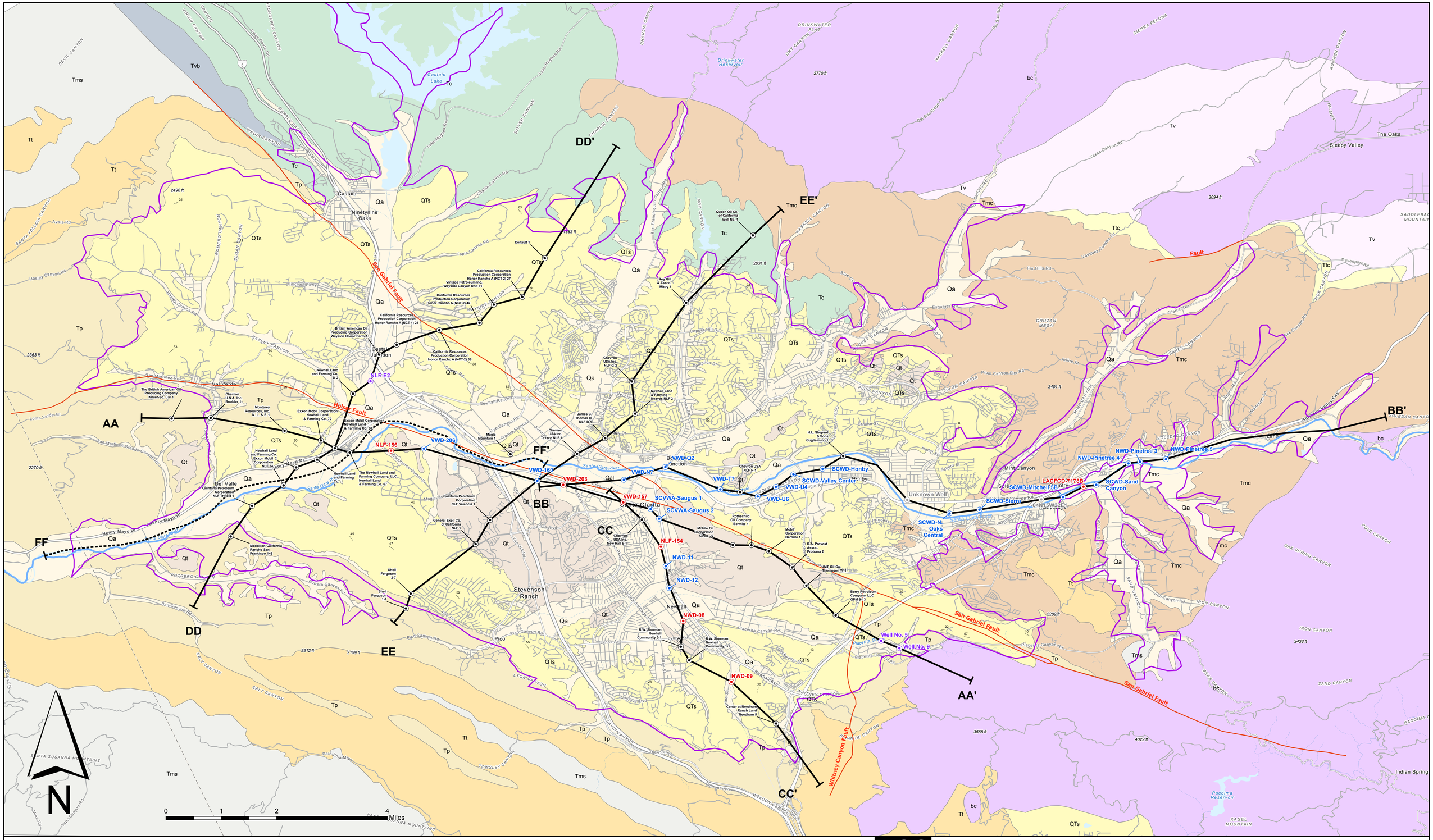
0 1 2 4 Miles

RCS

FIGURE 1-3
INFILTRATION RATES
LA COUNTY

RCS Job No. 693-LAS01

May 2021



LEGEND

- Santa Clara River Valley Groundwater Basin, East Subbasin
- Santa Clara River

Cross Section Trace
- By RCS
- By Geosyntec

Well Type
- Destroyed Well
- Municipal Well
- Irrigation Well
- Domestic Well
- Oil/Gas Well

Formations
- Undifferentiated Alluvium (Qa)
- Terrace Deposits (Qt)
- Saugus Formation (QTs [undifferentiated])
- Pico Formation (Tp)
- Towsley Formation (Tt)
- Castaic Formation (Tc)
- Modelo Formation (Tms)
- Violin Breccia (Tvb)
- Mint Canyon Formation (Tmc)
- Tick Canyon Formation (Ttc)
- Vasquez Formation (Tv)
- Basement Complex (bc)

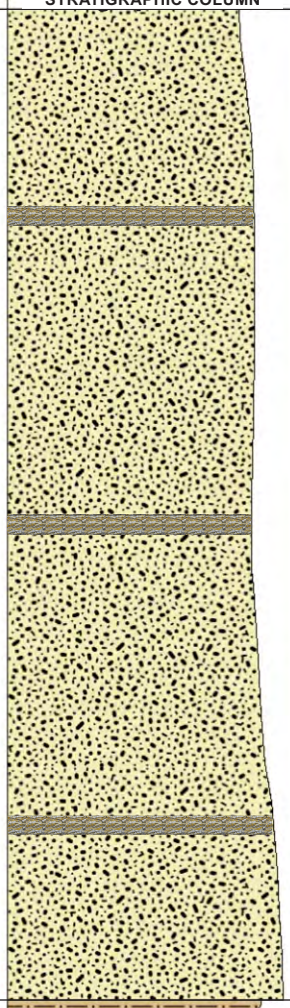
Faults
- Fault Trace (Simplified)
- Bedding Plane Orientation with Dip

RCS

FIGURE 1-4
GEOLOGIC MAP SHOWING CROSS-SECTIONS

RCS Job No. 693-LAS01

May 2021

GEOLOGIC AGE	FORMATION/DEPTH	STRATIGRAPHIC COLUMN	GENERAL LITHOLOGIC DESCRIPTION	ORIGIN
Quaternary /Tertiary	Upper Saugus Formation (QTsu) to ±5,300 ft bgs		Coarse-grained conglomerates and sandstones interbedded with clays/mudstones.	Terrestrial Depositional Environment (Fluvial & Floodplain)
Quaternary /Tertiary	Sunshine Ranch Member Saugus Formation (QTsr) to ±7,700 ft bgs		Predominantly Claystones, Siltstones & Sandstones, thinly interbedded	Transitional Terrestrial to Marine Depositional Environment
Tertiary	Pico Formation (Tp)		Bluish gray to gray Claystones	Deep Marine Depositional Environment

Note: Information above based on RCS correlation of the electric log for oil well Badger Oil Co. Magic Mountain No. 1 - 04N/16W-17Ka. Interpreted depths differ in other portions of the Basin.

RCS

FIGURE 1-5
GENERALIZED SAUGUS FORMATION STRATIGRAPHY

May 2021

FIGURE 1-6
CROSS-SECTION AA-AA'

RCS Job No. 693-LAS01

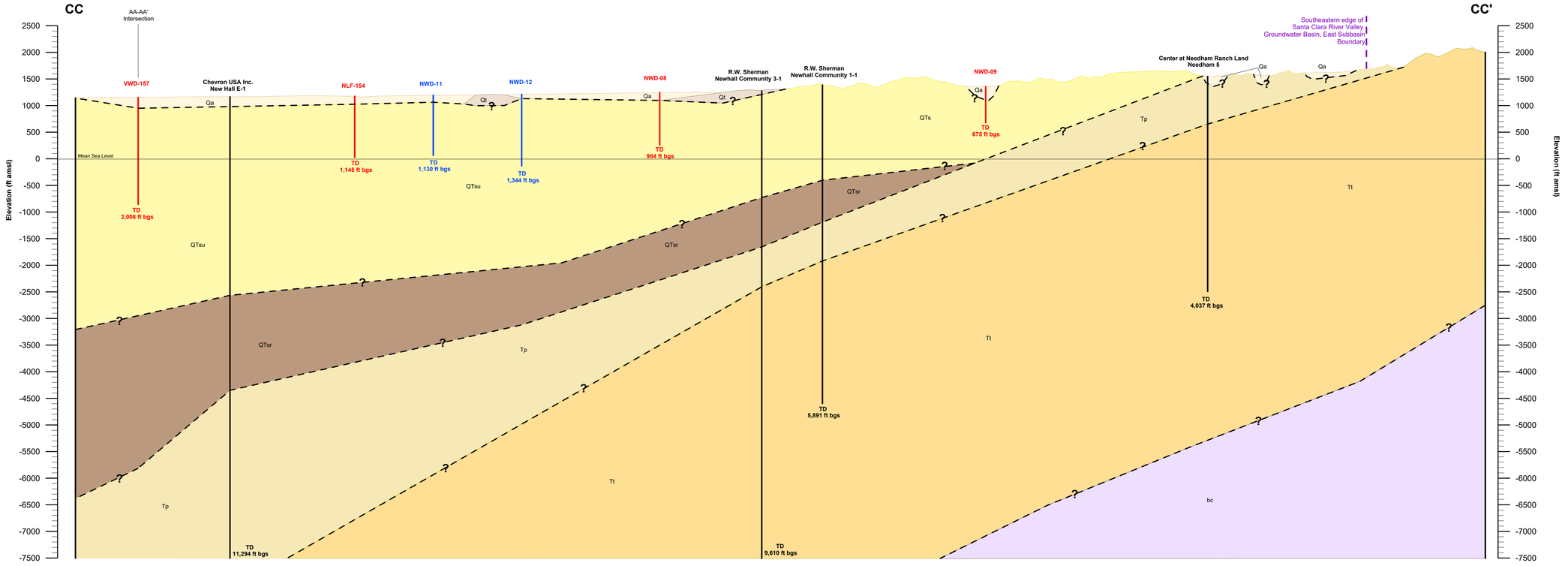
May 2021

RCS

FIGURE 1-7
CROSS-SECTION BB-BB'

RCS Job No. 693-LAS01

May 2021



LEGEND

Formations & Units

		Geologic Age
Qa	Undifferntiated Alluvium	*Holocene - Pliestocene*
Qt	Terrace Deposits	
QTs	QTsu Saugus Formation (QTs - Undifferentiated QTsu - Upper zone) / QTsr Sunshine Ranch Member	*Pleistocene - Pliocene*
Tp	Pico Formation	*Pliocene*
Tt	Towsley Formation	
Tc	Castaic Formation	*Miocene*
Tmc	Mint Canyon Formation	
bc	Basement Complex	*Pre-Tertiary*

Symbols

- Santa Clara River Valley Groundwater Basin, East Subbasin Boundary
- Inferred Contact
- Unknown Contact
- Oil/Gas Well Borehole Trace
- Municipal Well Borehole Trace
- Irrigation Well Borehole Trace
- Destroyed Well Borehole Trace
- Domestic Well Borehole Trace
- Inferred Fault Plane
- Interpreted Fault Motion
- TD — Total depth of borehole

Horizontal Scale

0 — 4,000 ft

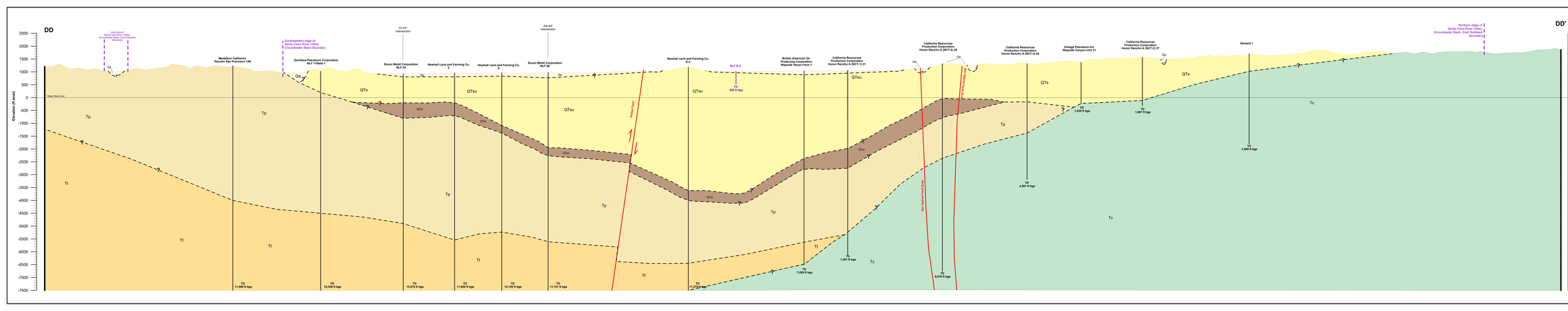
Scale 1:13,200
Vertical Exageration = 1.275

RCS

FIGURE 1-8
CROSS-SECTION CC-CC'

RCS Job No. 693-LAS01

May 2021



LEGEND

Formations & Units

- Qa — Undifferentiated Alluvium
- Qt — Terrace Deposits
- QTs — QTsu: Saugus Formation (QTs - Undifferentiated; QTsu - Upper zone); QTsr: Sunshine Ranch Member
- Tp — Pico Formation
- Tt — Towsley Formation
- Tc — Castaic Formation
- Tmc — Mint Canyon Formation
- bc — Basement Complex

Geologic Age

- Holocene - Pleistocene
- Pleistocene - Pliocene
- Pliocene
- Miocene
- Pre-Tertiary

Symbols

- Santa Clara River Valley Groundwater Basin, East Subbasin Boundary
- Inferred Fault Plane
- Inferred Contact
- Interpreted Fault Motion
- Unknown Contact
- TD — Total depth of borehole
- Oil/Gas Well Borehole Trace
- Municipal Well Borehole Trace
- Irrigation Well Borehole Trace
- Destroyed Well Borehole Trace
- Domestic Well Borehole Trace

Horizontal Scale

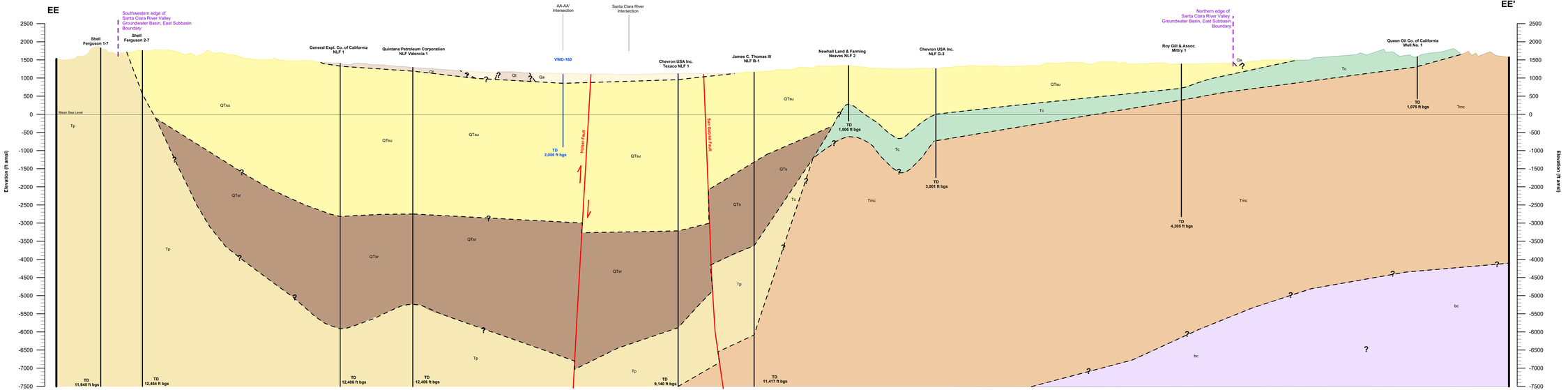
0 — 4,000 ft

Scale 1:12,000
Vertical Exaggeration 1:1.275

RCS

FIGURE 1-9
CROSS-SECTION DD-DD'

RCS Job No. 693-LAS01 — May 2021



LEGEND

Formations & Units

		Geologic Age
Qa	Undifferentiated Alluvium	Holocene - Pliestocene
Qt	Terrace Deposits	
QTs	QTsu Saugus Formation (QTs - Undifferentiated; QTsu - Upper zone) / QTsr Sunshine Ranch Member	Pleistocene - Pliocene
Tp	Pico Formation	Pliocene
Tt	Towsley Formation	
Tc	Castaic Formation	Miocene
Tmc	Mint Canyon Formation	
bc	Basement Complex	Pre-Tertiary

Symbols

- Santa Clara River Valley Groundwater Basin, East Subbasin Boundary
- Inferred Contact
- Unknown Contact
- Oil/Gas Well Borehole Trace
- Municipal Well Borehole Trace
- Irrigation Well Borehole Trace
- Destroyed Well Borehole Trace
- Domestic Well Borehole Trace
- Inferred Fault Plane
- Interpreted Fault Motion
- TD — Total depth of borehole

Horizontal Scale

0 — 4,000 ft

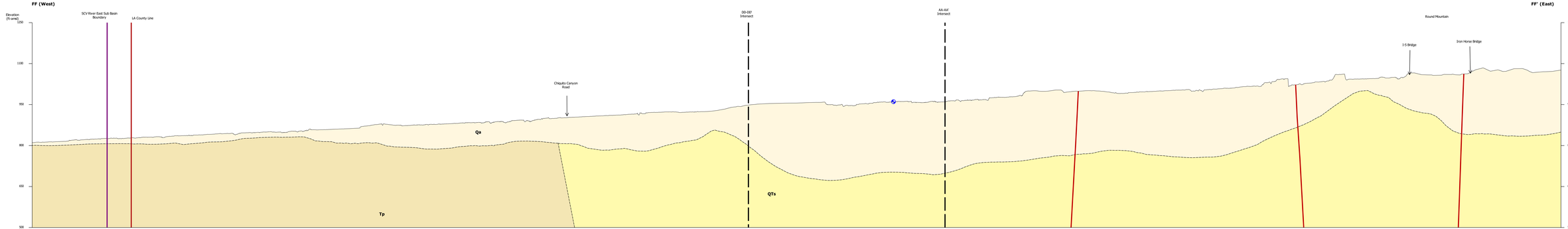
Scale 1:13,200
Vertical Exaggeration = 1.275

RCS

FIGURE 1-10
CROSS-SECTION EE-EE'

RCS Job No. 693-LAS01

May 2021



GM faulted - Fault System

Holser

Geological Model

Holser Fault

Stream Gauge Location

GM faulted

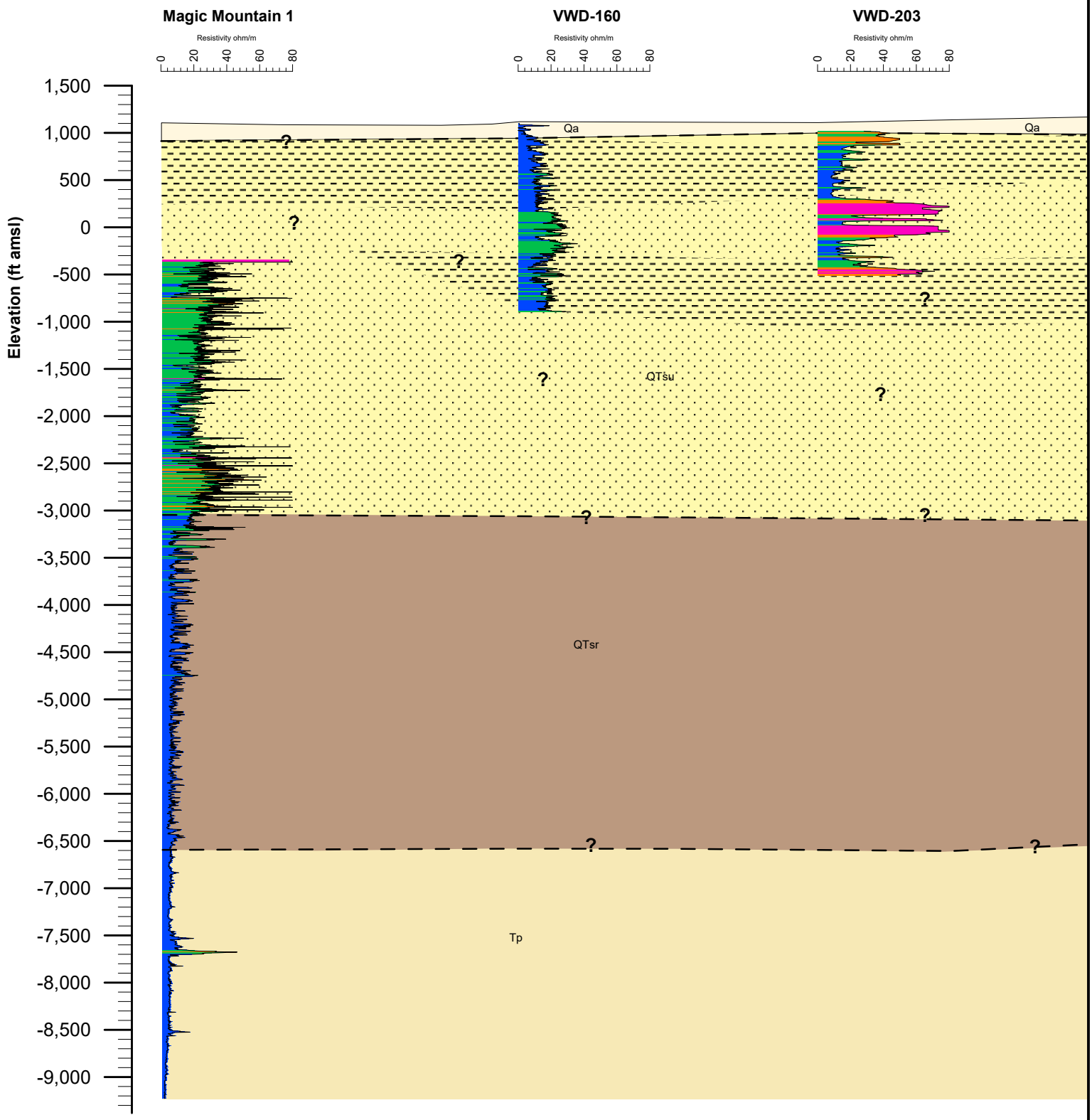
1. Qa - Undifferentiated Alluvium
3. QTs - Saugus Formation
5. Tp - Pico Formation

FIGURE 1-11
CROSS SECTION FF-FF'

Geosyntec consultants

Los Angeles | ECE Job No. 6914-LA01*

May 2021



LEGEND

Formations

- Qa — Undifferntiated Alluvium
- QTs — QTsu Saugus Formation (QTs - Undifferentiated / QTsu - Upper zone); QTsr Sunshine Ranch Member
- Tp — Pico Formation

Lithology

- Silty / Clay
- Clayey Sand / Silty Sand
- Sand with Silt / Sand
- Gravel / Cobbles

Units

- Fine Grained
- Coarse Grained
- Inferred Contact
- Unknown Contact

RCS

FIGURE 1-12
DETAILED STRATIGRAPHIC INTERPRETATION

RCS Job No. 693-LAS01

May 2021

APPENDIX C

Hydrogeologic Conceptual Model: Groundwater Conditions in the Santa Clara River Valley Groundwater Basin, East Subbasin; and Subsidence Vulnerability Technical Memorandum, Prepared by Luhdorff & Scalmanini, Consulting Engineers

This page intentionally left blank.

Luhdorff & Scalmanini
Consulting Engineers

TECHNICAL MEMORANDUM

DATE: December 15, 2021 Project No.: 18-1-132

TO: Mr. Jeff M. Barry, GSI Water Solutions, Inc.

FROM: Mr. Will Halligan, PG

SUBJECT: **Draft Hydrogeologic Conceptual Model: Groundwater Conditions in the Santa Clara River Valley Groundwater Basin, East Subbasin**

INTRODUCTION

This technical memorandum (TM) presents a description of groundwater conditions present in the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin). This TM describes the hydrogeologic framework of the Basin. It is intended to provide a general understanding of the physical controls that influence the flow of groundwater and groundwater quality conditions in the Basin. This TM focuses on the groundwater conditions portion of the hydrogeologic conceptual model. Following are the elements discussed in this TM:

- Groundwater occurrence, flow direction, and vertical gradients in each principal aquifer
- Primary use or uses of each aquifer
- Ground Surface Subsidence
- General water quality of principal aquifers

GROUNDWATER OCCURRENCE, FLOW DIRECTION, HORIZONTAL AND VERTICAL GRADIENT

The occurrence and movement of groundwater in the Basin are described in this section. Water level contours for seasonal high and seasonal low conditions for water year (WY) 2018 are presented as it is a year that had the most complete dataset at the time this document was first drafted in early 2020. WY is an abbreviation for water year that refers to the 12-month period from October 1 through September 30 for any given year for which precipitation and surface water supply totals are measured (**Figure 5-1**). Under the Sustainable Groundwater Management Act (SGMA), the California Department of Water Resources requires that groundwater related data be represented as a WY rather than a calendar year or other year type.

Historically, seasonal high groundwater conditions occur in the winter and early spring between January and April. This time frame is generally associated with the least amount of groundwater pumping and the greatest amount of recharge from rainfall and streamflow. The greatest amount of precipitation in WY

2018 (October 2017 through September 2018) occurred in January (3.18 inches) and March (7.5 inches). Seasonal low conditions occur at the end of the water year following the summer and early fall which are associated with the least amount of recharge from precipitation and the greatest amount of groundwater pumping. Historic groundwater elevation data are presented in hydrographs for wells that are representative of conditions in each principal aquifer **(Appendix A)**. There are two principal aquifers in the Basin: the Alluvial Aquifer and the Saugus Formation. The areal extent of each of these aquifers are presented in **Figure 5-2** and described in the following sections. The areal extent of these aquifers has been generalized to conform to the California Department of Water Resources Bulletin 118 Basin boundary.

Alluvial Aquifer

Groundwater Occurrence

The Alluvial aquifer is the uppermost principal aquifer in the Basin. Primary sources of recharge include precipitation, recharge from the Santa Clara River, recharge from the Saugus Formation, and mountain front recharge (**CLWA, 2003**). Sources of manmade recharge include infiltration of irrigation water, infiltration of stormwater runoff from urban areas, infiltration of surface flow and underflow from Castaic Dam, infiltration releases by LADPW from its reservoir facilities in the San Francisquito and Bouquet Canyon area, and infiltration associated with discharges from the water reclamation plants.

Discharge from the Alluvial aquifer occurs through pumping of irrigation and municipal supply wells, discharge to the Santa Clara River in the western portion of the Basin, subsurface discharge to the neighboring Piru Basin to the west, and evapotranspiration (ET) by riparian vegetation. Discharge also occurs in the form of seepage to the underlying Saugus Formation.

Flow Direction - Water Level Contours

Figures 5-3 and 5-4 present water level contours for seasonal high and seasonal low conditions for 2018. Contours of equal groundwater elevations provide information on the elevation of groundwater in various parts of the Basin where the aquifer exists, and data is collected. Contour maps also provide information on the direction of groundwater flow. Groundwater flow is in the direction from high elevation to lower elevations and are perpendicular to the contour lines. The general pattern and orientation of the contours shown in **Figures 5-3 and 5-4** are generally representative of historical conditions in the Basin, although the elevation values on the contour lines may change from year to year.

Under seasonal high conditions, groundwater depths range between 10 feet and 150 feet below ground surface (bgs) with groundwater elevations between 878 and 1,888 ft above mean sea level (msl) using the North American Vertical Datum 1988 (NAVD88). Groundwater flow is toward the Santa Clara River on the flanks of the Basin and to the west in the lower portions of the Valley along the Santa Clara River (refer to the groundwater contour map, **Figure 5-3**). Under seasonal low conditions, groundwater depths range between 12 feet and 150 feet bgs with groundwater elevations between 877 and 1,887 ft msl. Contours are not shown where there is a lack of water level data. The groundwater flow directions in the seasonal low conditions are similar to seasonal high directions. (**Figure 5-4**). During both seasonal high and seasonal low conditions, the highest groundwater elevations occurred in the northeastern part of the Basin and

the lowest occurred in the southwest part of the Basin. For WY 2018, there was minimal variation between seasonal high and seasonal low groundwater conditions. Groundwater flow conditions based on 2018 data are consistent with the observation of **RCS 1986** and with water level contours presented in the Salt and Nutrient Management Plan for 2016 (**CLWA, 2016**).

Water Level Hydrographs

Historic water level trends for wells in the subareas of the Basin that represent groundwater levels in those subareas are presented in **Figures 5-5 & 5-6**. The wells presented in these hydrographs are located in different areas of the Basin and represent groundwater levels in the Alluvial aquifer in those areas (**Figure 5-7**). **Figure 5-5** includes wells in the eastern part of the Basin (Mint Canyon, Santa Clara River area above Saugus Water Reclamation Plant (WRP), and Bouquet Canyon) where water levels are heavily influenced by climatic conditions and seasonal pumping. Wells in the Mint Canyon area and Santa Clara River area above the Saugus WRP all exhibit a similar pattern of gradual declines over five to 10-year periods when there are below normal periods of rainfall, followed by rapid recoveries during wet periods. Generally, one to two consecutive wet years can provide enough recharge to replenish the Alluvial aquifer in the eastern areas of the Basin. Wells in the eastern portion of the Basin have shown substantially lower water levels during extended drought periods (e.g., 2006 – 2019), causing a reduction in well production in this area. Since 2006, the Basin has experienced a long-term dry period interrupted by a wet year in 2011. Over the past 10 years, the average seasonal variation between high and low conditions in the Mint Canyon and above Saugus WRP area was approximately 16 feet. This small amount of variation is due primarily to a lack of recharge and the effect depressed groundwater levels in this area have had on minimizing groundwater production. Over multi-year drought periods, water levels can decline by as much as 70 feet, which occurred in SCWD-North Oaks Central from 2011 through 2016. Wells in the Bouquet Canyon area show a less rapid decline and recovery. Declines in groundwater levels during extended dry periods is not an indication of overdraft, which is why it is important to look at a long-term period of time that represents average annual climatic conditions. With this in mind, over the past 30 years, these wells have exhibited stable water levels with periods of rising levels during wet periods and declining water levels during droughts. Over the past 10 years, the average seasonal variation in water levels was approximately 10 feet.

Figure 5-6 represents the historical groundwater levels measured in wells located in the western part of the Basin (San Francisquito Canyon, Santa Clara River below Saugus WRP, Castaic Valley, and below Valencia WRP). Groundwater levels in the western part of the Basin exhibit similar trends to those in the eastern portion of the Basin (San Francisquito and below Saugus WRP) VWD-W11, VWD-9, VWD-Q2, and NLF-W5. However, the magnitude of water level declines during periods of reduced rainfall are less due to the recharge from the two WRPs and the upward vertical gradient from the Saugus Formation into the Alluvial aquifer. This influence is indicated in the hydrograph for well VWD-I. Since 2010, the average variation between seasonal high and seasonal low water levels was approximately 10 feet. Over drought periods, depth to water has ranged between 20 and 50 feet as exhibited in VWD-I and VWD-W11 from 2011 through 2016, respectively. All the Alluvial aquifer wells completed in the Castaic Creek drainage and the western portion of the Basin below the Valencia WRP along the Santa Clara River remained stable over various hydrologic wet and dry periods. Since 2010, the average variation between seasonal high and low water levels on average is approximately 9 feet, similar to other areas of the Basin in the Alluvial

aquifer. Over drought periods, water levels have declined by as much as 40 feet as exhibited in VWD-D from 2011 through 2016. Other wells such as NLF-B10 and NLF-B4 have shown almost no change in water levels over dry periods. Historic groundwater elevations for All alluvial aquifer wells having long-term monitoring data are presented in hydrographs in **Appendix A.**

Saugus Formation Aquifer

Groundwater Occurrence

The Saugus Formation Aquifer underlies the Alluvial aquifer and is present throughout the entire Basin, unlike the Alluvial aquifer. The Saugus Formation can be further subdivided into two units. The upper portion, which is up to 5,000 ft thick and consists of coarse-grained sand and gravel beds, contains the majority of the accessible groundwater. The lower portion, known as the Sunshine Ranch Member, is up to 3,500 ft thick and is composed of fine-grained sediments with low permeability. The Sunshine Ranch Member does not provide groundwater in sufficient quantity or adequate quality for municipal use (**Slade, 2002**). Generally, the upper 1,000 to 2,000 ft of the upper portion of the Saugus Formation is utilized for municipal groundwater production. The underlying 3,000 ft is not utilized for municipal supply.

The primary sources of recharge to the Saugus Formation include percolation from the Alluvial aquifer (particularly on the east end of the Basin), direct recharge from precipitation, and inflow from outside the Basin (**CLWA, 2003**). Discharge from the Saugus Formation is primarily from groundwater extraction and flow to the Alluvial aquifer in the western portion of the Basin (**CH2MHill, 2004**).

Flow Direction - Water Level Contours

Under seasonal high conditions, groundwater depths range between 50 and 185 feet bgs with groundwater elevations ranging between 964 and 1,190 ft msl (**Figure 5-8**). Water level measurements across the Saugus Formation are limited due to the lack of wells in many areas of the Basin where the Saugus Formation is present. However, utilizing available data, the general groundwater flow direction is thought, based upon groundwater modeling results, to be generally westerly toward where the Saugus Formation naturally discharges to the alluvium. As shown on Figure 5-8, there also appears to be a component of flow from the northwest to southeast, perhaps toward major production wells in the central part of the Basin. During seasonal low conditions, groundwater depths range between 50 and 217 feet bgs and groundwater elevations range between 956 and 1,192 ft msl (**Figure 5-9**). The direction of flow during seasonal low conditions is similar to seasonal high directions. Groundwater flow conditions based on 2018 water level measurements are similar to the contours presented for the Fall 2000 in **CH2MHill, 2004**.

Water Level Hydrographs

Historic water level trends for selected Saugus Formation wells are presented in **Figure 5-10** and well locations are illustrated in **Figure 5-11**. The spatial extent and availability of groundwater level data for the Saugus Formation is limited to two areas (South and Central/West). Groundwater elevation data extends to the mid-1960s in only one well. VWD-160, shows a trend of gradual rising and falling groundwater elevations in response to wet and dry periods with historic highs occurring in the mid-1980s.

Two dry periods that occurred in the early 1990s and from the mid-2000s to 2019, resulted in groundwater levels declines of approximately 100 ft. Following the first dry period, groundwater levels recovered, however full recovery from the most recent dry period has not occurred by 2019 as the Basin has been in an extended dry period since 2006, with the exception of 2011. All of the Saugus Formation wells show this general trend. The downward trend in the most recent dry period was a result of lower amounts of recharge rather than from an increase in groundwater extractions from the Saugus Formation. In recent years in the South Area groundwater levels have shown an upward trend (NWD-12 and VWD-159) due to increased rainfall since 2016 as compared to prior years. Since 2010, the average variation between seasonal high and seasonal low water levels in the south area was approximately 18 feet, and the average variation in the central/west area was approximately 16 feet. All available historic water level data for Saugus Formation wells are included in **Appendix A**.

Horizontal Gradient

Alluvial Aquifer

The horizontal hydraulic gradient is as high as 0.018 ft/ft (95 ft/mile) in eastern portions of the Basin in the Mint Canyon area and as low as 0.005 ft/ft (29 ft/mile) in the west along the Santa Clara River (**Figure 5-3**). Under seasonal low conditions, the gradient in the east is the same as seasonal high conditions at approximately 0.018 ft/ft (95 ft/mile), but with a slightly steeper gradient in the west at 0.006 ft/ft (31 ft/mile) (**Figure 5-4**).

Saugus Formation

Under seasonal high conditions, the horizontal hydraulic gradient is approximately 0.008 ft/ft (42 ft/mile) (**Figure 5-8**). Under seasonal low conditions, the hydraulic gradient is approximately 0.007 ft/ft (35 ft/mile) (**Figure 5-9**). Gradient values are based on groundwater flow from east to west. In the western portion of the Basin where the groundwater flow directions are northwest to southeast in the area east of Interstate 5, there was insufficient data to calculate a horizontal flow gradient.

Vertical Gradient Between Principal Aquifers

The vertical gradient between the Alluvial aquifer and Saugus Formation is the mechanism to assess flow between the two aquifers. Vertical gradients or flow can be either in an upward or downward direction. For example, if the water level in the Alluvial aquifer is higher than the water level in the Saugus Formation at a particular location, there is the potential for groundwater to move vertically from the Alluvial aquifer to the Saugus Formation. The reverse can also occur in areas where groundwater elevations in the Saugus Formation are higher than those in the Alluvial aquifer. The magnitude and direction of vertical gradients were determined based on the average seasonal high-water level since 2010 at two locations in the Basin where groundwater level data from Saugus Formation wells is generally available along with nearby wells screened in the Alluvial aquifer. The average vertical gradient was determined in the vicinity of Saugus well VWD-201 located in the South area, and at the Saugus well VWD-207 area located in the western portion of the Basin. Results are presented in **Table 5-1**. The negative value in the South area indicates a downward gradient (i.e., groundwater elevations in the Alluvial aquifer at this location are higher than groundwater elevations measured in the Saugus Formation). The positive values indicate an upward

gradient from the Saugus Formation to the Alluvial aquifer. These estimates are based on available groundwater level measurements in both aquifers.

Table 5-1. Approximate Aquifer Vertical Gradient

Basin Area	Aquifer – Seasonal Condition	Average GWE	Gradient (ft/ft)
South Area	Alluvial – All VWD Monitor Wells	1079	-0.04
	Saugus – VWD 201	1024	
Western Area	Alluvial – VWD-E14	983	0.003
	Saugus – VWD-207	984	

Change in Groundwater Storage

Change in groundwater storage can be estimated using groundwater elevation data from successive seasonal high periods; or using water budget results from a groundwater flow model. The change in storage of water using the change in water level approach is a function of aquifer storage coefficients, amount of water level change, and areal extent of water level changes. A change in storage calculation using the water budget approach calculates the difference between recharge and discharge terms. The water budget approach using the Basin groundwater model will be utilized in the GSP for each of the principal aquifers when it is available. The groundwater flow model will calculate the change in groundwater storage for the historical, current, and projected water budget periods.

Subsidence

According to the U.S. Geological Survey (USGS), land subsidence is a phenomenon found across the United States, affecting the land surface of over 17,000 square miles in 45 states (**Galloway et al., 1999**). Land subsidence in California is commonly a result of fluid withdrawal (oil or groundwater). The principal causes of land subsidence are the compaction of fine-grained materials (caused by reduction in hydraulic head affecting the physical structure and orientation of clay minerals and drainage of organic soils. Subsidence can occur in two forms, elastic and inelastic (or permanent). For SGMA, only inelastic subsidence is to be evaluated in the GSP. Generally, elastic subsidence occurs on a seasonal basis. When groundwater pumping occurs and groundwater levels decline, the land surface can temporarily subside. When groundwater levels recover following wetter conditions and reduced groundwater pumping, the land surface can recover, similar to compressing and releasing a spring. The amount that the ground surface subsides and subsequently "springs back" is considered elastic subsidence. Conversely, the amount of decline in the ground surface elevation that remains regardless of groundwater level recovery is considered to be inelastic subsidence. This cycle occurs every year and is common everywhere there are seasonal variations in groundwater levels. For inelastic subsidence to occur in an area, that area generally requires two primary conditions. One is to have wells screened in aquifers which contain substantial amounts of clay within the depth interval that the well is screened. The second condition is that there needs to be a multi-year period where groundwater levels in the aquifer are at elevations below historical low levels in that area of the Basin. If both conditions do not occur, then inelastic subsidence is unlikely

to occur in appreciable quantities to impact critical infrastructure. Short term declines in groundwater levels over one or two years likely will not result in significant amounts of inelastic subsidence and impacts to infrastructure. This is based on data collected areas in the San Joaquin Valley that have experienced significant amounts of subsidence and where there have been significant investments in subsidence monitoring networks.

As discussed above, when discussing the potential for inelastic land subsidence in any area, it is important to consider the type of subsurface materials that could contribute to subsidence combined with well construction data, pumping records and groundwater level measurements through a multi-year period of record. As described above, the upper portion of the Saugus Formation generally consists of sands and gravels, while the Sunshine Ranch member is composed primarily of fine-grained materials. However, the upper portion of the Saugus Formation, in some but not all areas where there are current wells, contains lenses of silt and clay, which are located within the depth interval that some Saugus Formation wells are perforated and extract groundwater. However, based on an evaluation of existing geologic data for Saugus Formation wells, these materials are not laterally continuous. In addition, the Saugus Formation has not been pumped significantly to cause extended periods of groundwater level declines that have resulted in subsidence to a degree that impacts critical infrastructure to a significant and unreasonable degree. Through the last nineteen years of reviewing and reporting on the geology and water resources in the Basin, there has not been evidence of chronic groundwater level declines in areas with Saugus Formation geology with silts and clays within the screened intervals of municipal supply wells that would contribute to subsidence (**LSCE, 2017**).

A comprehensive description of land subsidence and available historical data is described by LSCE in a separate TM (**see Appendix C, LSCE, 2021**). There are three sources of information on subsidence in the region. These sources include benchmark survey data from Los Angeles County Department of Public Works (LADPW) from a comprehensive network of benchmarks located throughout Los Angeles County. Unfortunately, LADPW provides general benchmark locations on maps, but exact coordinate information is not available at this time. The second source of data is Interferometic Synthetic Aperture Radar (InSAR) data from the Department of Water Resources SGMA Data viewer. The TRE Altamira InSAR Dataset contains vertical displacement data from 2015 through September 2019. These data were collected by the European Space Agency Sentinel-1A satellite and processed by TRE Altamira. The dataset covers more than 200 groundwater basins across the state at a resolution of approximately 100 square meters. The third source of data involves land surface elevation monitored at two continuous global positioning system (CGPS) sites, one located in the Basin north of the Santa Clara River (station SKYB) and the other outside the Basin to the north just east of Interstate 5 (station CTDM) as shown in **Figure 5-12**. The data from these two stations are reported by UNAVCO from its Data Archive Interface (http://www.unavco.org/ data/data.html). Data collection has been ongoing since the early 2000s with daily measurements.

The LACDPW has a network of over one hundred benchmarks in the Basin as part of a larger survey network in Los Angeles County (http://dpw.lacounty.gov/sur/BenchMark/). LACDPW reportedly surveys these benchmarks approximately every six years. The last survey in the Basin was conducted in 2018 and the surveys began in 1978, however, prior to the 1995 survey, the vertical datum was NGVD29 and not NAVD88. The NGVD29 and NAVD88 referenced data cannot be compared without conducting a complex

conversion. These benchmarks could be utilized as part of a subsidence monitoring network, pending LACDPW approval. These benchmarks are located in the "Newhall Quad." The Index of benchmarks contained in this quad is depicted in **Figure 5-12**. Land surface elevation data from these benchmarks that were measured using the NAVD88 vertical datum required by DWR, date back to 1995. Benchmark measurements reflect a basic accuracy of ± 0.017 ft. Between 1995 and 2018, the total change in elevation of benchmarks located in the south/central area of the Basin in the vicinity of wells Saugus 1, Saugus 2, V201, and V205 ranged from -0.099 to 0.011 feet . Near wells V206 and V207 and south near well NCWD Saugus Formation wells, the total elevation changes over 1995 and 2018 ranged from -0.149 to -0.082 ft. These represent slight declines that average about -0.0045 ft/year over this 24-year period. Groundwater elevations in the Saugus Formation historically have been most depressed in the early 1990s which corresponded to the highest amount of pumping form the Saugus Formation. The 1995 dataset was collected by LACDPW about one or two years after the peak decline in groundwater levels. Due to experience in evaluation of subsidence occurrence in the San Joaquin Valley during short term dry periods with high amounts of groundwater pumping (one to two years in length), the amount of inelastic subsidence is dependent on local conditions and often includes large proportions of elastic subsidence. Pumping from the Saugus Formation reached a peak in the early 1990s, and the intervening years have seen lower levels of pumping than this historic peak. Between 2009 and 2018, the 0.13 feet of subsidence that occurred in the vicinity of well V201 is likely a result of multiple factors, including time of year that data was collected and the influence of elastic subsidence on the dataset, tectonic activity, and variations in groundwater levels and pumping. The rate of subsidence that occurred between 2009 and 2018 was 0.014 feet per year. That rate is within the accuracy of the benchmark surveying equipment and is negligible.

Table 5-2 – Benchmark Elevation Data

Basin Area	Nearby Well	Benchmark	Year	Elevation (ft, NAVD88)	Total Elevation Change 1995-2018 (ft)
Southern Saugus	VWD-206	1947	1995	1,059.463	-0.082
			2009	1,059.359	
			2018	1,059.381	
		1948	1995	1,034.371	-0.092
			2009	1,034.287	
			2018	1,034.279	
		5210	1995	1,061.530	-0.097
			2009	1,061.448	
			2018	1,061.433	
		5402	1995	1,031.950	-0.126
			2009	1,031.831	
			2018	1,031.824	
		7104	1995	No Data	No Data
			2009	1,047.77	
			2018	1,047.76	
		7106	1995	No Data	No Data
			2009	1,043.68	
			2018	1,043.67	
		7103	1995	No Data	No Data
			2009	1,023.59	
			2018	1,023.58	
	VWD-207	4511	1995	1,012.295	-0.149
			2009	1,012.182	
			2018	1,012.146	
		7204	1995	No Data	No Data
			2009	1,018.51	
			2018	1,018.51	
		6082	1995	No Data	No Data
			2009	1,019.99	
			2018	1,019.97	
	VWD-201	6077	1995	No Data	No Data
			2009	1,146.896	
			2018	1,146.766	
	VWD-205/205M	6078	1995	No Data	No Data
			2009	1,182.083	
			2018	1,182.019	
		5267	1995	1,151.717	-0.099
			2009	1,151.683	
			2018	1,151.618	
		6076	1995	No Data	No Data

Basin Area	Nearby Well	Benchmark	Year	Elevation (ft, NAVD88)	Total Elevation Change 1995-2018 (ft)
Southern Saugus			2009	1,151.860	
			2018	1,151.785	
	Saugus-1	611	1995	1,157.803	-0.068
			2009	1,157.800	
			2018	1,157.735	
		6068	1995	No Data	No Data
			2009	1,166.50	
			2018	1,166.43	
		5311	1995	1,159.535	0.011
			2009	1,159.575	
			2018	1,159.546	
	Saugus-2	5260	1995	1,170.900	-0.056
			2009	1,170.923	
			2018	1,170.844	
		5312	1995	1,168.039	-0.041
			2009	1,168.086	
			2018	1,167.998	
		5259	1995	1,177.996	-0.089
			2009	1,178.015	
			2018	1,177.907	
	VWD-159	5375	1995	1,276.700	-0.042
			2009	1,276.714	
			2018	1,276.658	
		7054	1995	N/A	No data
			2009	1,329.124	
			2018	1,329.073	
		7055	1995	N/A	No Data
			2009	1,348.352	
			2018	1,348.324	
		5085	1995	1,317.921	0.005
			2009	1,317.966	
			2018	1,317.926	
	NWD-12	5256	1995	1,217.960	-0.074
			2009	1,217.936	
			2018	1,217.886	
		6066	1995	No Data	No Data
			2009	1,201.063	
			2018	1,201.025	
	NWD-13	5337	1995	1,192.215	-0.059
			2009	1,192.211	
			2018	1,192.156	
		6067	1995	No Data	No Data
			2009	1,193.131	
			2018	1,193.054	

The TRE Altamira InSAR Dataset contains vertical displacement data from June 2015 through September 2019. These data were collected by the European Space Agency Sentinel-1A satellite and processed by TRE Altamira. As discussed above, the evaluation of subsidence occurrence requires the ability to quantify the occurrence of inelastic subsidence and not elastic subsidence. Elastic subsidence is greatest during seasonal periods (normally summer and fall) when seasonal groundwater levels are lowest. Inelastic subsidence generally is best quantified by evaluating changes in ground surface elevations during the winter/early spring periods when groundwater levels are generally at higher elevations, groundwater pumping is low, and over a multi-year period. For the InSAR data, vertical displacement for the winter-to-winter period from 2015/2016 through 2018/2019 period over the entire Subbasin from the TRE Altamira InSAR dataset is presented in **Figure 5-13.** Notwithstanding the potential influence of tectonic activity influences on the dataset, this winter-to-winter period of time represents the least amount of elastic subsidence which results in the change in elevation data being primarily related to inelastic subsidence. Vertical displacement values in the Basin ranged between -0.25 and +0.25 ft for that three-year period. In the south-central area of the Subbasin in the vicinity of wells V201, V205, Saugus 1, and Saugus 2 the range was 0.025 to 0.032 ft during that three-year period.

The locations of the UNAVCO CGPS sites along with historic vertical displacement data are presented in **Figure 5-14.** The relatively stable trend of these plots, along with the positive values of displacement, indicate that no long-term subsidence is occurring in these monitored areas and the variations observed appear to be related to tectonic factors rather than from activities associated with groundwater pumping. Since the beginning of data collection in the early 2000s at both locations, the net vertical displacement is positive (0.05 ft) at the CTDM site and zero at the SKYB site. This means that the land surface has actually risen (positive displacement) or stayed the same in these areas since 2000. In any given year, the vertical displacement is generally less than 0.05 feet, with the exception of 2006 to 2007 at the SKYB site. Within the context of complex southern California geology, the elevation change (less than 0.2 feet vertical change over the last 20 years) seen at the two UNAVCO stations are likely due to tectonic activity as mentioned above.

The three datasets pertaining to subsidence all indicate minimal or no subsidence occurring in the Subbasin. Los Angeles County Public Works Benchmarks indicate an average ground surface elevation decline of 0.004 feet per year, the TRE Altamira InSAR dataset indicates a ground surface elevation increase in the area of Saugus Formation wells, and the UNAVCO CGPS dataset also indicates a ground surface elevation increase at various points in the Subbasin.

Primary Uses of Each Aquifer

Groundwater production rates presented in this section for municipal/industrial, agricultural, domestic water users were obtained from the 2018 Santa Clarita Valley Water Report (**LSCE, 2019**). Each is summarized in the following section.

Municipal/Industrial

Municipal/Industrial groundwater production for both the alluvial aquifer and the Saugus Formation from 1980 to 2018 are presented in **Figure 5-15**. Groundwater production in the alluvial aquifer has ranged from 8,684 to 27,919 acre-feet/year (AFY) with an average of 19,400 AFY. Production increased until the

late 1990's, after which production remained at this level until 2015 when it began to decline rapidly. Saugus Formation production has ranged from 2,728 to 14,417 AFY with a long-term average of 6,750 AFY. Saugus Formation production peaked in the early 1990's for a short period before reaching its lowest point in 1999. Production gradually returned to normal levels and was relatively stable thereafter.

Agricultural

Agricultural production for both the alluvial and Saugus Formation aquifers from 1980 to 2018 are presented in **Figure 5-16**. Alluvial production ranged from 5,951 to 13,824 AFY with an average of 10,194 AFY. Alluvial production has been relatively steady over the four decades presented in **Figure 5-16** with year-to-year variation typically within 2,000 AF. Agricultural production from the Saugus Formation has been minor. Presently, there is no agricultural production from the Saugus Formation.

Private Domestic Uses

Private domestic uses of groundwater constitute a minor percentage of the total groundwater extraction in the Basin. Private domestic also includes groundwater production used for golf courses. Total domestic groundwater extractions by aquifer are presented in **Figure 5-17**. Alluvial aquifer domestic well production values are estimated to range from 500 to 1,369 AFY with an average of 741 AFY.

Groundwater Quality

This section summarizes the constituents of general groundwater quality (from both natural and anthropogenic sources) for both principal aquifers based on previous technical studies and monitoring performed by SCV Water. Natural constituents discussed in this TM include total dissolved solids (TDS), chloride, nitrate, and sulfate. These constituents are naturally occurring in groundwater, but some constituents can also result from human activities.

Also discussed are anthropogenic groundwater constituents of concern (COC) that have been observed in the Basin. The Santa Clarita Valley Water Report identifies perchlorate and volatile organic compounds (VOCs) as the primary human caused COC. The most frequently detected VOCs in the Basin are Trichloroethylene (TCE) and Tetrachloroethylene (PCE). Less frequently detected compounds include Chloroform, and 1,1-dichloroethene which have been detected in trace amounts below the state drinking water standards maximum contaminant levels (MCL) in the Basin (**LSCE, 2019**). The Salt and Nutrient Management Plan (SNMP) prepared by SCV Water in 2016 identified dichlorodiphenyltrichloroethane (DDT) and polychlorinated biphenlys (PCBs) as other COC. A contaminant of emerging concern in the Basin are perfluoroalkyl substances or PFAS.

Groundwater quality concentration data are expressed in terms of milligrams per liter (mg/L) or parts per million (ppm) and also micrograms per liter (ug/L) or parts per billion (ppb). Historic and recent concentrations are compared to primary and secondary maximum contamination levels (MCL, SMCL) that are based on State Water Resource Control Board Division of Drinking Water (SWRCB DDW) and Environmental Protection Agency (EPA) standards. These are generalized standards for drinking water, which are set to protect public health. Groundwater quality concentrations are also compared to water quality objectives (WQO) as set by the Los Angeles Regional Water Quality Control Board (LARWQB) that are site specific based on location conditions. WQOs have been set by the LARWQB for the alluvial aquifer

but not for the Saugus Formation. The SNMP identifies WQOs for TDS, chloride, and nitrate, but state that further analysis is necessary in order to establish meaningful WQOs (CLWA, 2016).

Water quality concentration graphs for TDS, chloride, nitrate, and sulfate are presented in **Appendix B**. Data through 2018 are included in the individual concentration graphs. A summary of groundwater quality data for each principal aquifer is presented below.

Groundwater Quality – Alluvial Aquifer

Total Dissolved Solids

The amount of dissolved solids or salts in water is represented by TDS. Water quality in terms of TDS has been described in the Water Report prepared for SCV Water for about 20 years. Groundwater quality conditions in the alluvial aquifer are described for the different zones shown in **Figure 5-7**. The SWRCB DDW recommends an SMCL for TDS of 500 mg/L, with an upper limit of 1000 mg/L and a short-term limit of 1,500 mg/L. In addition to the SMCL, the WQO values range between 700 and 1,000 mg/L.

In the Mint Canyon and Above Saugus WRP areas (**Figure 5-18**), TDS concentrations show a long-term stable trend over the past 30 years with the exception of well VWD-U4 that has shown an increasing trend overall with concentrations above the WQO. Concentrations in this well have decreased over the past three years.

In Bouquet Canyon, TDS concentrations show long-term stable trends over the past 30 years with minimal variation and may be correlated with periods of flow in Bouquet Canyon Creek (**Figure 5-18**). TDS concentrations in Bouquet Canyon have ranged from approximately 400 to almost 900 mg/L historically. In 2018, TDS concentrations exceeded the historical range with a value of 910 mg/L in one of the wells in this area while another well was within the range. The WQO for Bouquet Canyon is 700 mg/L. The SNMP found that the average TDS concentration for this area was 710 mg/L, slightly above the WQO.

TDS concentrations in the western areas of the Basin exhibited similar patterns and responses to wet and dry periods as those observed in the eastern portions of the Valley (**Figure 5-19**). TDS concentrations in San Francisquito Canyon and Below Saugus WRP areas historically have ranged from approximately 300 to 1,100 mg/L. In 2018, TDS concentrations were within historical ranges and ranged from approximately 580 to 960 mg/L. The WQO for San Francisquito Canyon and Below Saugus WRP is 700 mg/L.

In the Castaic Valley and Below Valencia WRP areas, TDS concentrations have historically ranged between 300 to 1,100 mg/L (**Figure 5-19**). At times, variations in TDS concentrations appear to be related to wet and dry periods along with discharge from Castaic Lake. In 2018, there was only one analysis for TDS with a concentration of 460 mg/L, which is within the historic range. The WQO for the Castaic Valley and Below Valencia WRP areas is 1000 mg/L. The SNMP found that the average TDS in this area was 727 mg/L.

Box and Whisker plots illustrating summary statistics for TDS measured in wells located in each area are shown in **Figure 5-20.** This figure is based on data collected from 1990 through 2018. The largest range of values and highest concentration occurred in the Above Saugus WRP area. The Below Valencia WRP area displayed the smallest range but also the highest median value. Castaic Valley has the lowest median TDS concentrations. Below Saugus WRP, Bouquet Canyon, and Mint Canyon all exhibited similar distributions of TDS concentrations.

Long-term groundwater quality monitoring data for TDS shows a consistent pattern of meeting drinking water standards, although it appears to be intermittently affected by wet and dry cycles. This supports the conclusion that the Alluvium remains a viable ongoing water supply source in terms of groundwater quality even with short-term exceedances of water quality standards in a few of the wells.

Chloride

Chloride is a naturally occurring inorganic salt, but higher concentrations in groundwater can be associated with anthropogenic activities such as urban runoff or discharge of recycled water (**CLWA, 2016**). High concentrations result in a salty taste when used for drinking water. The SCML for chloride recommended by SWRCB DDW is 250 mg/L, with and upper limit of 500 mg/L and a short-term limit of 600 mg/L. The WQOs for chloride range from 100 to 150 mg/L.

Chloride concentrations in the Mint Canyon and Above Saugus WRP areas have historically ranged from 17 to 160 mg/L. Values in 2018 were between 46 and 120 mg/L (**Figure 5-21**). Concentrations have increased and decreased over time likely due to wet and dry conditions. WQO for this area is 150 mg/L and all representative wells are currently below this level. The SNMP found that the average concentration for the Mint Canyon and Above Saugus WRP area was 89 mg/L and 72 mg/L, respectively.

Chloride concentrations in the Bouquet Canyon have ranged between 40 and 120 mg/L (**Figure 5-21**). Values in 2018 were between 94 and 120 mg/L. Historical data is available since the mid 1970's where chloride concentrations are generally stable and below the WQO of 100 mg/L. The SNMP found that the average concentration for this area is 77 mg/L.

Chloride concentrations in the San Francisquito Canyon and Below Saugus WRP areas range from 36 to 130 mg/L, with 2018 values between 62 and 130 mg/L (**Figure 5-22**). Similar to other alluvial areas, chloride concentrations are stable but with a small increase in recent years. WQO for this area is 100 mg/L. The SNMP found that the average concentration for this area is 77 mg/L.

In the Castaic Valley and Below Valencia WRP Areas, chloride concentrations have ranged between 55 and 180 mg/L with a single 2018 measurement at 97 mg/L (**Figure 5-22**). There has been a slight upward trend in chloride concentrations since the mid-1990s.

Chloride concentrations across the alluvial aquifer are presented statistically as Whisker plots in **Figure 5-23**. Chloride concentrations in the Above Saugus, Below Valencia, and Castaic Valley all have similar distributions. The highest median value occurred in the Below Valencia area and the lowest in the San Francisquito Canyon. The SNMP found that the average concentration for this area was 77 mg/L.

Nitrate

Nitrate is a compound that is associated with agricultural activities, septic systems, confined animal facilities, landscape fertilization, and water treatment facilities. Consumption of water with high concentrations of nitrate can have adverse health effects, specifically for infants under the age of six months who can develop methemoglobinemia or blue baby syndrome (**SWRCB, 2017**). The MCL and the WQO objectives for each of the management areas for nitrate concentration is 45 mg/L (**CLWA, 2016**).

In the Mint Canyon and Above Saugus WRP areas, nitrate concentrations have ranged between non-detect (ND) and 38 mg/L. There is no apparent trend of increasing nitrate concentration in the Mint Canyon and Above Saugus WRP areas (**Figure 5-24**). The average concentration identified in the SNMP for the Mint Canyon and Above Saugus WRP area were 20 and 21 mg/L, respectively.

Nitrate concentrations in the Bouquet Canyon Area have ranged from 3 to 34 mg/L. Values have not shown any increasing trend over time (**Figure 5-24**). Average concentration identified in the SNMP for this area was 16 mg/L.

Nitrate concentrations in the San Francisquito Canyon and the Below Saugus WRP area have ranged from ND to 50 mg/L. This area has exhibited a wide range of values dating back to the mid 1950's but has not shown any increasing trend over time (**Figure 5-25)**. Average concentration identified in the SNMP for this area was 16 mg/L.

In the Castaic Valley and Below Valencia WRP areas, nitrate concentrations have ranged from ND to 36 mg/L with the highest concentration occurring in the 1950's. There has not been an increasing trend in nitrate concentrations (**Figure 5-25**). Average concentration identified in the SNMP for this area was 8 mg/L.

Figure 5-26 includes Box and Whisker plots representing the statistical distribution of nitrate concentrations across the alluvial aquifer that includes data from 1990 to present. Median concentrations are all well below the MCL and WQO of 45 mg/L. The lowest median value is in Castaic area while the highest is the Below Saugus WRP area.

Sulfate

Sulfate is naturally occurring in groundwater and can occur as a result as runoff from natural geological deposits and from industrial waste. Consumption of sulfate in high concentrations can have a laxative effect (**WHO, 2004**). The SMCL is 250 mg/L with an upper limit of 500 mg/L and a short-term limit of 600 mg/L. The WQOs for the alluvial aquifer range from 150 to 350 mg/L (**CLWA, 2016**).

In the Mint Canyon and Above Saugus WRP areas, sulfate concentrations have historically ranged between 34 and 538 mg/L (**Figure 5-27**). In the set of wells shown on **Figure 5-27**, all wells except VWD-U4 exhibit a similar steady trend with values less than the WQO of 150 mg/L and no long-term increasing trend. VWD-U4 has shown a very wide range of sulfate concentrations with values exceeding the WQO and SMCL. The last available measurement for this well was in 2014 with a concentration of 440 mg/L. 2018 values were between 78 and 140 mg/L, which were measured at VWD-T7 and SCWD-N. Oaks Central, respectively (**Figure 5-27**). VWD-U4 has had sulfate concentrations as high as 500 mg/L. The last measurement for this well was in 2014 with a concentration of 440 mg/L. The average concentration identified in the SNMP for the Mint Canyon and Above Saugus WRP area was 138 and 269 mg/L, respectively.

In the Bouquet Canyon area, sulfate concentrations have historically ranged from 89 and 260 mg/L. Values have shown little variation over time with a gradual increasing trend. 2018 values were 210 and 260 mg/L measured at SCWD-Clark and SCWD-Guida (**Figure 5-27**). The WQO for this area is 250 mg/L. The average concentration identified in the SNMP for this area was 189 mg/L.

In the San Francisquito Canyon and Below Saugus WRP areas, sulfate concentrations have historically ranged between 46 and 506 mg/L. The highest value occurred in the early 1960s. Since the early 1990's values have been consistent in this area, showing a gradual increasing trend. In 2018, sulfate concentrations were between 160 and 300 mg/L (**Figure 5-28**). The WQO for this area is 250 mg/L. The average concentration identified in the SNMP for this area was 189 mg/L.

In the Castaic Valley and Below Valencia WRP areas, sulfate concentrations have historically ranged between 89 and 606 mg/L (**Figure 5-28**). The historic high value occurred in the late 1960's with the historic low occurring in 2018. Wells in the area have exhibited a decreasing trend of sulfate concentration. The WQO for this area is 350 mg/L. The average concentration identified in the SNMP for this area was 246 mg/L.

Figure 5-29 is a Box and Whisker plot that presents the distribution of sulfate concentrations across the alluvial aquifer with data from 1990 to present. The greatest variation occurs in the Above Saugus WRP area with the highest median value in the Below Valencia WRP area.

Groundwater Quality – Saugus Formation

TDS

TDS concentrations for wells in the Saugus Formation are illustrated in **Figure 5-30**. Beginning in 2000, several wells within the Saugus Formation have exhibited an increase in TDS concentrations, similar to short-term changes in the Alluvium, possibly as a result of decreased recharge to the Saugus Formation from the Alluvium. From 2006 through about 2010, TDS concentrations had been steadily declining, followed by an increase through 2016 and a slight decrease in 2017/2018. TDS concentrations in the Saugus Formation remain within the range of historic concentrations and below the SMCL upper level. The WQO for the Saugus Formation is 700 mg/L. (**CLWA, 2016**). The average concentration identified in the SNMP was 636 mg/L. Groundwater quality within the Saugus Formation will continue to be monitored to ensure that the long-term viability of the Saugus Formation as a component of overall water supply is preserved.

Chloride

Chloride concentrations for representative wells are presented in **Figure 5-31.** Historic chloride concentrations have ranged between 17 and 420 mg/L. Chloride concentration in the Saugus Formation have been stable for the past 50 years. The WQO for chloride in the Saugus Formation is 100 mg/L. The average concentration identified in the SNMP was 28 mg/L.

Nitrate

Nitrate concentrations for representative wells are presented in **Figure 5-32.** Nitrate concentrations in the Saugus Formation have ranged from ND to 28 mg/L. Values have historically been stable but have shown higher concentrations in recent years, but are still well below the WQO of 45 mg/L. The average concentration identified in the SNMP was 14 mg/L.

Sulfate

Sulfate concentrations for representative wells are presented in **Figure 5-33**. Historic sulfate concentrations have ranged from 80 to 730 mg/L. The highest concentrations have been observed in VWD-159, which has not been sampled since 1998. Overall, sulfate concentrations have exhibited an increasing trend in recent years. The high sulfate in the Saugus Formation is mostly likely due to naturally occurring minerals present in the rock. The average concentration identified in the SNMP was 235 mg/L. A WQO for sulfate in the Saugus Formation is not identified in the SNMP.

Groundwater Constituents of Concern (Anthropogenic) in the Alluvium and Saugus Formation

Groundwater COC that have been measured in the Alluvium and Saugus Formation include perchlorate, per- and polyfluoroalkyl substances (PFAS), and volatile organic compounds (VOCs) such as trichloroethylene (TCE), and tetrachloroethylene (PCE). These contaminates have been identified in previous studies and are currently monitored under other state and federal regulatory programs (**LSCE, 2019; CLWA, 2016; CLWA, 2016a**).

Perchlorate and VOCs

Perchlorate is a regulated substance that is commonly used in propellants for rockets, missiles, and fireworks. Consumption of groundwater with high concentrations perchlorate can result in issues with the thyroid gland (**EPA, 2014**). There have been a number of detections in the Basin, both in the alluvial aquifer and in the Saugus Formation. Perchlorate was first detected in the Basin in 1997 and since has been detected in a total of eight wells. Wellhead treatment systems have been built for four Saugus Formation production wells operated by SCV water, with oversight from the California Department of Toxic Substances Control (**LSCE, 2019**).

PCE is a VOC that is commonly associated with dry cleaning and metal degreasing processes. Long-term exposure at levels near the MCL can result in cancer. Other adverse effects include damage to the liver, kidneys, and central nervous system (**SWRCB, 2017a**). Detections of PCE have primarily occurred in the alluvial aquifer, however, the concentrations have been below the MCL.

TCE is a VOC that is primarily associated as a solvent to remove grease from metal parts. Long-term exposure could result in cancer. Exposure can also affect the central nervous system with symptoms such as light-headedness, drowsiness, and headache (**SWRCB, 2017b**). Detections of TCE have primarily occurred in the Alluvial Aquifer, however, the concentrations have been below the MCL. **Table 5-3** presents the number of wells with detections above the reporting limit (RL) and MCL for each Perchlorate and VOCs of interest across the Basin.

Table 5-3. Wells with Perchlorate and VOC Detections

COC	Alluvial Wells with Detections > RL	Saugus Wells Detections > RL	RL	Max Concentration	MCL	Wells with Detections Above MCL	Units
PERCHLORATE	2	6	4	47	6	7	ug/L
PCE	14	1	0.5	2.6	5	0	ug/L
TCE	4	6	0.5	4.4	5	0	ug/L

PFAS

PFAS refers to the larger group of COC of per- and polyfluoroalkyl substances. Largely used in firefighting foams, non-stick coatings, cookware, carpets, and furniture, these substances tend to accumulate in groundwater and long-term exposure could potentially affect the immune system, thyroid, liver, and can cause cancer. The most common types of PFAS are perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). They are a contaminant of emerging concern that are not currently regulated. The SWRCB DDW have identified notification levels for PFAS concentrations that is a precautionary health-based measure for concentrations of chemicals in drinking water that warrant further monitoring and assessment (**SWRCB, 2019**).

The DTSC and LA Regional Water Quality Control Board are overseeing the monitoring of and response to detections of constituents of concern exceeding the MCLs. SCV Water is actively addressing the issue with the regulatory agencies and has taken wells out of service that have detections above reporting limits until wellhead treatment systems are deployed.

The following is a SCVWA News Release from March 13, 2020.

> *SANTA CLARITA –SCV Water has taken proactive steps to protect public health by voluntarily removing 13 of its groundwater wells from service. This move follows the State Water Resources Control Board – Division of Drinking Water (DDW) Feb. 6, 2020, decision to lower its response level guidelines for two chemicals found in low concentrations in drinking water across the state.*
>
> *Voluntary quarterly sampling of all active wells was done in February, and this action is based on those results for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). The Agency did not find more or higher levels of the chemicals, but instead is taking action based on the lowered response levels set by the DDW.*
>
> *The action this week is not related to the COVID-19 virus. The virus is not found in drinking water.*
>
> *Under the new levels, 14 of the 44 agency wells are impacted. This accounts for approximately 34 percent of the Agency's groundwater supply. In 2019, groundwater accounted for just 28% of the total water used in the SCV Water service area. SCV Water will continue to rely on its diverse water supply portfolio, including imported and banked water, to minimize supply impacts to customers.*
>
> *"SCV Water has a diverse and resilient water supply, so this action will not impact the availability of water to our customers," stated Matt Stone, general manager. "However, with some groundwater wells temporarily offline, it remains important that customers continue to use water efficiently in their homes and on their landscapes.*

Last month, the DDW lowered its response levels to 10 parts per trillion (ppt) for PFOA and 40 parts per trillion (ppt) for PFOS. The state's previous response level set a combined 70 ppt for PFOA and PFOS. These response levels are some of the most stringent guidelines in the nation, and lower than the Environmental Protection Agency's Lifetime Health Advisory level of 70 ppt. For perspective, one part per trillion would be equal to four grains of sugar in an Olympic-size swimming pool.

The updated guidelines are part of DDW's statewide effort to assess the scope of water supply contamination by PFOS and PFOA.

"We have three quarters of sampling data we can factor in now, giving us a head start in addressing the new guideline," stated Matt Stone, general manager of SCV Water. "Our top priority is providing clean and reliable water to our customers. We immediately removed one well from service last year when it exceeded the original response level, and we have taken the same actions for the 13 additional wells that exceeded the revised response level."

SCV Water is also quickly moving forward with the construction of several water treatment plants to return affected wells back to service. The first PFAS treatment facility has started construction and is expected to be in operation by June of this year, restoring three key wells to service, which provides enough groundwater for 5,000 families. The fast-tracked project is estimated to cost $6 million to build and $600,000 annually to operate. Additional groundwater treatment facilities are in the planning and design phase.

"We are committed to clear and timely communication with our customers about all water quality changes and how we plan to address them," said Stone. "Our customers are our top priority, and we are committed to rigorously testing our water thousands of times per year to ensure it meets or surpasses all water-quality standards and is safe for our customers to drink."

Per- and polyfluoroalkyl substances (PFAS) are a group of manmade chemicals that are prevalent in the environment and were commonly used in industrial and consumer products to repel grease, moisture, oil, water and stains. Water agencies do not put these chemicals into the water, but over time very small amounts enter the water supplies through manufacturing, wastewater discharge and product use. Exposure to these chemicals may cause adverse health effects.

For more information and resources on PFAS, visit yourSCVwater.com/pfas.

REFERENCES

Castaic Lake Water Agency (CLWA), Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Subbasin, Los Angeles County, California, December 2003.

Castaic Lake Water Agency (CLWA), CLWA Santa Clarita Water Division, Newhall County Water District, and Valencia Water Company, 2015 Urban Water Management Plan, Los Angeles County Waterworks District No. 36, Cooperating Agency, June 2016a.

Castaic Lake Water Agency (CLWA), Salt and Nutrient Management Plan Santa Clara River Valley East Subbasin – DRAFT Final, October 2016.

CH2M Hill Regional Groundwater Flow Model for the Santa Clarita Valley, Model Development and Calibration, April 2004.

Galloway, D.L., Jones, D.R., and Ingebritsen, S.E. 1999. Land subsidence in the United States: U.S. Geological Survey Circular 1182, 175 p.

Hoffmann, J., S.A. Leake, D.L. Galloway, and A.M. Wilson. 2003. MODFLOW-2000 Groundwater model – user guide to the subsidence and aquifer-system compaction (SUB) package, U.S. Geological Survey Open File Report 03-233.

Luhdorff and Scalmanini, Consulting Engineers (LSCE), 2016 Santa Clarita Valley Water Report, prepared for Castaic Lake Water Agency, CLWA Santa Clarita Water Division, Los Angeles County Waterworks District 36, Newhall County Water District, and Valencia Water Company, June 2017.

Luhdorff and Scalmanini, Consulting Engineers (LSCE), 2018 Santa Clarita Valley Water Report, prepared for Castaic Lake Water Agency, CLWA Santa Clarita Water Division, Los Angeles County Waterworks District 36, Newhall County Water District, and Valencia Water Company, May 2019.

Luhdorff and Scalmanini, Consulting Engineers (LSCE), Revised Subsidence Vulnerability, Santa Clarita Valley Water Agency, Santa Clara River Valley Basin, East Subbasin Technical Memorandum, prepared For GSI Water Solutions, Inc., June 2021.

Slade, R. C., Hydrogeologic Investigation of Perennial Yield and Artificial Recharge Potential of the Alluvial Sediments in the Santa Clarita River Valley of Los Angeles County, California, Vols. I and II, prepared for Upper Santa Clara Water Committee, December 1986.

Slade, R.C., Hydrogeologic Conditions in the alluvial and Saugus Formation Aquifer Systems, Vols. I and II, prepared for Santa Clarita Valley Water Purveyors, July 2002.

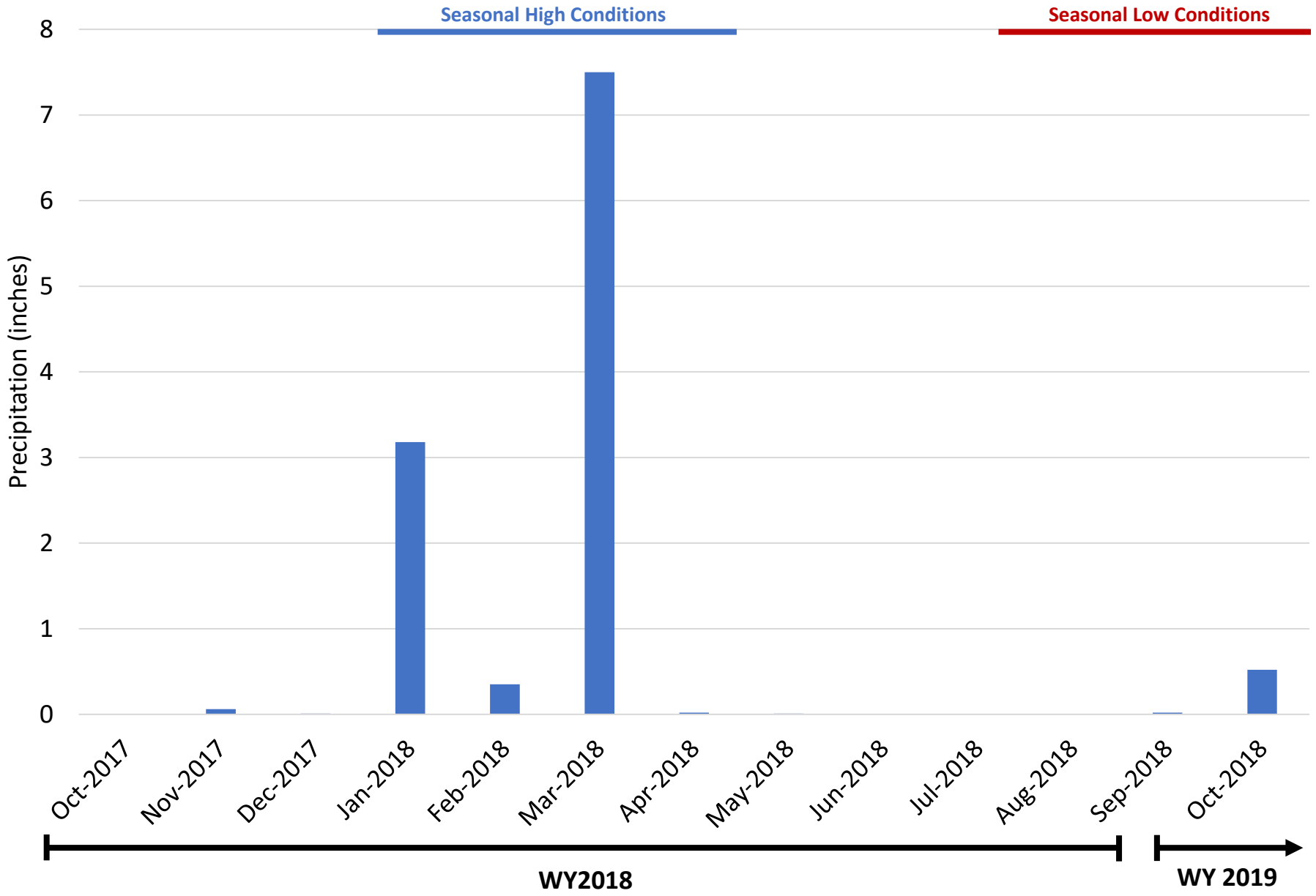
State Water Resource Control Board (SWRCB), Groundwater Information Sheet: Nitrate, November 2017

State Water Resource Control Board (SWRCB), Groundwater Information Sheet: Tetrachloroethylene (PCE), November 2017a

State Water Resource Control Board (SWRCB), Groundwater Information Sheet: Trichloroethylene (TCE), November 2017b

State Water Resource Control Board (SWRCB), PFAS – Frequently Asked Questions, March 2020
United States Environmental Protection Agency (EPA), Technical Fact Sheet – Perchlorate, January 2014
World Health Organization (WHO), Sulfate in Drinking Water: *Background document for development of WHO Guidelines for Drinking-water Quality*, 2004

Figures

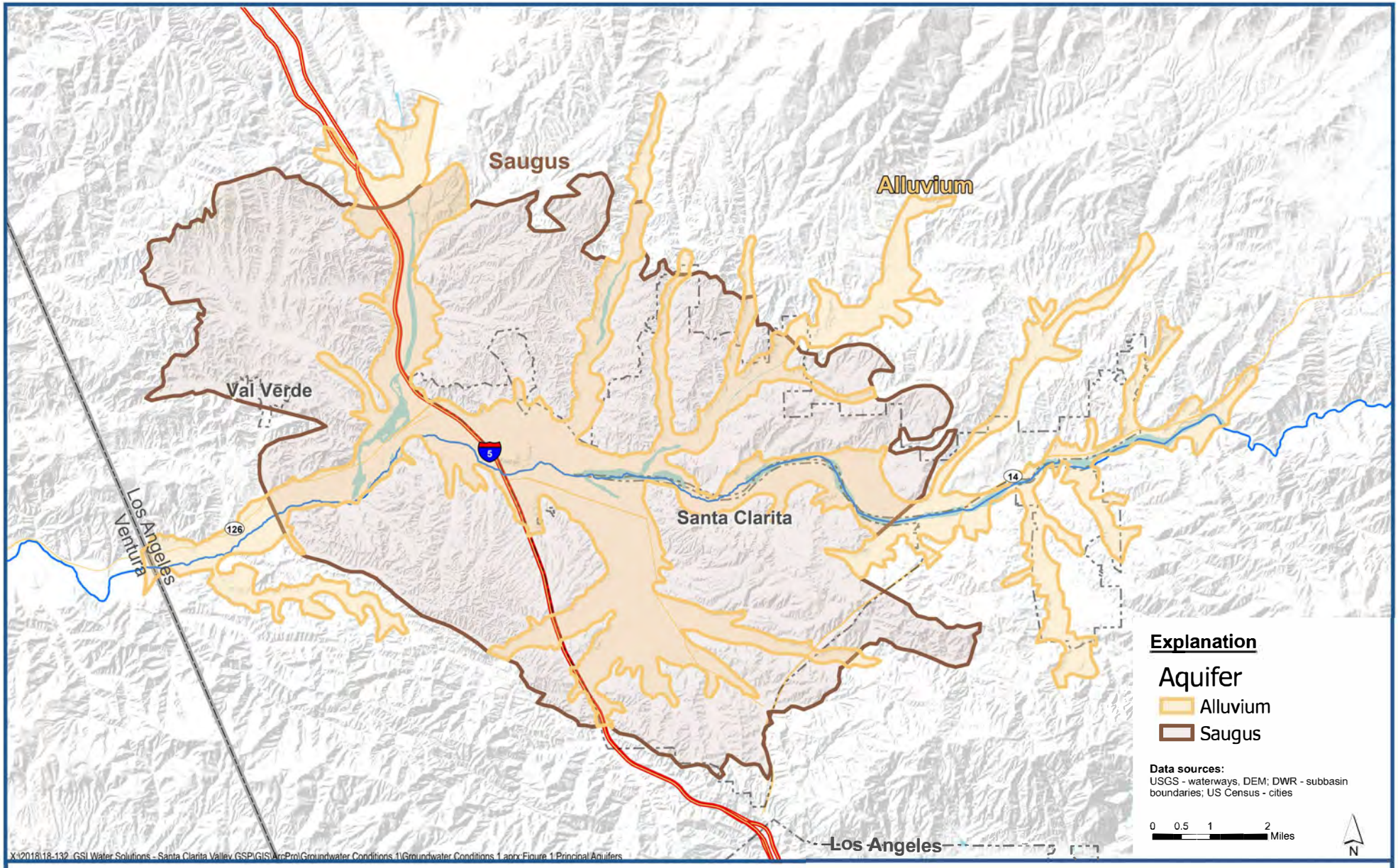


Luhdorff & Scalmanini Consulting Engineers

Water Year 2018 Calendar and Precipitation Totals (Newhall Water Division Gage)

Santa Clara River Valley East Subbasin Groundwater Sustainability Plan

Figure 5-1

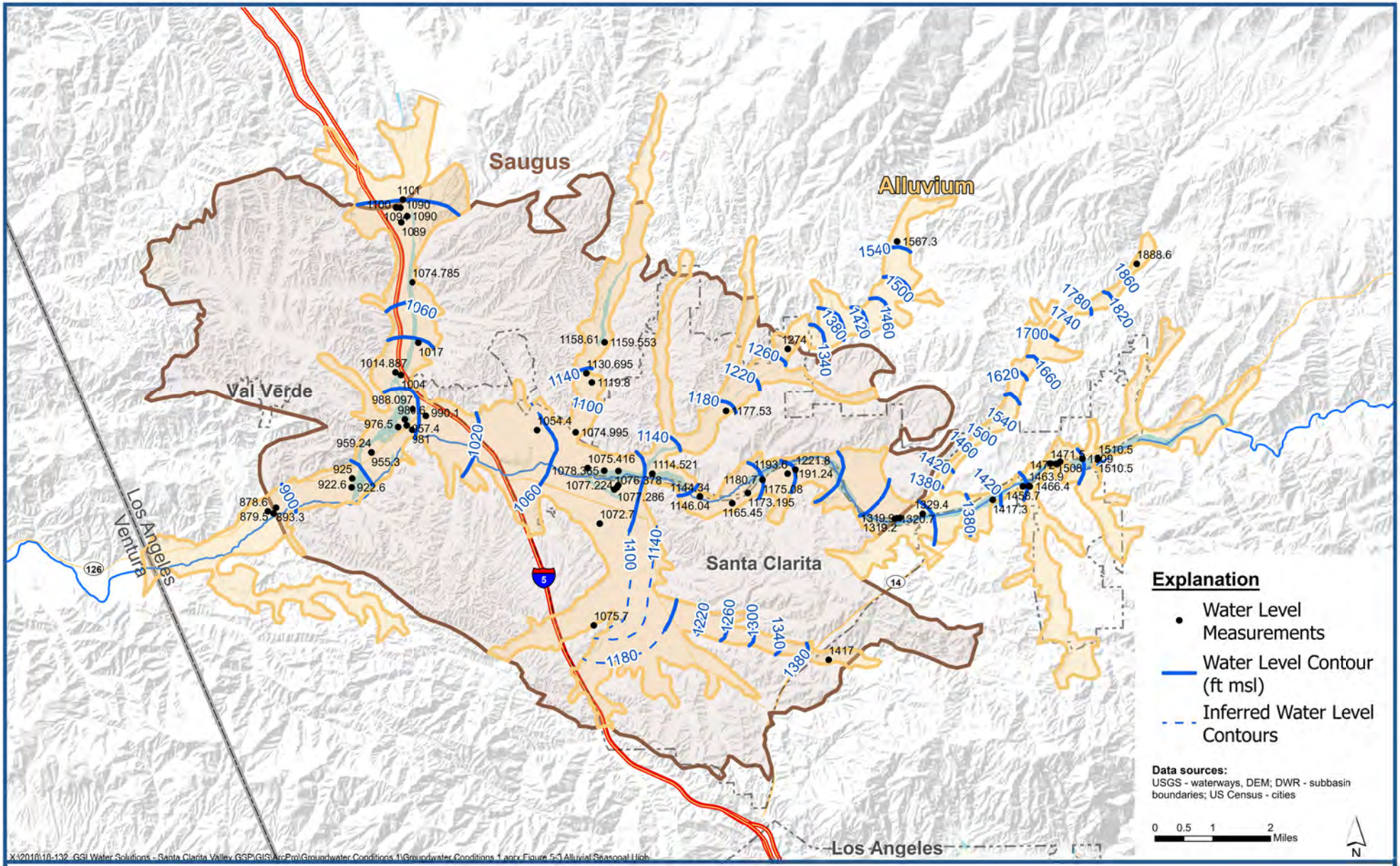


Luhdorff & Scalmanini
Consulting Engineers

Santa Clara East Subbasin
Principal Aquifers

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-2

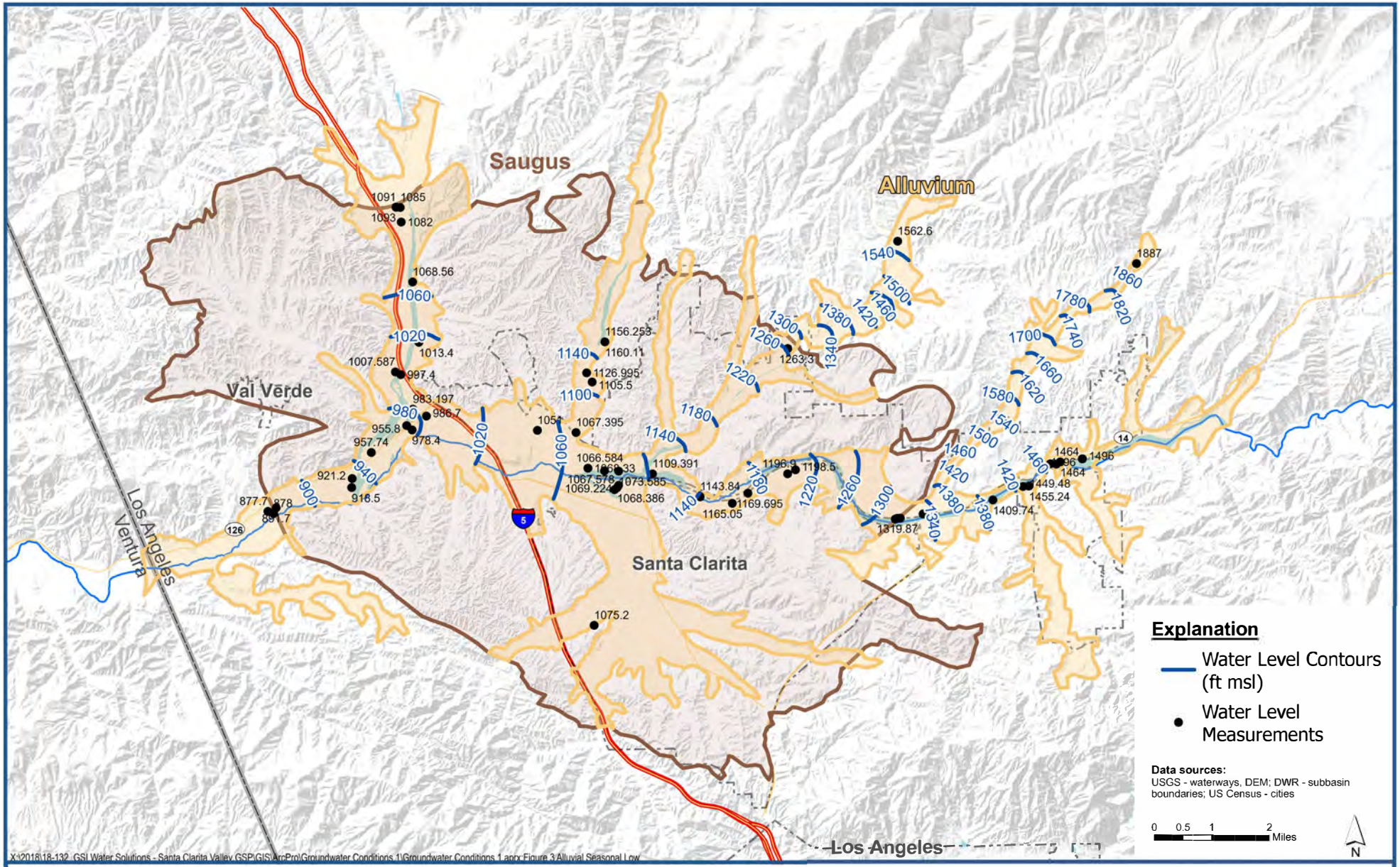


Water Year 2018 Seasonal High
Water Level Contours - Alluvial Aquifer

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-3

Luhdorff & Scalmanini
Consulting Engineers

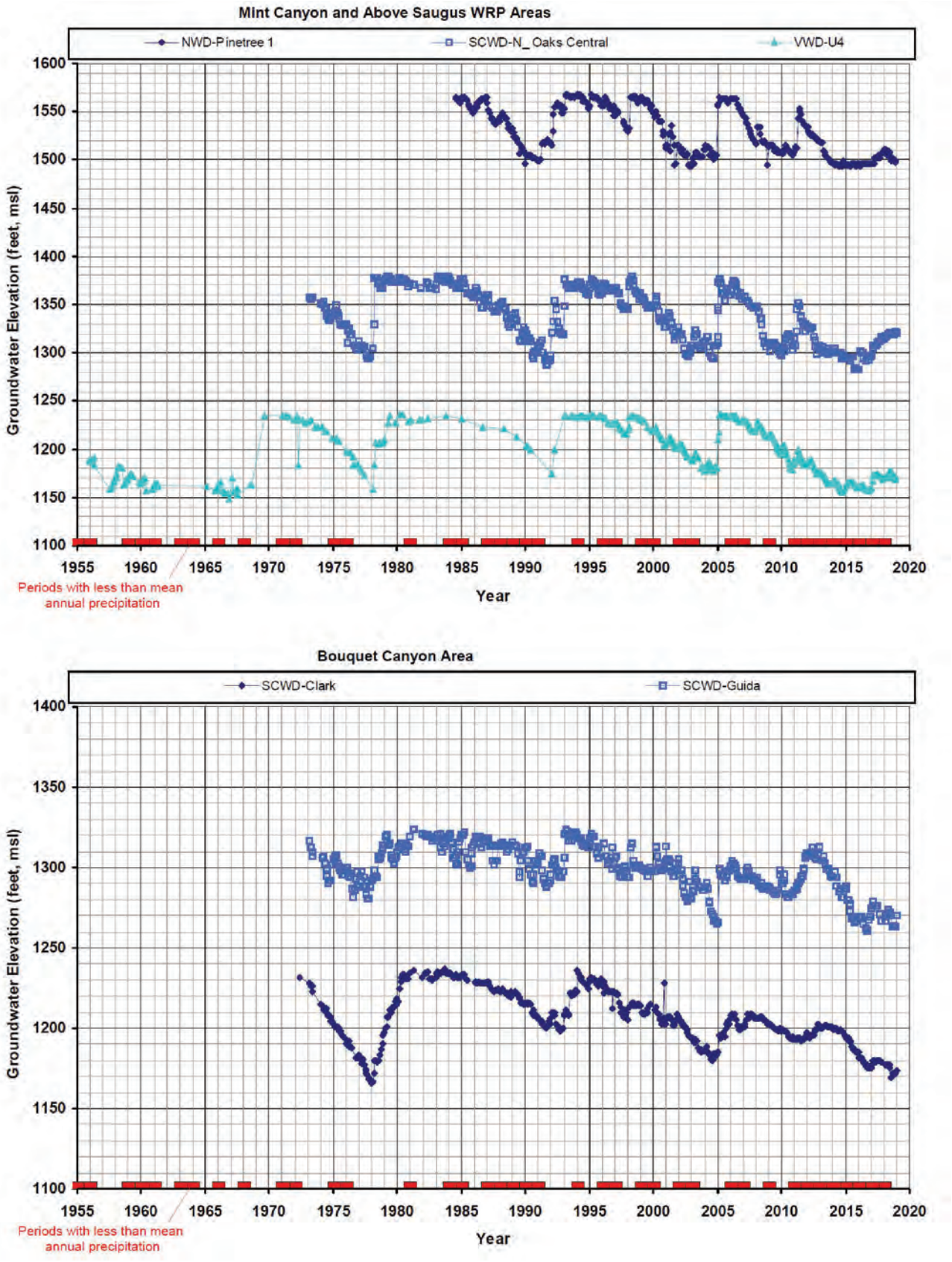


Luhdorff & Scalmanini
Consulting Engineers

Water Year 2018 Seasonal Low
Water Level Contours - Alluvial Aquifer

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-4



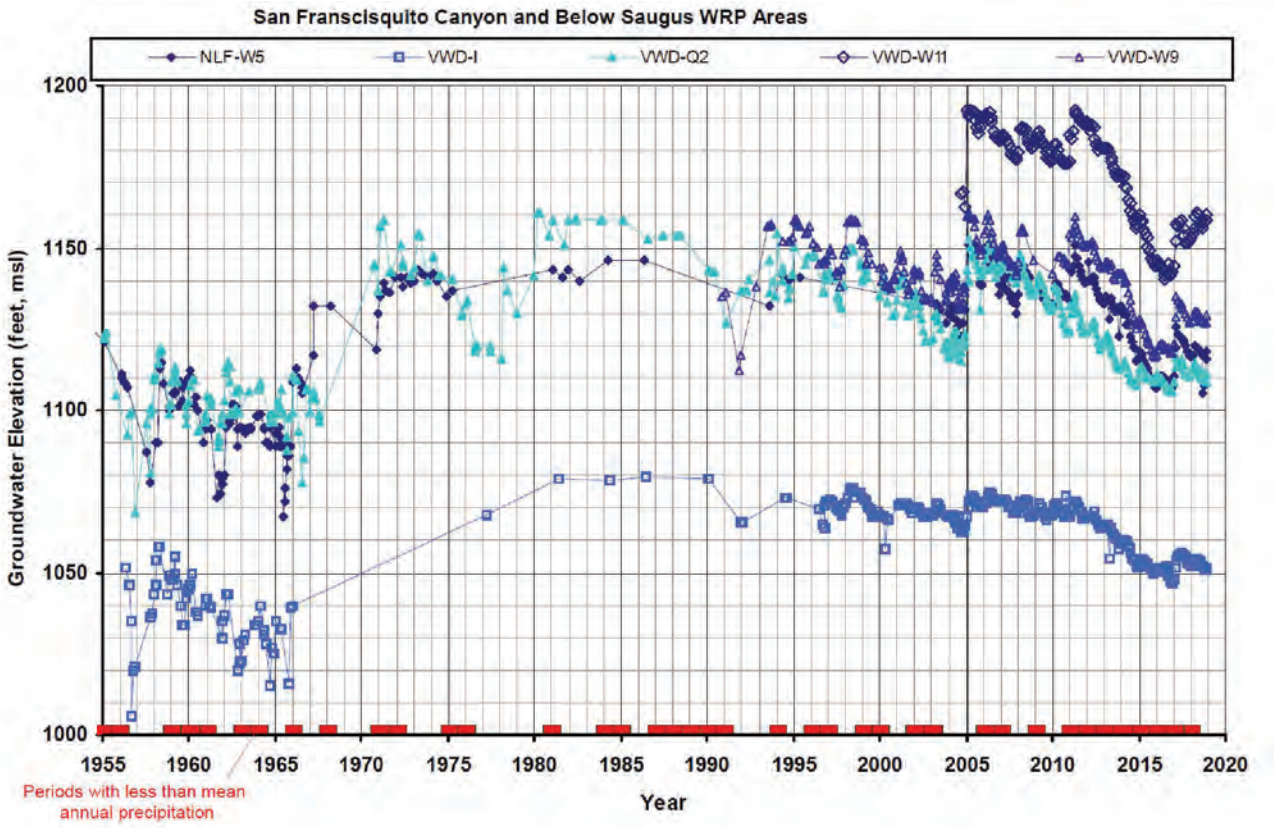
Y:\Santa Clarita\Water Report\Data\SCV\GIS\2017 Figures\FINAL MAPS NEW TEMPLATE\Portrait Access Titleblocks.mxd

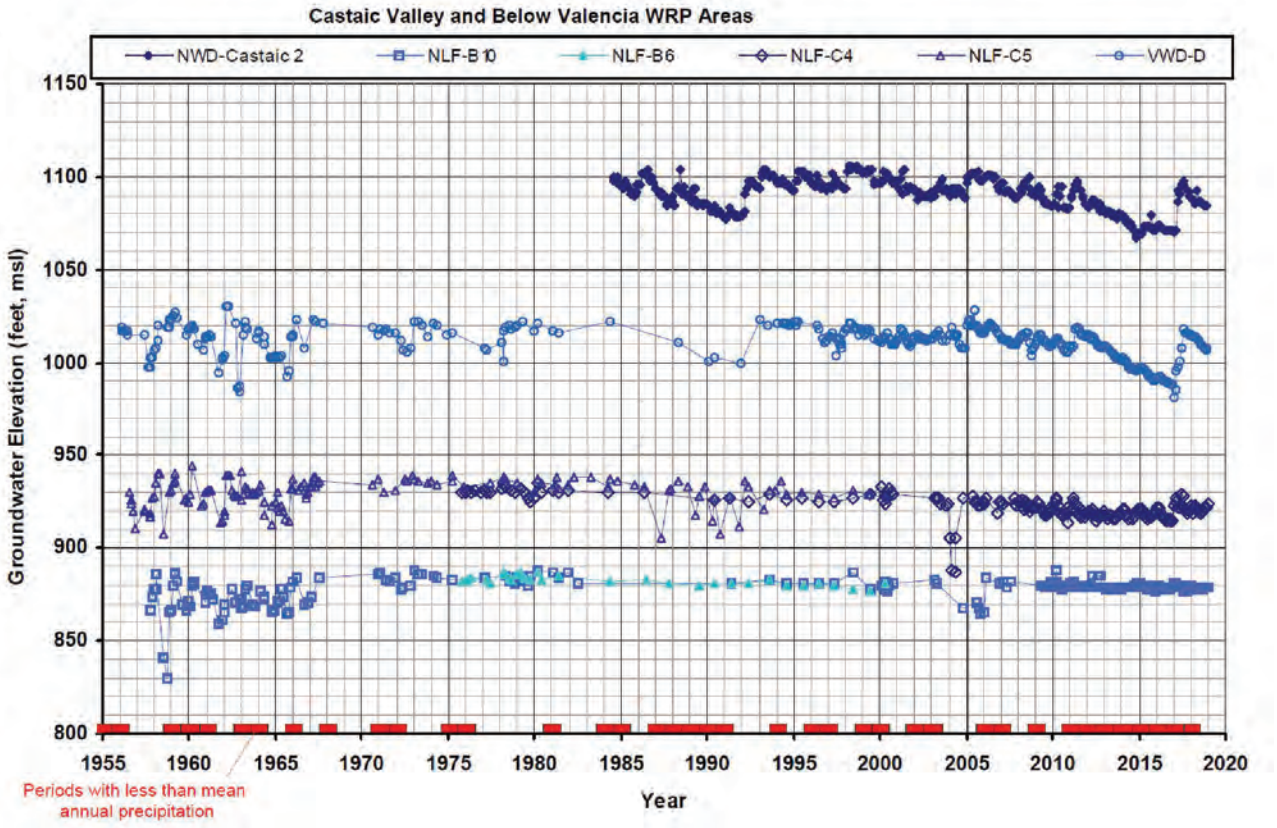
Luhdorff & Scalmanini
Consulting Engineers

Groundwater Elevations in Eastern Santa Clarita Valley Alluvial Wells

Santa Clara River Valley East Subbasin
Santa Clarita Valley, Los Angeles County, California

Figure 5-5





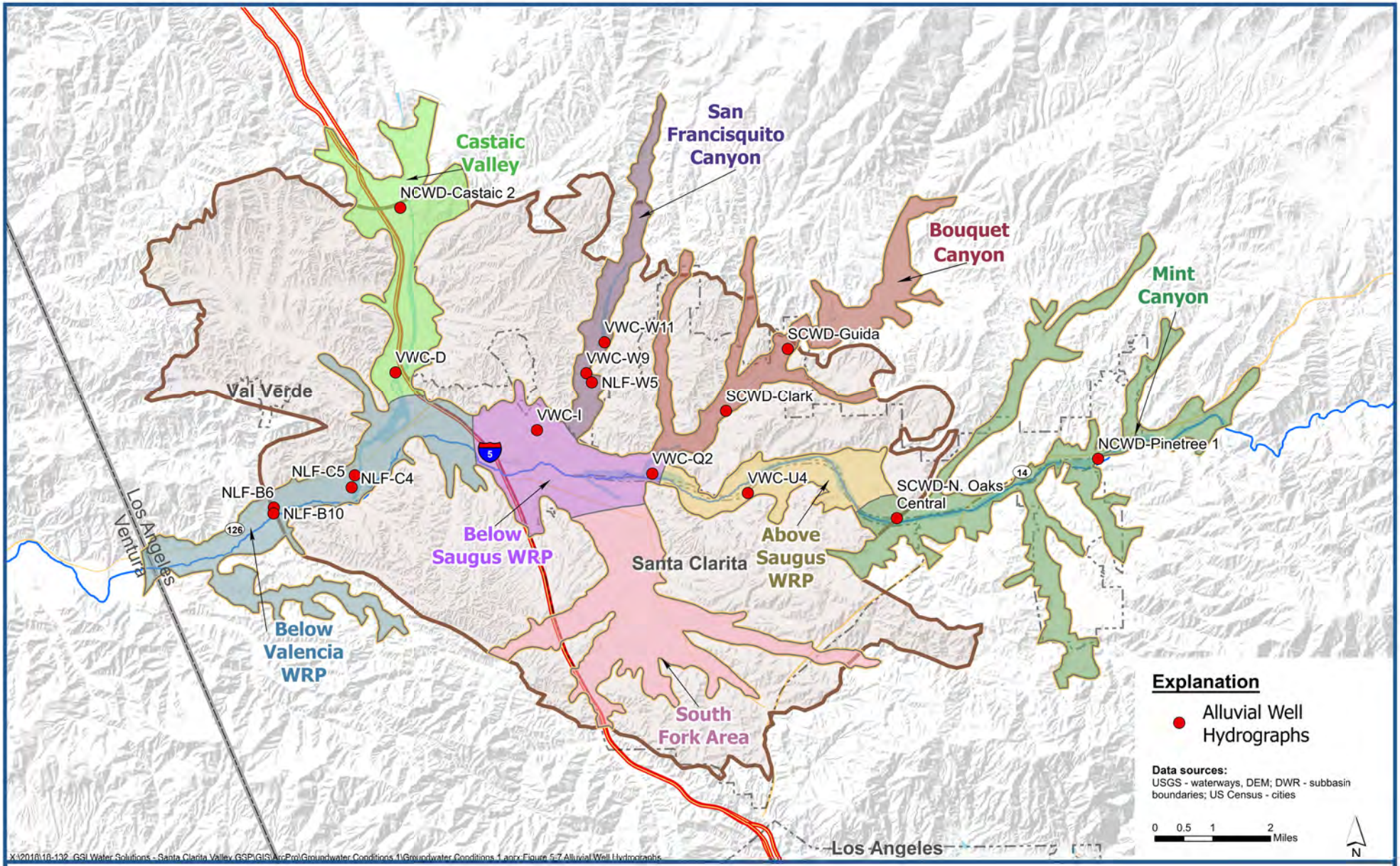
Y:\Santa Clarita\Water Report\Data\SCV\GIS\2017 Figures\FINAL MAPS NEW TEMPLATE\Portrait Access Titleblocks.mxd

Luhdorff & Scalmanini
Consulting Engineers

Groundwater Elevations in Western Santa Clarita Valley Alluvial Wells

Santa Clarita Valley Water Report
Santa Clarita Valley, Los Angeles County, California

Figure 5-6

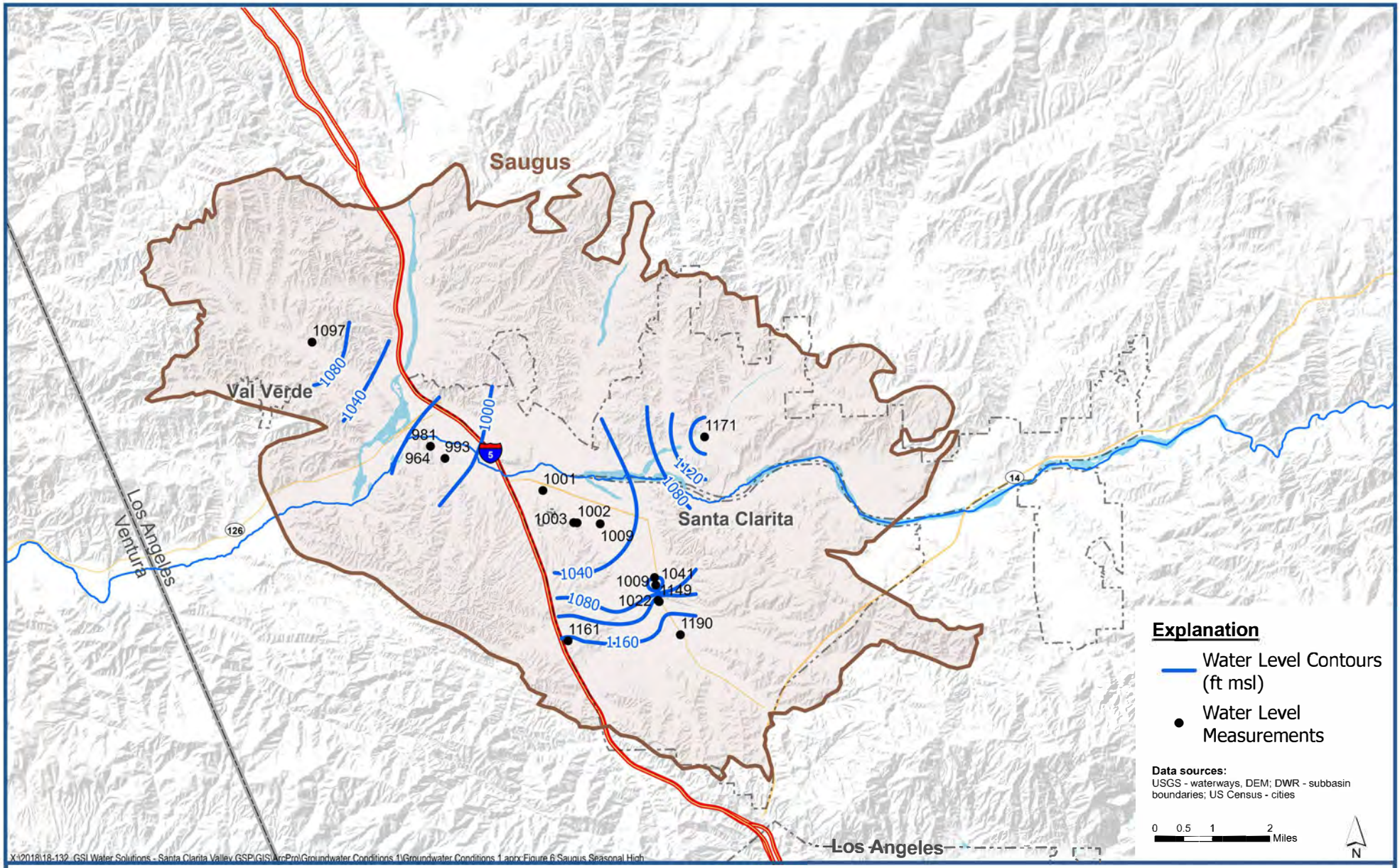


Luhdorff & Scalmanini
Consulting Engineers

Alluvial Well Hydrographs

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-7

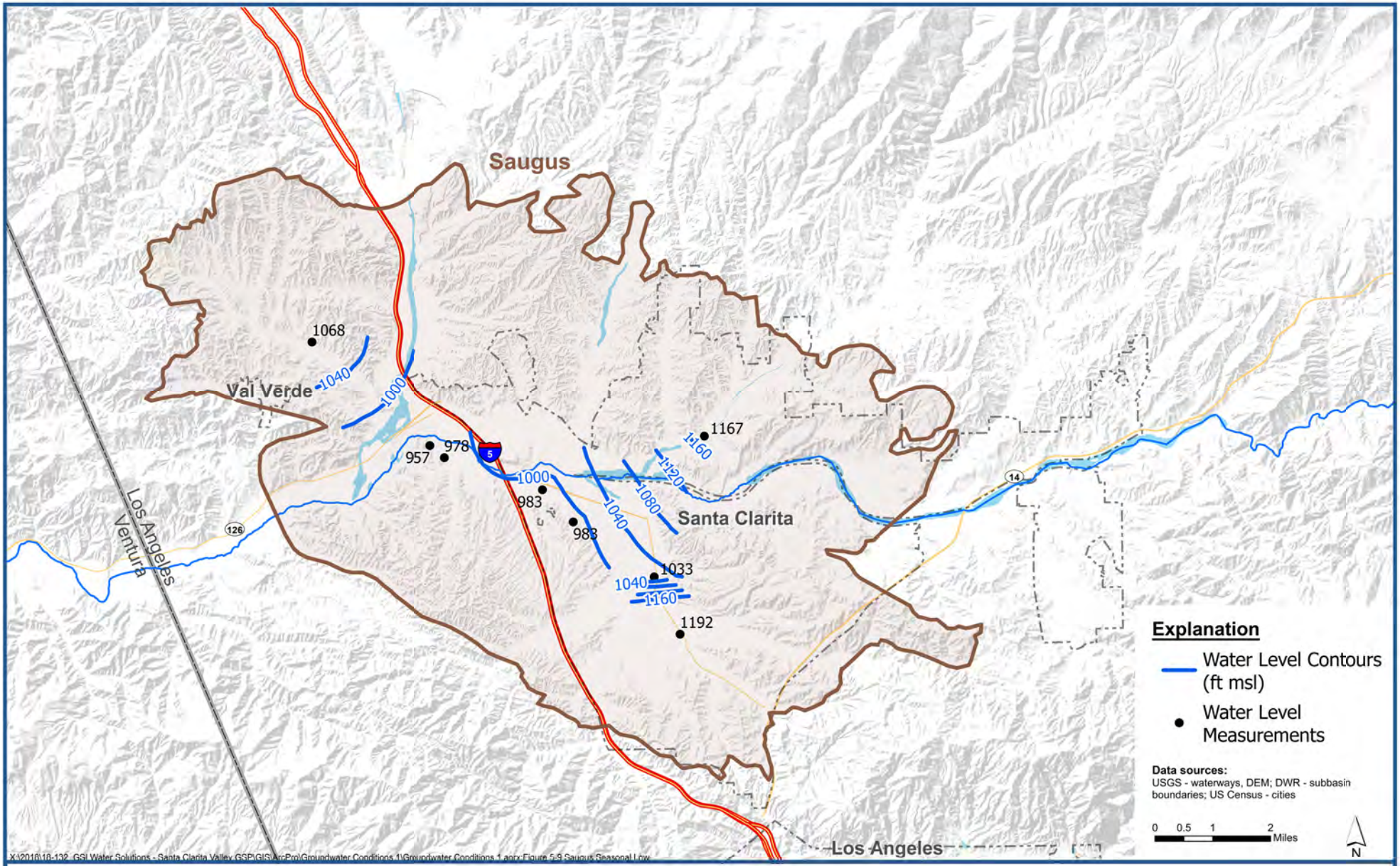


Luhdorff & Scalmanini
Consulting Engineers

Water Year 2018 Seasonal High
Water Level Contours - Saugus Formation Aquifer

Figure 5-8

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

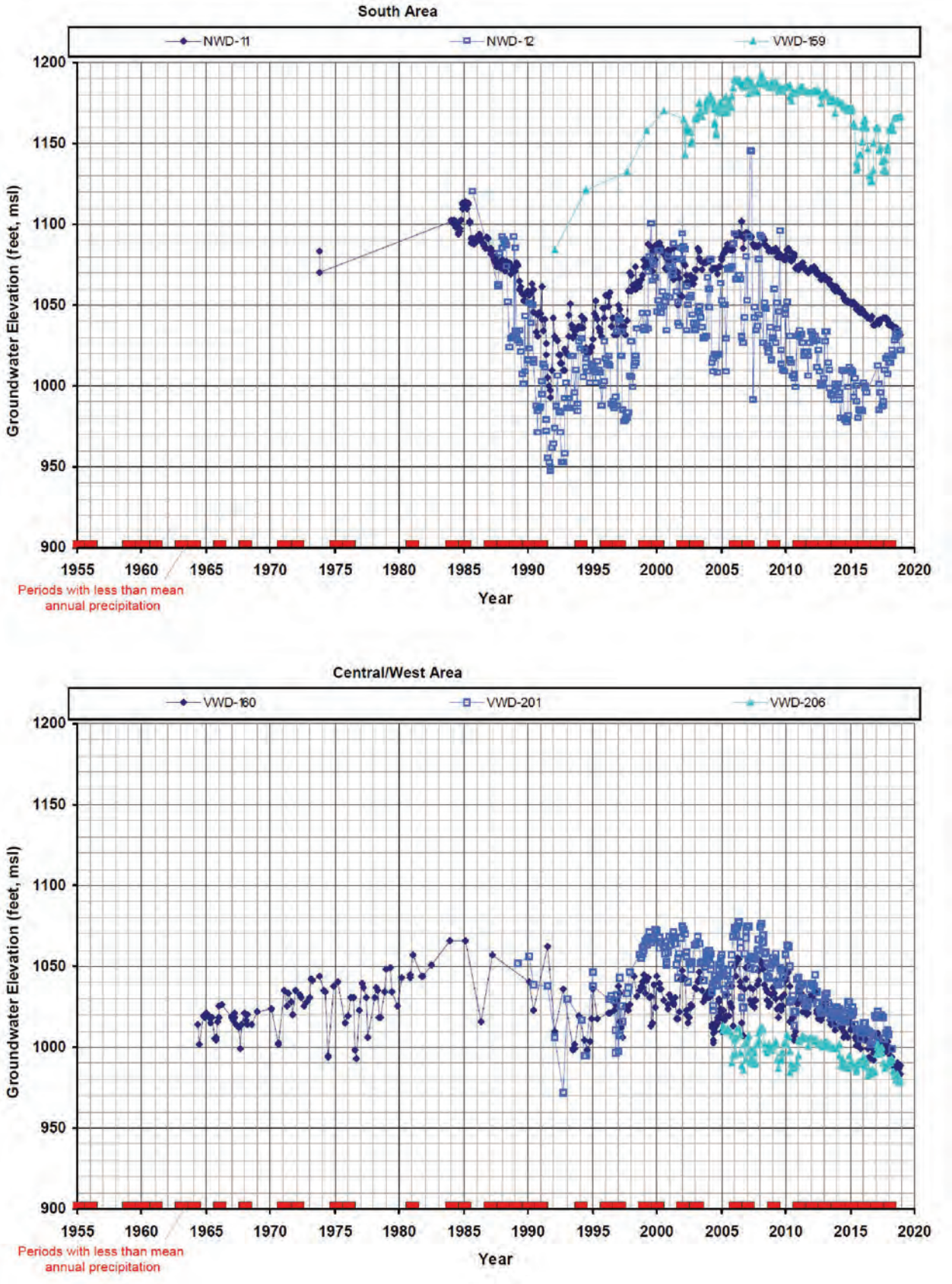


Luhdorff & Scalmanini
Consulting Engineers

Water Year 2018 Seasonal Low
Water Level Contours - Saugus Formation Aquifer

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-9



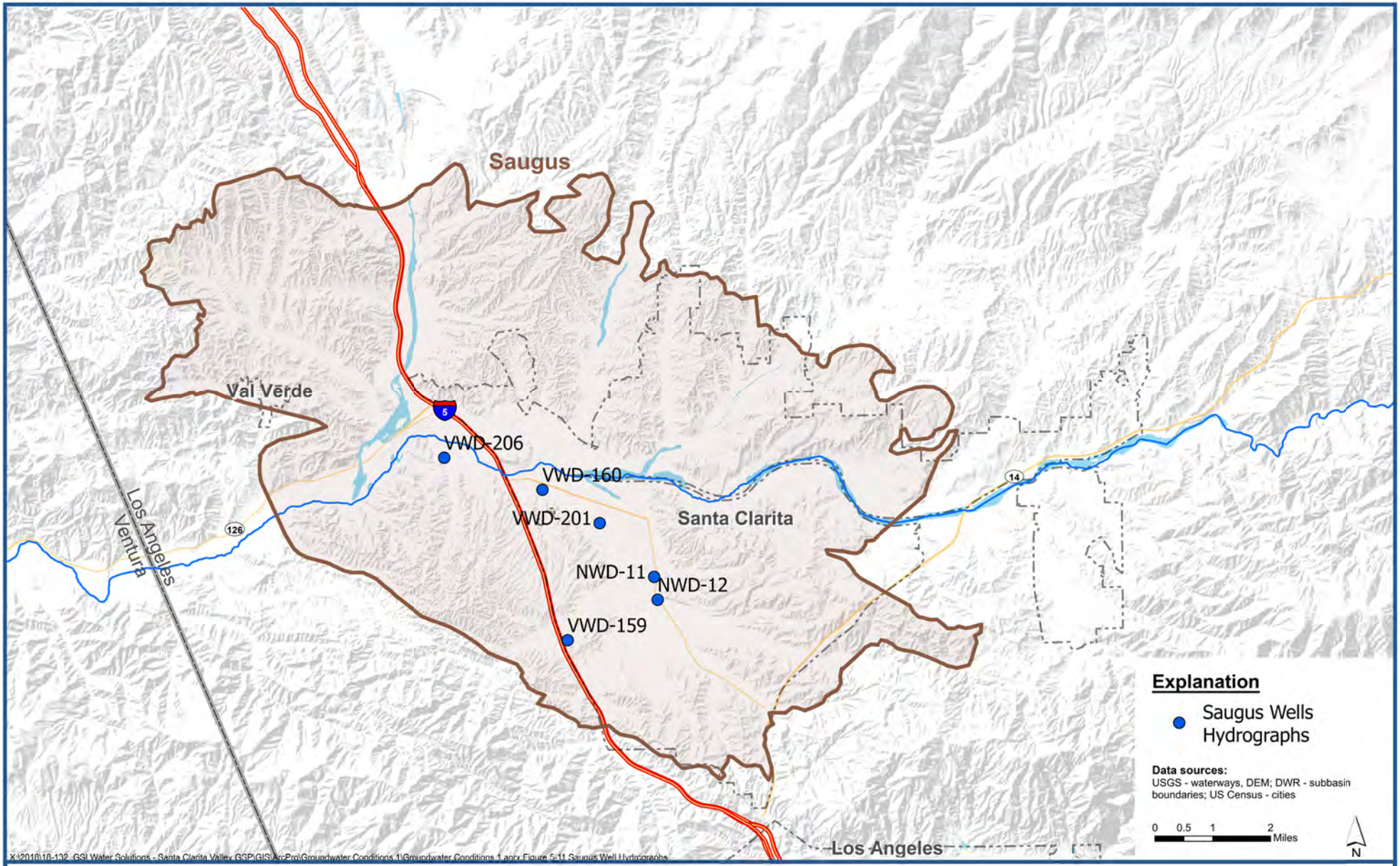
Y:\Santa Clarita\Water Report\Data\SCV\GIS\2017 Figures\FINAL MAPS NEW TEMPLATE\Portrait Access Titleblocks.mxd

Luhdorff & Scalmanini Consulting Engineers

Groundwater Elevations in Saugus Wells

Santa Clara River East Subbasin Groundwater Sustainability Plan

Figure 5-10

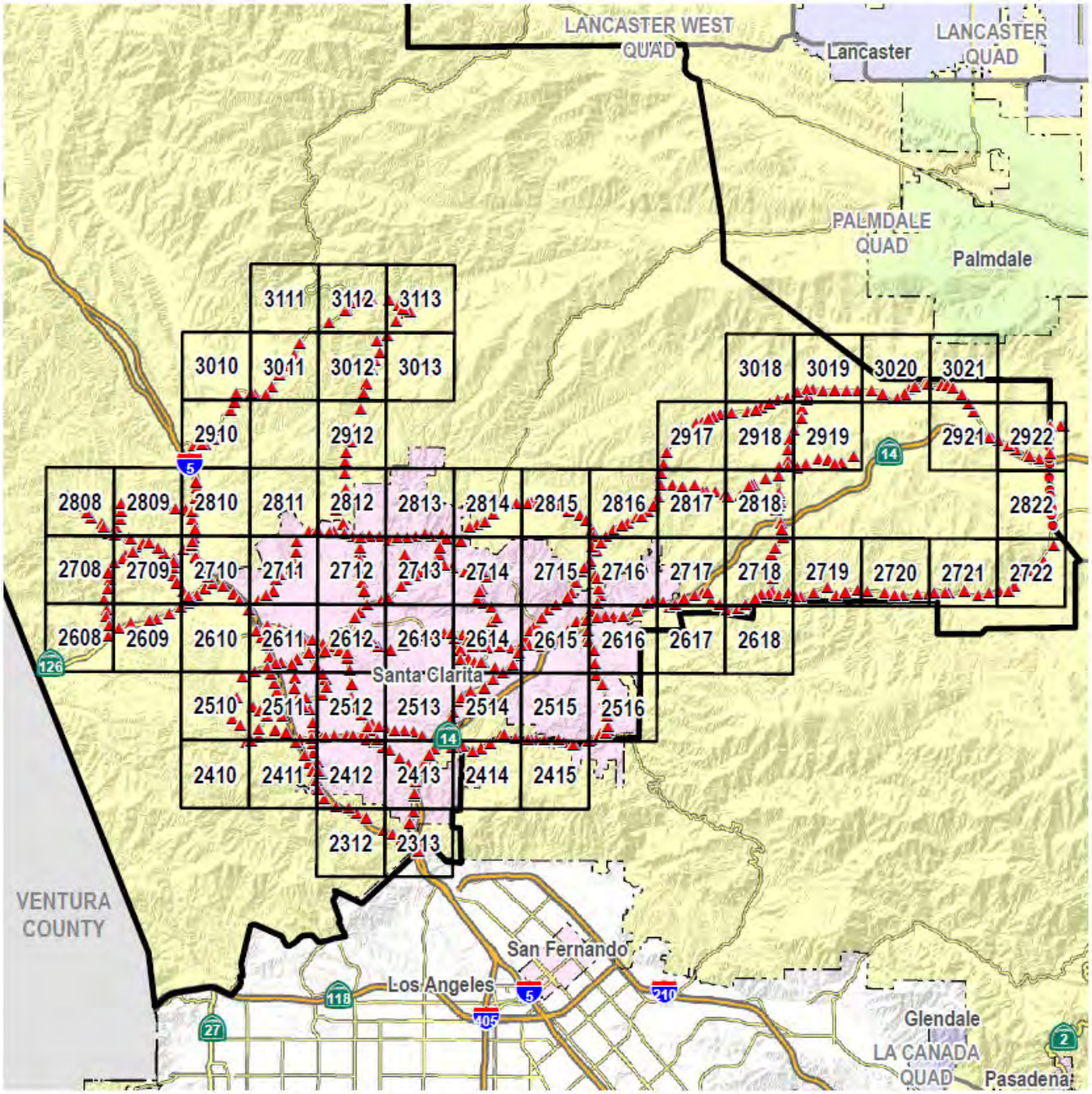


Luhdorff & Scalmanini
Consulting Engineers

Saugus Well Hydrographs

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-11



Data sources:
LA County Department of Public Works

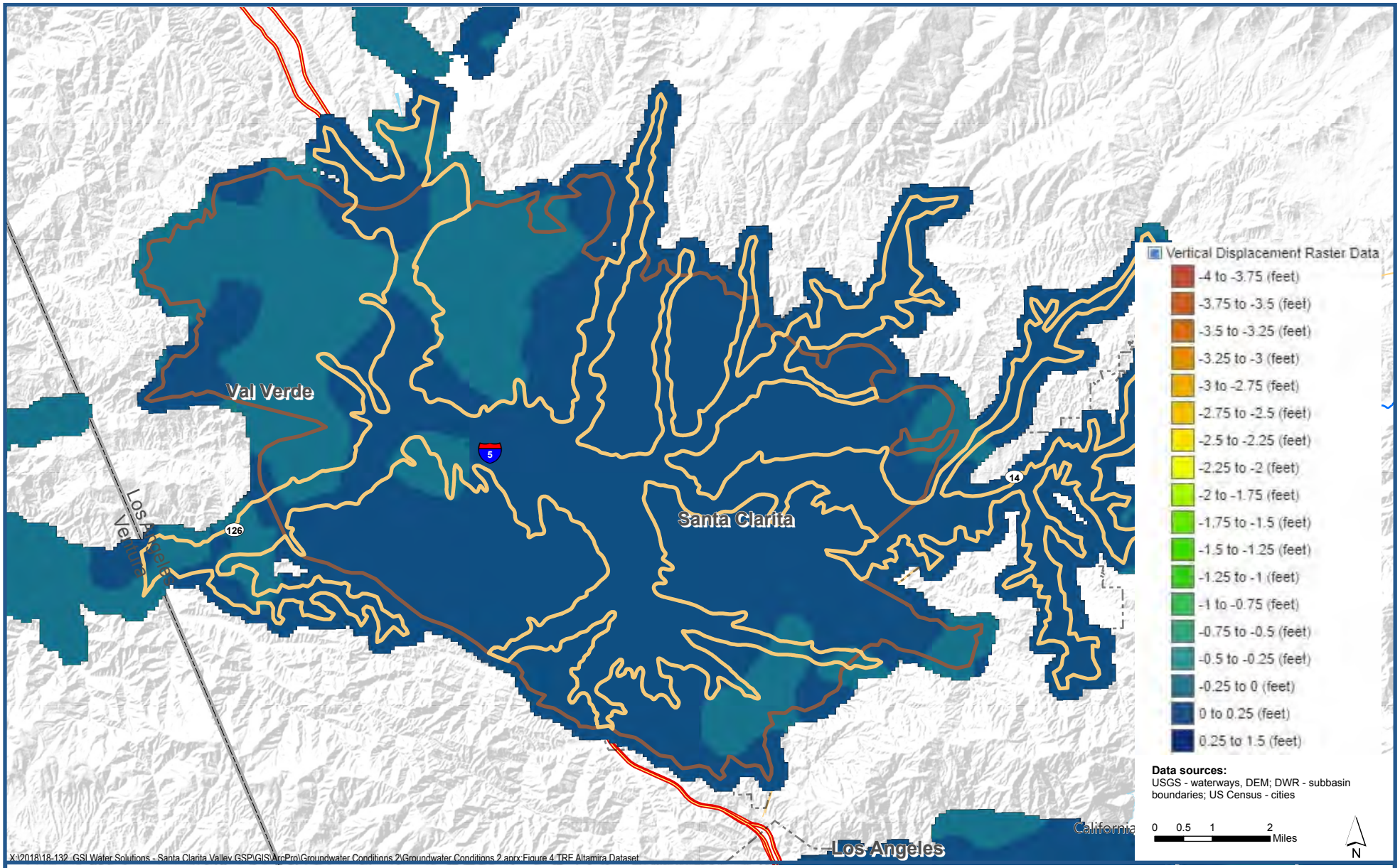
C:\2018\18-132 GSI Water Solutions - Santa Clarita Valley GSP\GIS\ArcPro\Groundwater Conditions 2\Groundwater Conditions 2.aprx

Luhdorff & Scalmanini
Consulting Engineers

Newhall Quad Benchmark Index

Figure 5-12

Santa Clarita Valley Water Report
Santa Clarita Valley, Los Angeles County, California

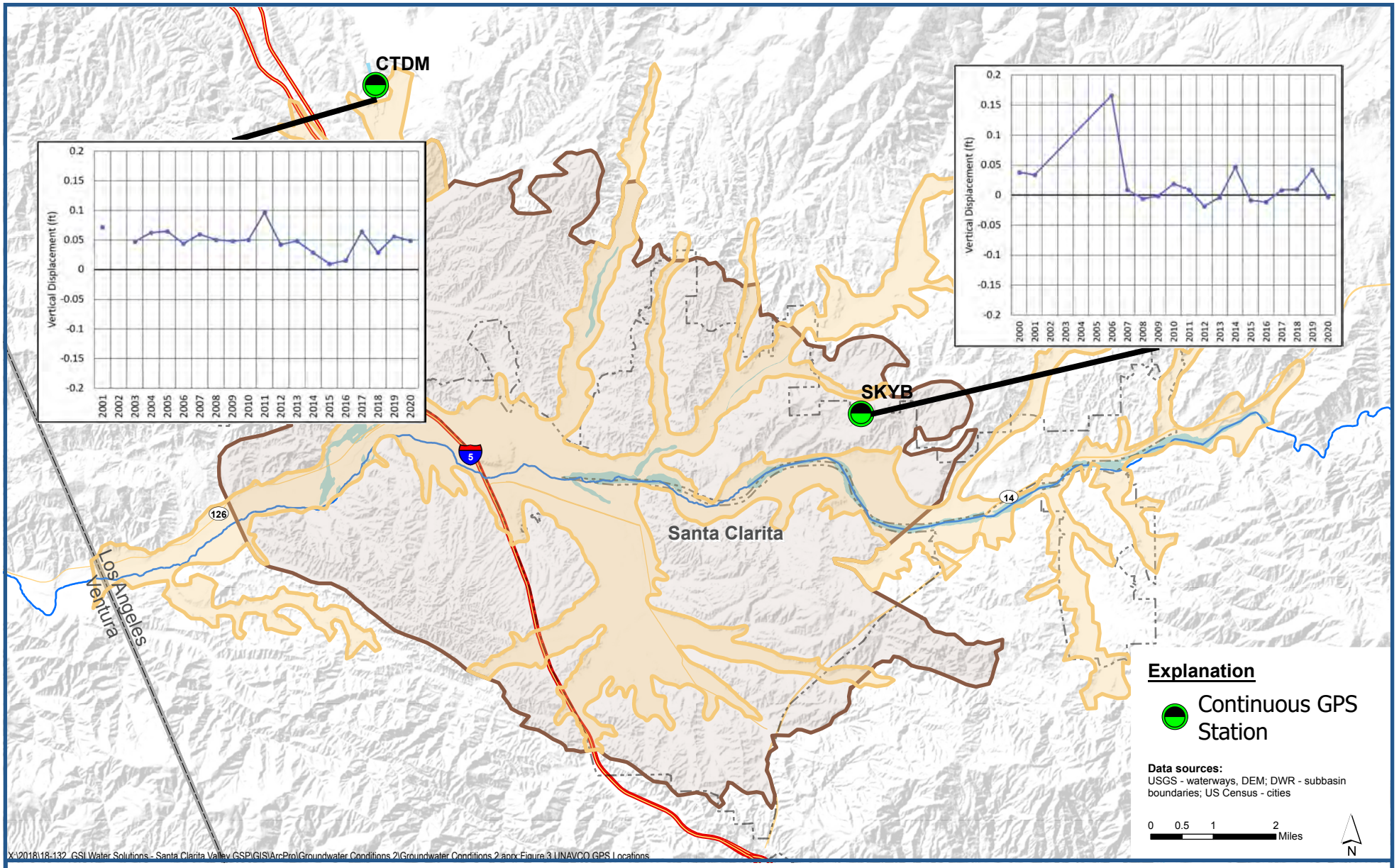


Luhdorff & Scalmanini
Consulting Engineers

TRE Alatamira InSAR Dataset
(October 2018 - October 2019)

Figure 5-13

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

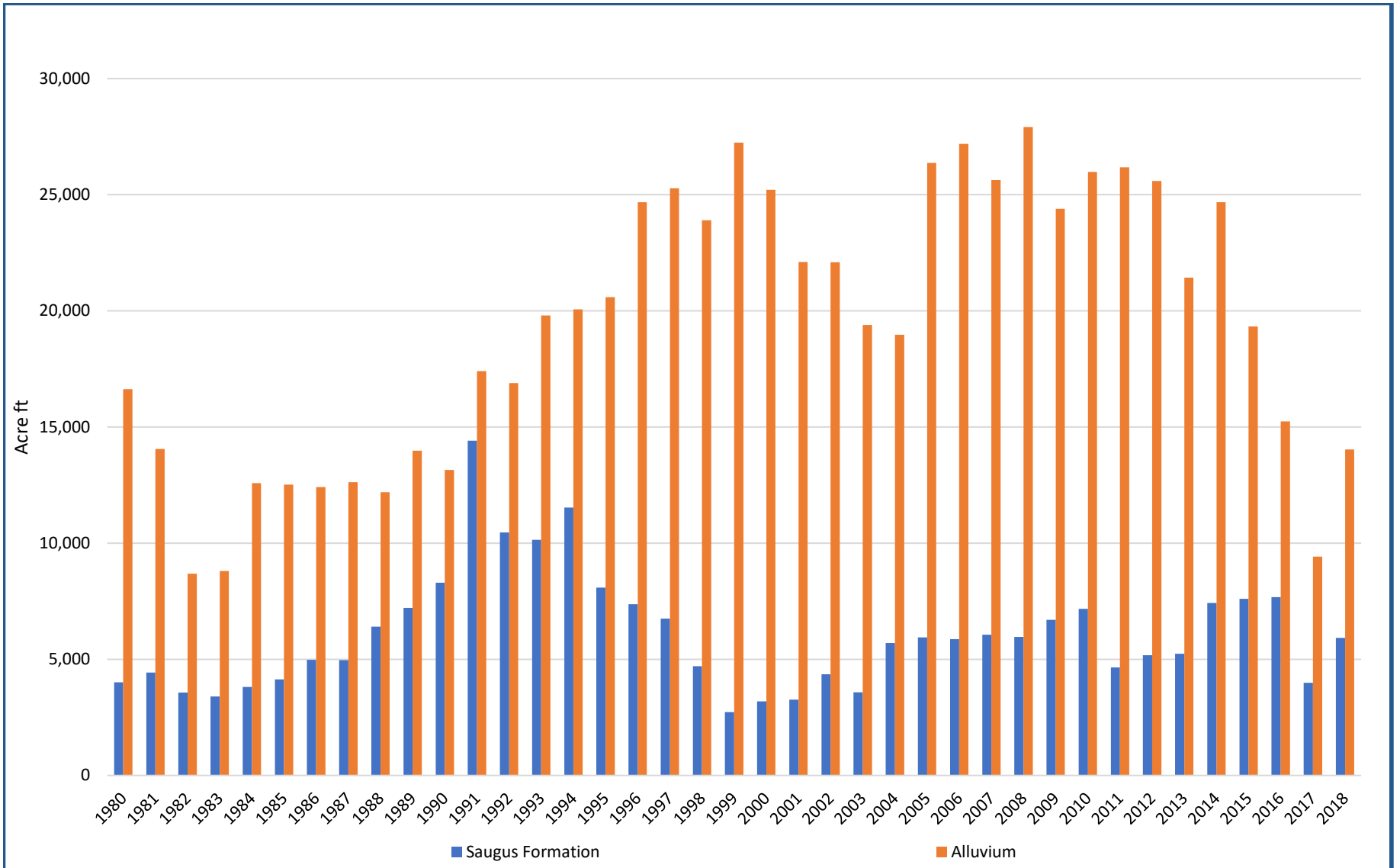


Luhdorff & Scalmanini
Consulting Engineers

UNAVCO Continuous GPS Station Locations

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

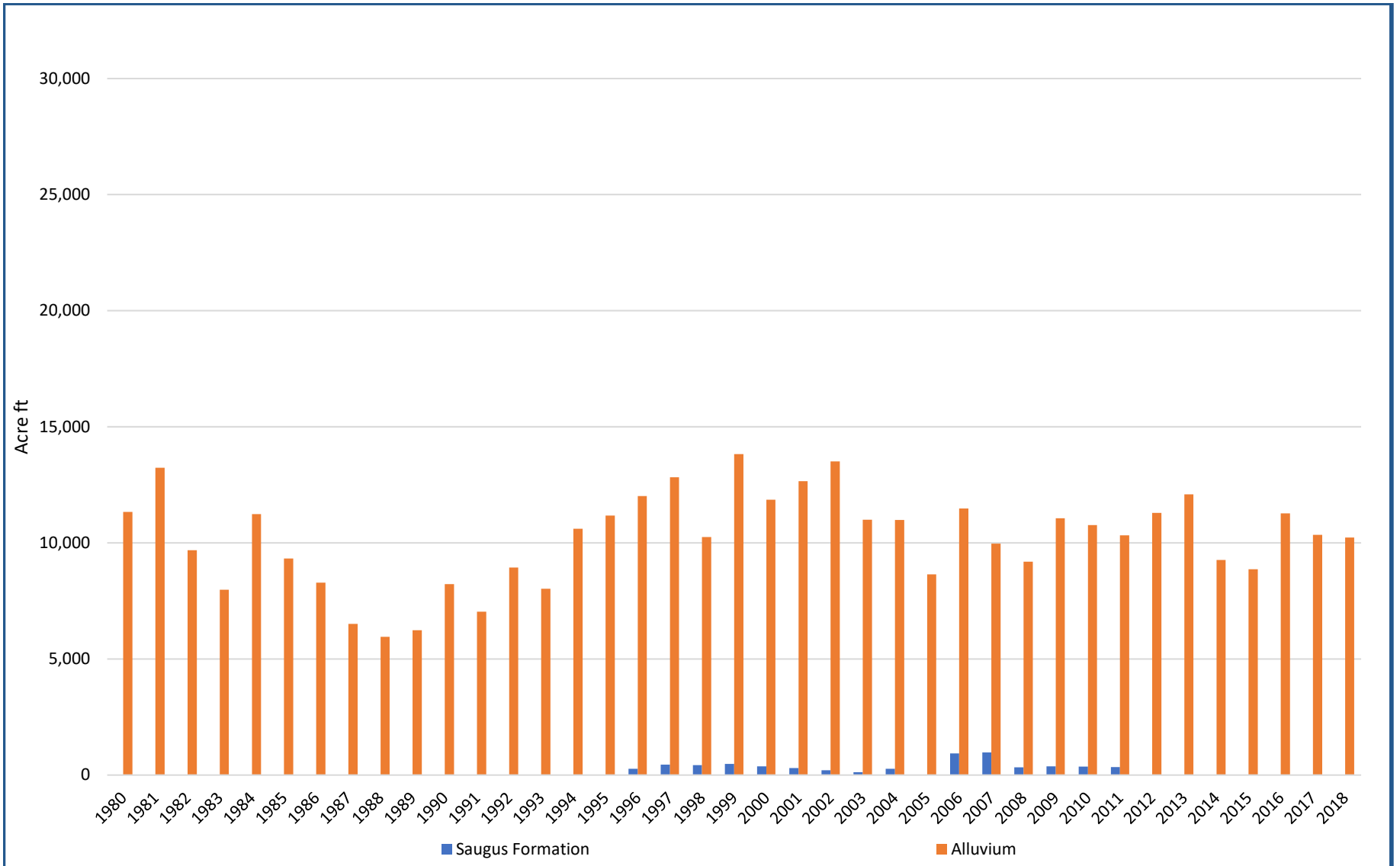
Figure 5-14



Municipal Groundwater Use

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

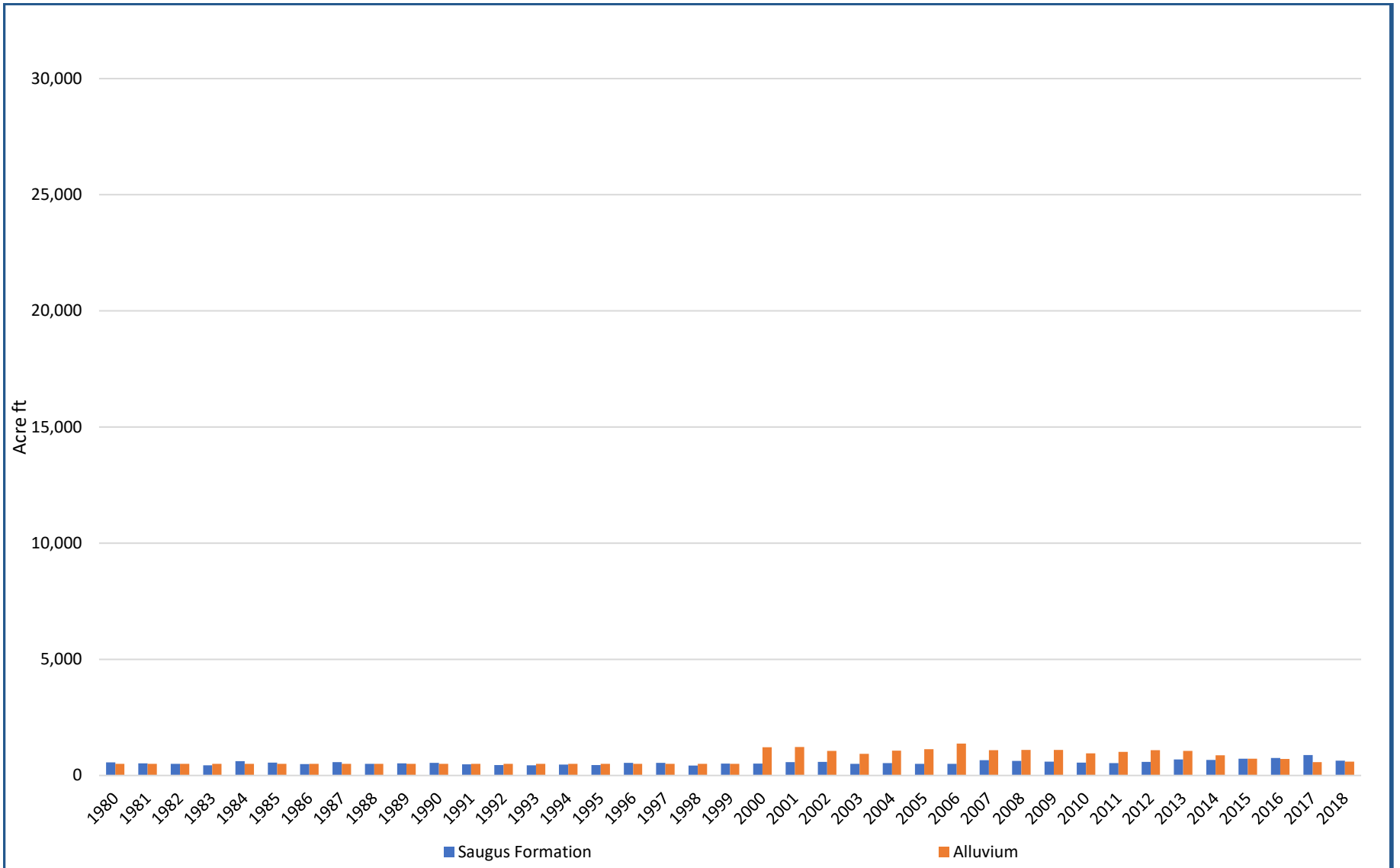
Figure 5-15



Agricultural Groundwater Use

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

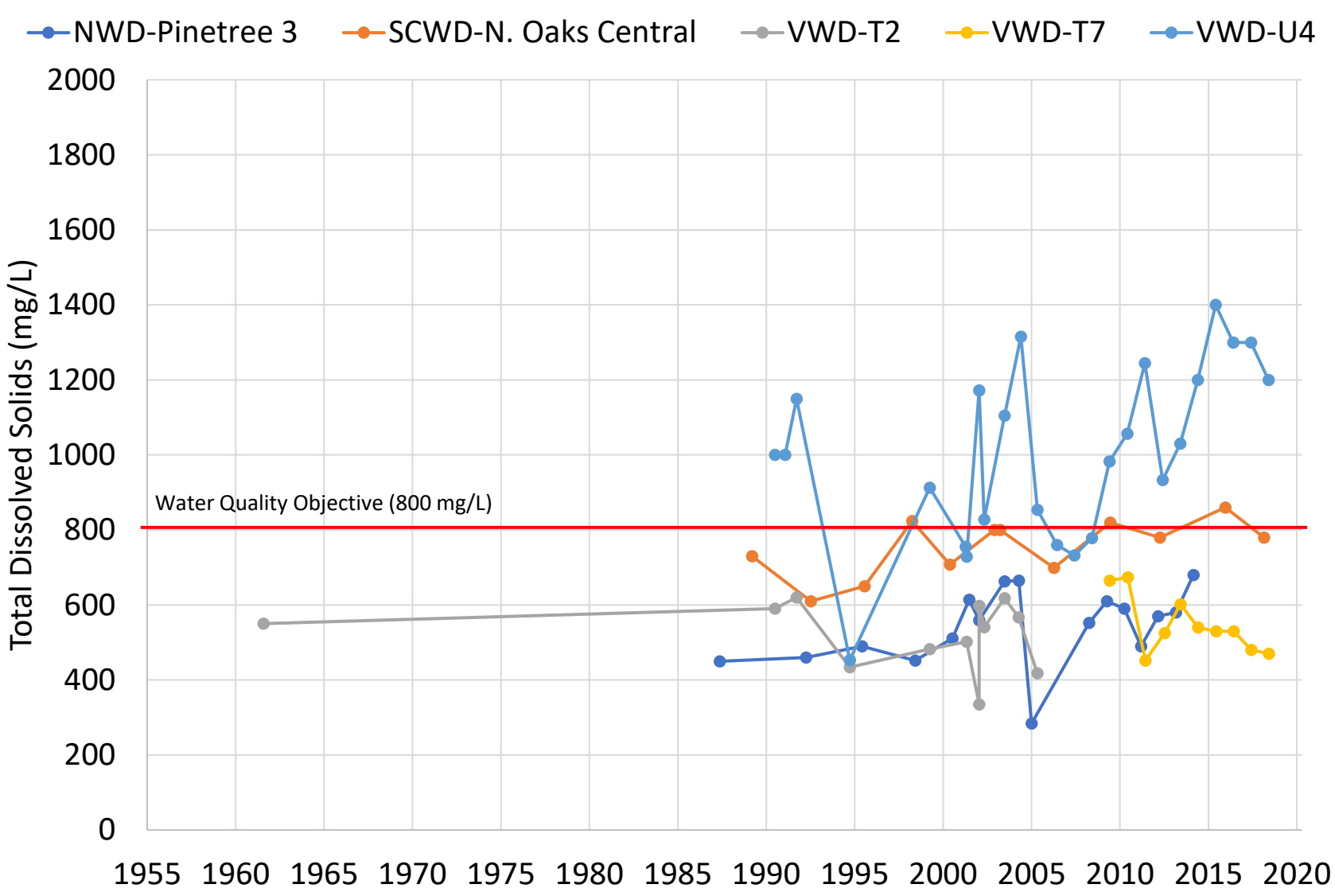
Figure 5-16

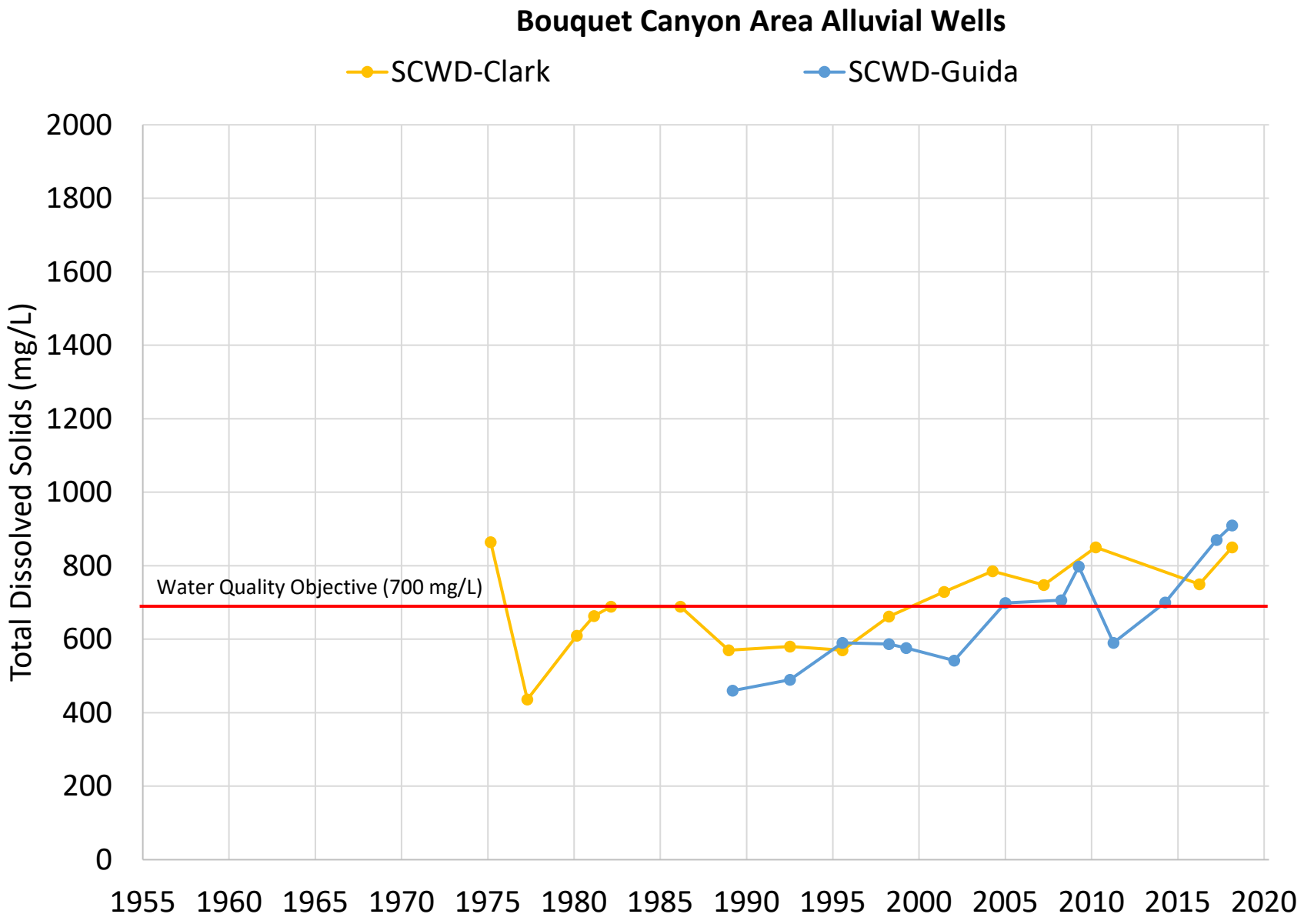


Private Domestic Groundwater Use

Santa Clara River Valley East Subbasin
Groundwater Sustainability Plan

Figure 5-17



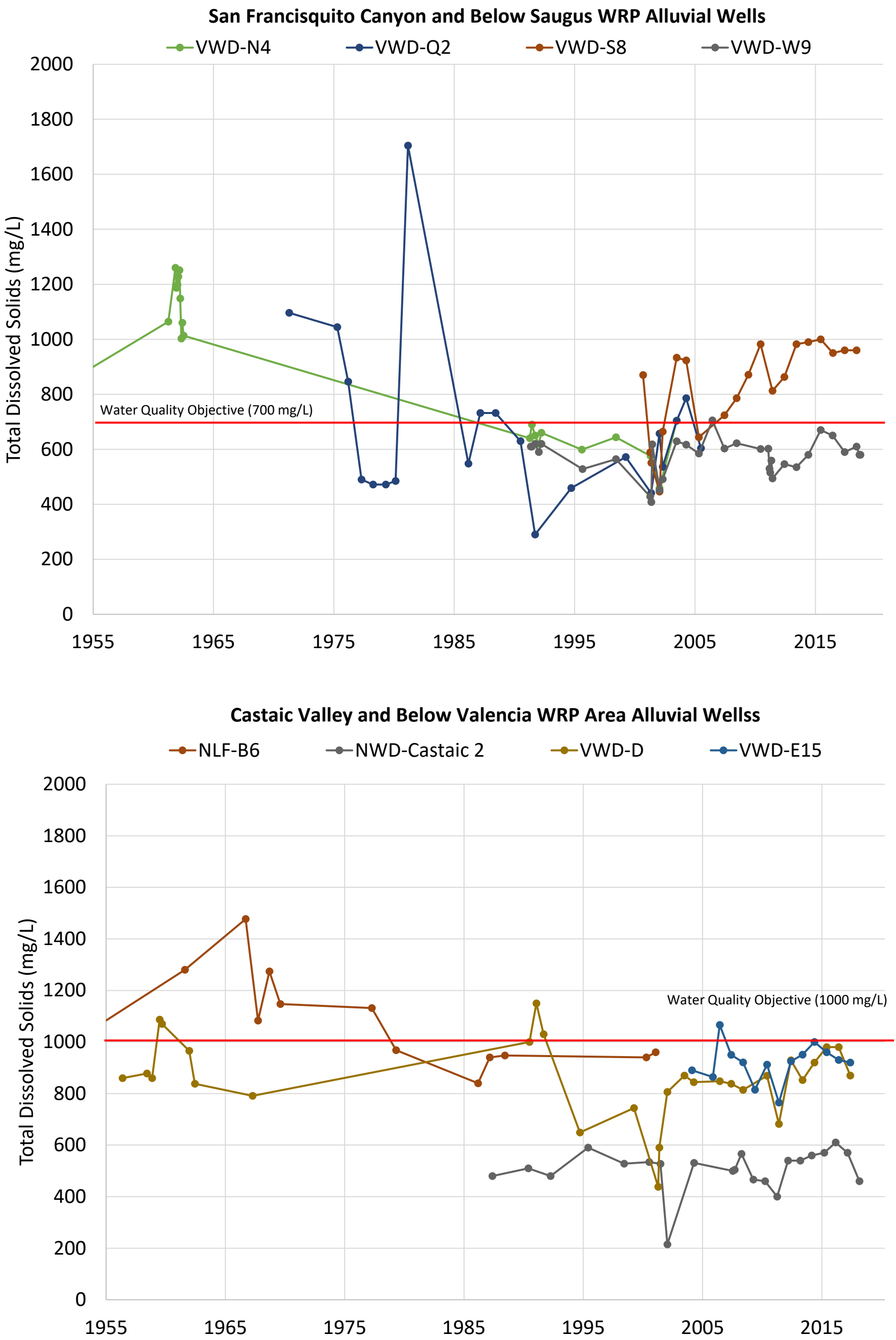


Luhdorff & Scalmanini
Consulting Engineers

Groundwater Quality in Eastern Alluvial Wells

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-18

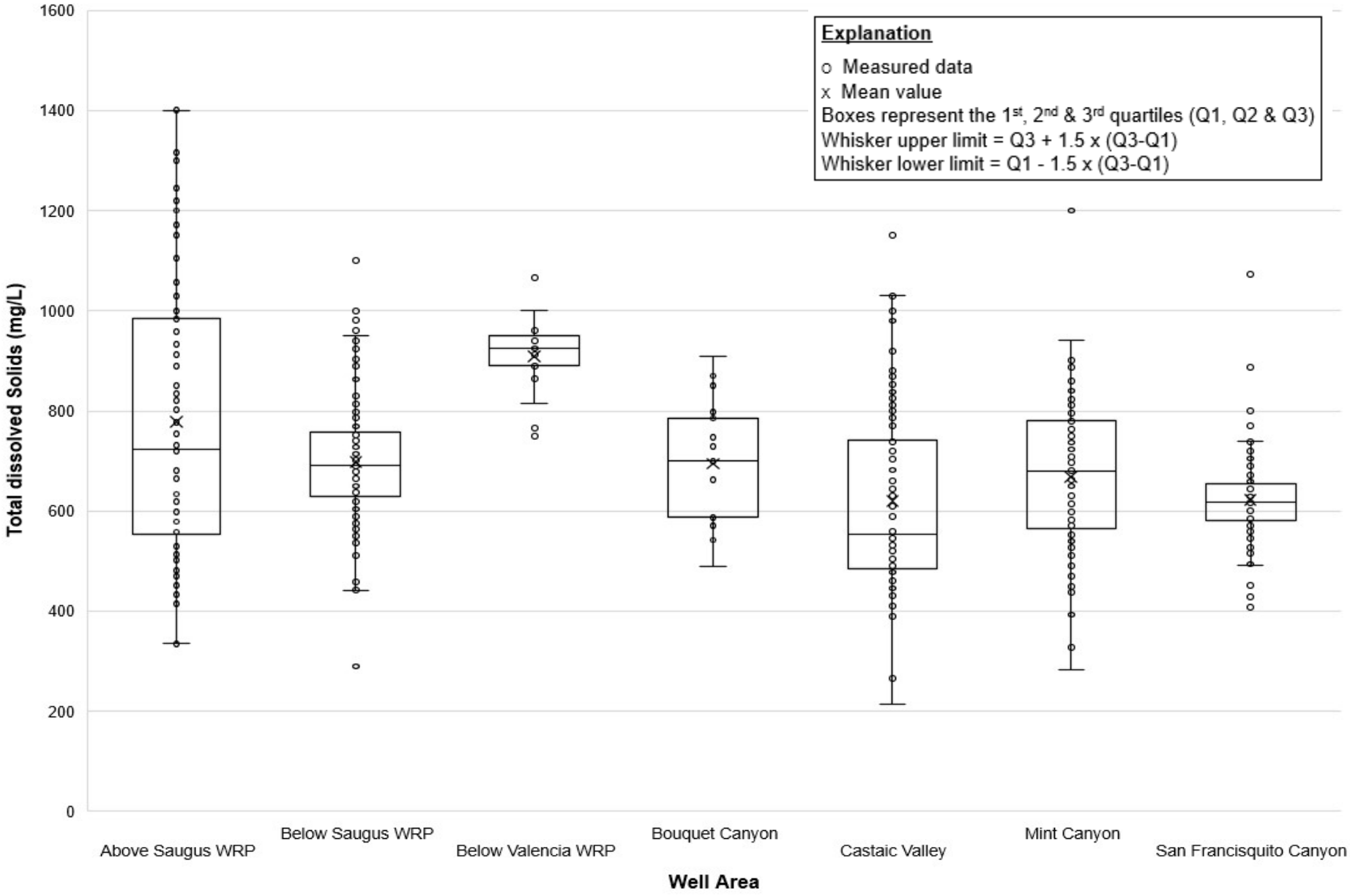


Luhdorff & Scalmanini Consulting Engineers

Groundwater Quality in Western Alluvial Wells

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-19

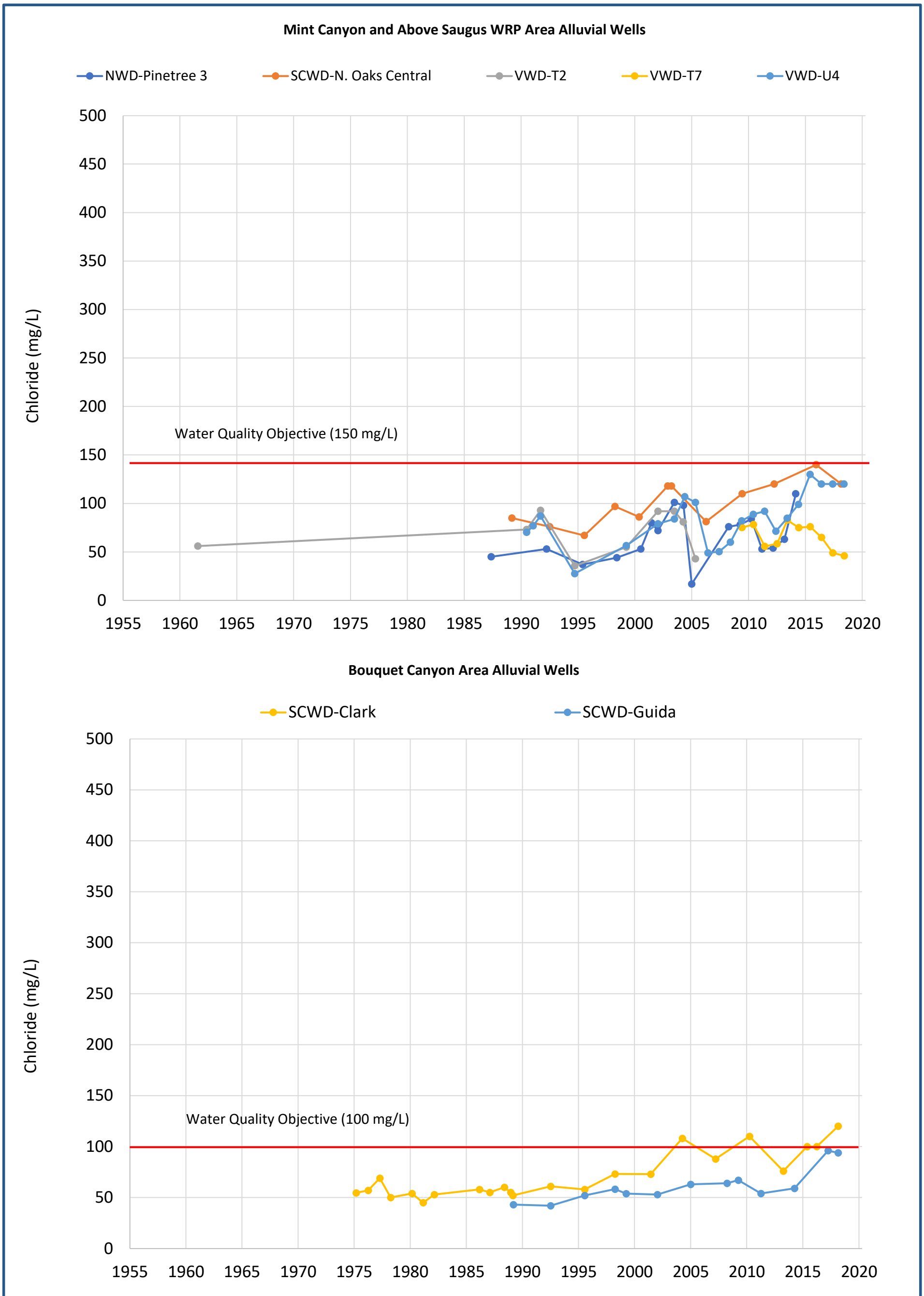


Luhdorff & Scalmanini Consulting Engineers

Alluvial Aquifer TDS Box & Whisker Plot

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-20

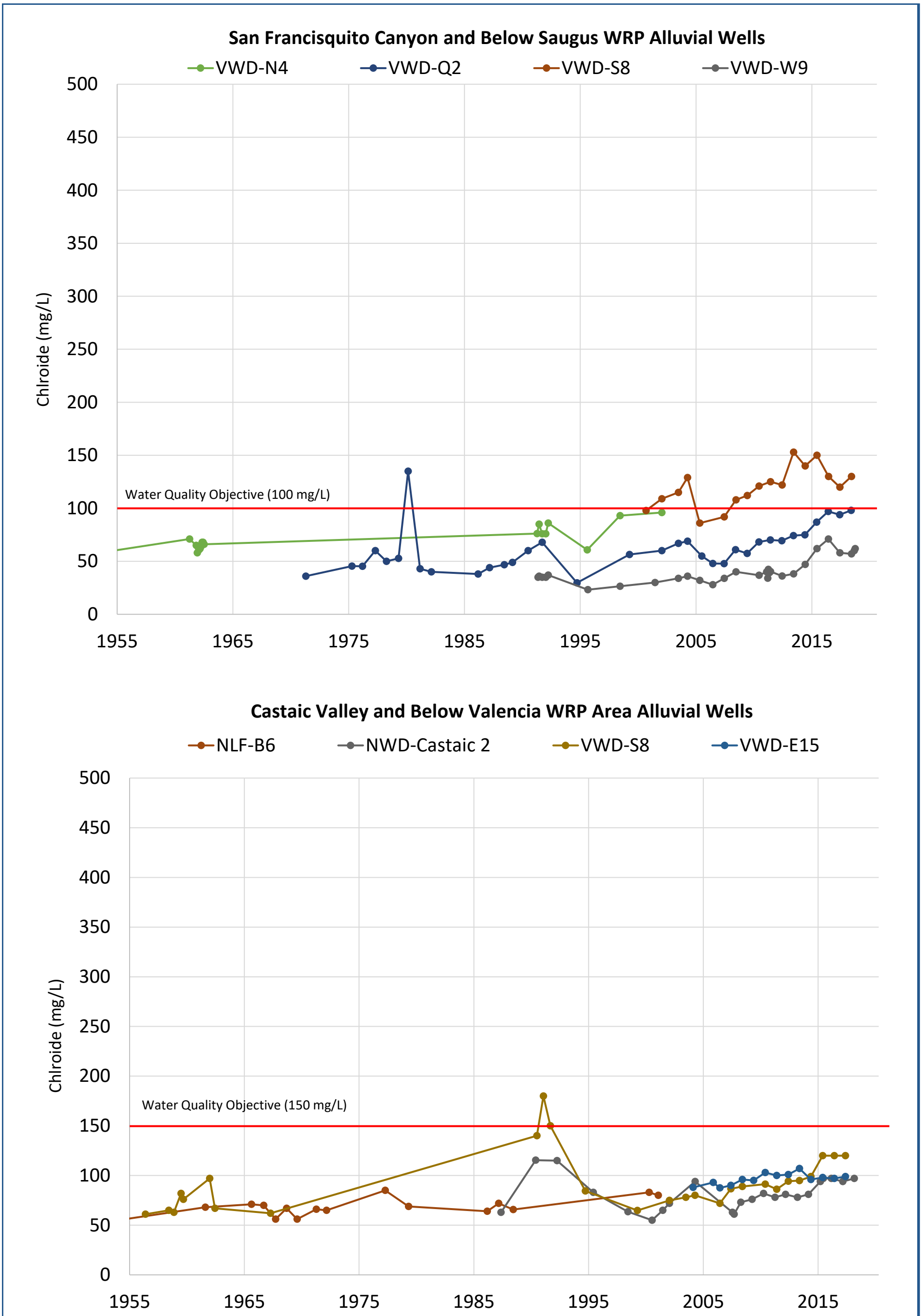


Luhdorff & Scalmanini Consulting Engineers

Groundwater Quality in Eastern Alluvial Wells
Chloride

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-21

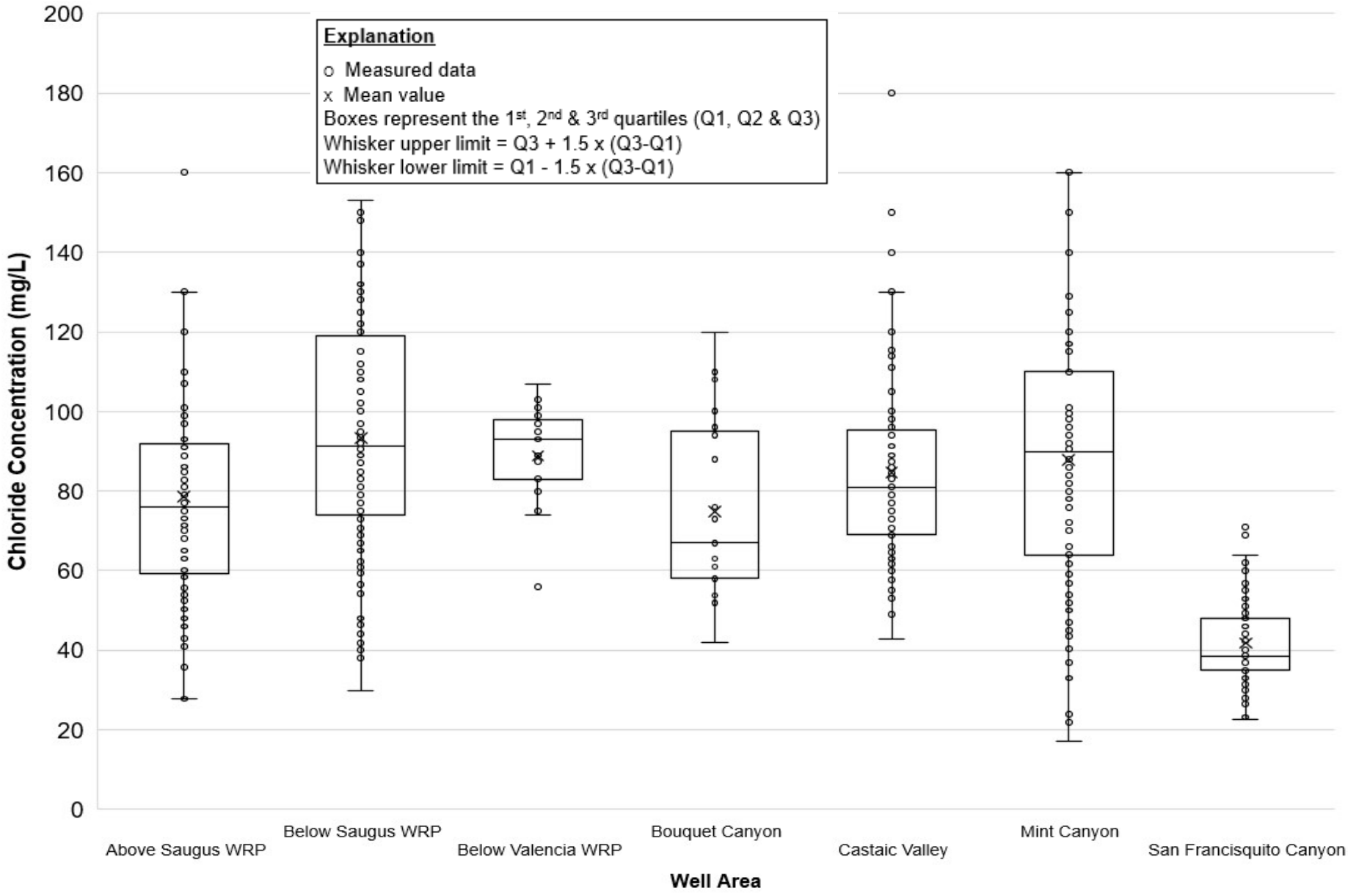


Luhdorff & Scalmanini
Consulting Engineers

Groundwater Quality in Western Alluvial Wells
Chloride

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-22



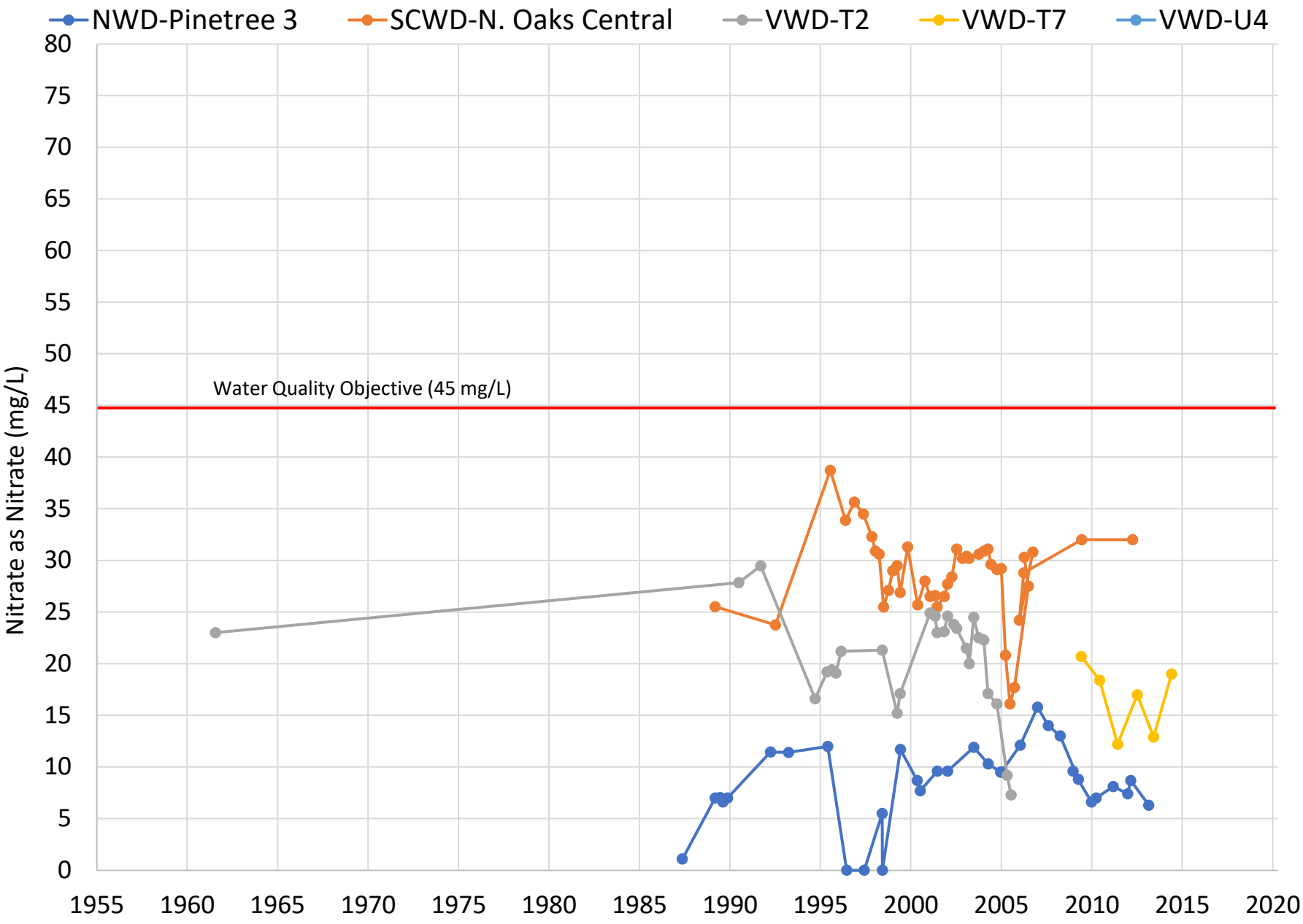
Luhdorff & Scalmanini Consulting Engineers

Alluvial Aquifer Chlroide Box & Whisker Plot

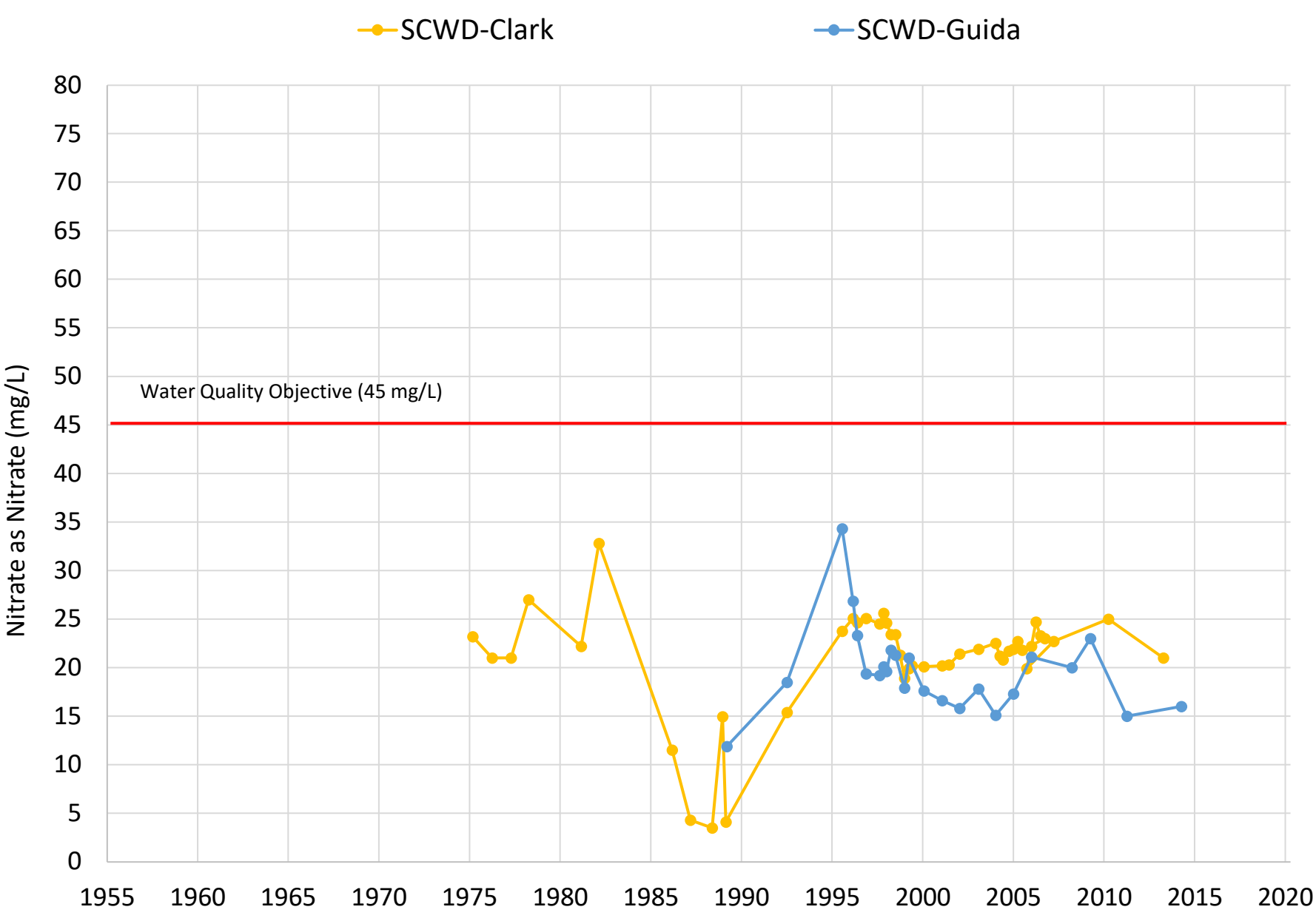
Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-23

Mint Canyon and Above Saugus WRP Area Alluvial Wells



Bouquet Canyon Area Alluvial Wells

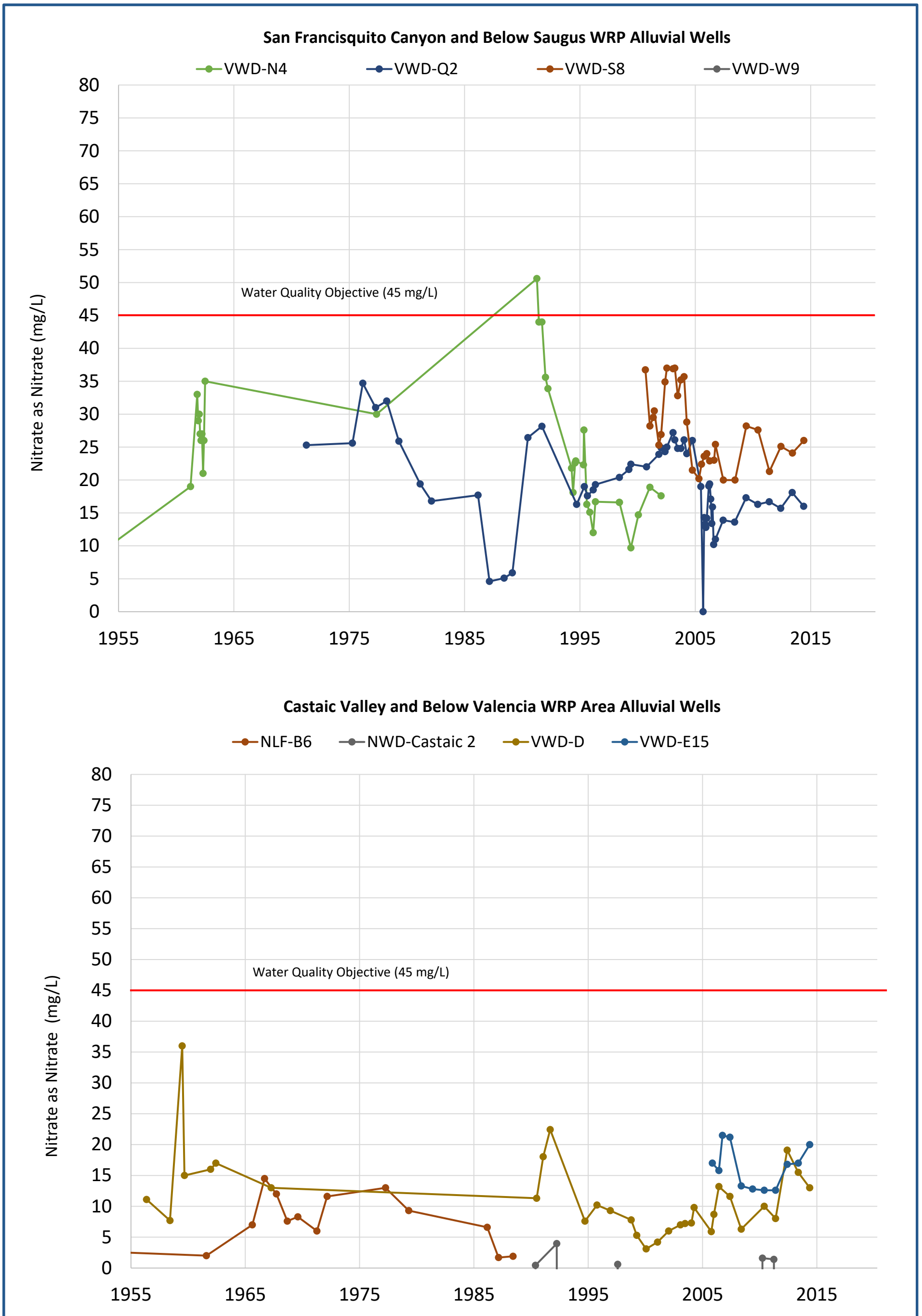


Luhdorff & Scalmanini Consulting Engineers

Groundwater Quality in Eastern Alluvial Wells
Nitrate

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-24

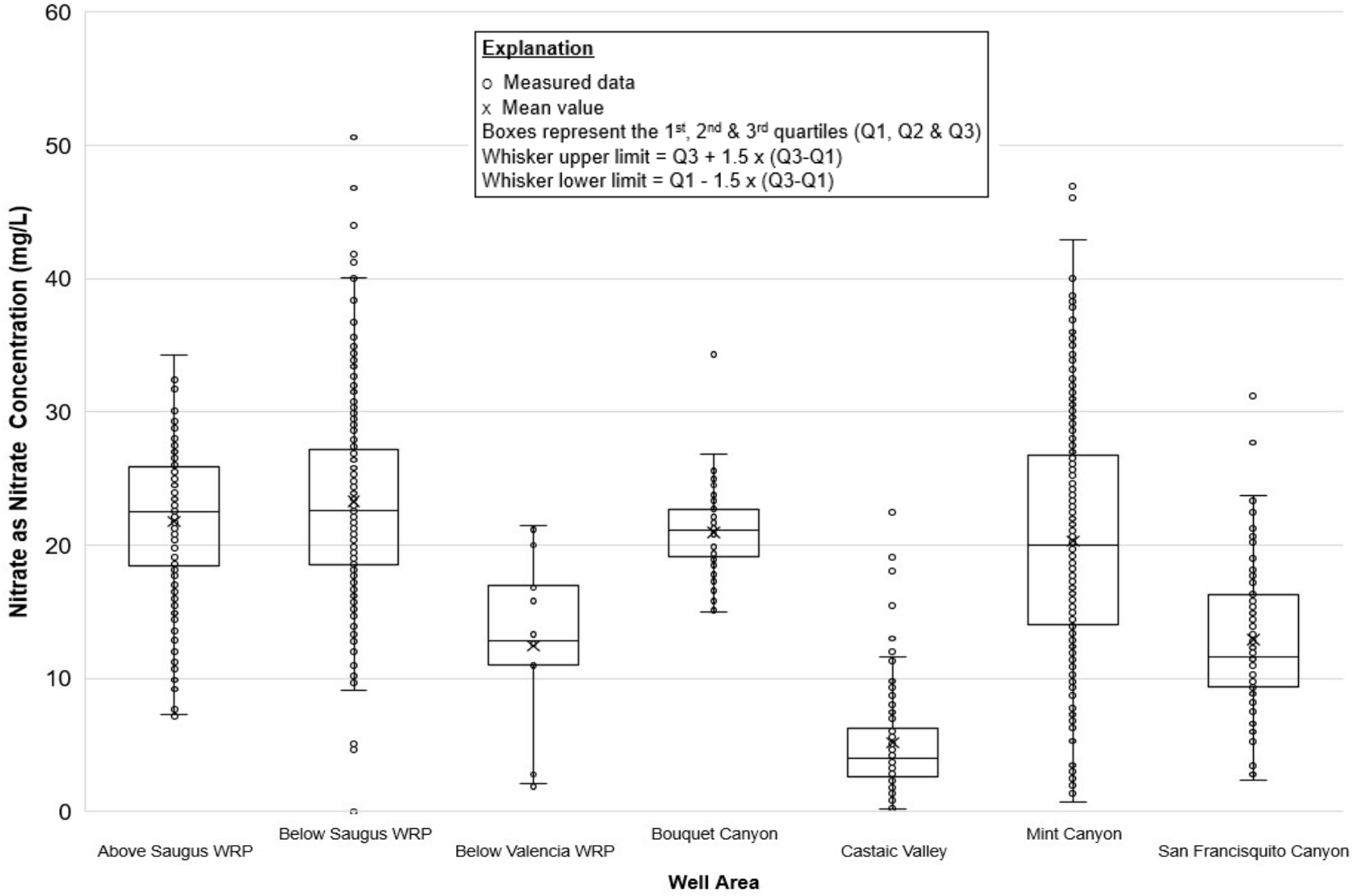


Luhdorff & Scalmanini Consulting Engineers

Groundwater Quality in Western Alluvial Wells
Nitrate

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-25

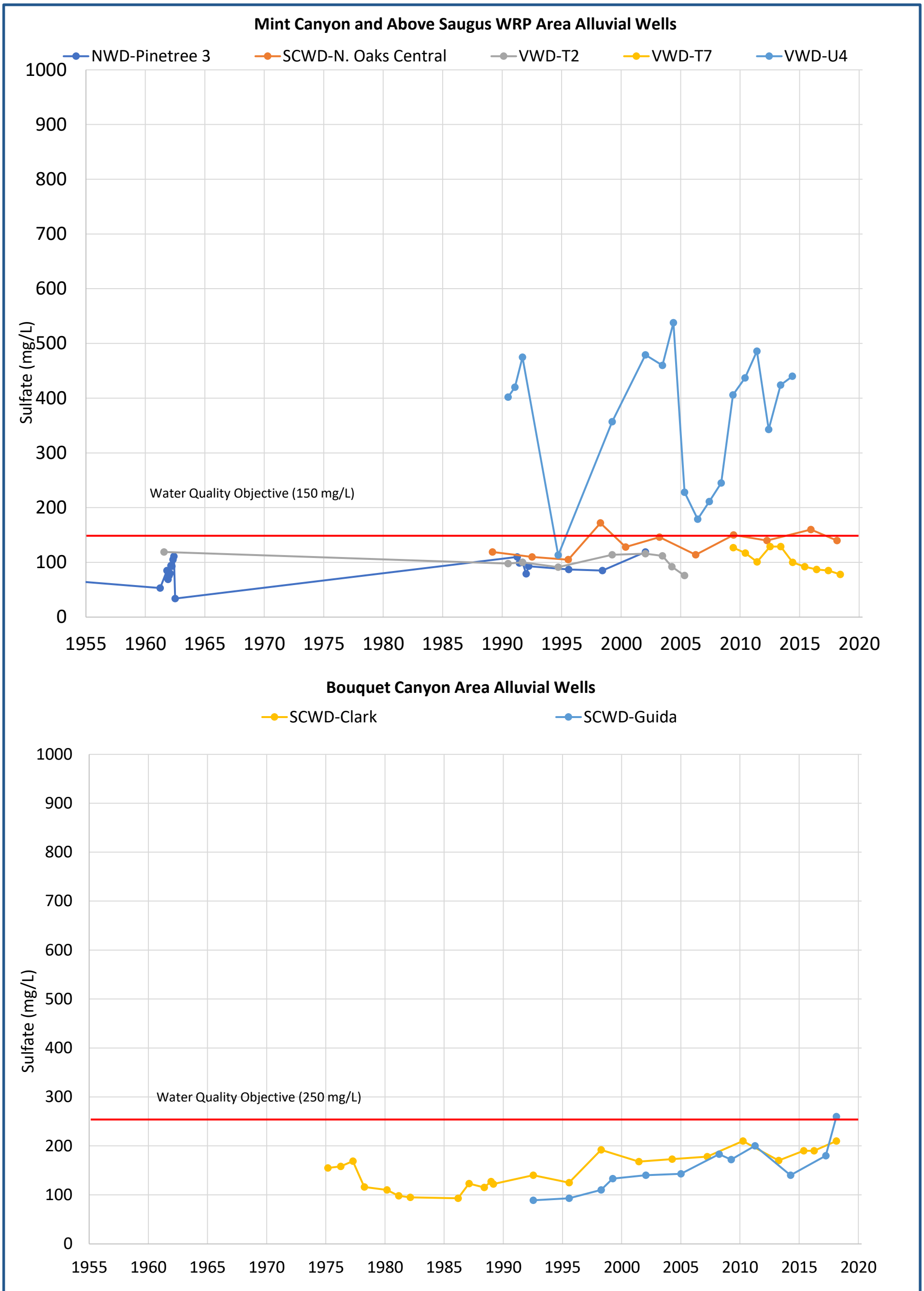


Luhdorff & Scalmanini Consulting Engineers

Alluvial Aquifer Nitrate Box & Whisker Plot

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-26

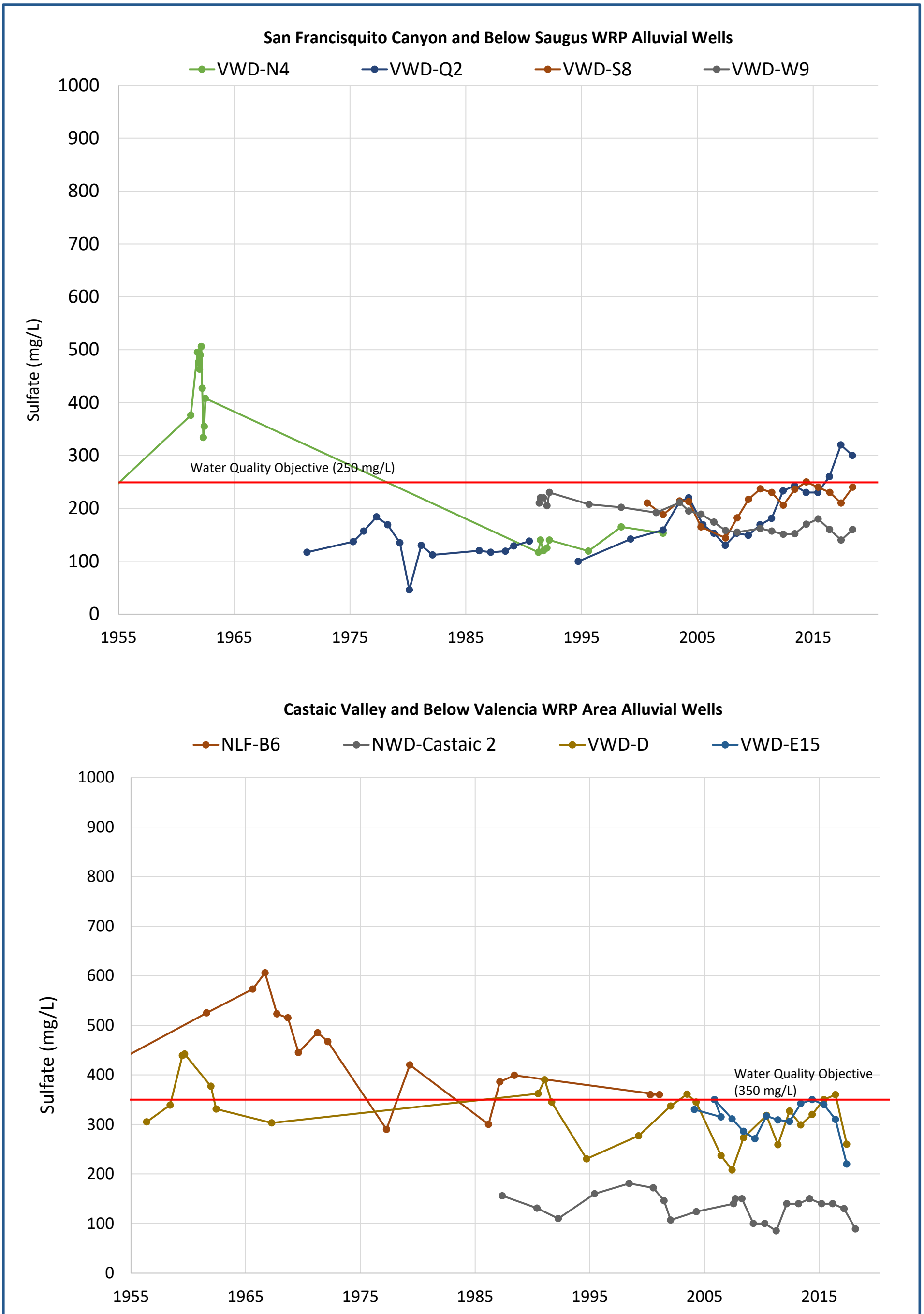


Luhdorff & Scalmanini Consulting Engineers

Groundwater Quality in Eastern Alluvial Wells
Sulfate

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-27

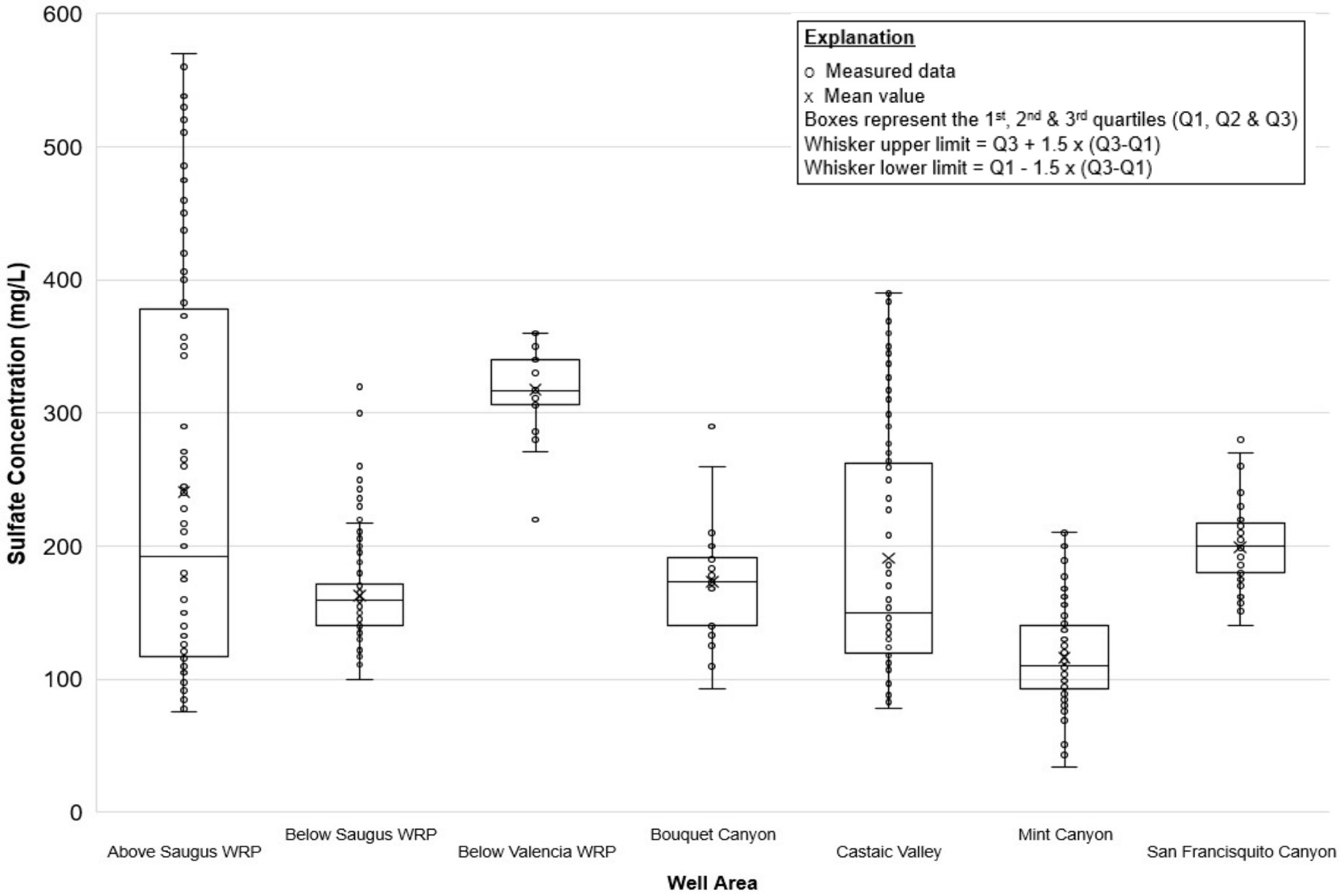


Luhdorff & Scalmanini
Consulting Engineers

Groundwater Quality in Western Alluvial Wells
Sulfate

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-28

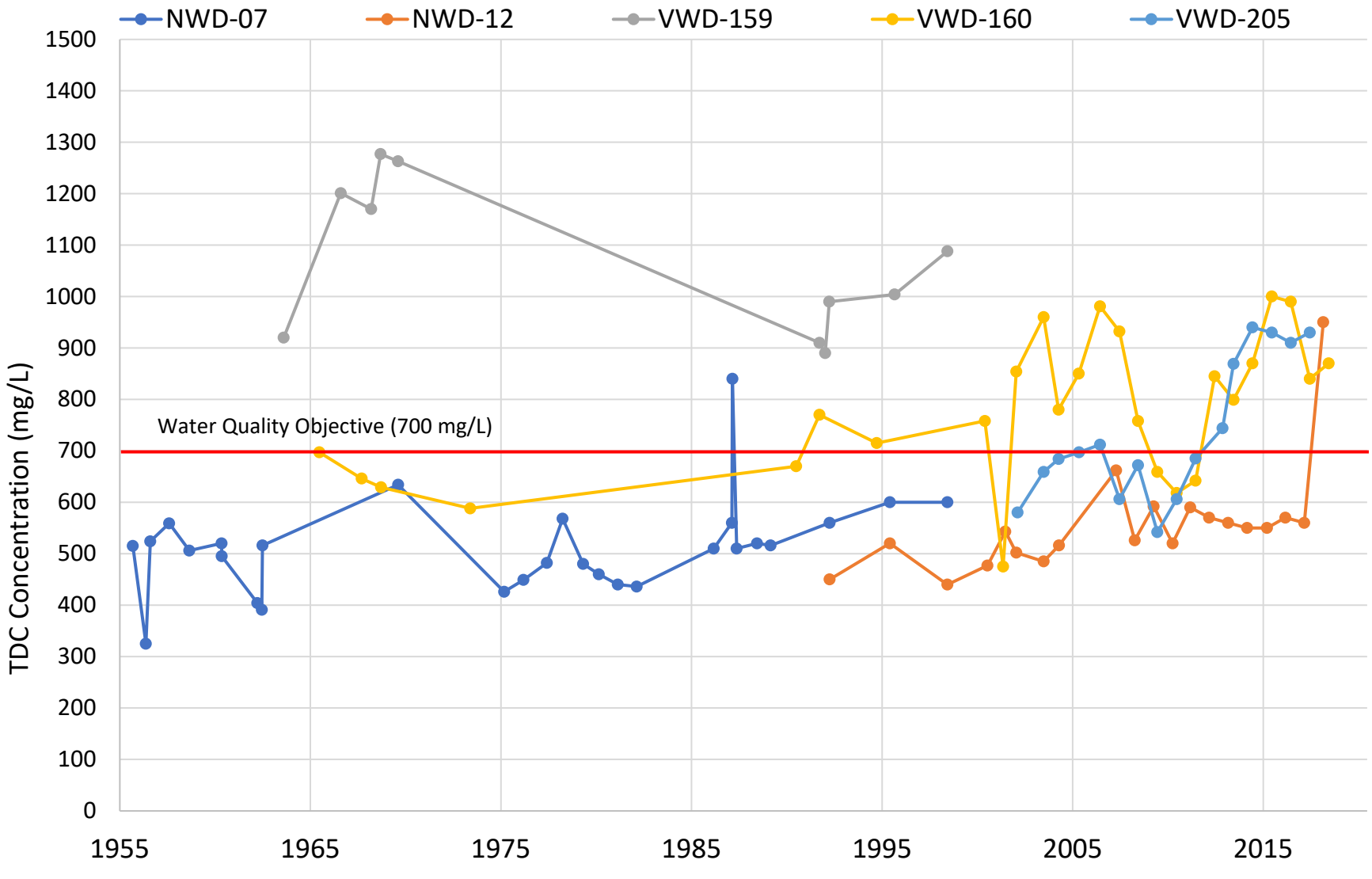


Luhdorff & Scalmanini Consulting Engineers

Alluvial Aquifer Sulfate Box & Whisker Plot

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-29

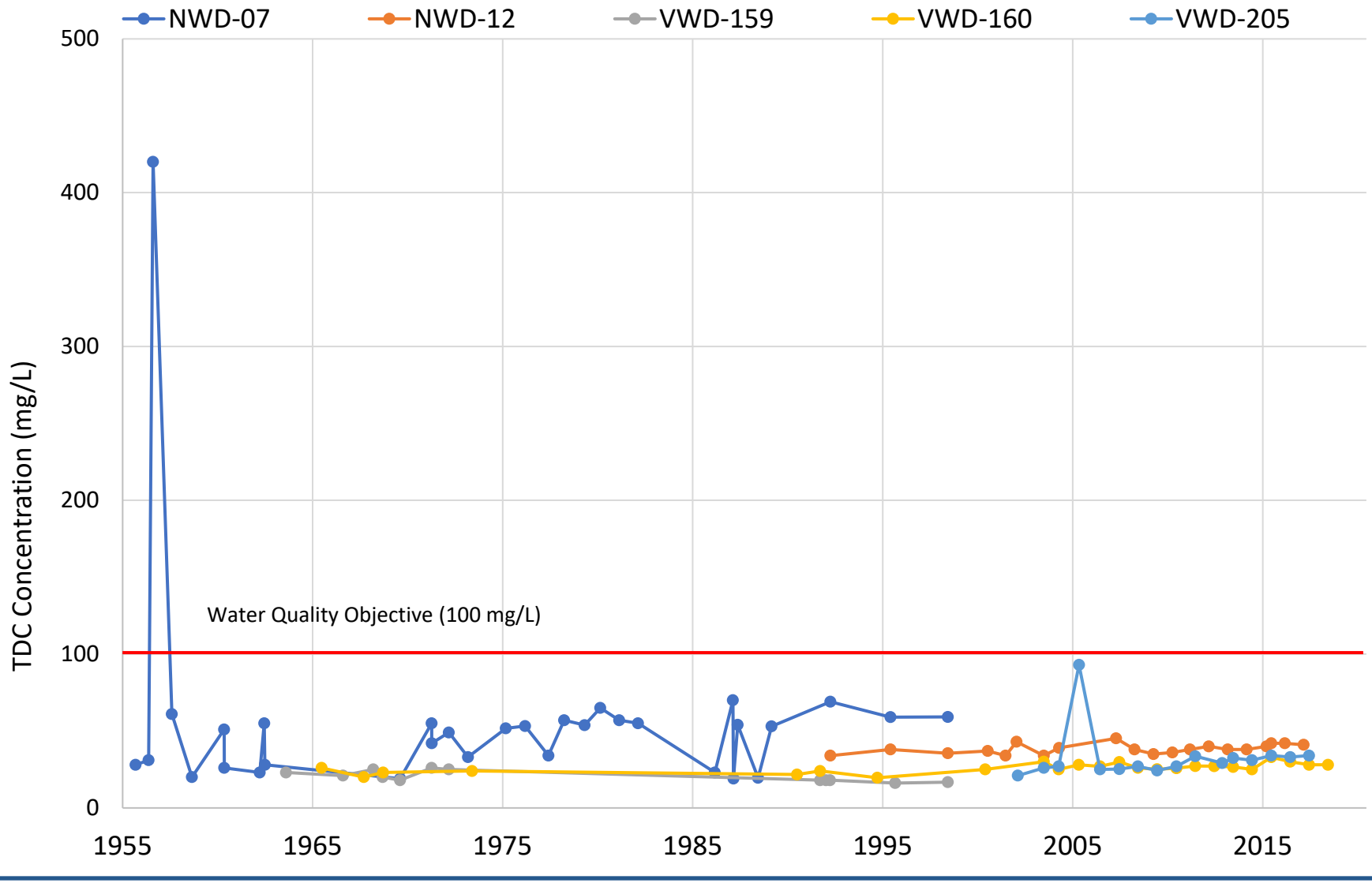


Luhdorff & Scalmanini Consulting Engineers

Saugus Formation TDS Concentrations

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-30

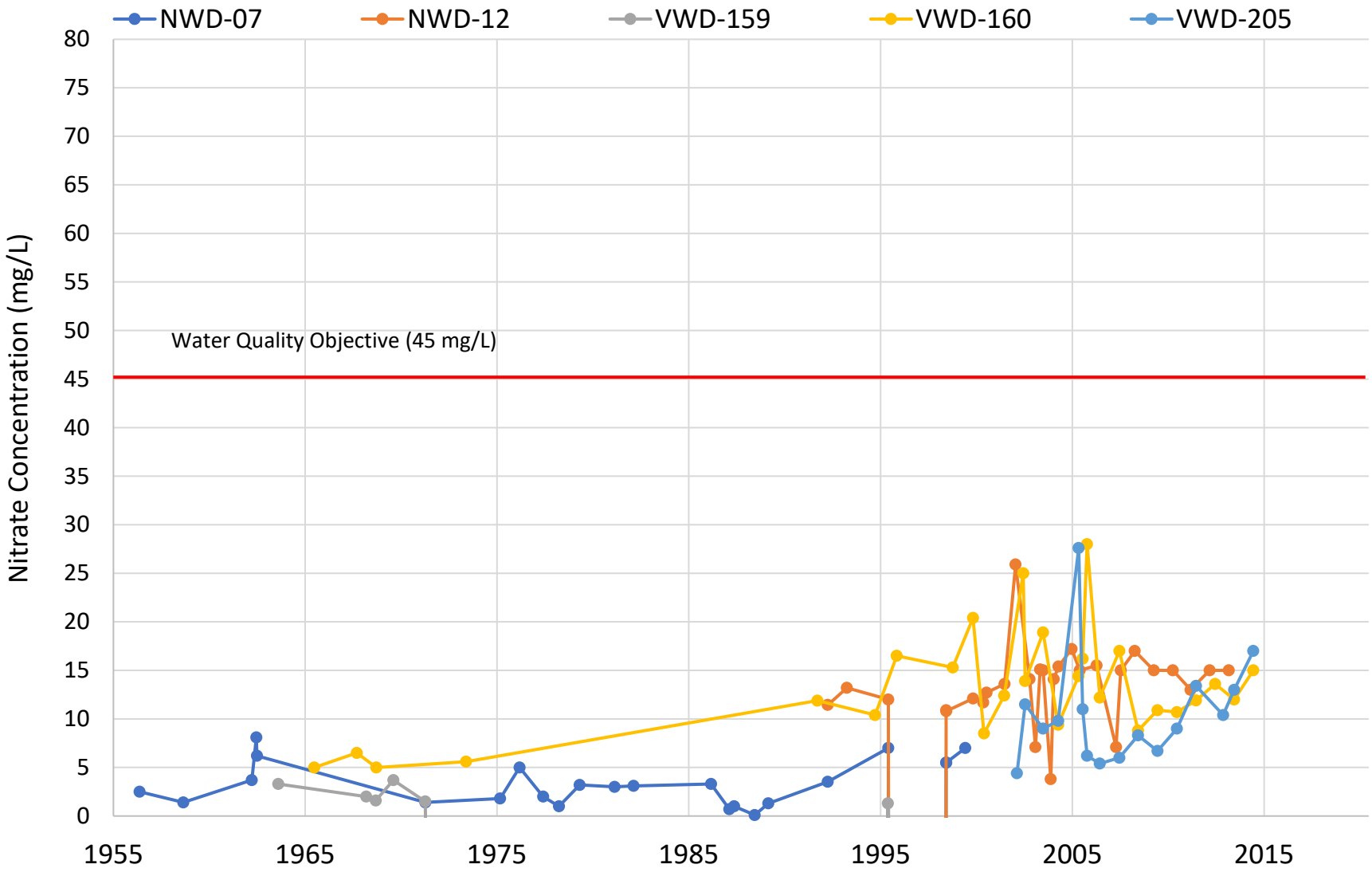


Luhdorff & Scalmanini Consulting Engineers

Saugus Formation Chloride Concentrations

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-31

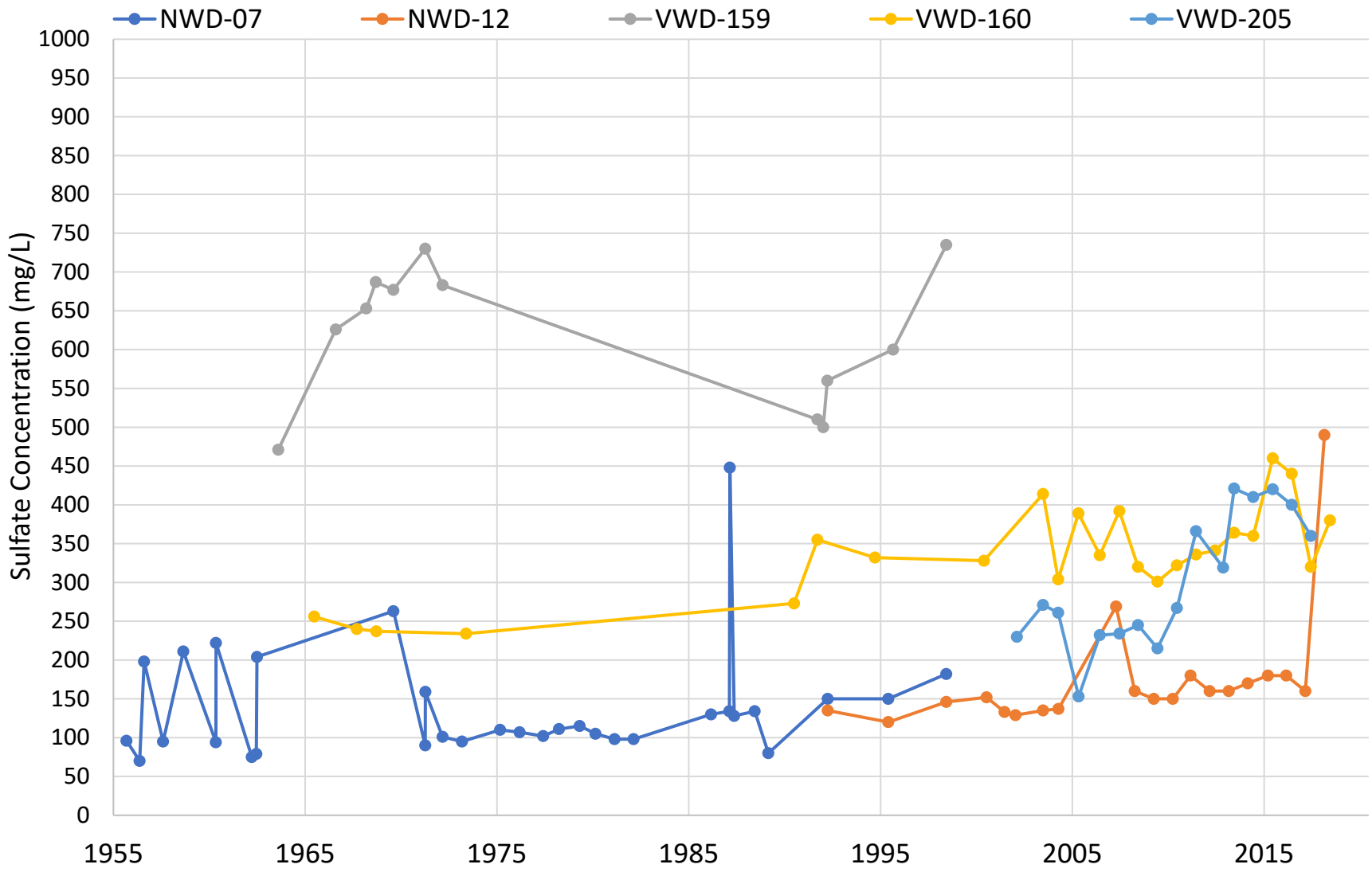


Luhdorff & Scalmanini Consulting Engineers

Saugus Formation Nitrate Concentrations

Santa Clara River East Subbasin
Groundwater Sustainability Plan

Figure 5-32



Luhdorff & Scalmanini Consulting Engineers

Saugus Formation Sulfate Concentrations

Santa Clara River East Subbasin
Groundwater Sustainability Plan

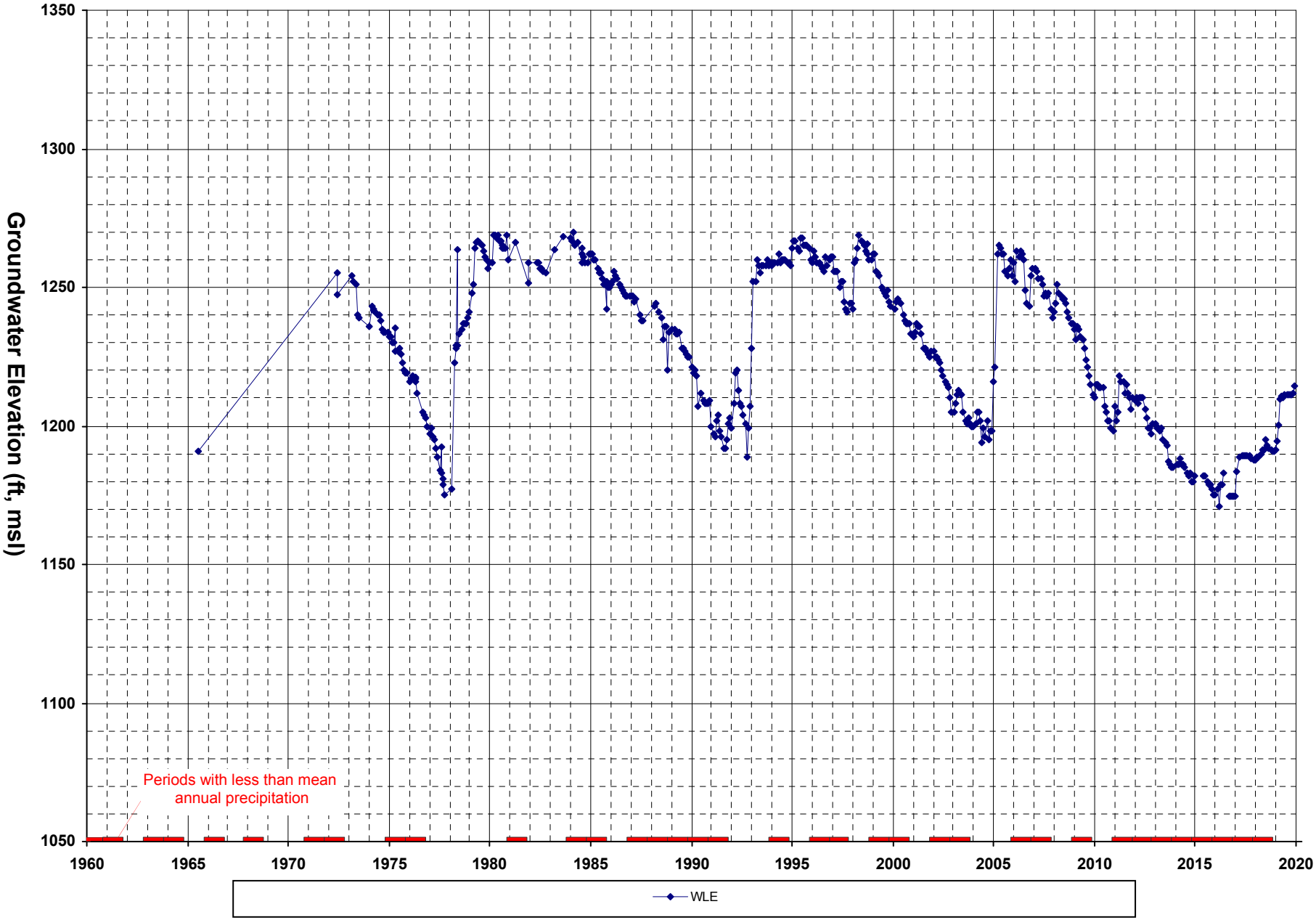
Figure 5-33

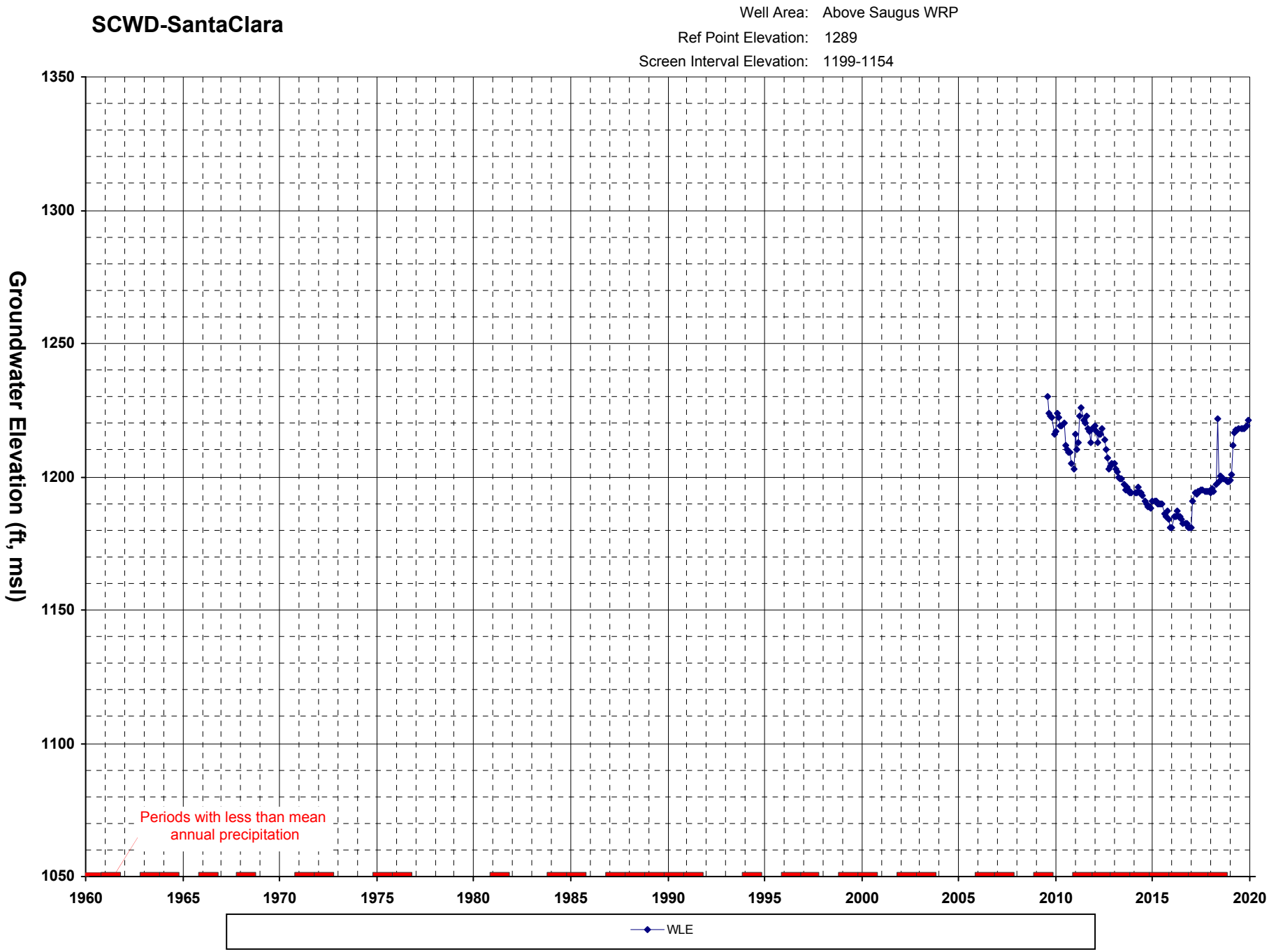
Appendices

Appendix A
Water Level Hydrographs

SCWD-Honby

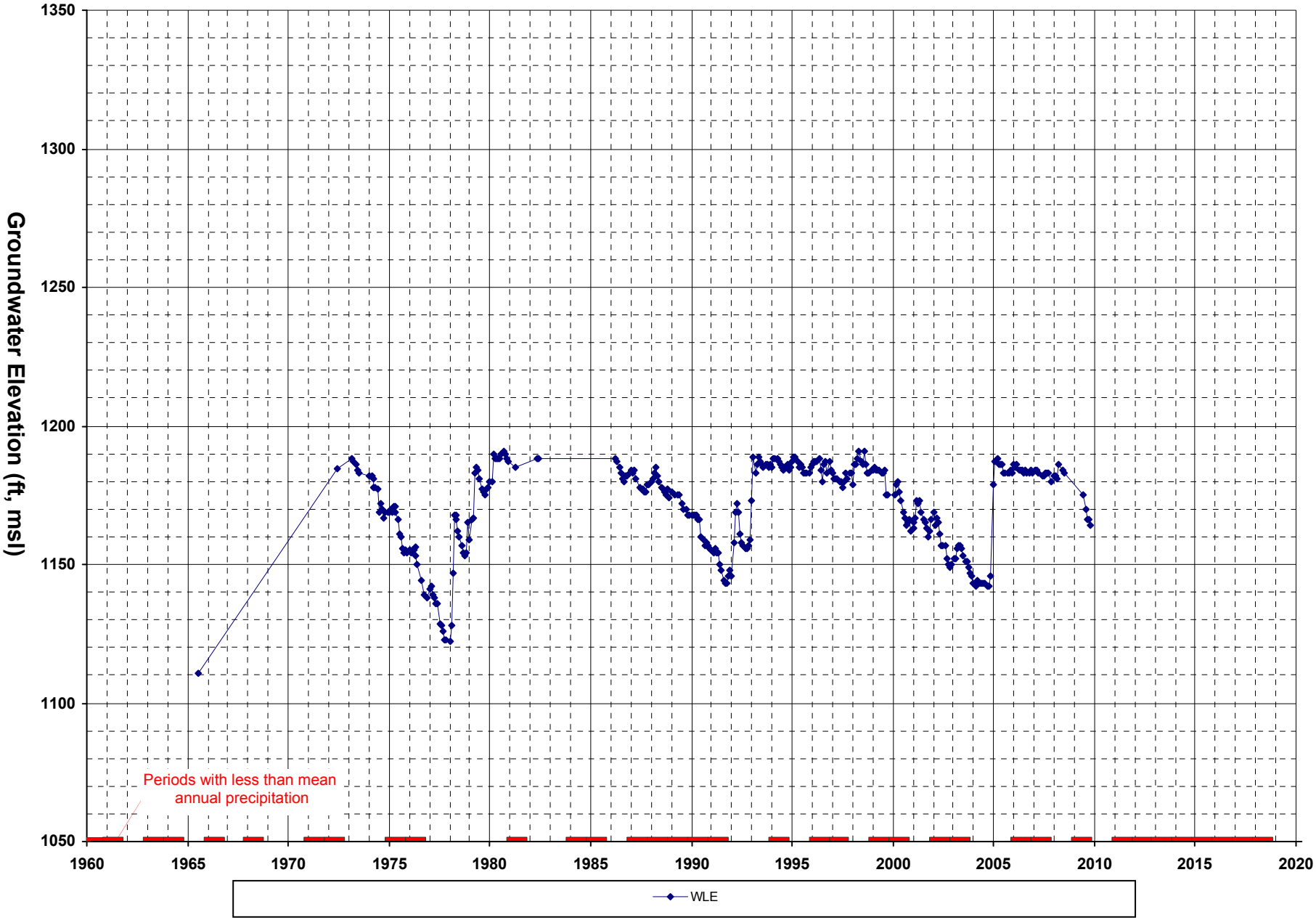
Well Area: Above Saugus WRP
Ref Point Elevation: 1280
Screen Interval Elevation: 1230-1078




SCWD-SantaClara
Well Area: Above Saugus WRP
Ref Point Elevation: 1289
Screen Interval Elevation: 1199-1154
Groundwater Elevation (ft, msl)
1350
1300
1250
1200
1150
1100
1050
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

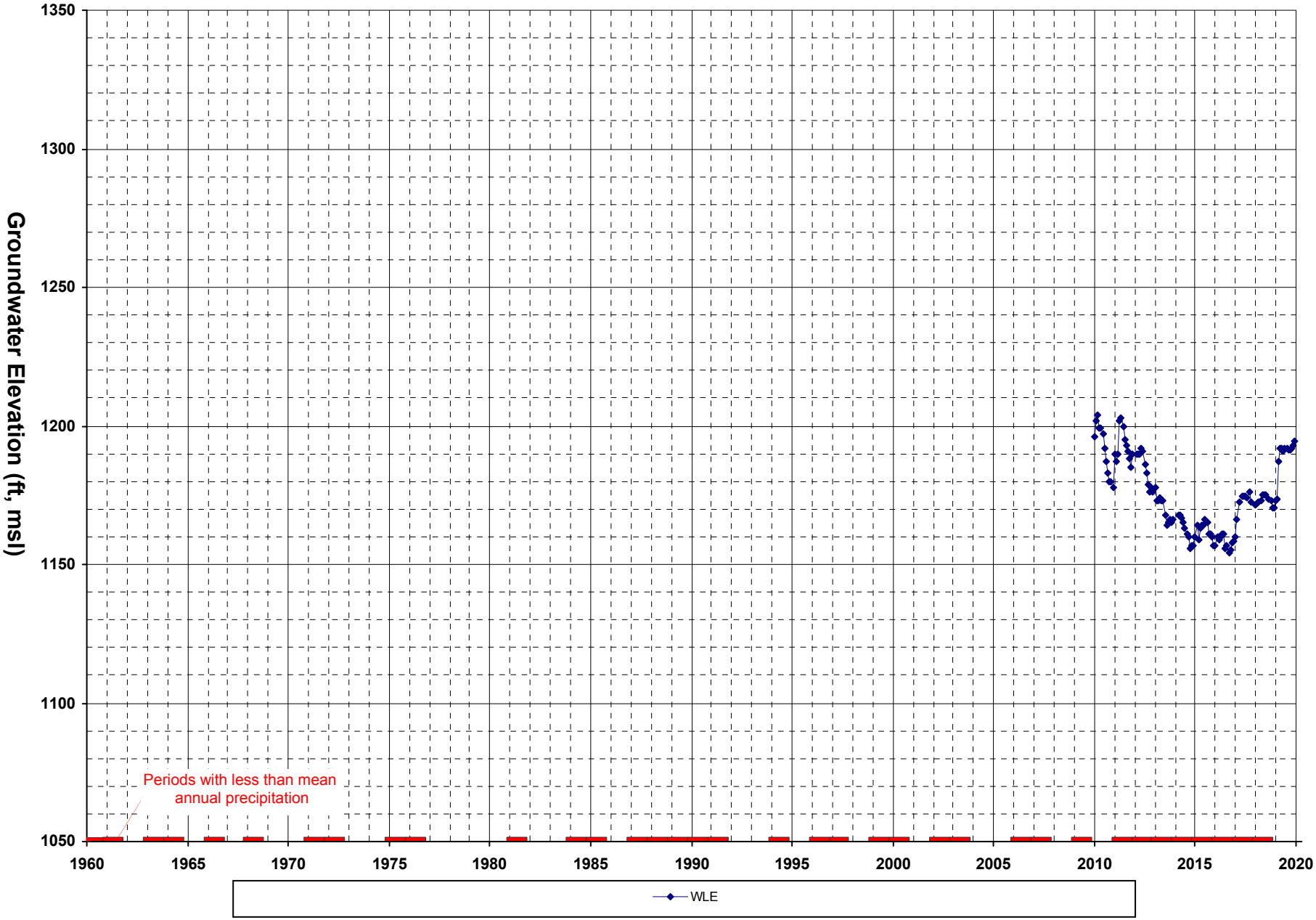
SCWD-Stadium

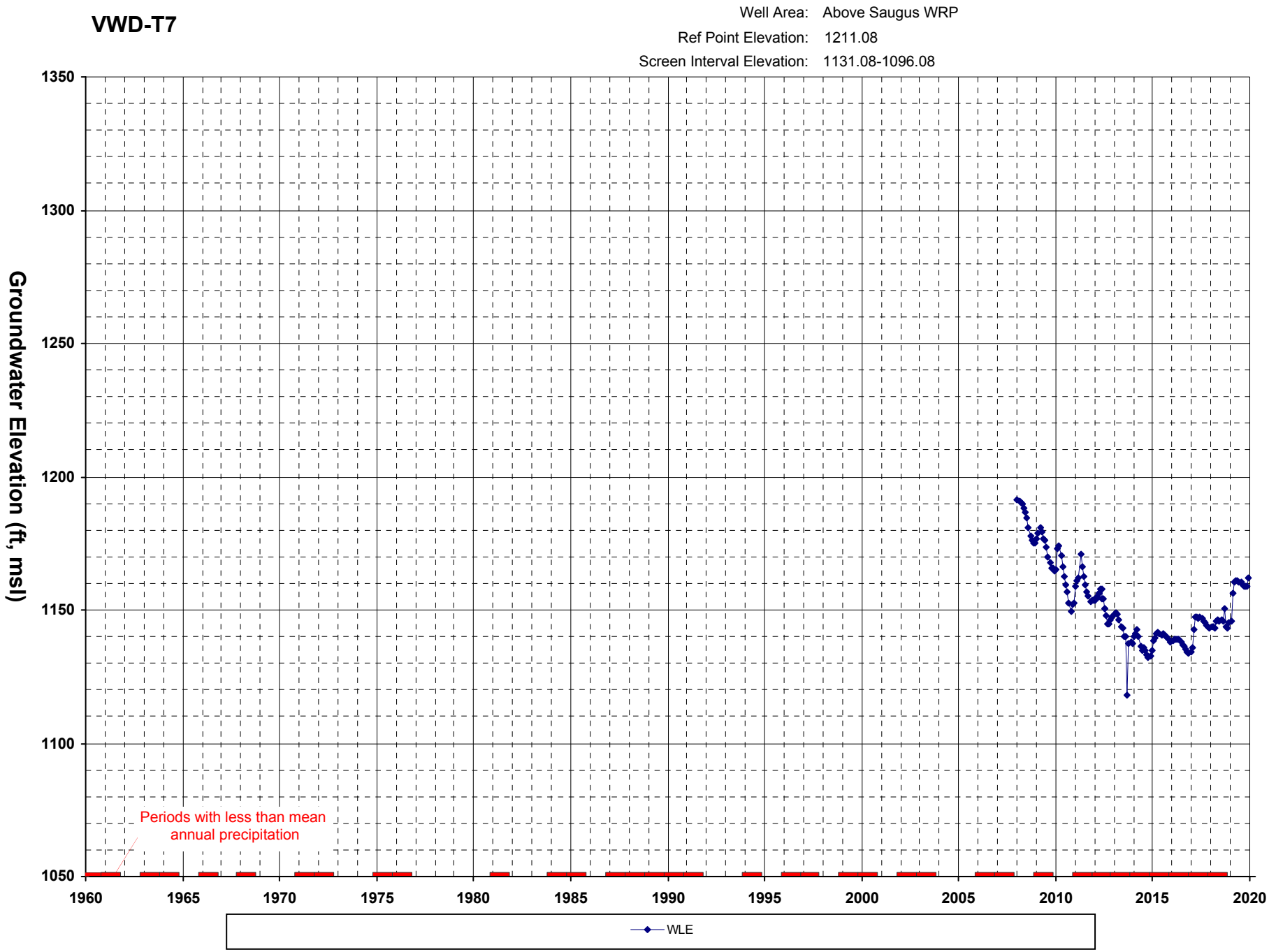
Well Area: Above Saugus WRP
Ref Point Elevation: 1198
Screen Interval Elevation: 1165-1068

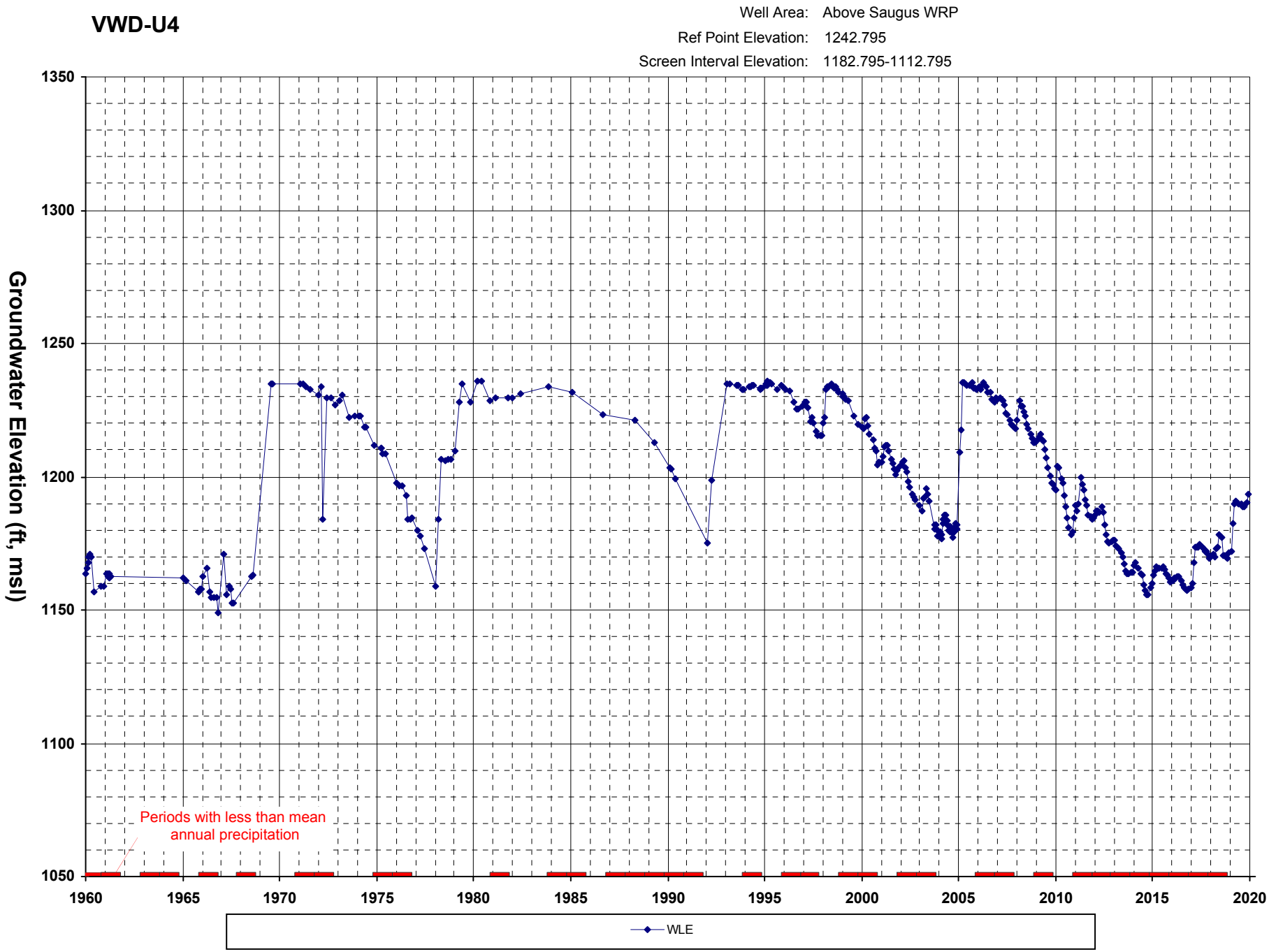


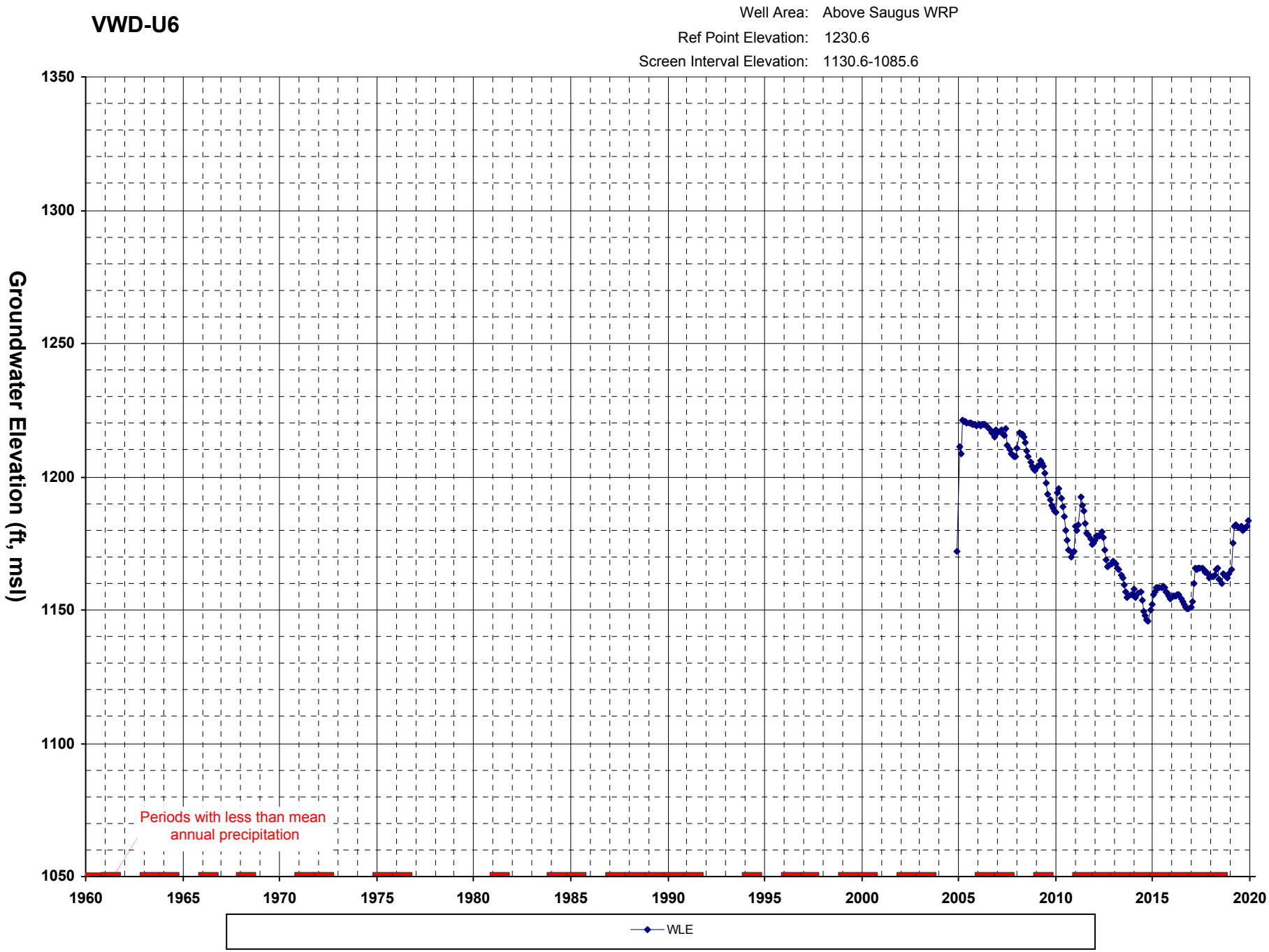
SCWD-Valley Center

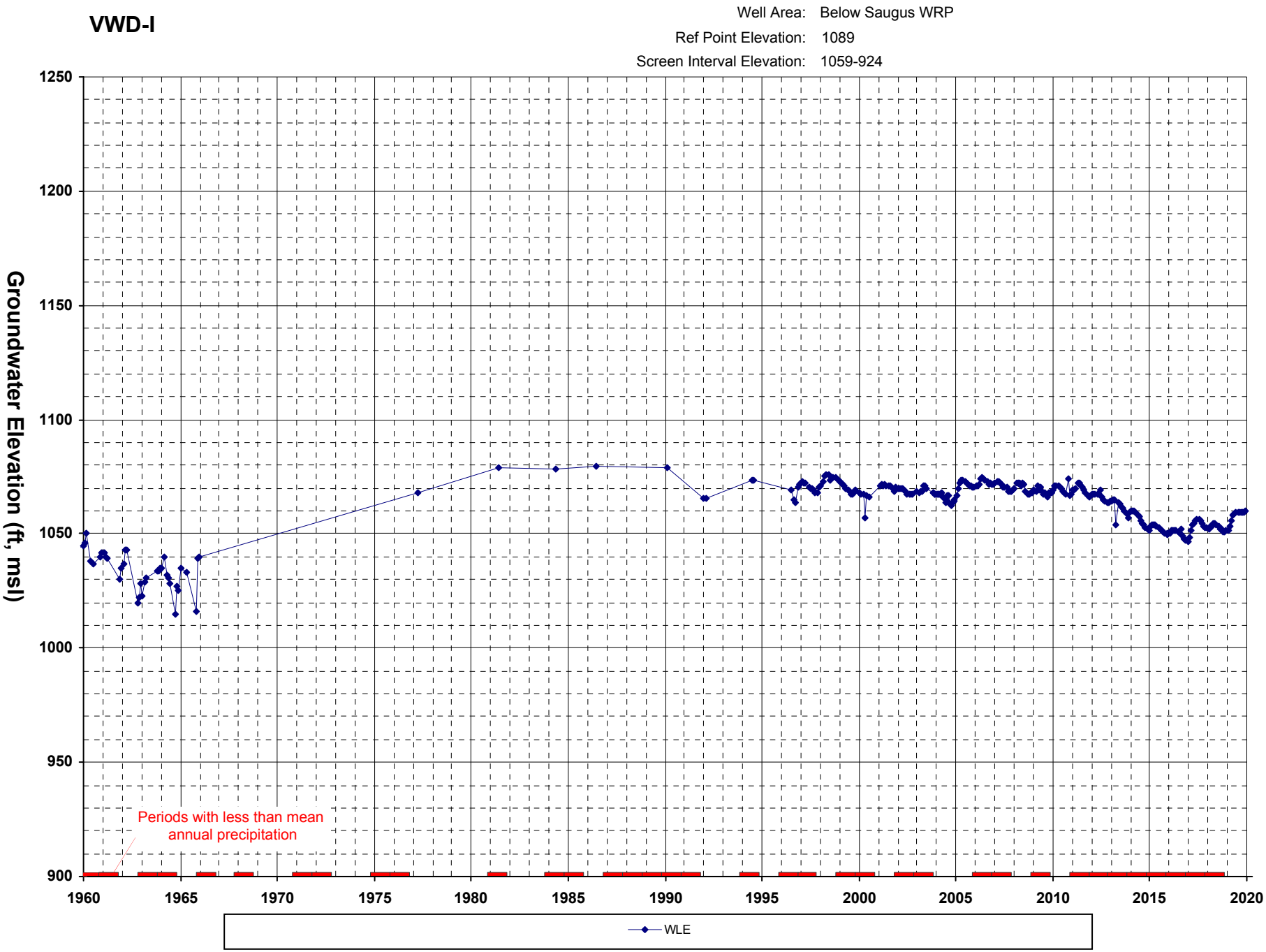
Well Area: Above Saugus WRP
Ref Point Elevation: 1256
Screen Interval Elevation: 1166-1131

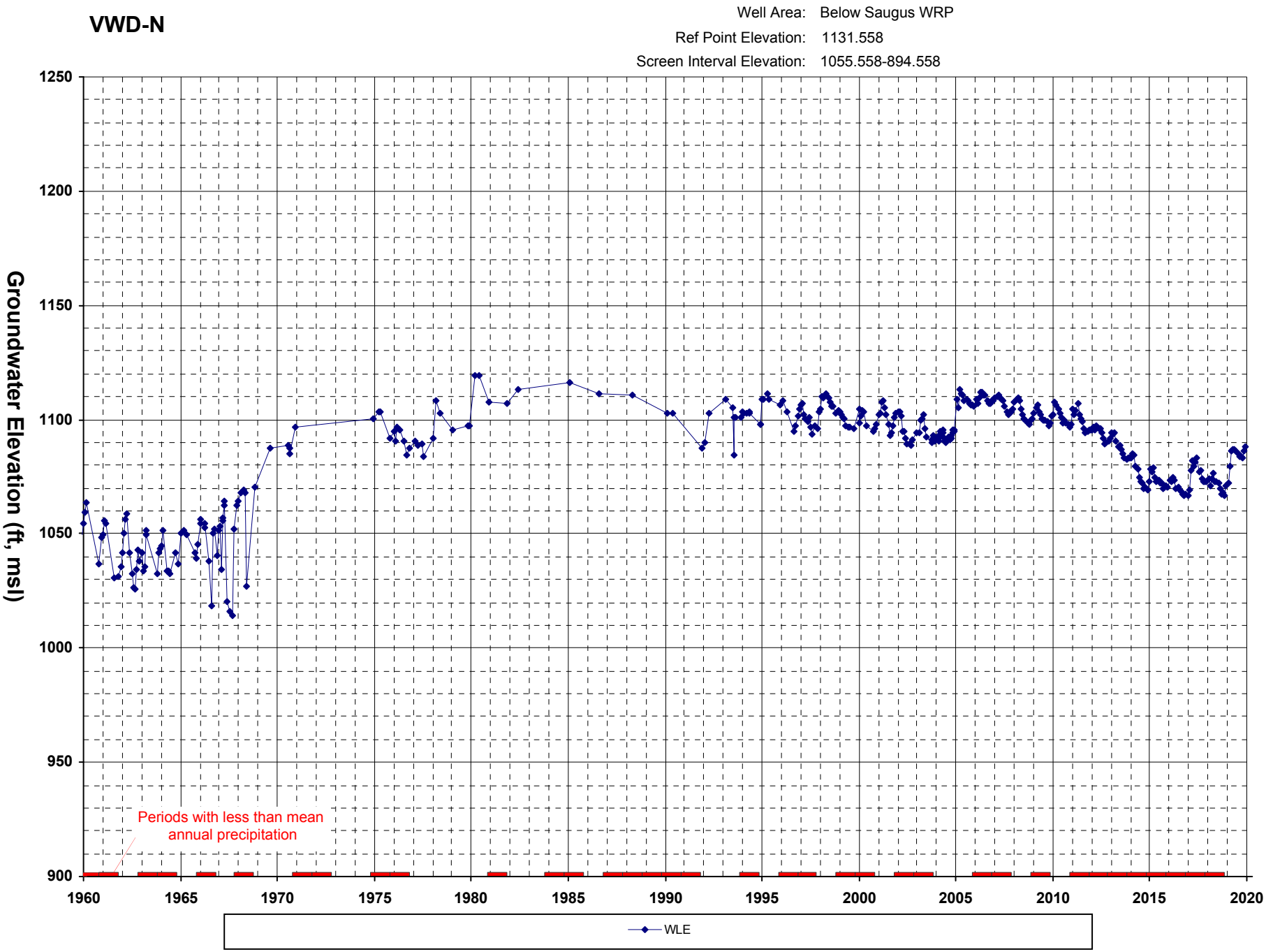


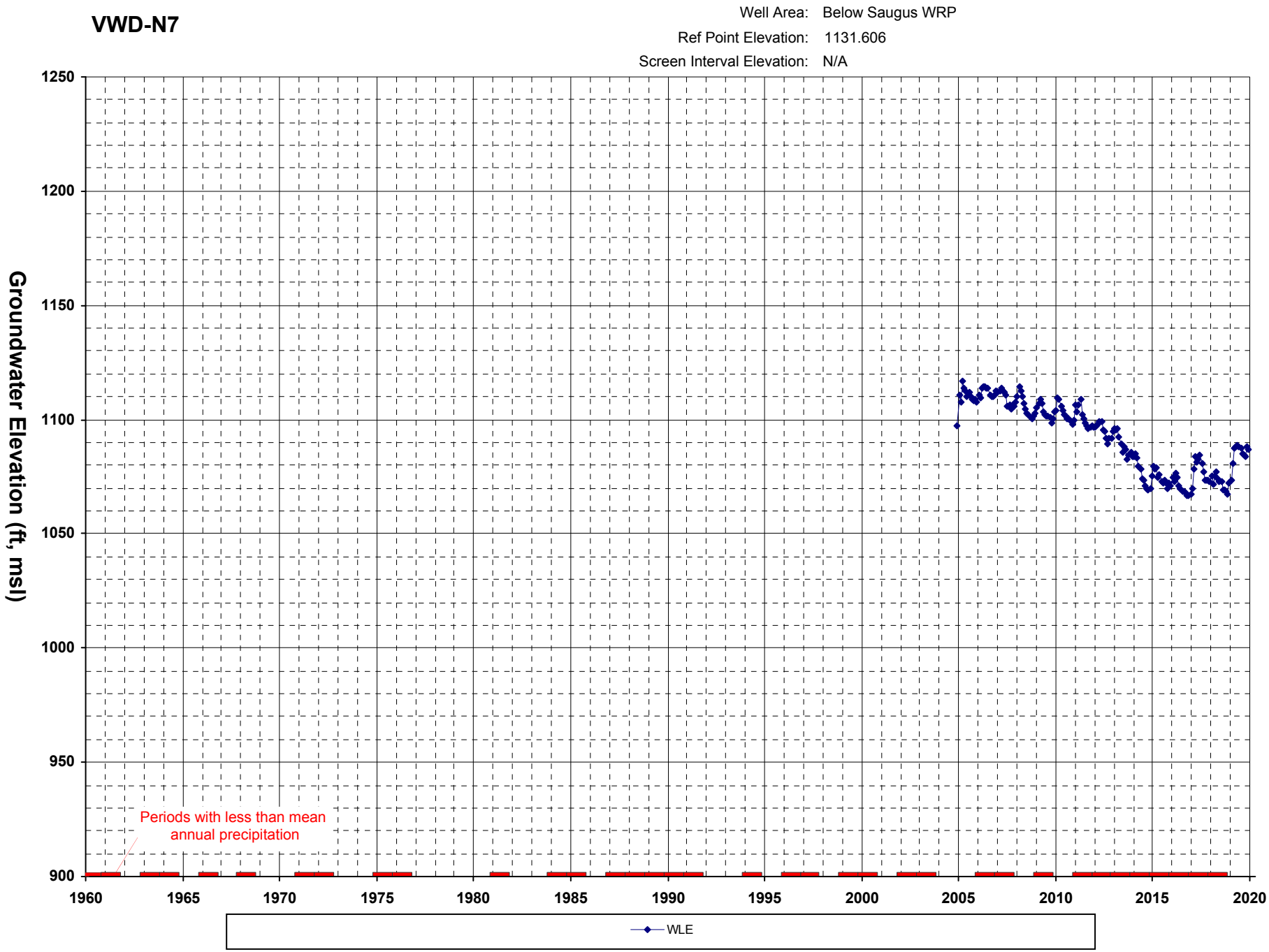

VWD-T7
Well Area: Above Saugus WRP
Ref Point Elevation: 1211.08
Screen Interval Elevation: 1131.08-1096.08
Groundwater Elevation (ft, msl)
1350
1300
1250
1200
1150
1100
1050
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

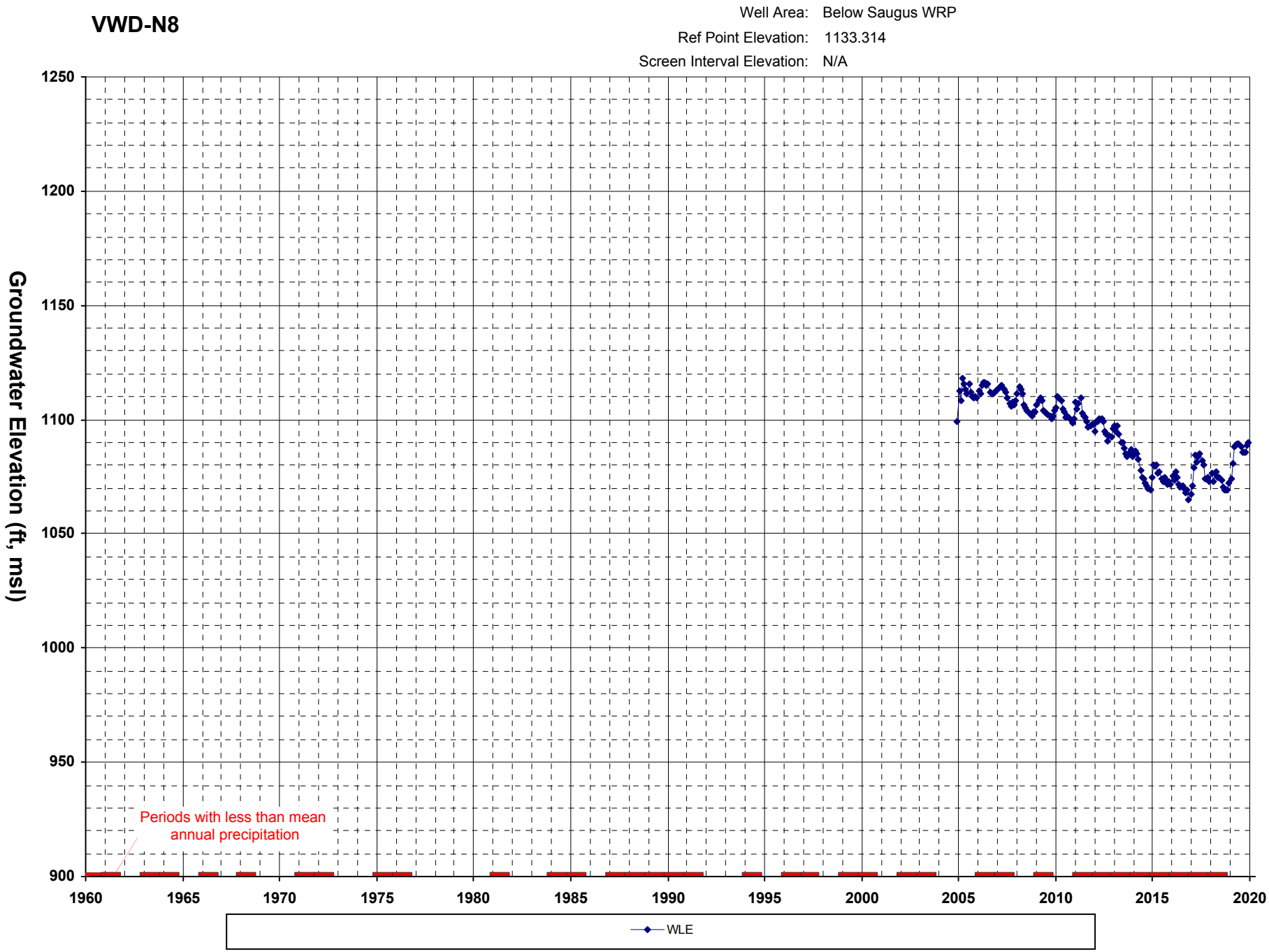

VWD-U4
Well Area: Above Saugus WRP
Ref Point Elevation: 1242.795
Screen Interval Elevation: 1182.795-1112.795
Groundwater Elevation (ft, msl)
1350
1300
1250
1200
1150
1100
1050
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

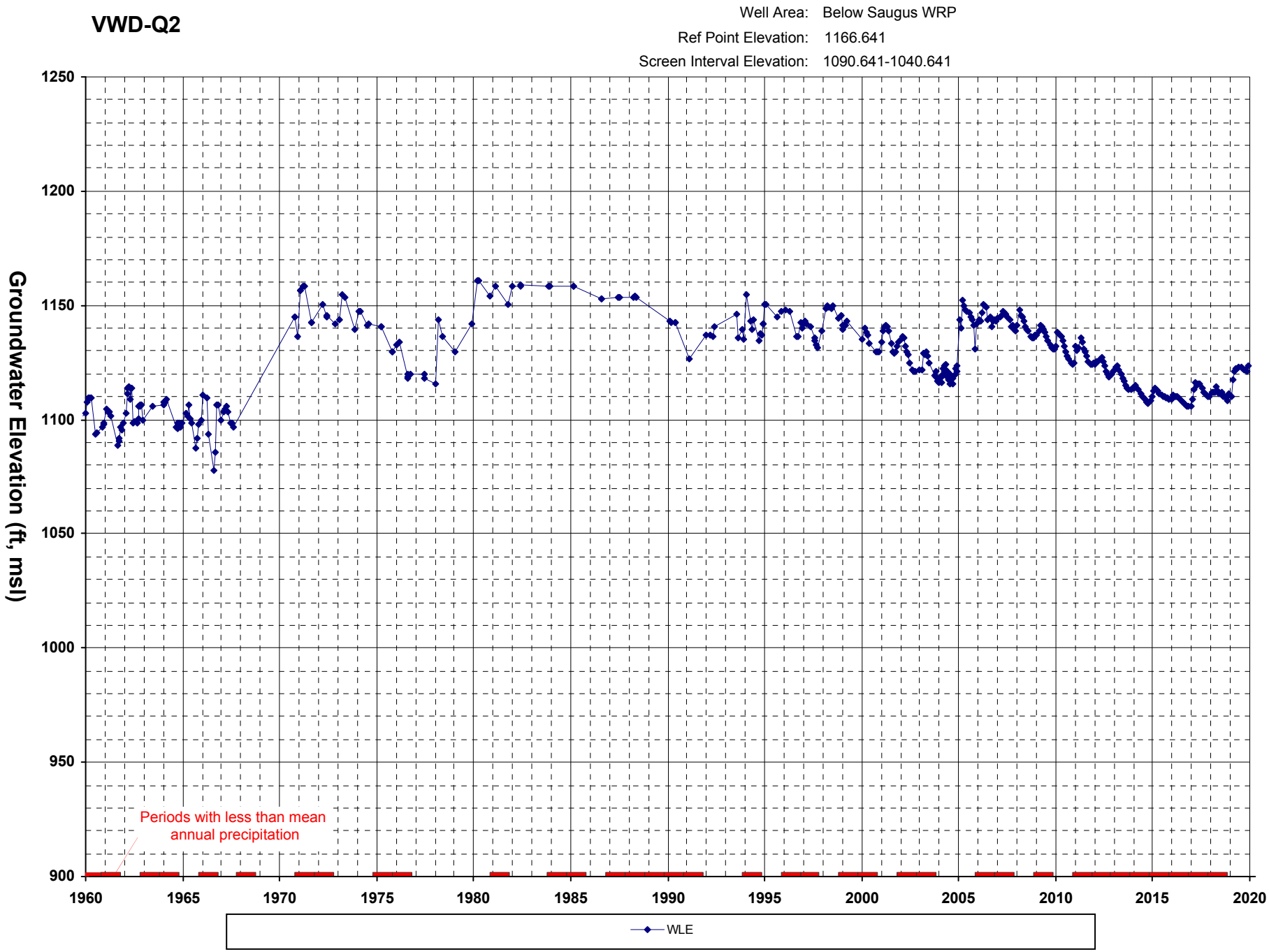

VWD-U6
Well Area: Above Saugus WRP
Ref Point Elevation: 1230.6
Screen Interval Elevation: 1130.6-1085.6
Groundwater Elevation (ft, msl)
1350
1300
1250
1200
1150
1100
1050
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

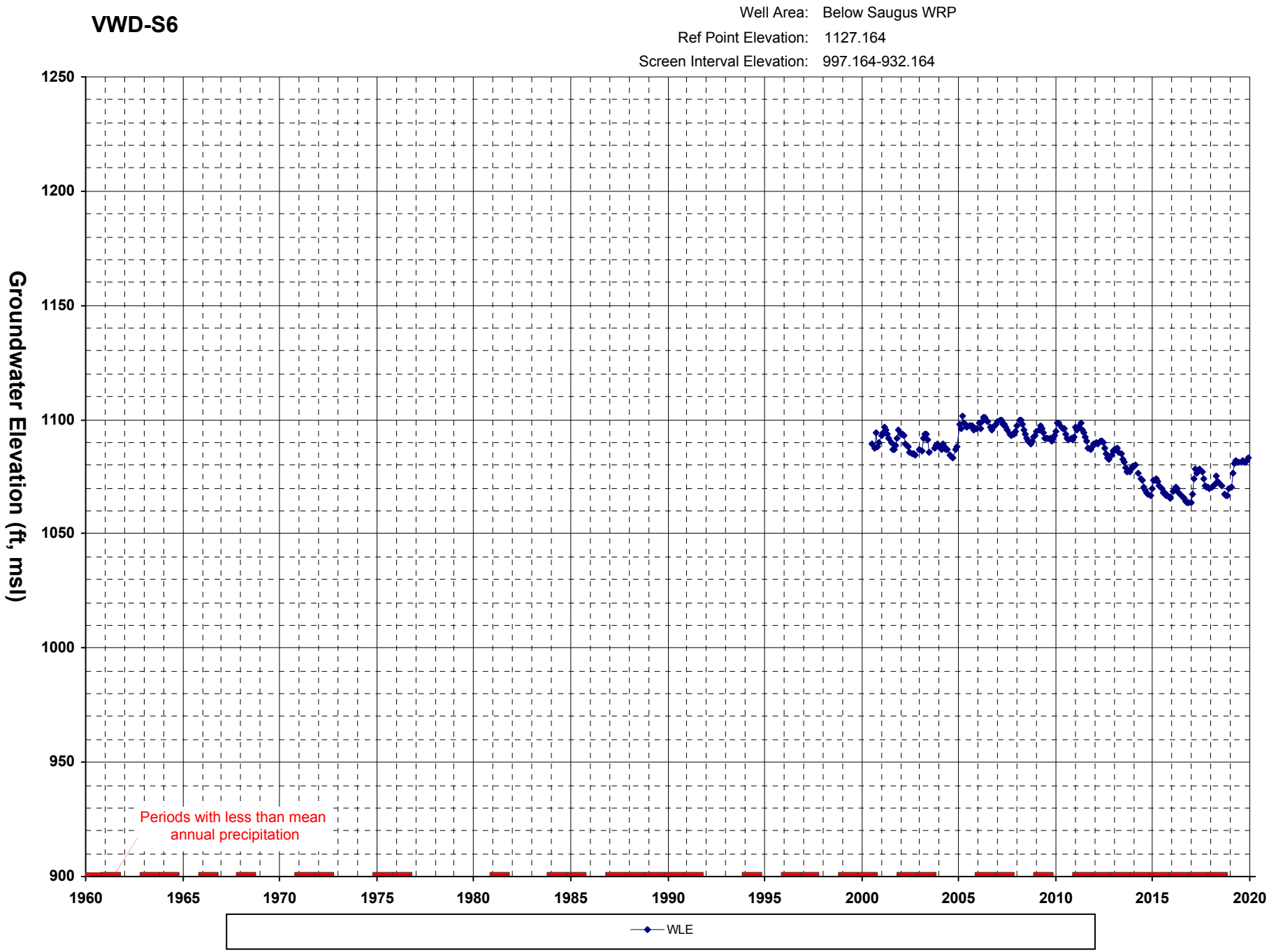

VWD-I
Well Area: Below Saugus WRP
Ref Point Elevation: 1089
Screen Interval Elevation: 1059-924
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

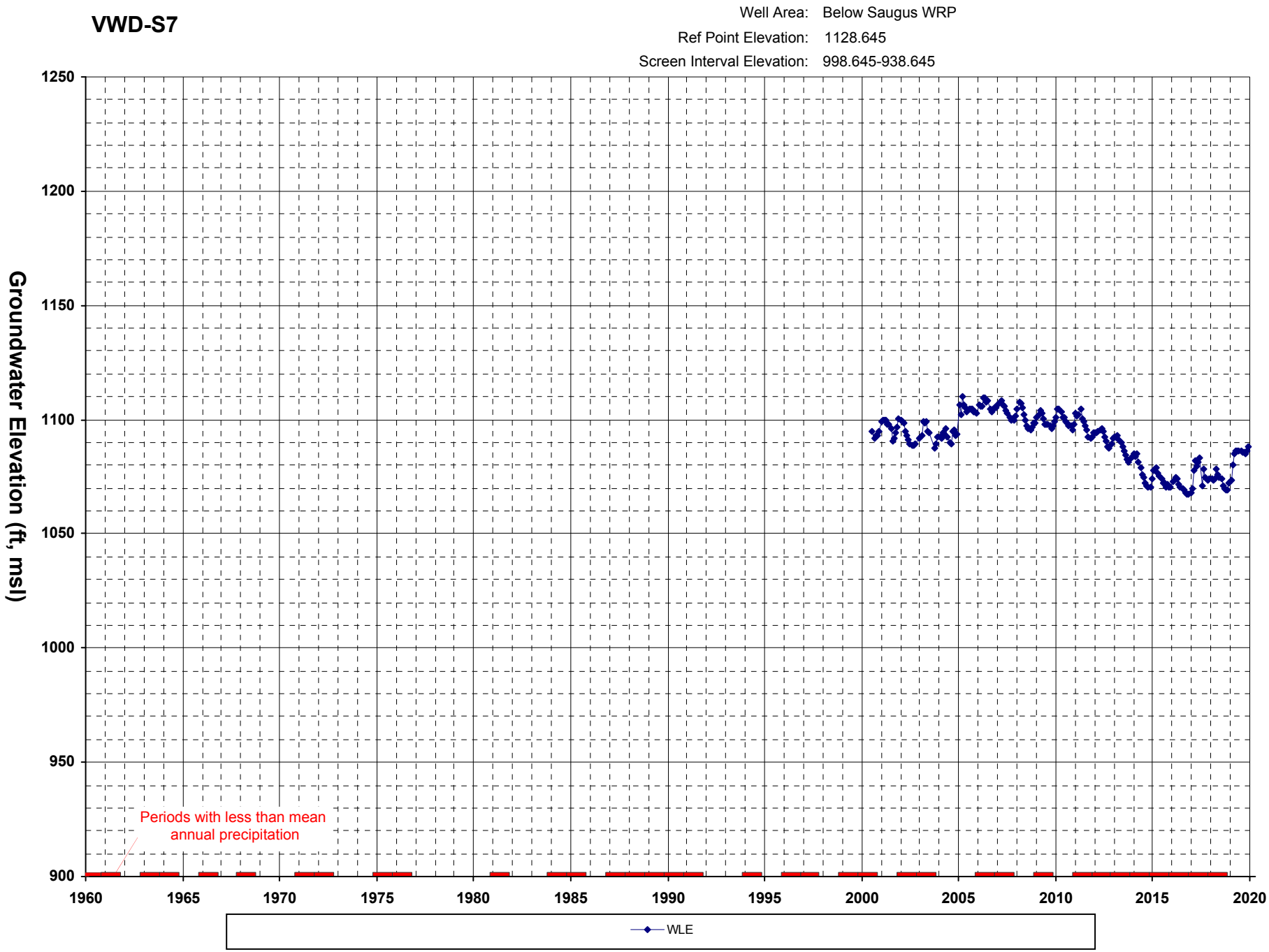

VWD-N
Well Area: Below Saugus WRP
Ref Point Elevation: 1131.558
Screen Interval Elevation: 1055.558-894.558
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

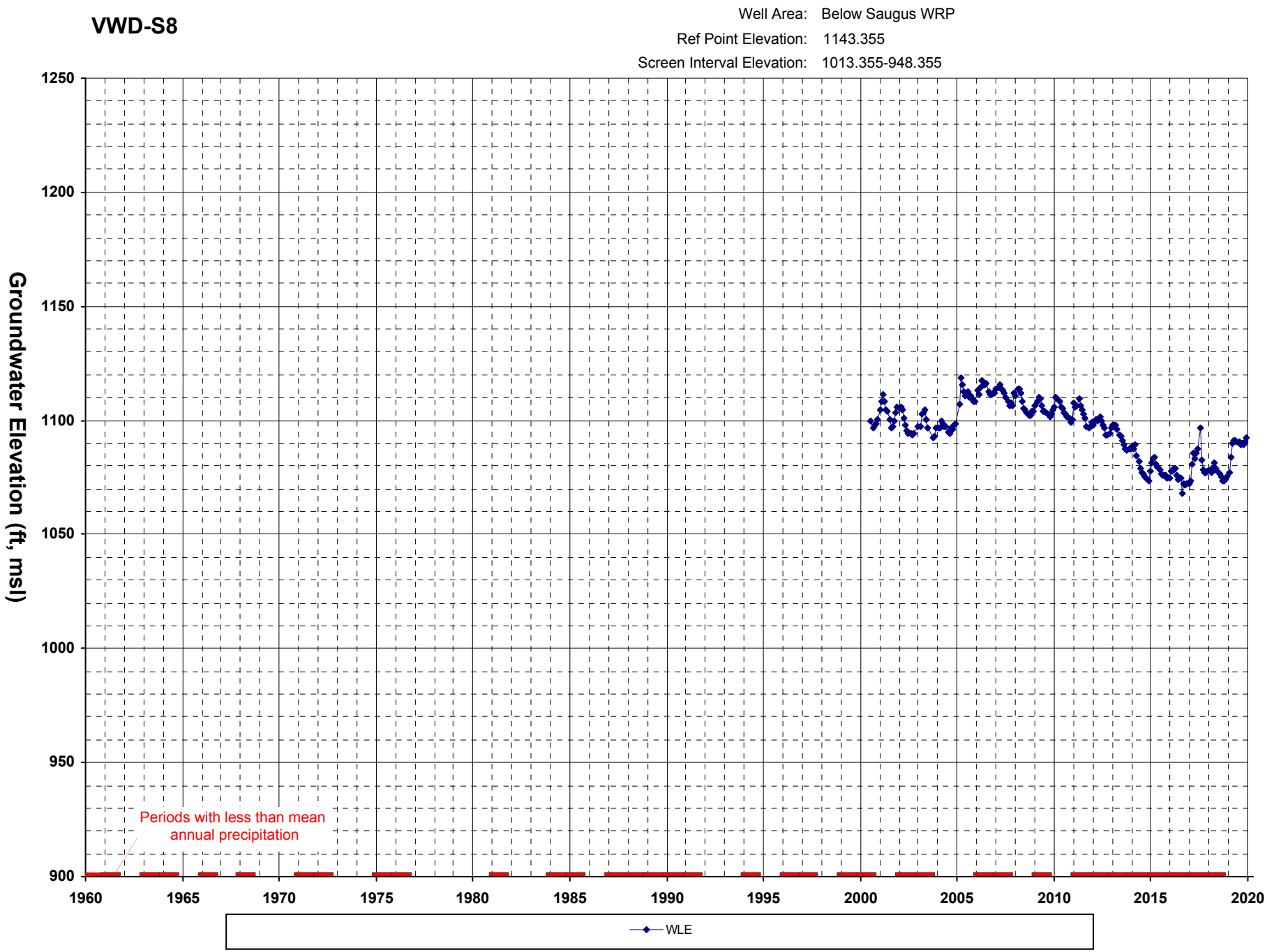

VWD-N7
Well Area: Below Saugus WRP
Ref Point Elevation: 1131.606
Screen Interval Elevation: N/A
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE


VWD-N8
Well Area: Below Saugus WRP
Ref Point Elevation: 1133.314
Screen Interval Elevation: N/A
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE


VWD-Q2
Well Area: Below Saugus WRP
Ref Point Elevation: 1166.641
Screen Interval Elevation: 1090.641-1040.641
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

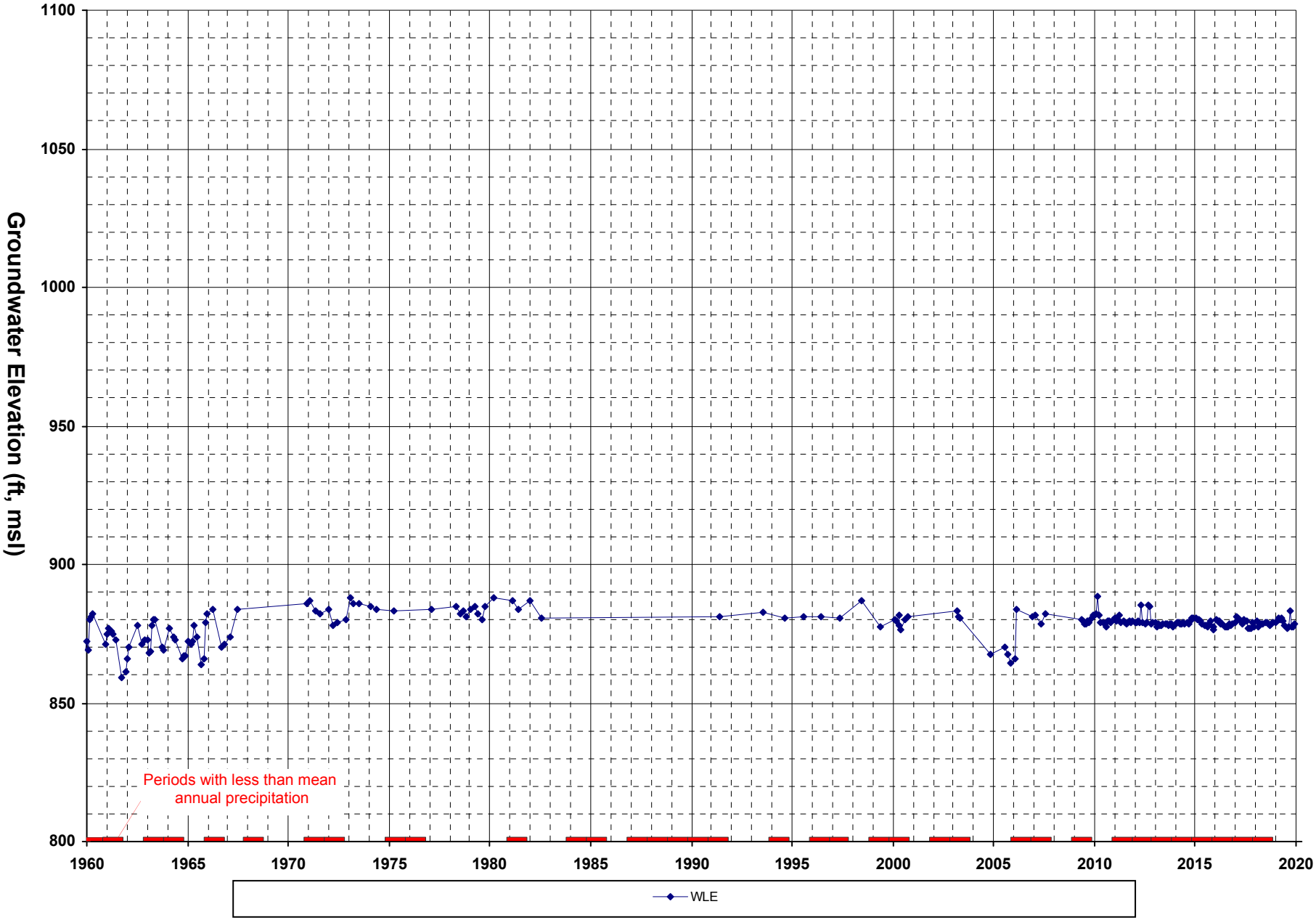

VWD-S6
Well Area: Below Saugus WRP
Ref Point Elevation: 1127.164
Screen Interval Elevation: 997.164-932.164
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE


VWD-S7
Well Area: Below Saugus WRP
Ref Point Elevation: 1128.645
Screen Interval Elevation: 998.645-938.645
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE


VWD-S8
Well Area: Below Saugus WRP
Ref Point Elevation: 1143.355
Screen Interval Elevation: 1013.355-948.355
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

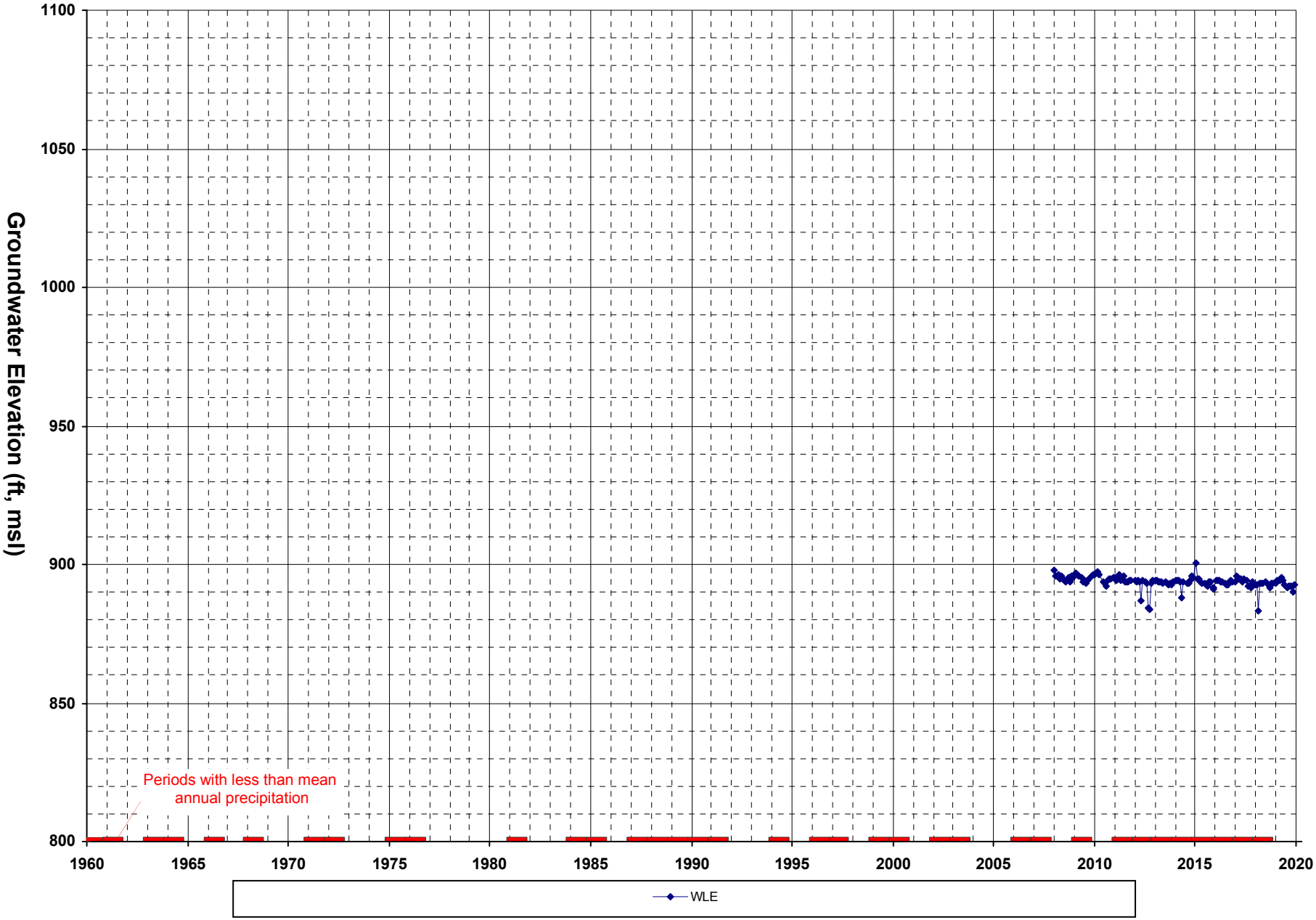
NLF-B10

Well Area: Below Valencia WRP
Ref Point Elevation: 896
Screen Interval Elevation: 866-766



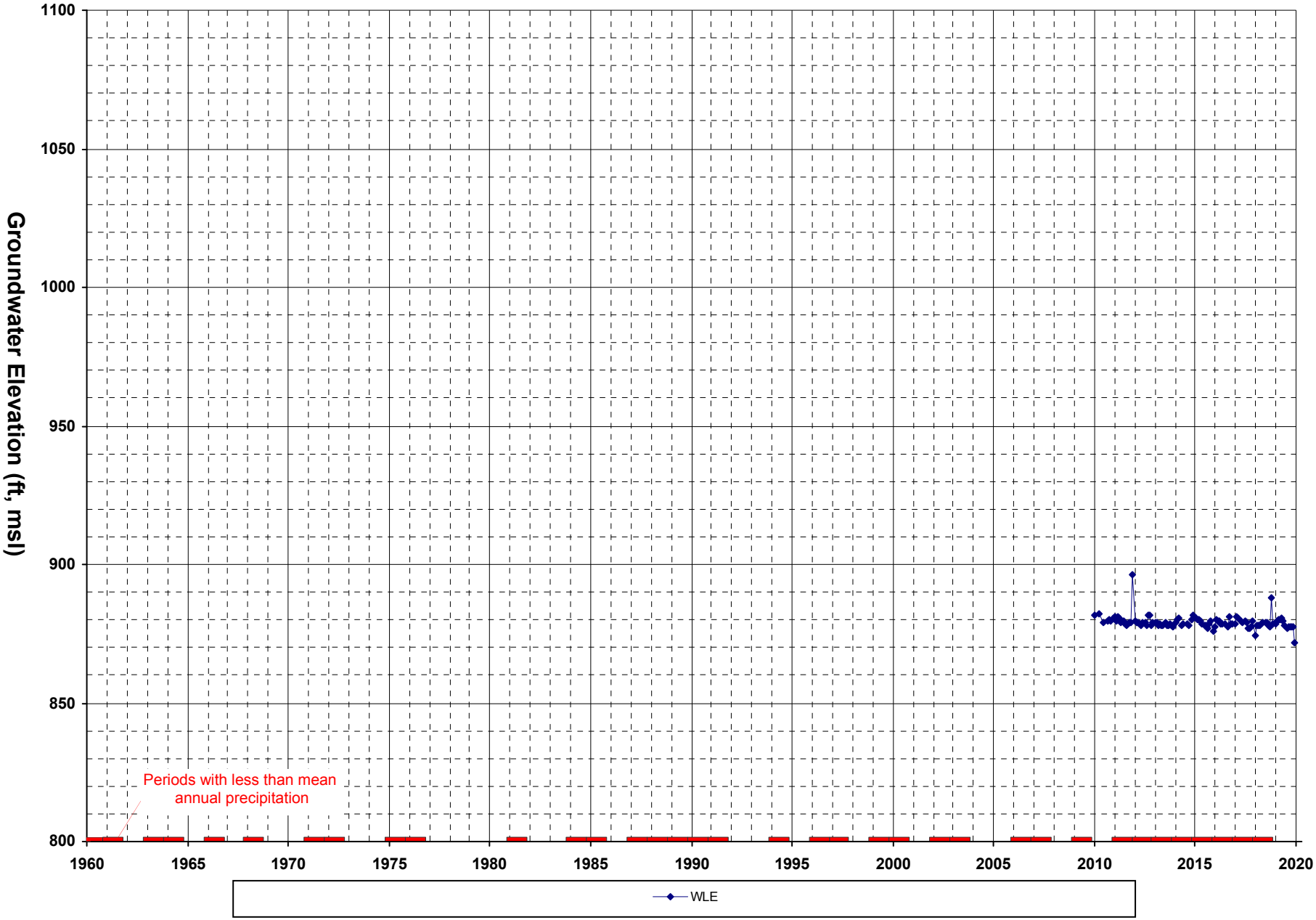
NLF-B14

Well Area: Below Valencia WRP
Ref Point Elevation: 904
Screen Interval Elevation: N/A



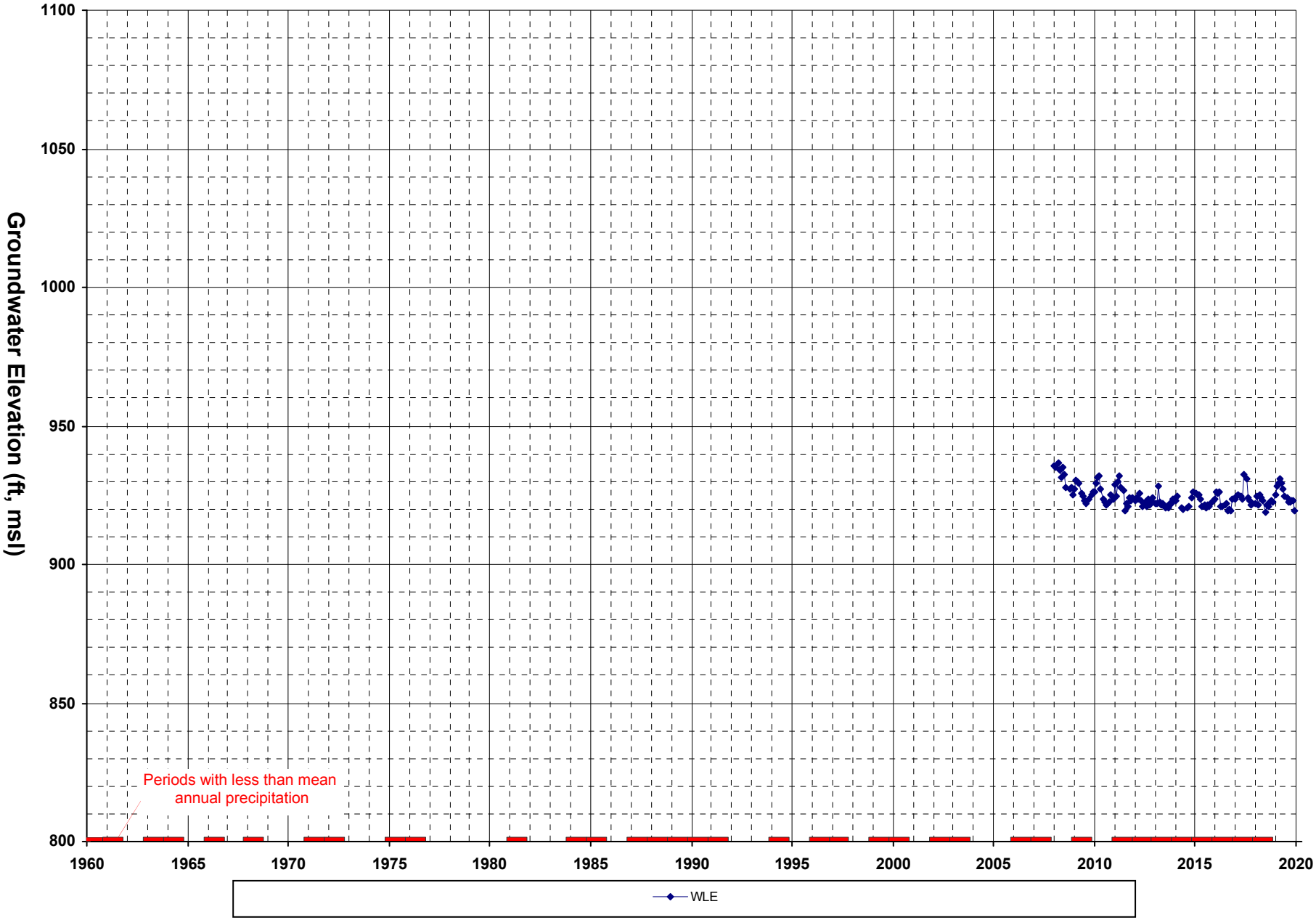
NLF-B16

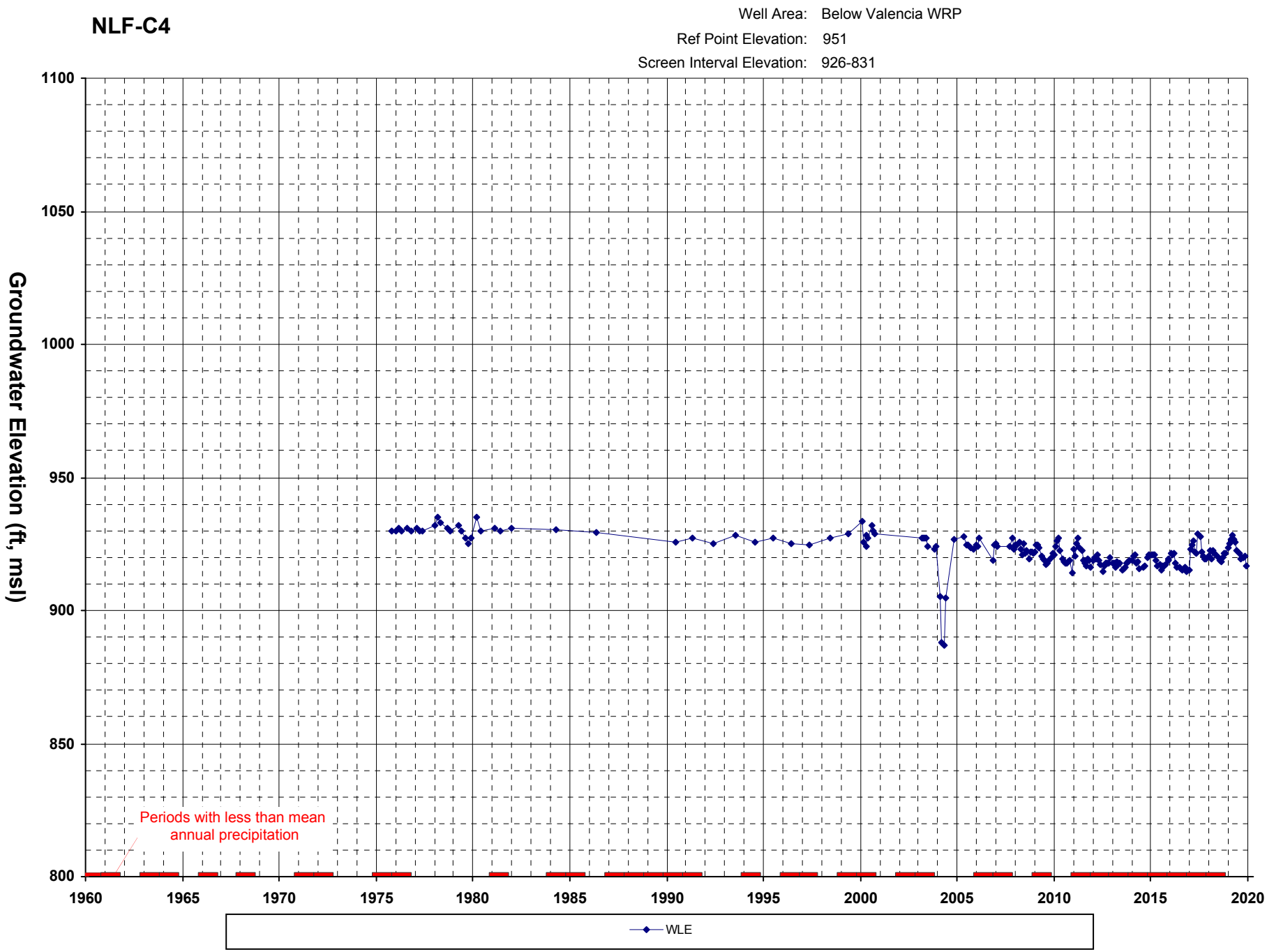
Well Area: Below Valencia WRP
Ref Point Elevation: 898
Screen Interval Elevation: N/A

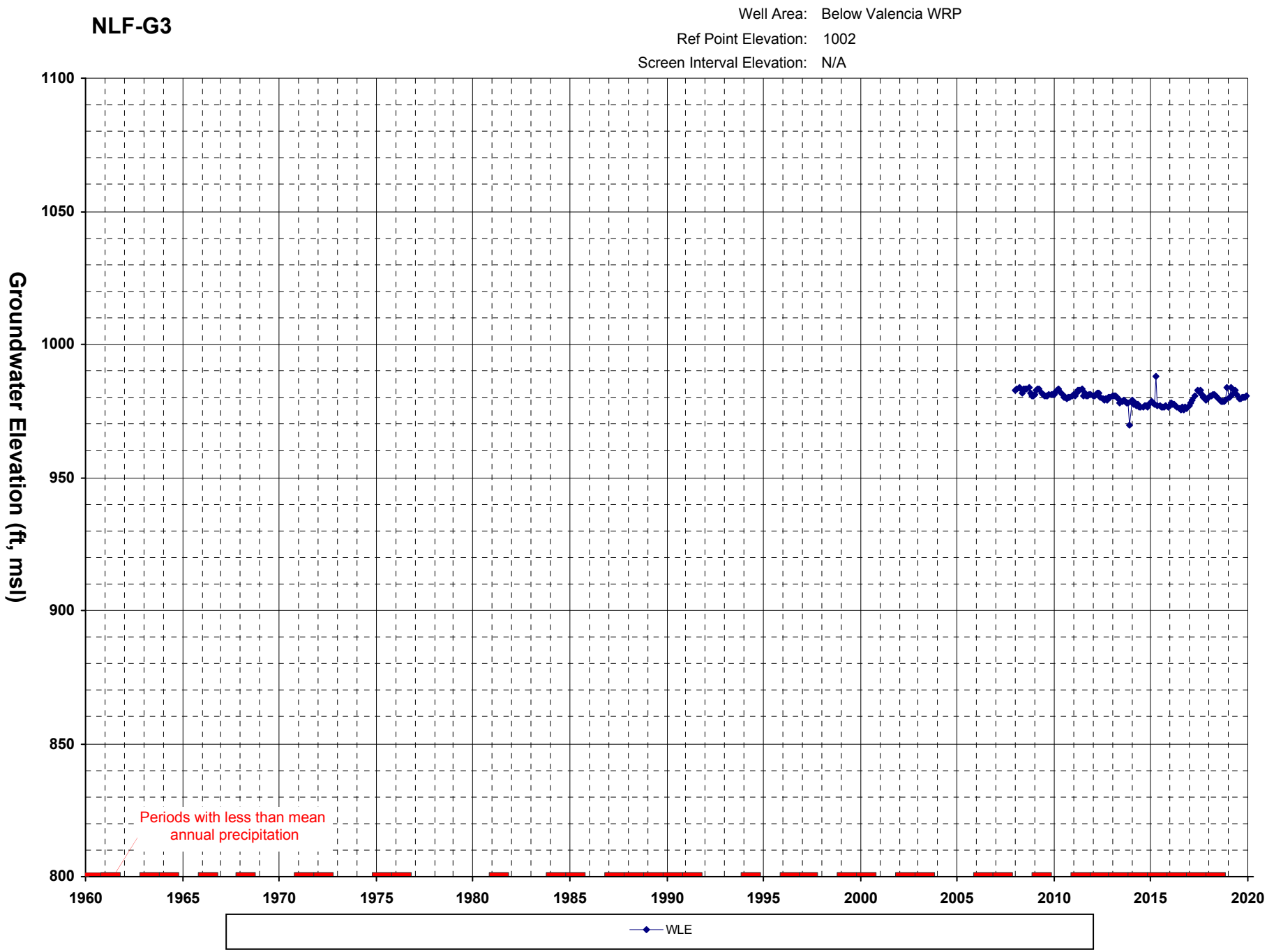


NLF-C10

Well Area: Below Valencia WRP
Ref Point Elevation: 956
Screen Interval Elevation: N/A

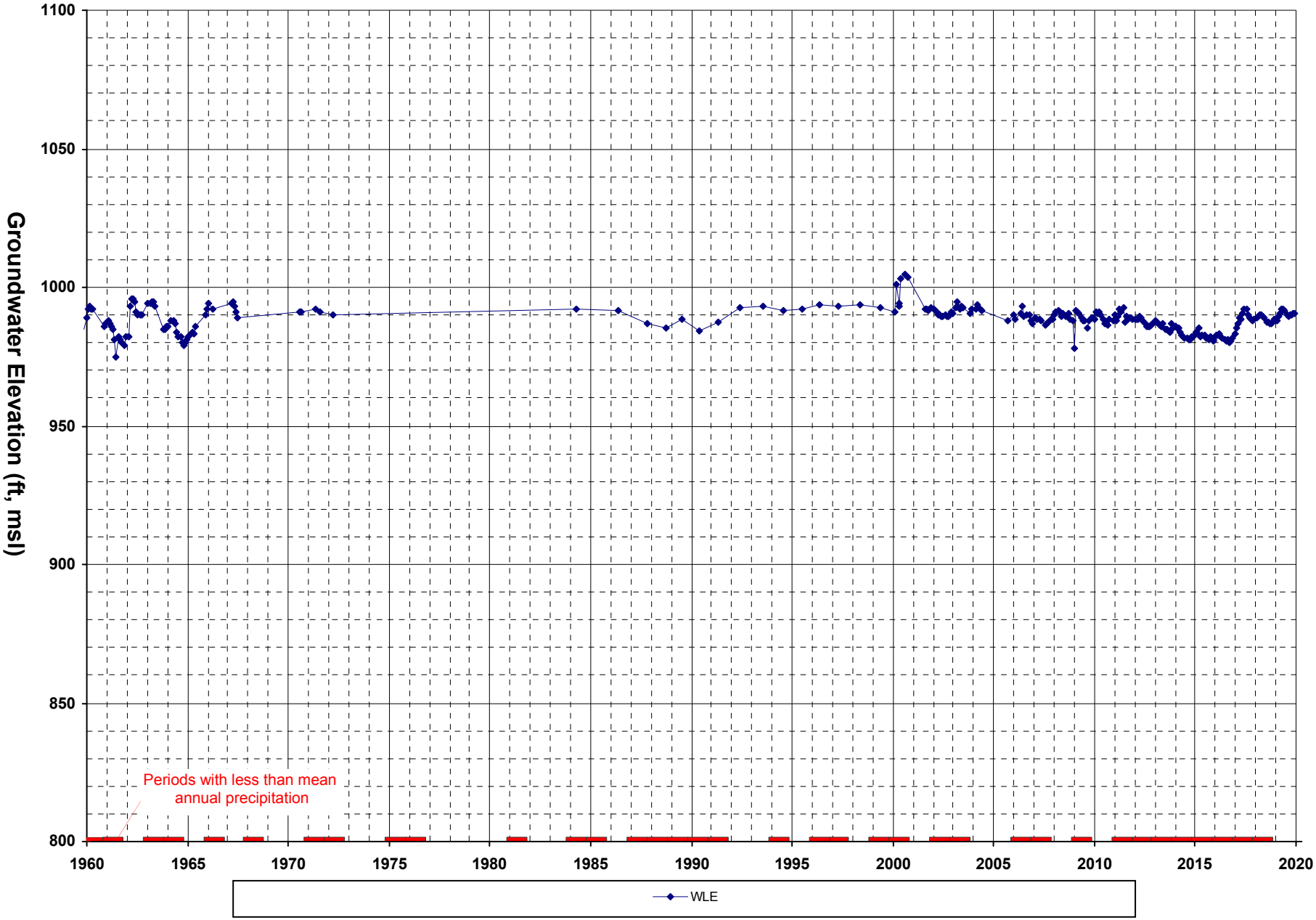


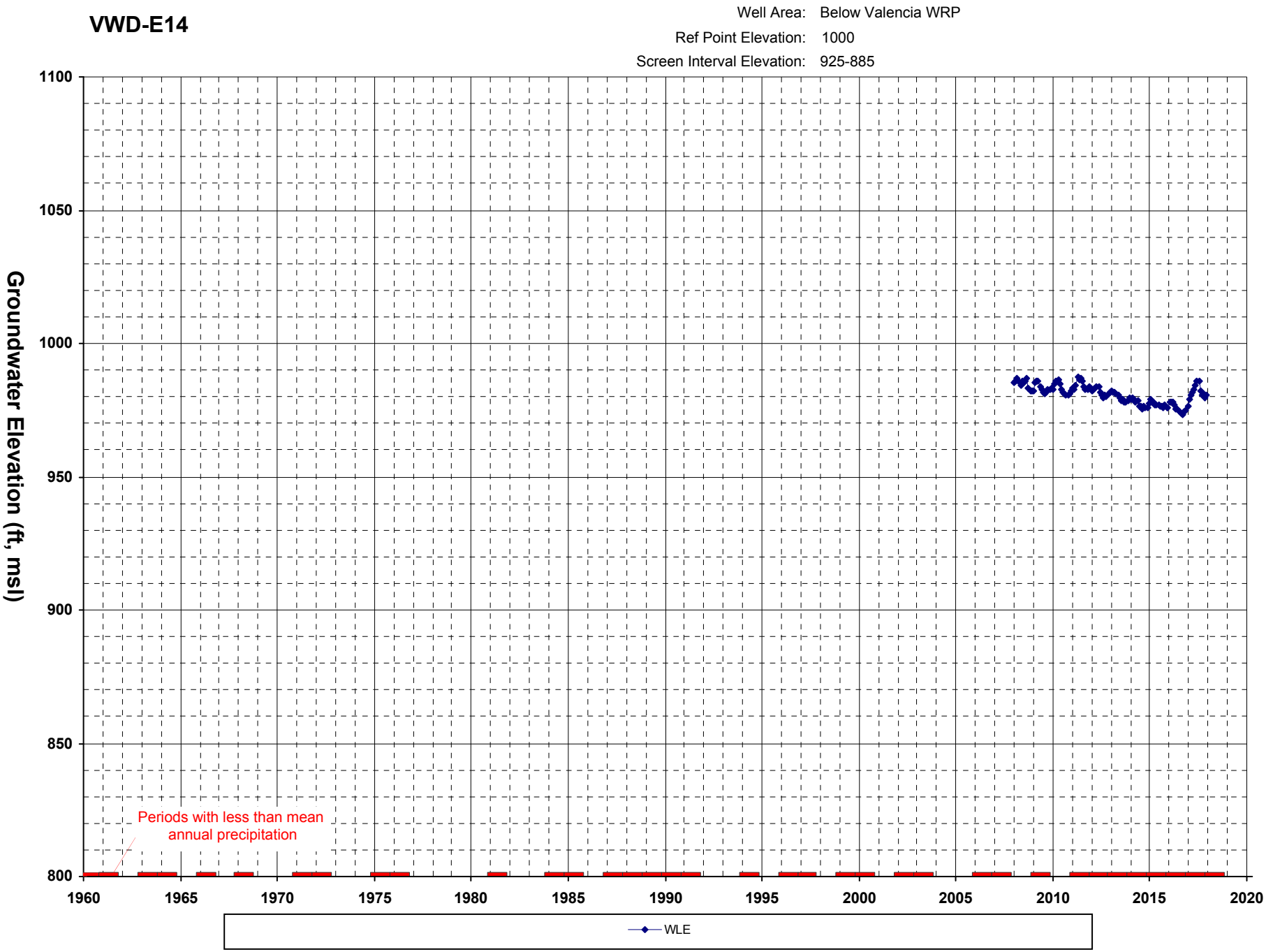

NLF-C4
Well Area: Below Valencia WRP
Ref Point Elevation: 951
Screen Interval Elevation: 926-831
Groundwater Elevation (ft, msl)
1100
1050
1000
950
900
850
800
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

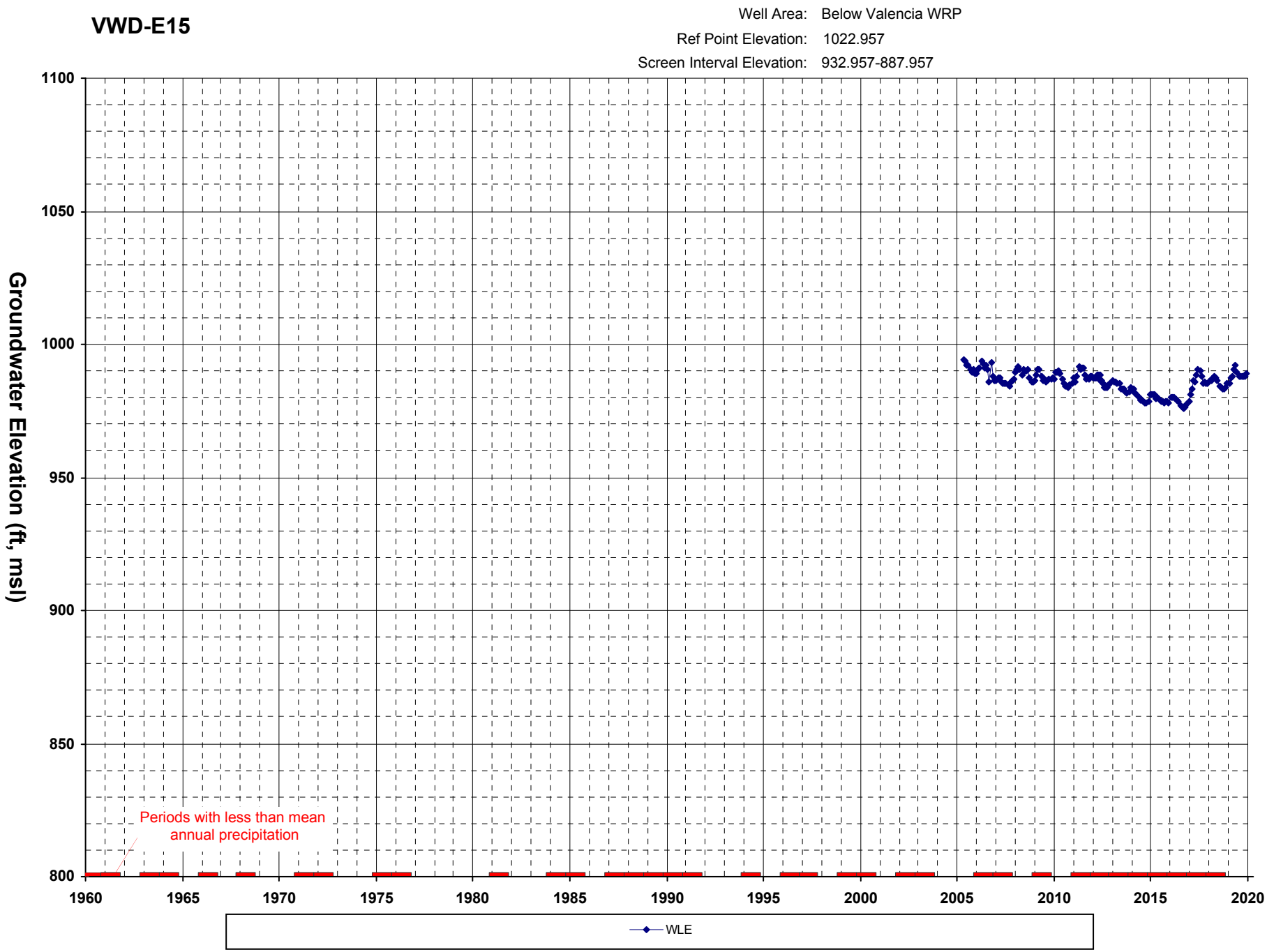

NLF-G3
Well Area: Below Valencia WRP
Ref Point Elevation: 1002
Screen Interval Elevation: N/A
Groundwater Elevation (ft, msl)
1100
1050
1000
950
900
850
800
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

NLF-X3

Well Area: Below Valencia WRP
Ref Point Elevation: 1014
Screen Interval Elevation: 939-869

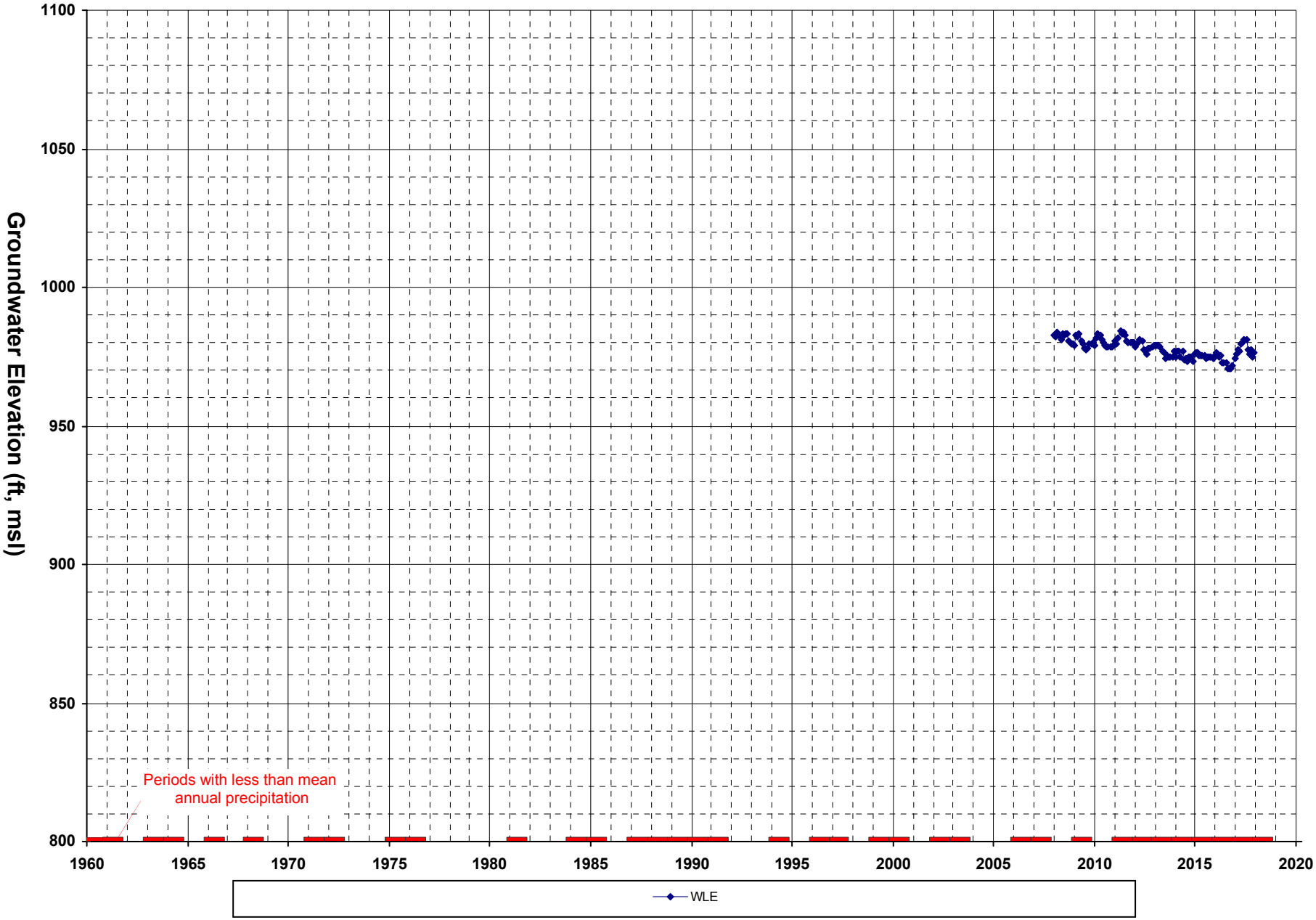


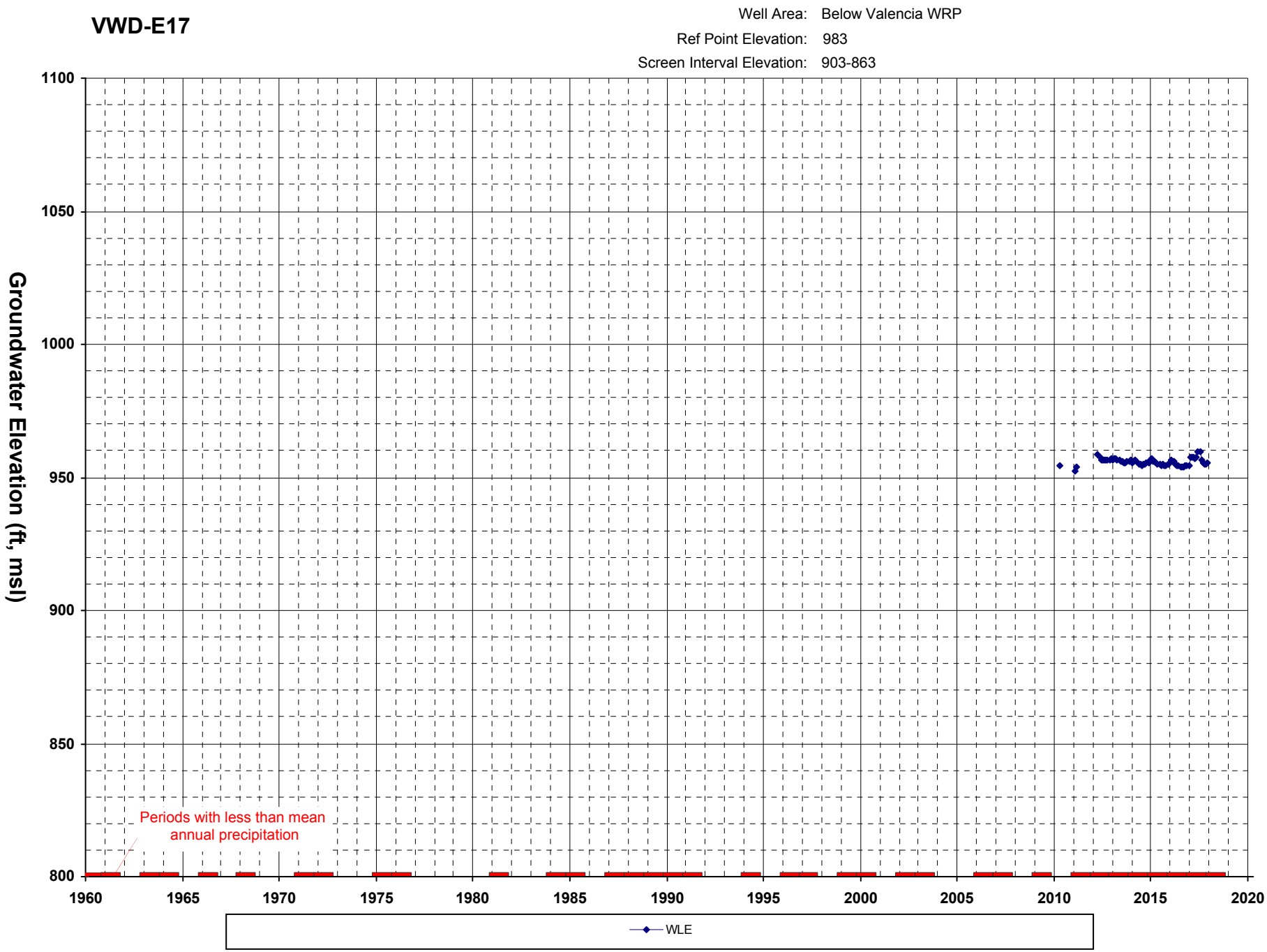

VWD-E14
Well Area: Below Valencia WRP
Ref Point Elevation: 1000
Screen Interval Elevation: 925-885
Groundwater Elevation (ft, msl)
1100
1050
1000
950
900
850
800
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

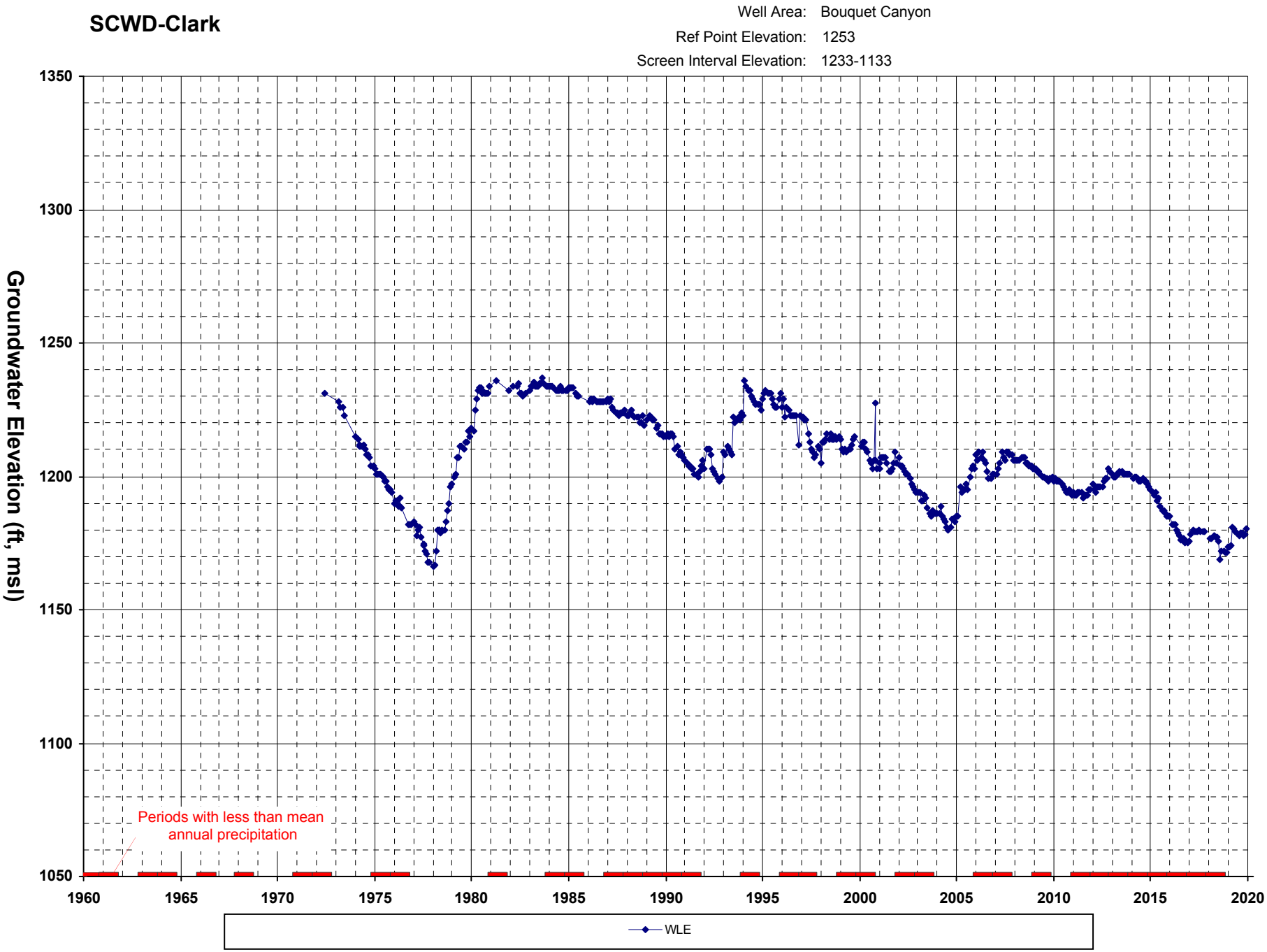

VWD-E15
Well Area: Below Valencia WRP
Ref Point Elevation: 1022.957
Screen Interval Elevation: 932.957-887.957
Groundwater Elevation (ft, msl)
1100
1050
1000
950
900
850
800
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

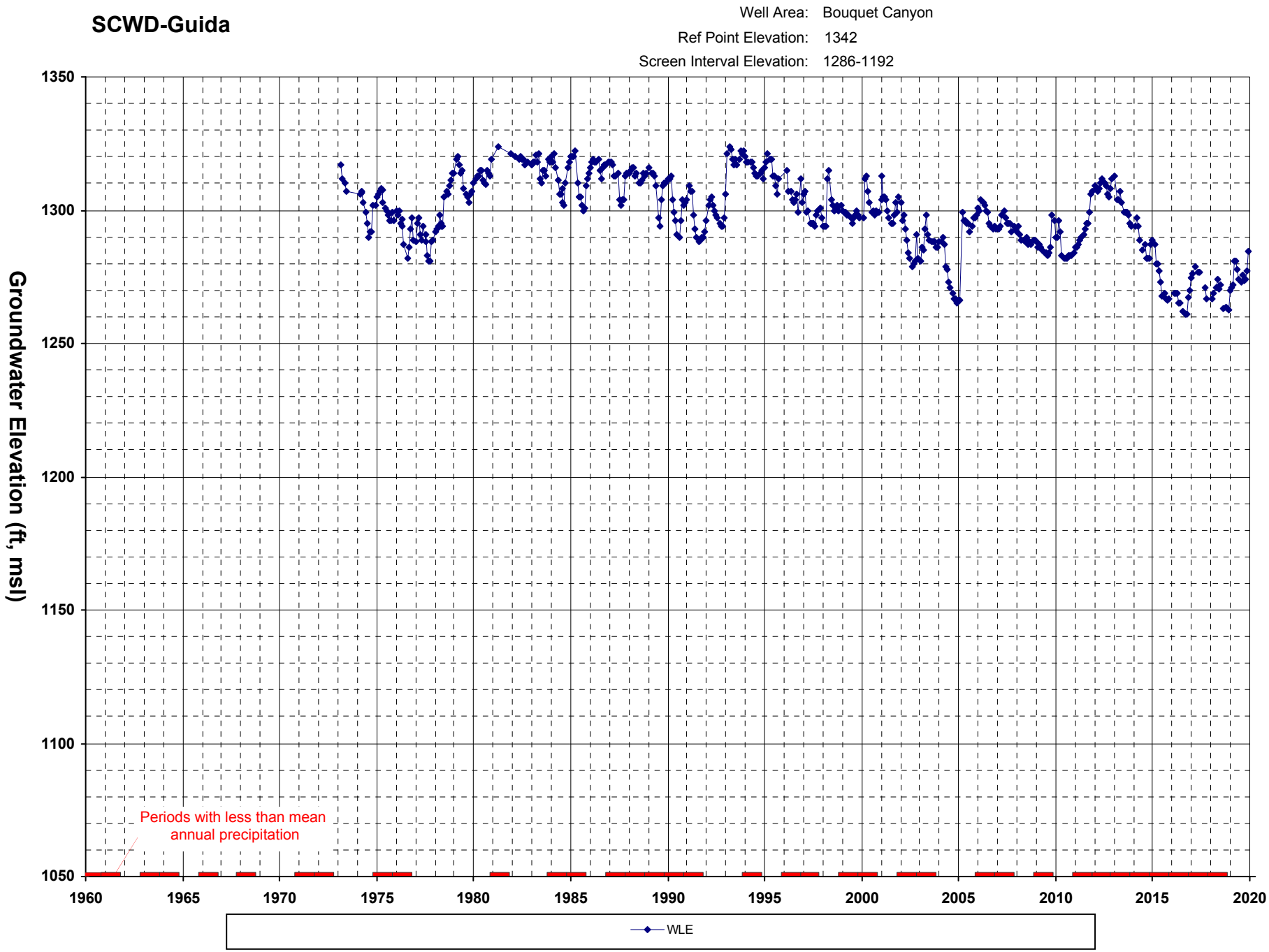
VWD-E16

Well Area: Below Valencia WRP
Ref Point Elevation: 996
Screen Interval Elevation: 916-851



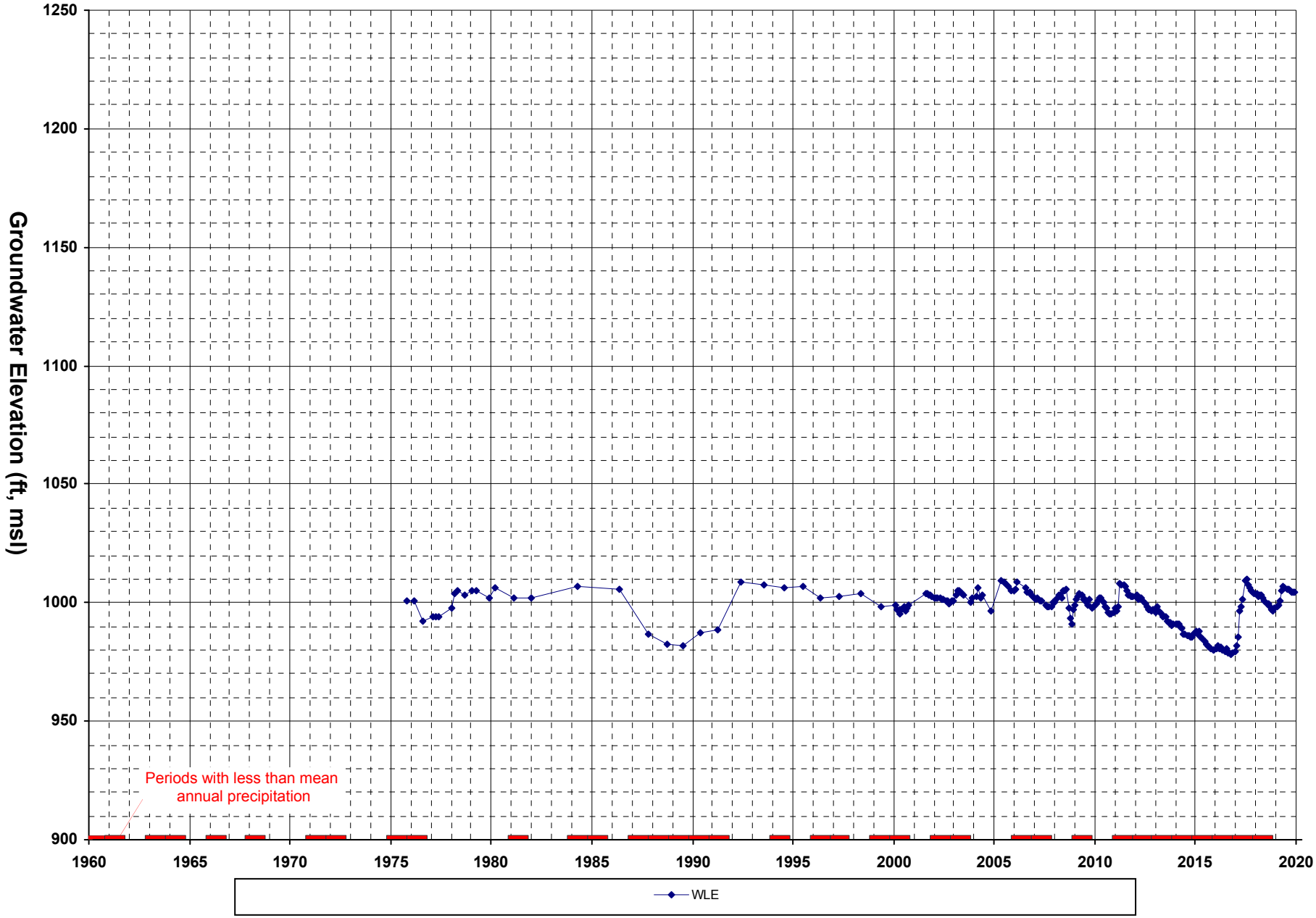

VWD-E17
Well Area: Below Valencia WRP
Ref Point Elevation: 983
Screen Interval Elevation: 903-863
Groundwater Elevation (ft, msl)
1100
1050
1000
950
900
850
800
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE


SCWD-Clark
Well Area: Bouquet Canyon
Ref Point Elevation: 1253
Screen Interval Elevation: 1233-1133
Groundwater Elevation (ft, msl)
1350
1300
1250
1200
1150
1100
1050
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE


SCWD-Guida
Well Area: Bouquet Canyon
Ref Point Elevation: 1342
Screen Interval Elevation: 1286-1192
Groundwater Elevation (ft, msl)
1350
1300
1250
1200
1150
1100
1050
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

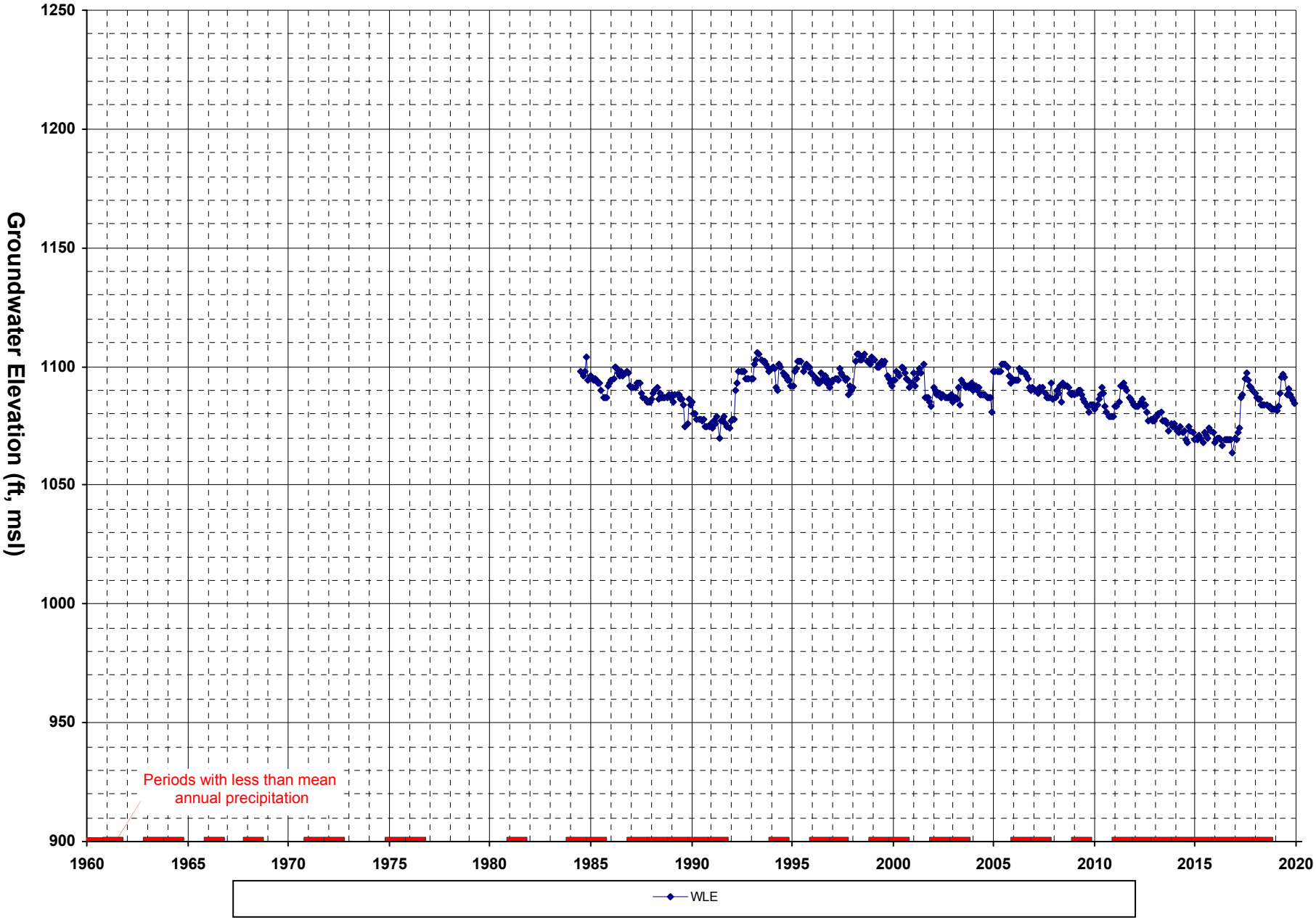
NLF-E

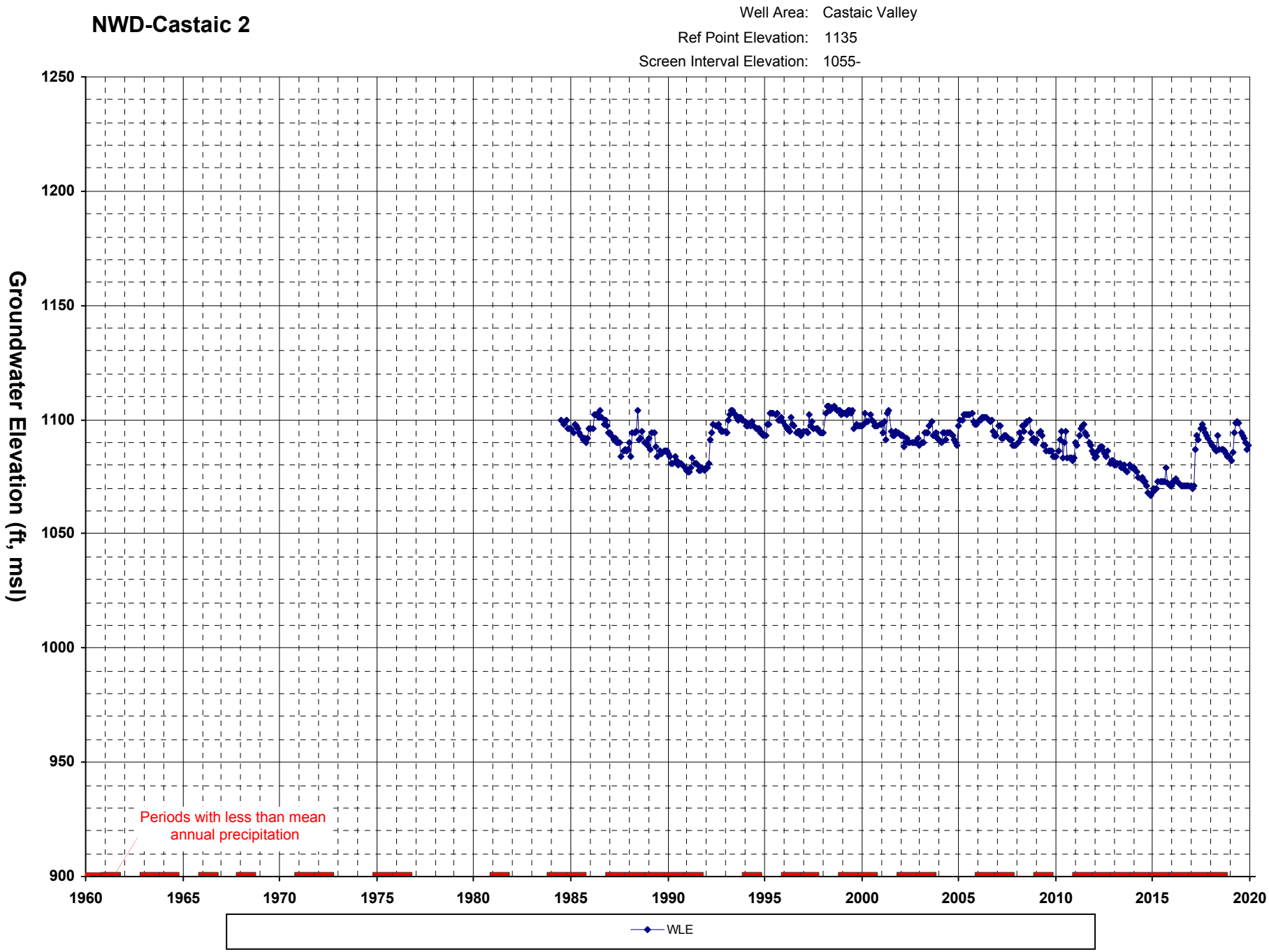
Well Area: Castaic Valley
Ref Point Elevation: 1024
Screen Interval Elevation: 1012-931



NWD-Castaic 1

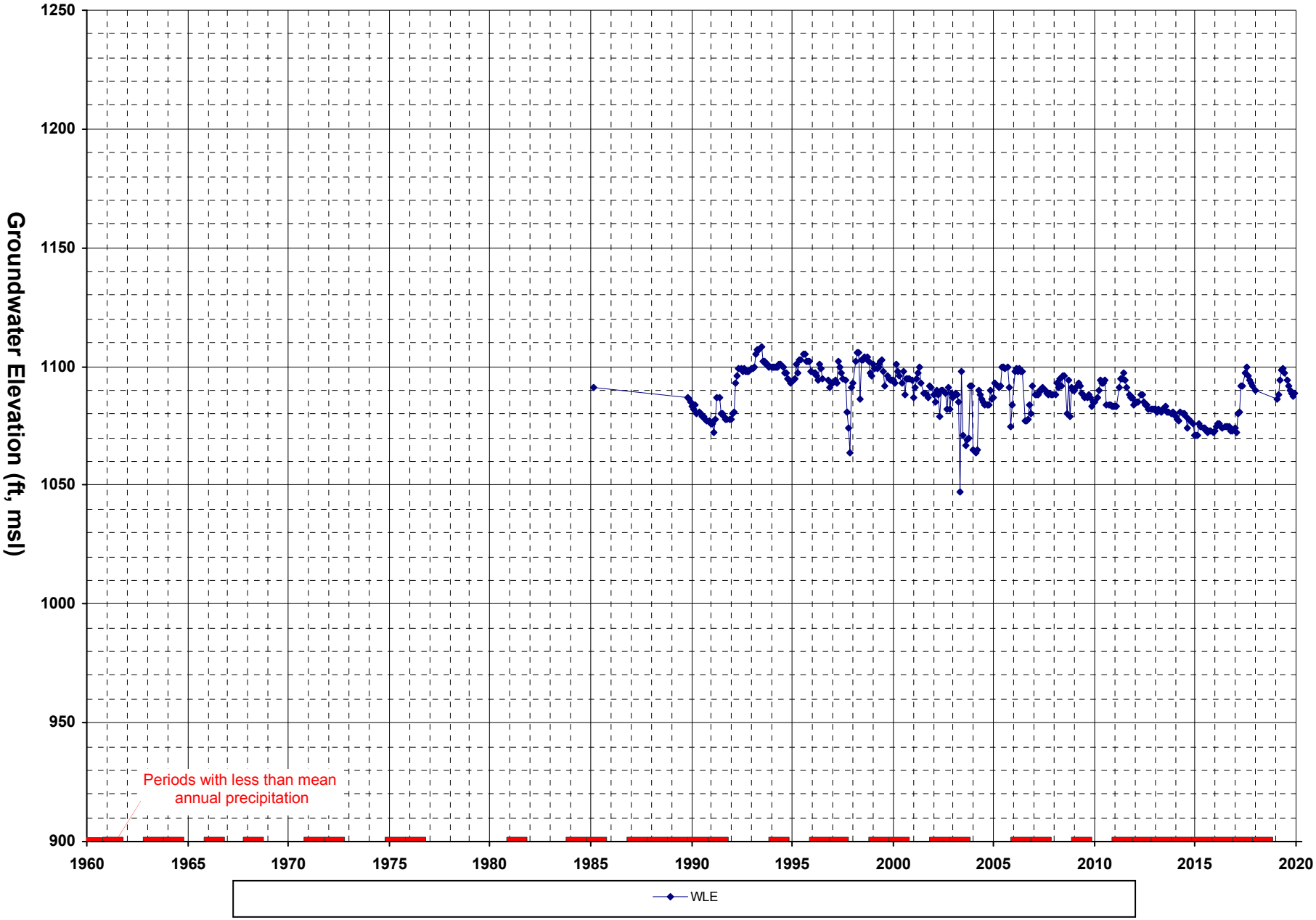
Well Area: Castaic Valley
Ref Point Elevation: 1129
Screen Interval Elevation: 1019-832




NWD-Castaic 2
Well Area: Castaic Valley
Ref Point Elevation: 1135
Screen Interval Elevation: 1055-
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

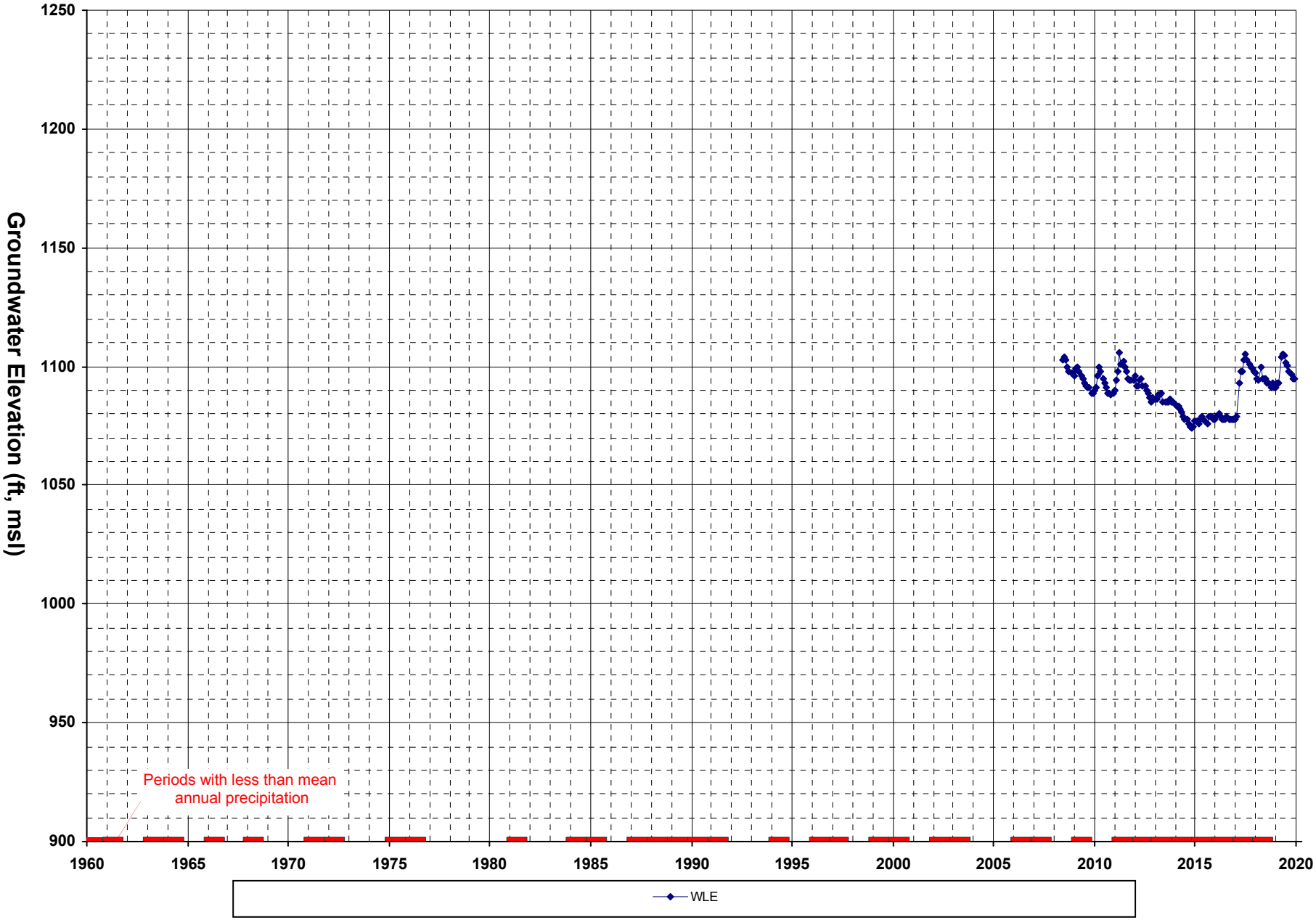
NWD-Castaic 4

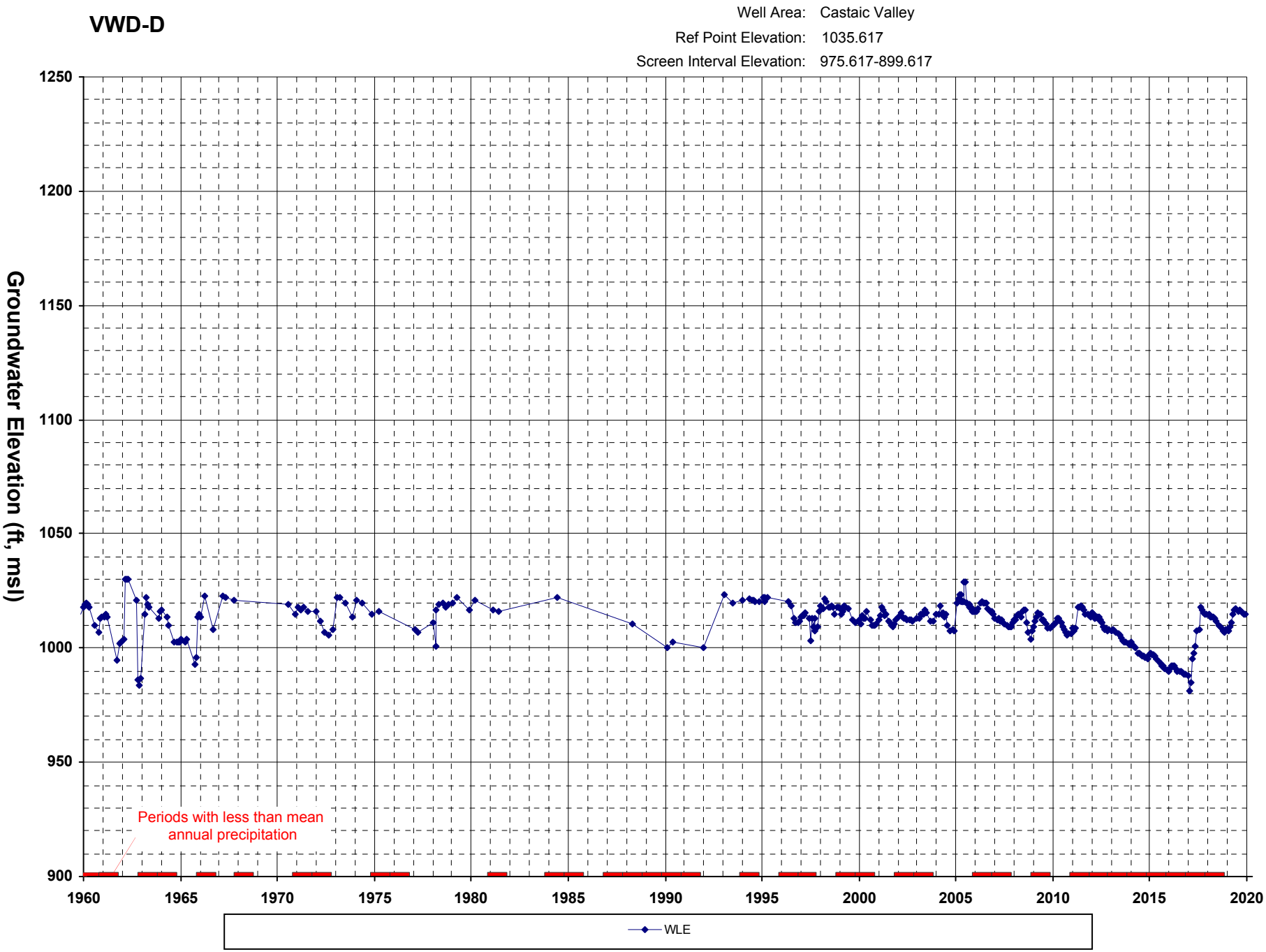
Well Area: Castaic Valley
Ref Point Elevation: 1129
Screen Interval Elevation: 1069.5-



NWD-Castaic 7

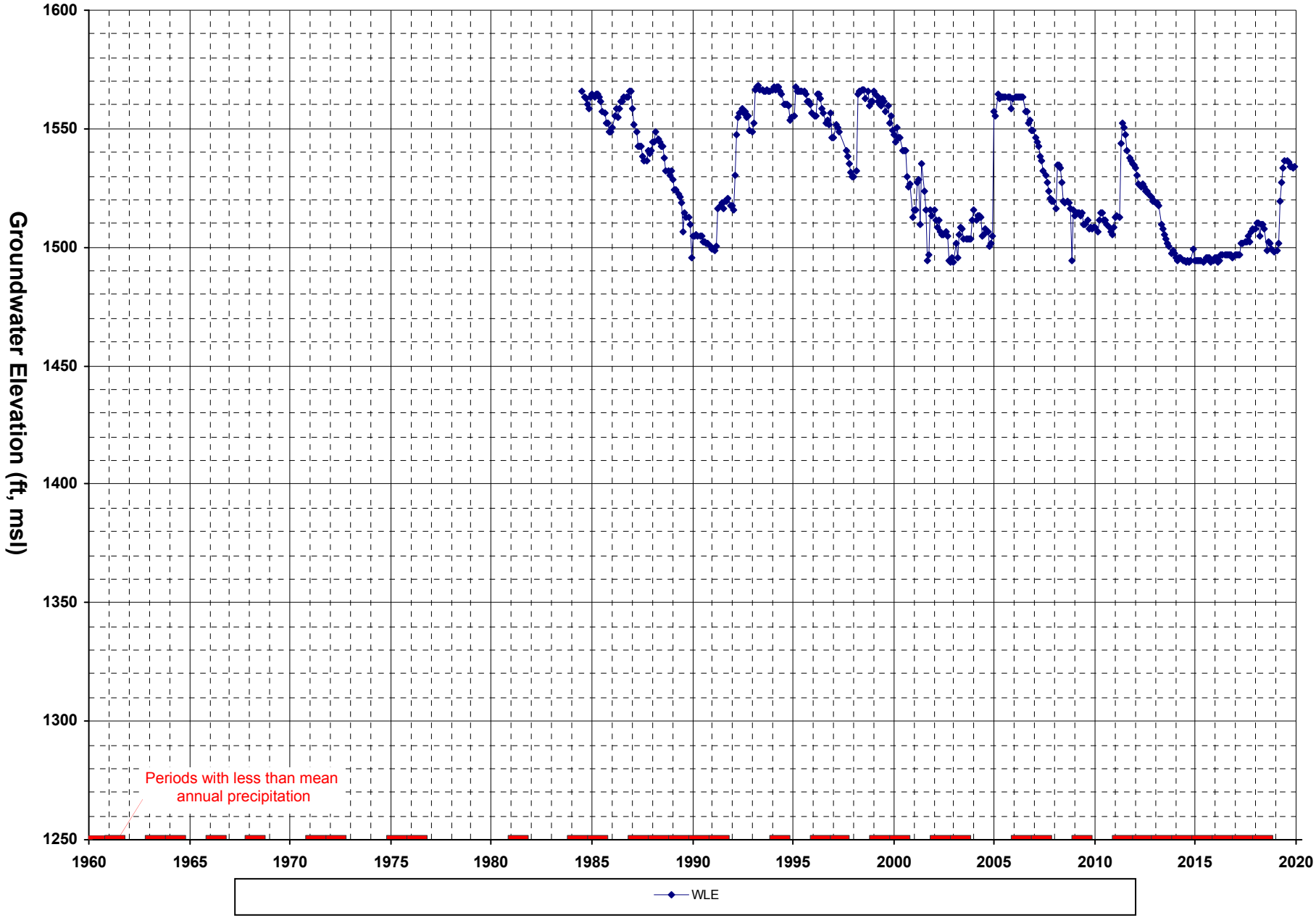
Well Area: Castaic Valley
Ref Point Elevation: 1149
Screen Interval Elevation: N/A




VWD-D
Well Area: Castaic Valley
Ref Point Elevation: 1035.617
Screen Interval Elevation: 975.617-899.617
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

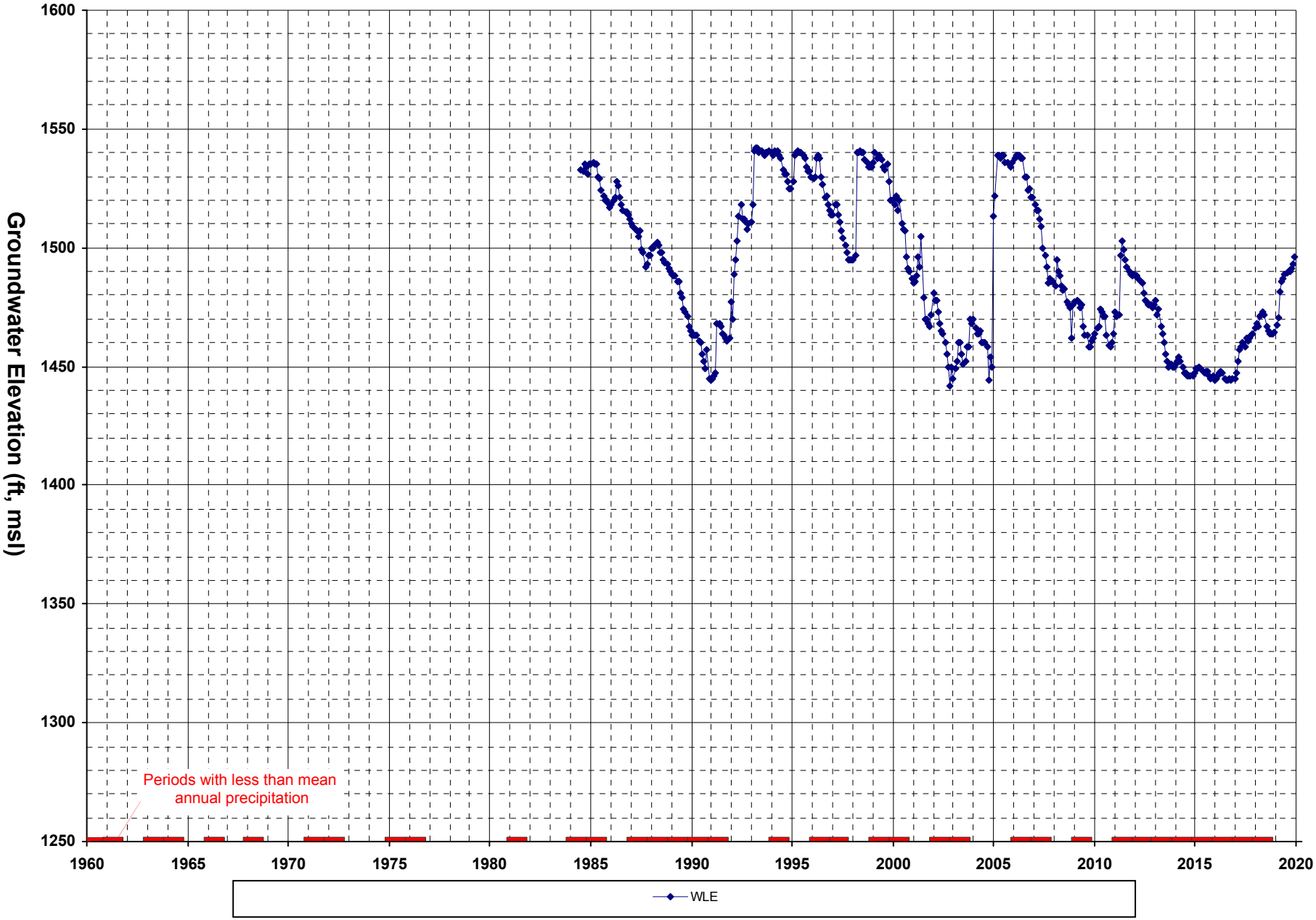
NWD-Pinetree 1

Well Area: Mint Canyon
Ref Point Elevation: 1583.5
Screen Interval Elevation: 1533.5-1373.5



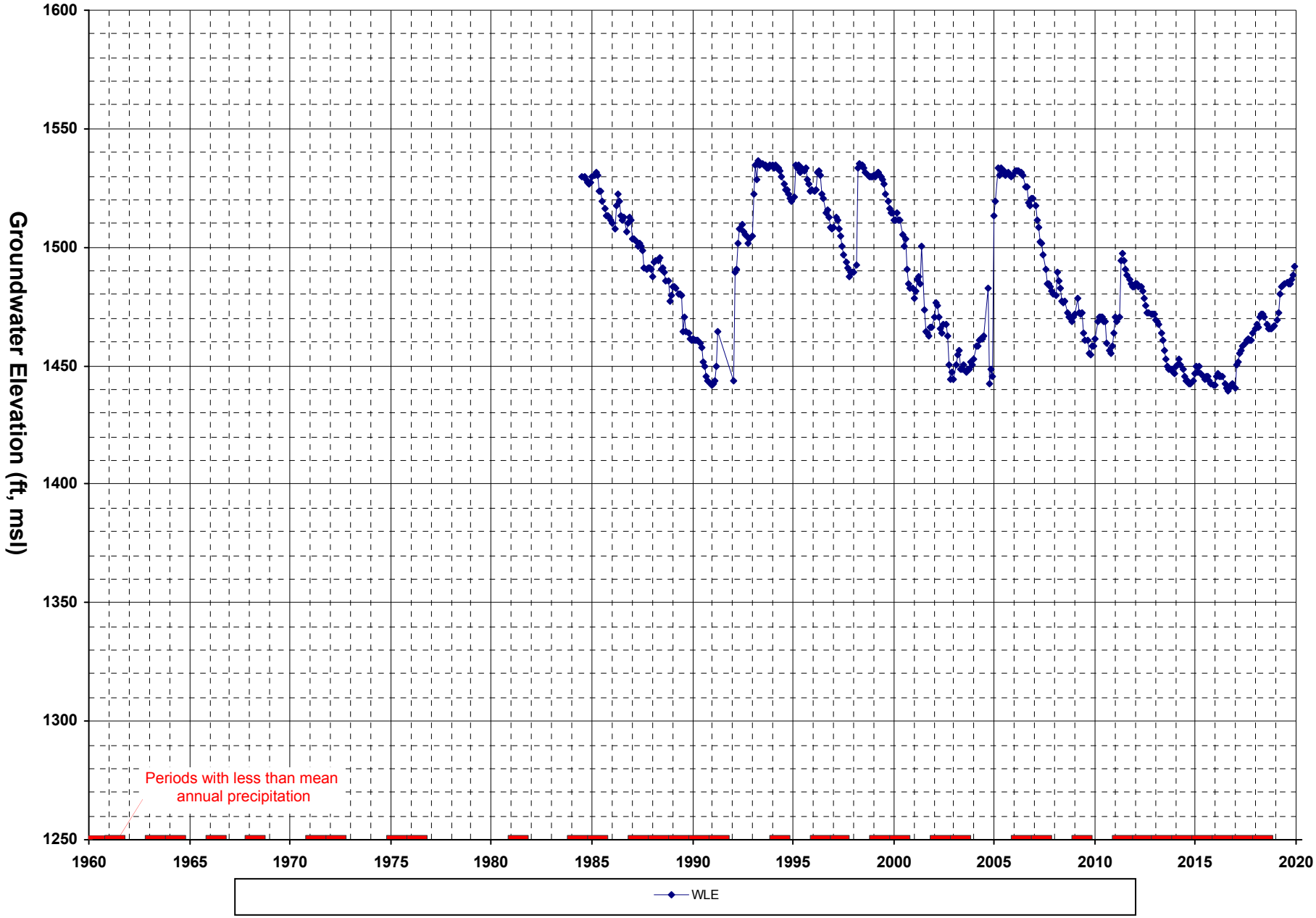
NWD-Pinetree 3

Well Area: Mint Canyon
Ref Point Elevation: 1560
Screen Interval Elevation: 1510-1425



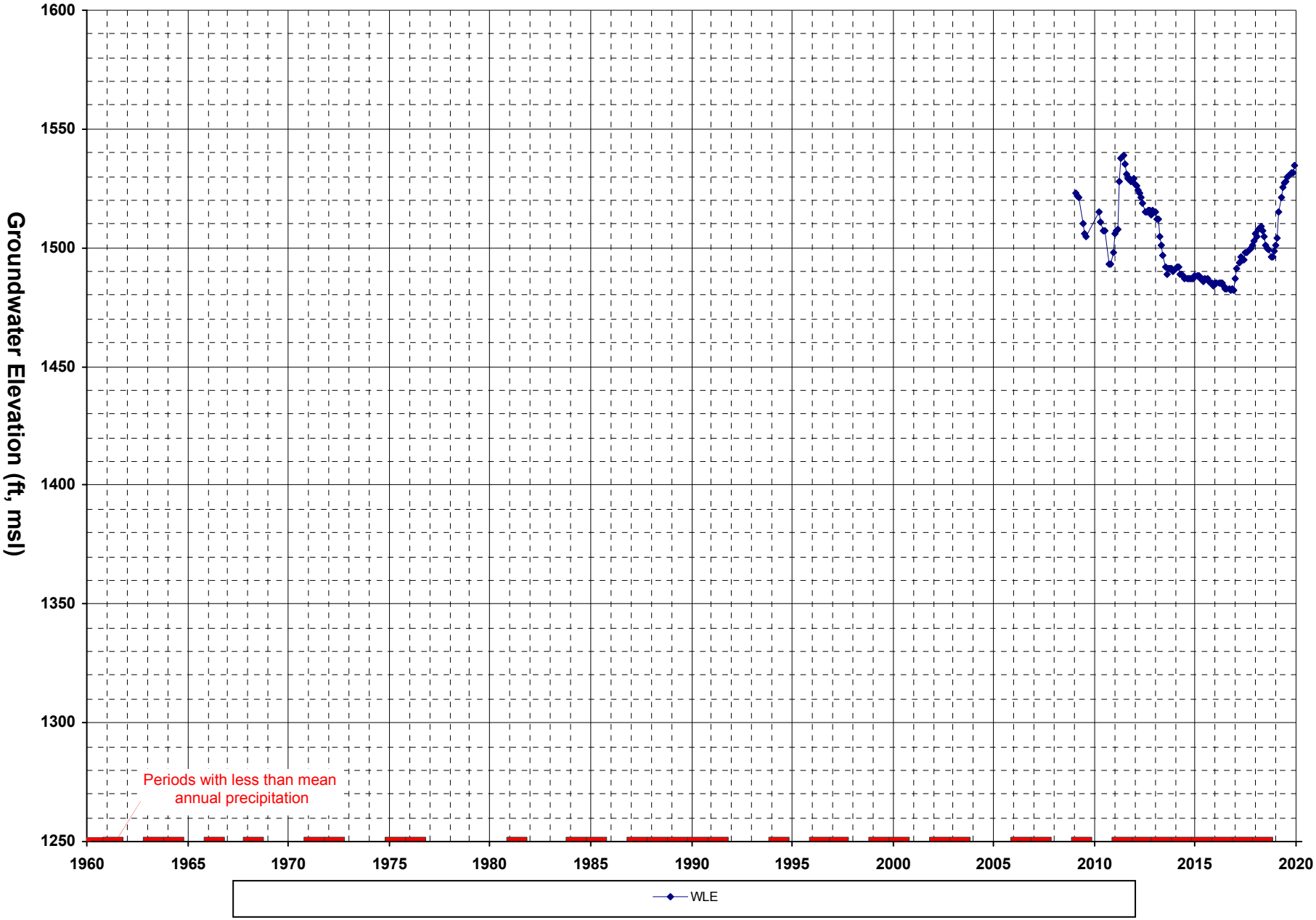
NWD-Pinetree 4

Well Area: Mint Canyon
Ref Point Elevation: 1552.5
Screen Interval Elevation: 1442.5-1367.5



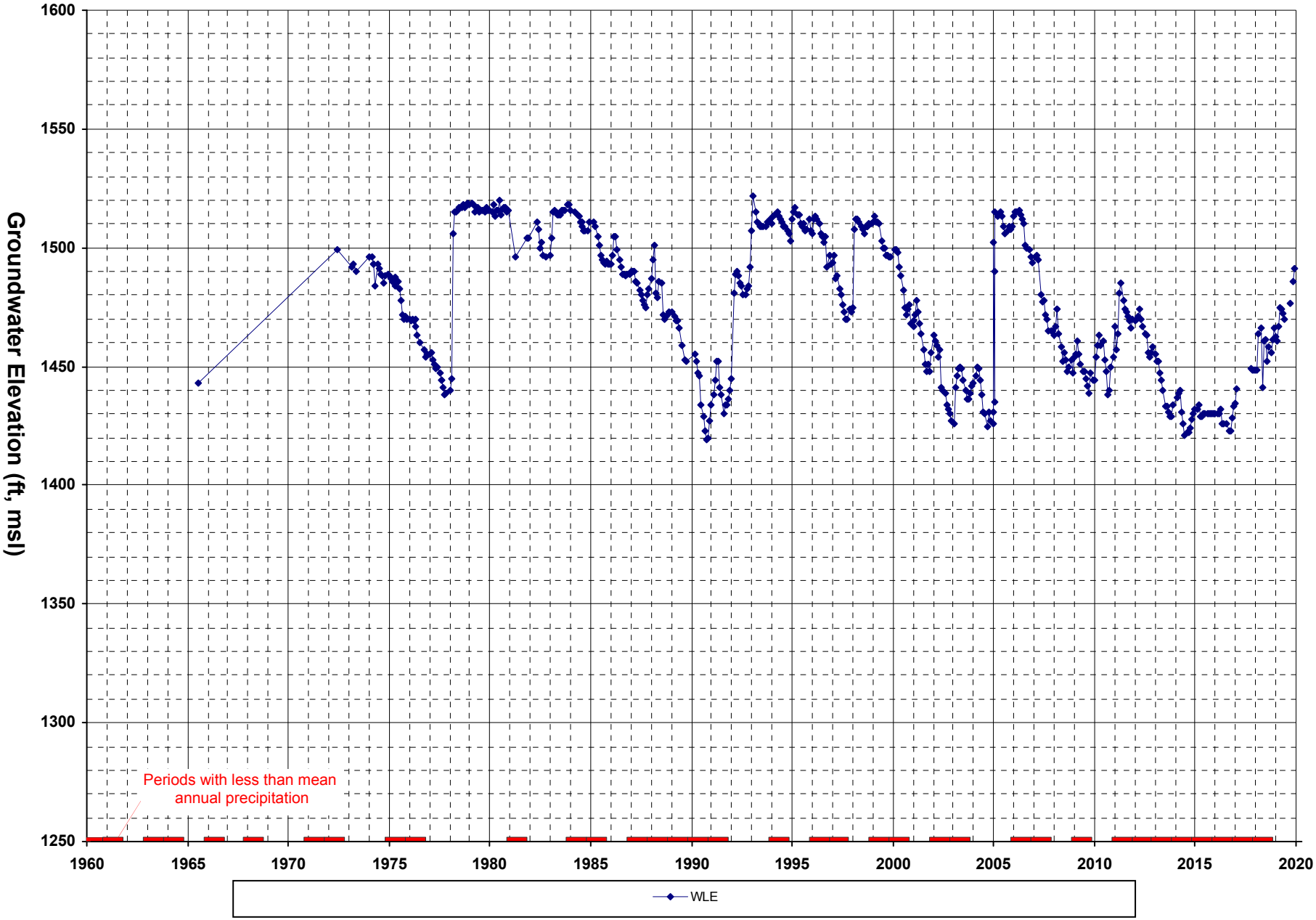
NWD-Pinetree 5

Well Area: Mint Canyon
Ref Point Elevation: 1597
Screen Interval Elevation: N/A



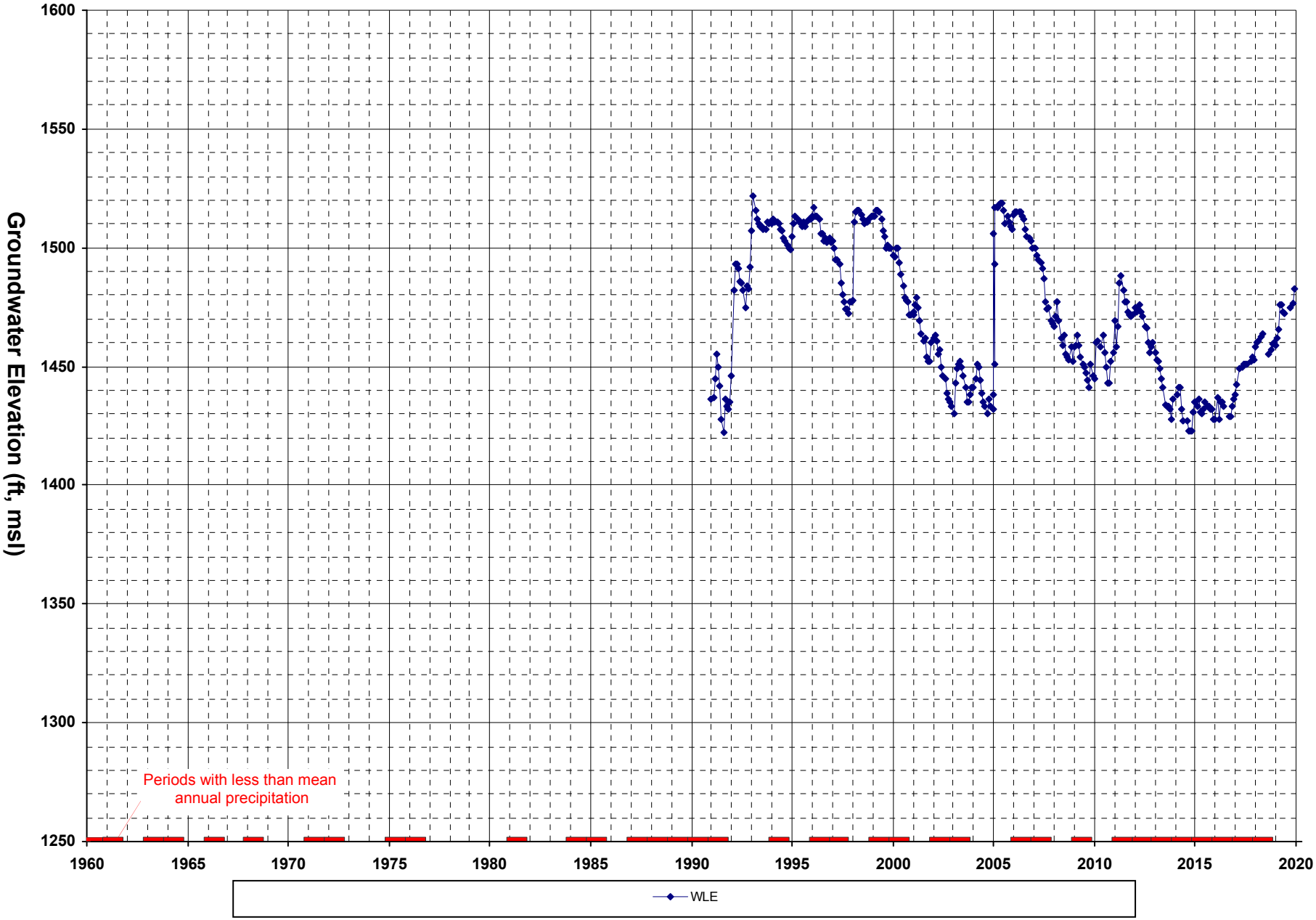
SCWD-Lost Canyon 2

Well Area: Mint Canyon
Ref Point Elevation: 1532
Screen Interval Elevation: 1437-1407



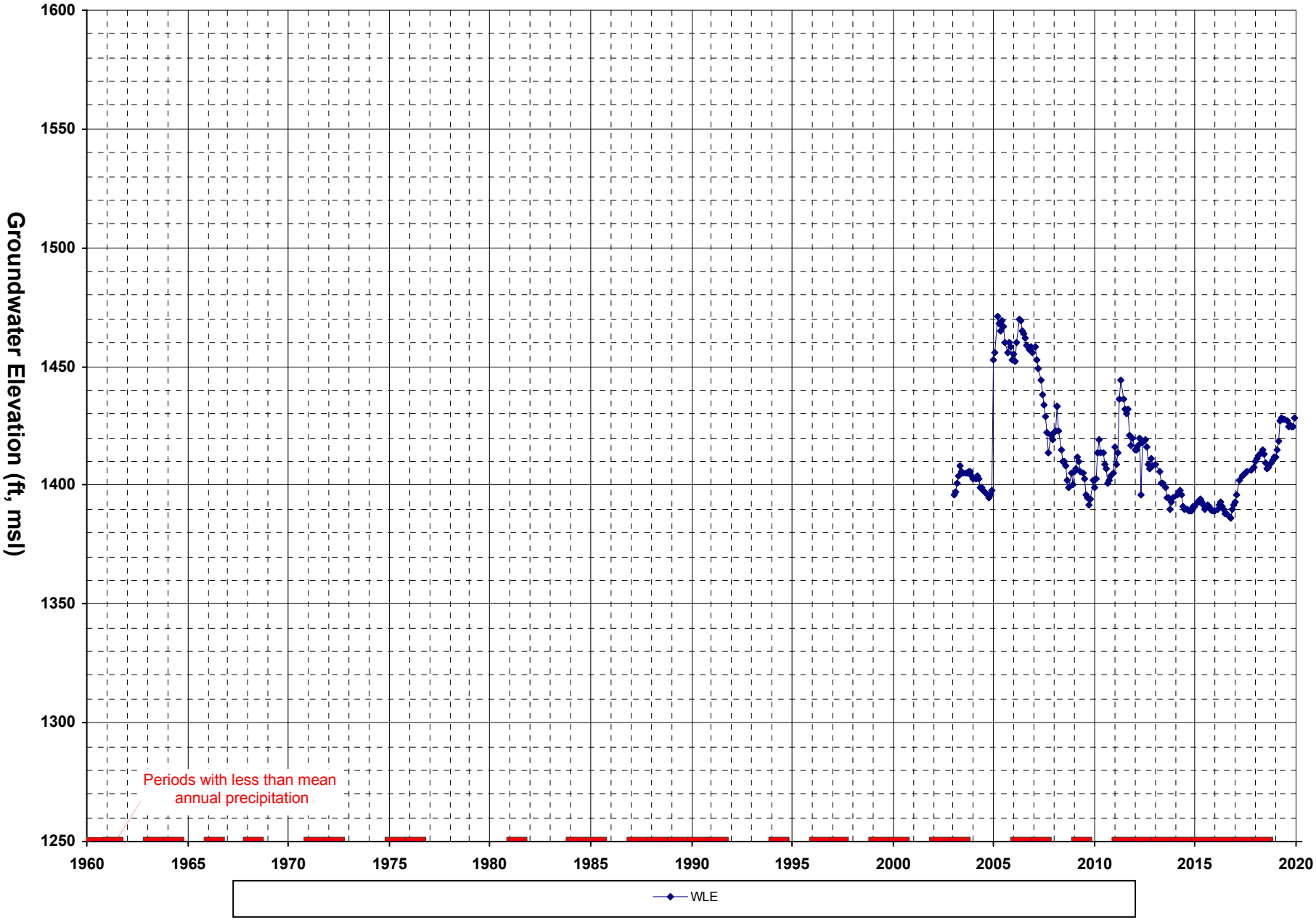
SCWD-Lost Canyon 2A

Well Area: Mint Canyon
Ref Point Elevation: 1532
Screen Interval Elevation: 1437-1407



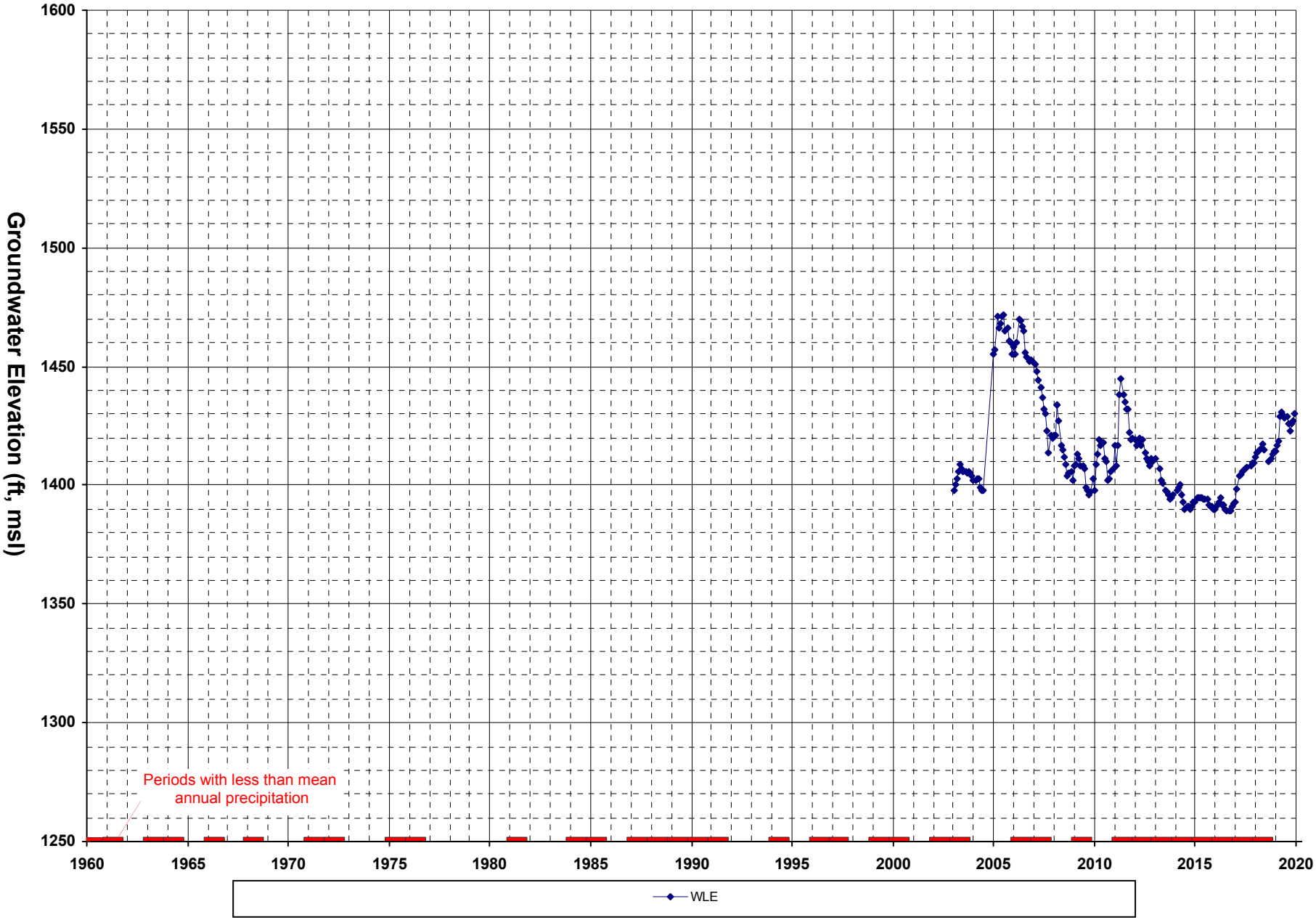
SCWD-Mitchell #5A

Well Area: Mint Canyon
Ref Point Elevation: 1486
Screen Interval Elevation: N/A



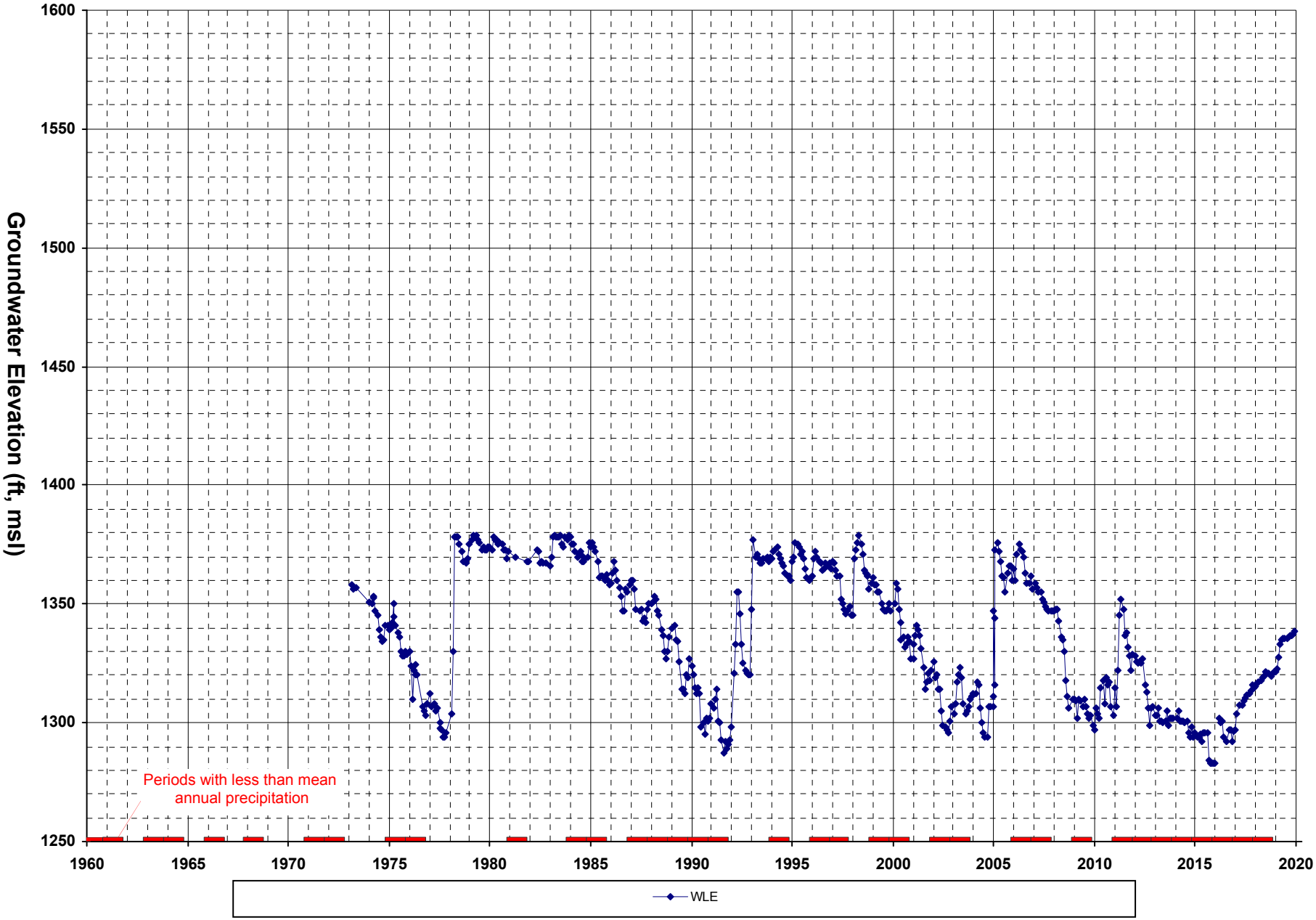
SCWD-Mitchell #5B

Well Area: Mint Canyon
Ref Point Elevation: 1486
Screen Interval Elevation: N/A



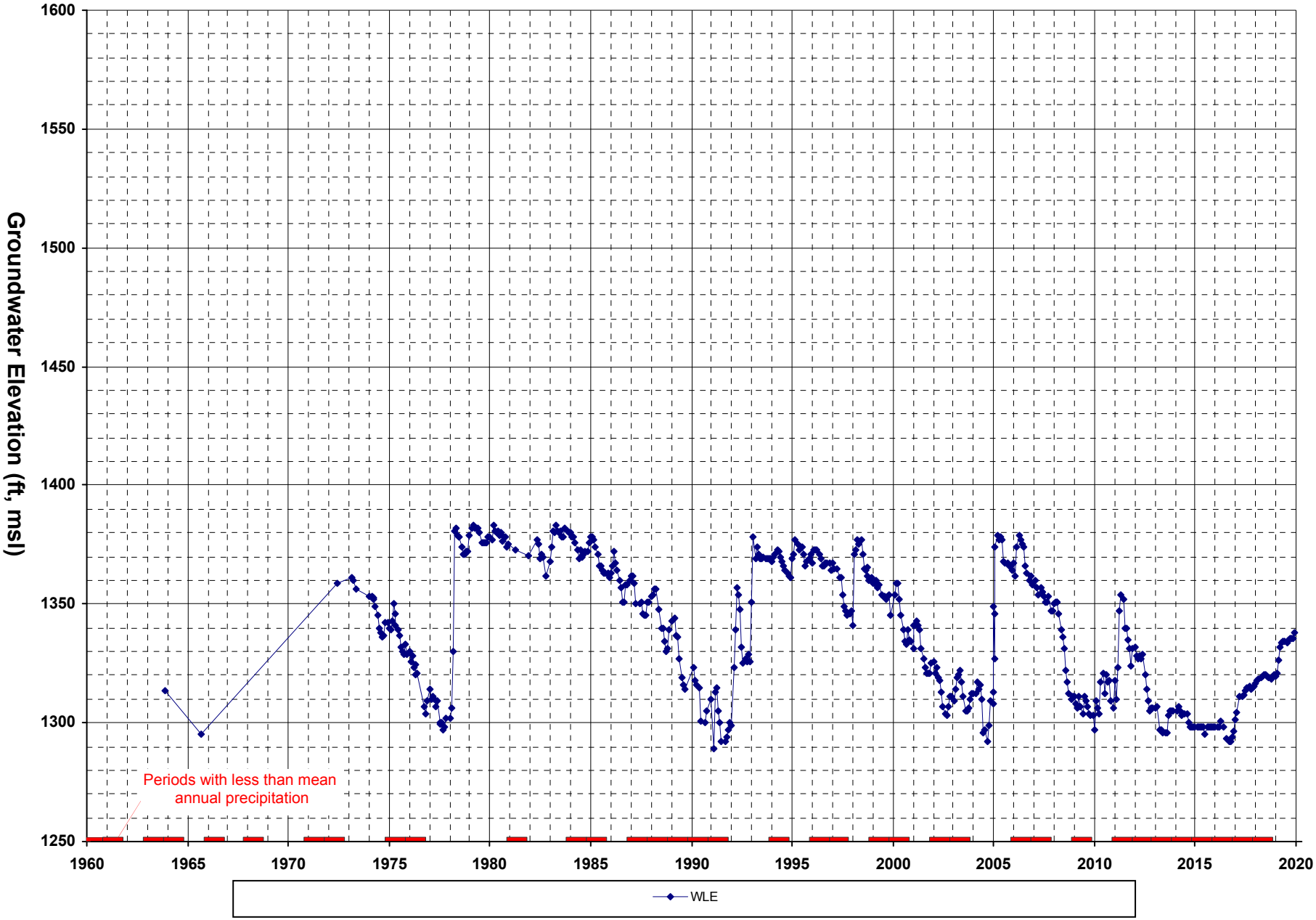
SCWD-N. Oaks Central

Well Area: Mint Canyon
Ref Point Elevation: 1391
Screen Interval Elevation: 1341-1147



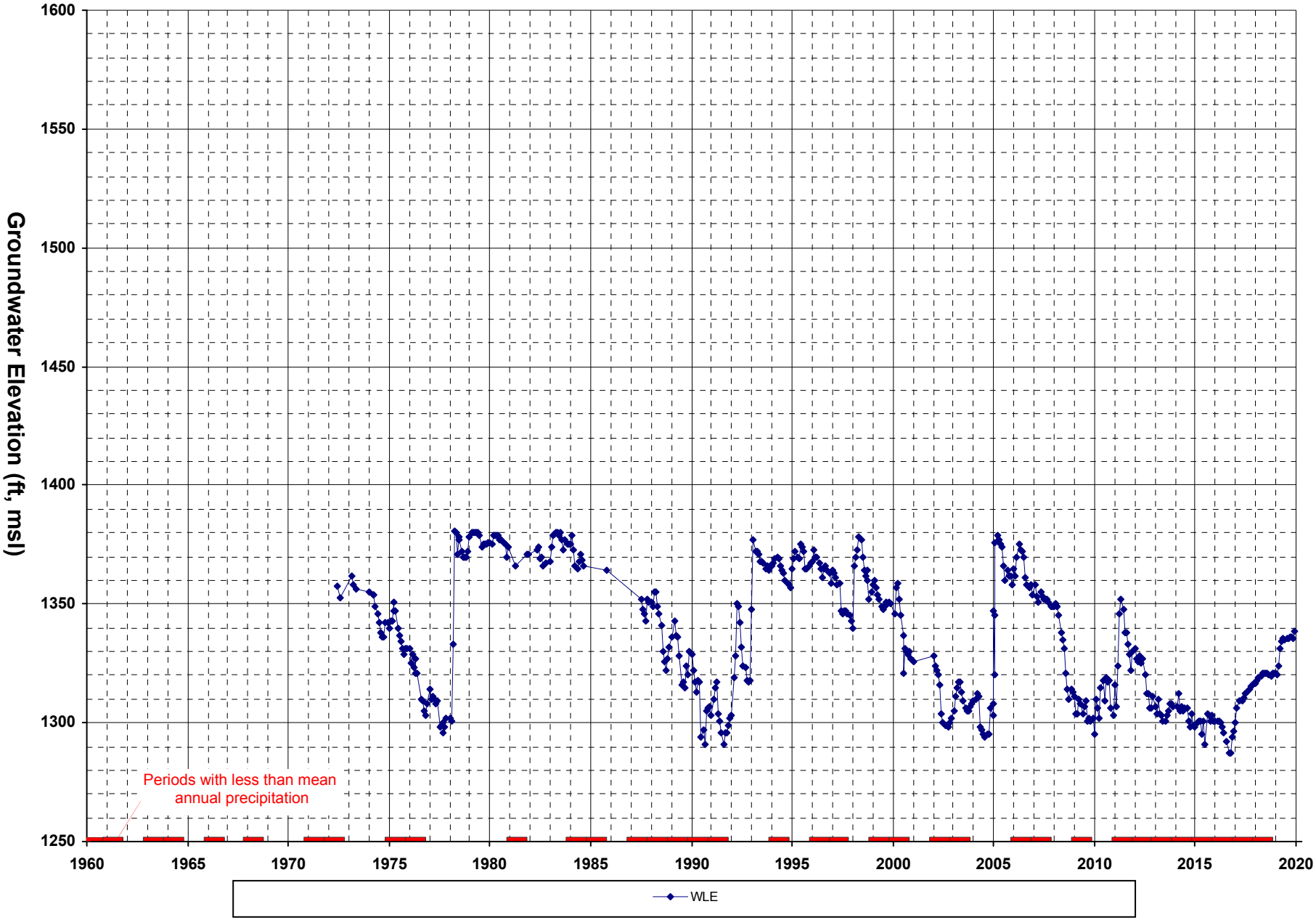
SCWD-N. Oaks East

Well Area: Mint Canyon
Ref Point Elevation: 1391
Screen Interval Elevation: 1310-1241



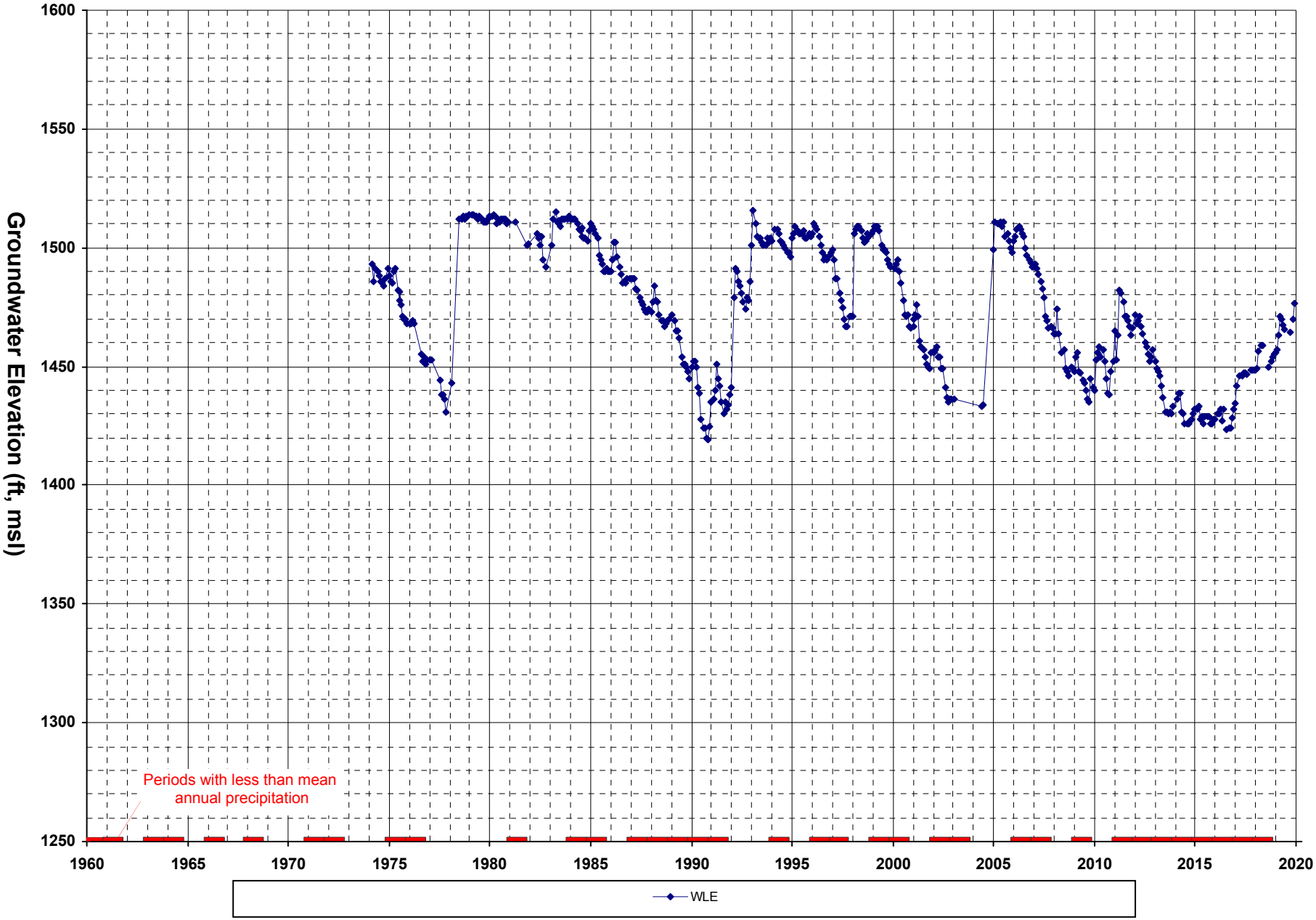
SCWD-N. Oaks West

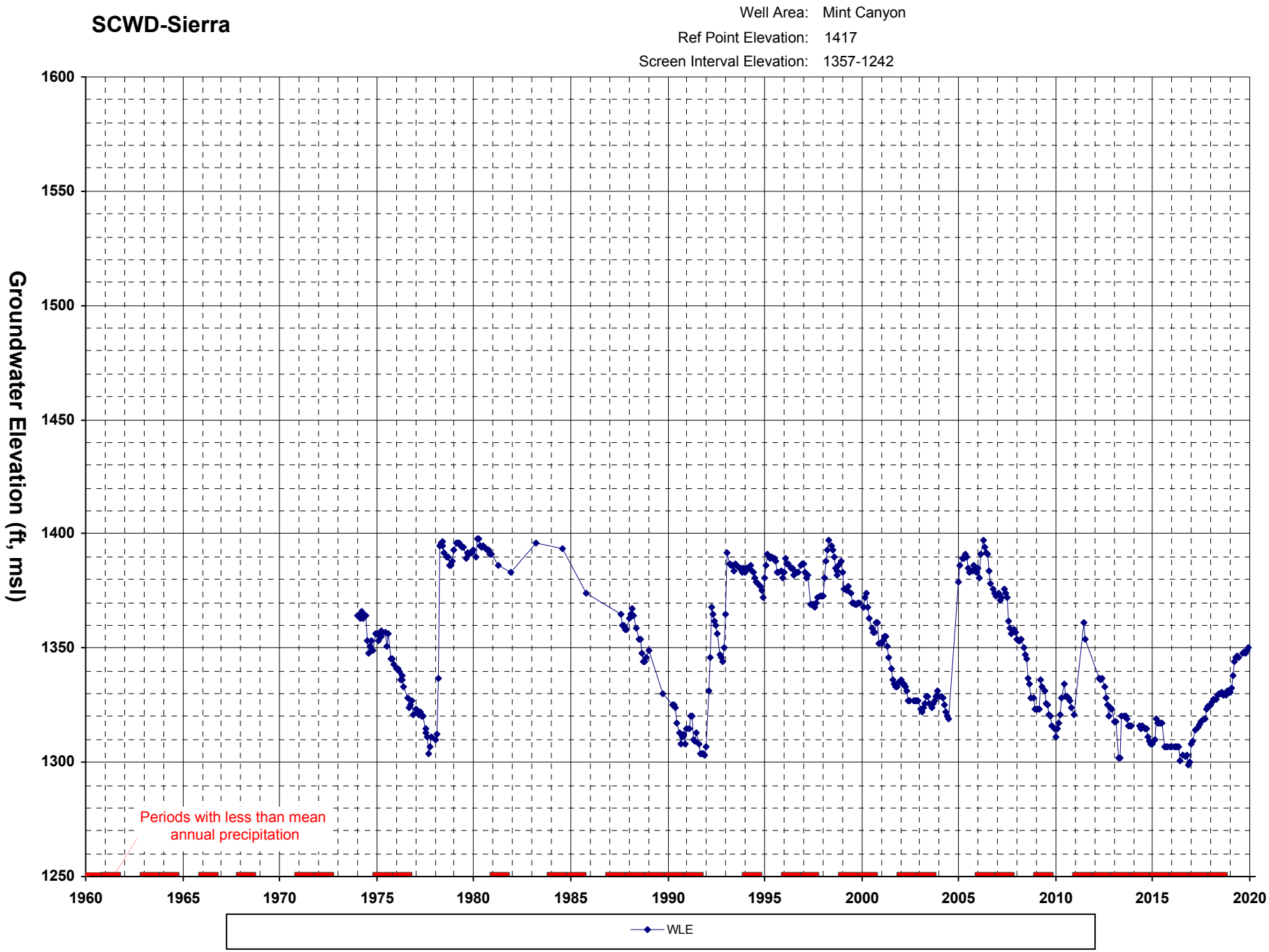
Well Area: Mint Canyon
Ref Point Elevation: 1387
Screen Interval Elevation: 1307-1269

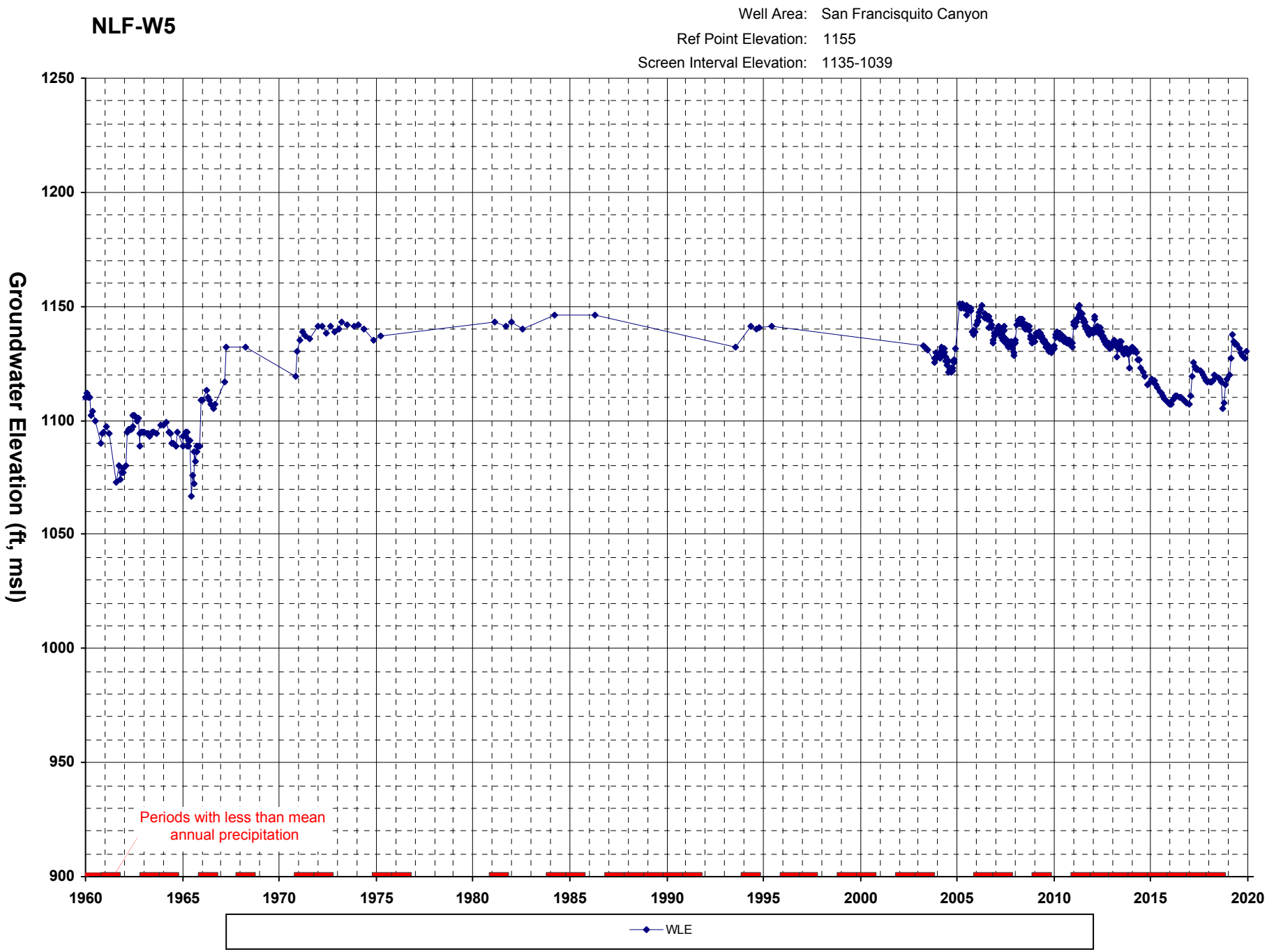


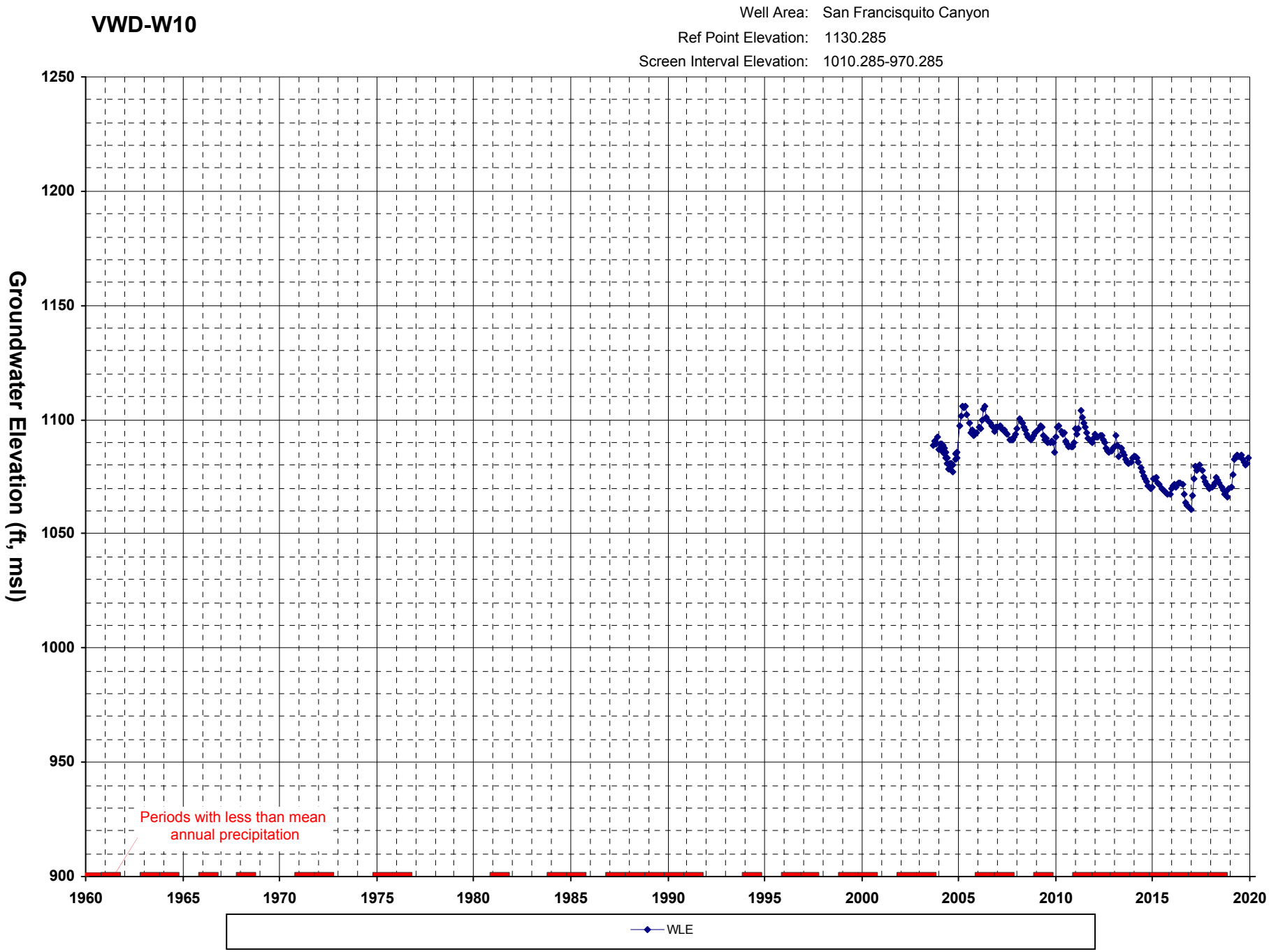
SCWD-Sand Canyon

Well Area: Mint Canyon
Ref Point Elevation: 1525
Screen Interval Elevation: 1465-1385



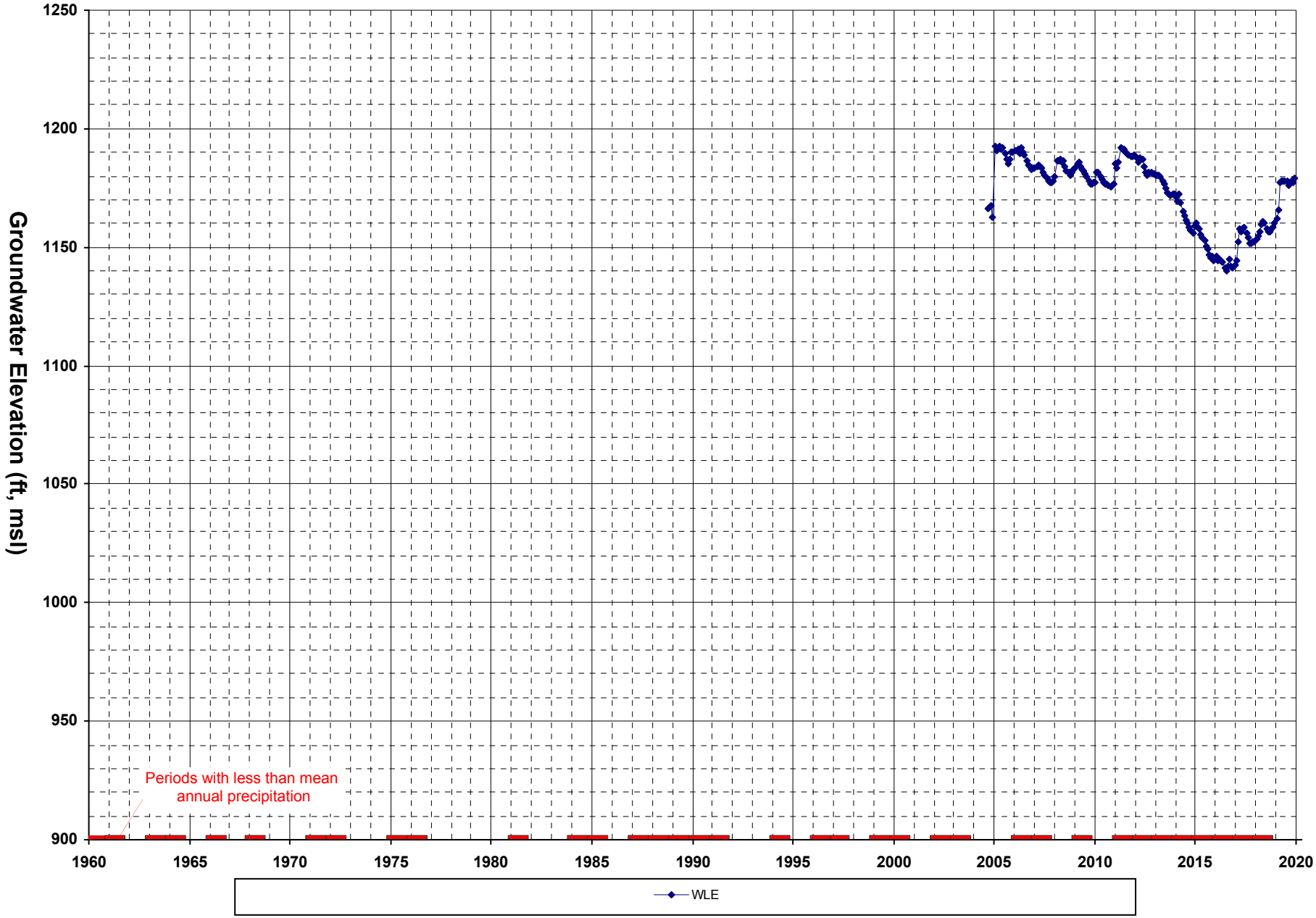

SCWD-Sierra
Well Area: Mint Canyon
Ref Point Elevation: 1417
Screen Interval Elevation: 1357-1242
Groundwater Elevation (ft, msl)
1600
1550
1500
1450
1400
1350
1300
1250
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

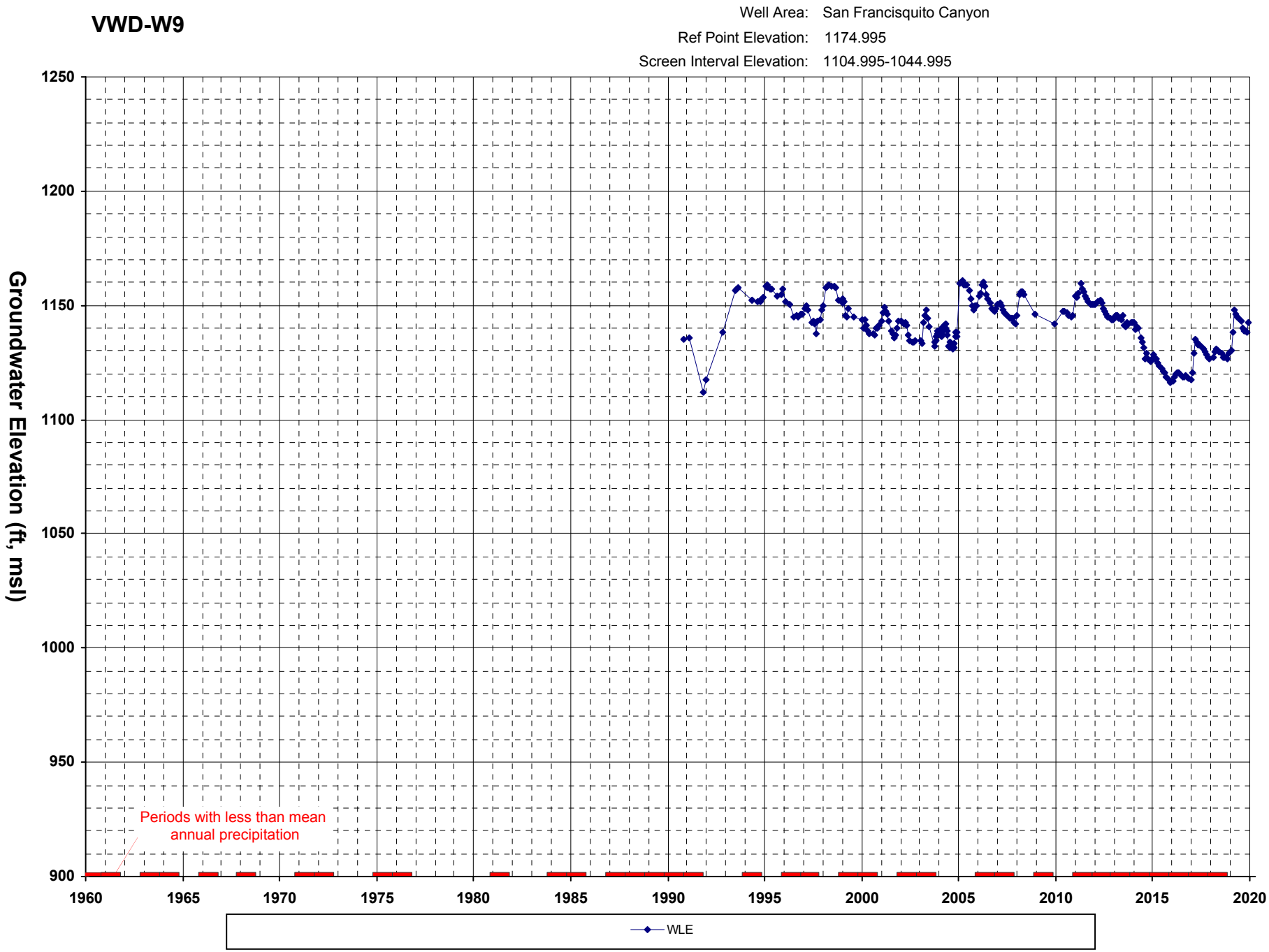

NLF-W5
Well Area: San Francisquito Canyon
Ref Point Elevation: 1155
Screen Interval Elevation: 1135-1039
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE


VWD-W10
Well Area: San Francisquito Canyon
Ref Point Elevation: 1130.285
Screen Interval Elevation: 1010.285-970.285
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

VWD-W11

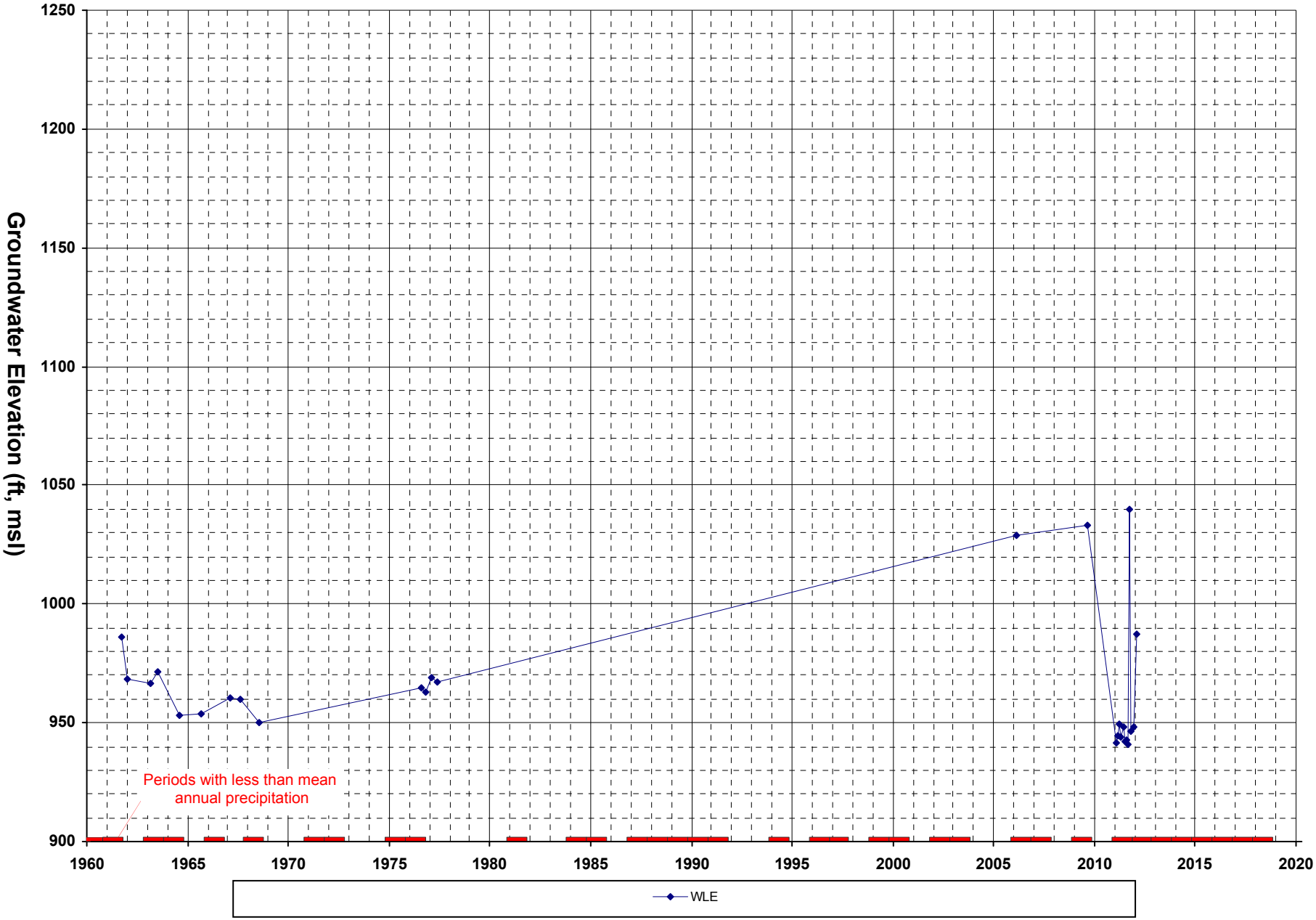
Well Area: San Francisquito Canyon
Ref Point Elevation: 1208.253
Screen Interval Elevation: 1098.253-1053.253

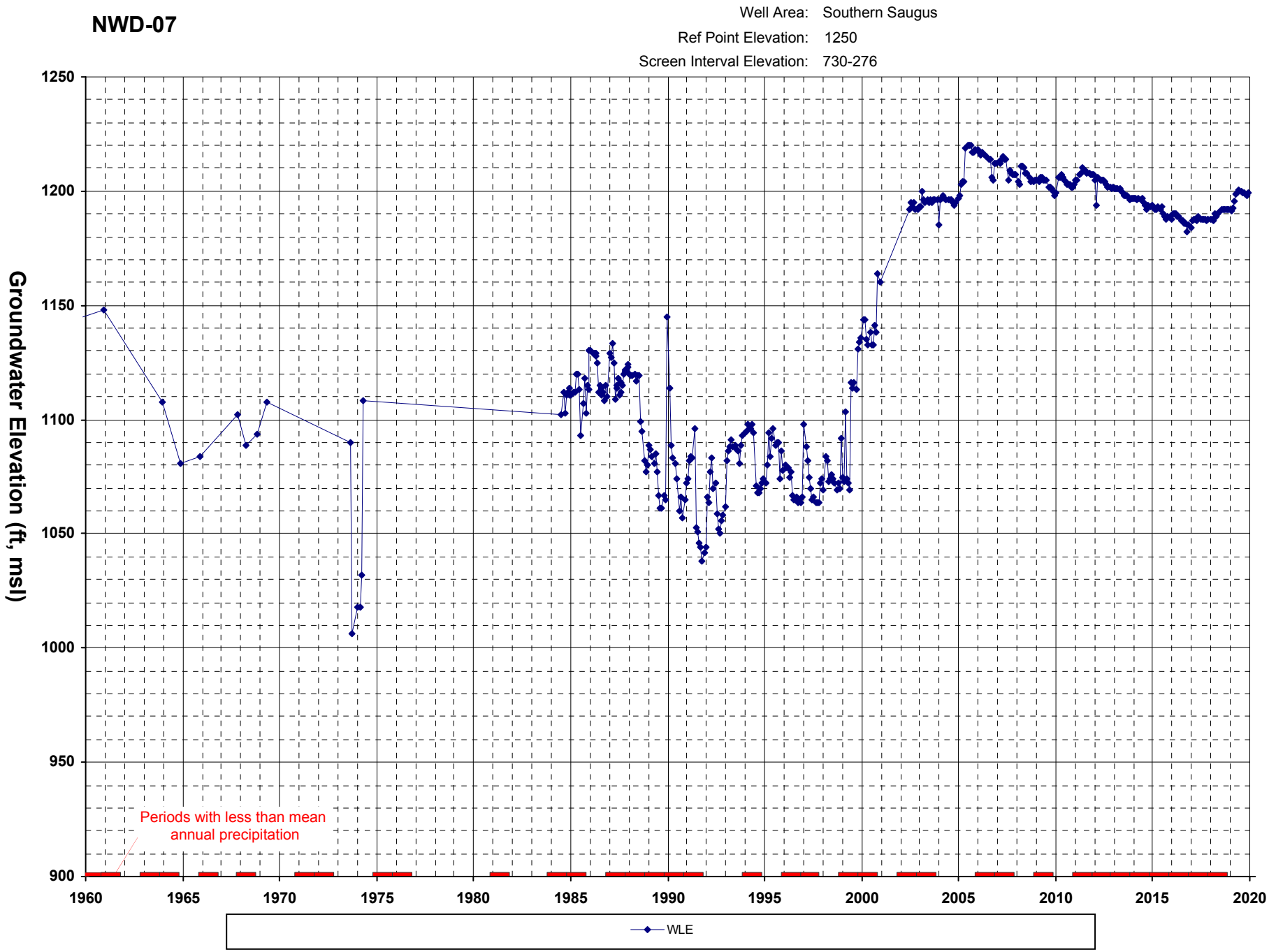



VWD-W9
Well Area: San Francisquito Canyon
Ref Point Elevation: 1174.995
Screen Interval Elevation: 1104.995-1044.995
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

NLF-156

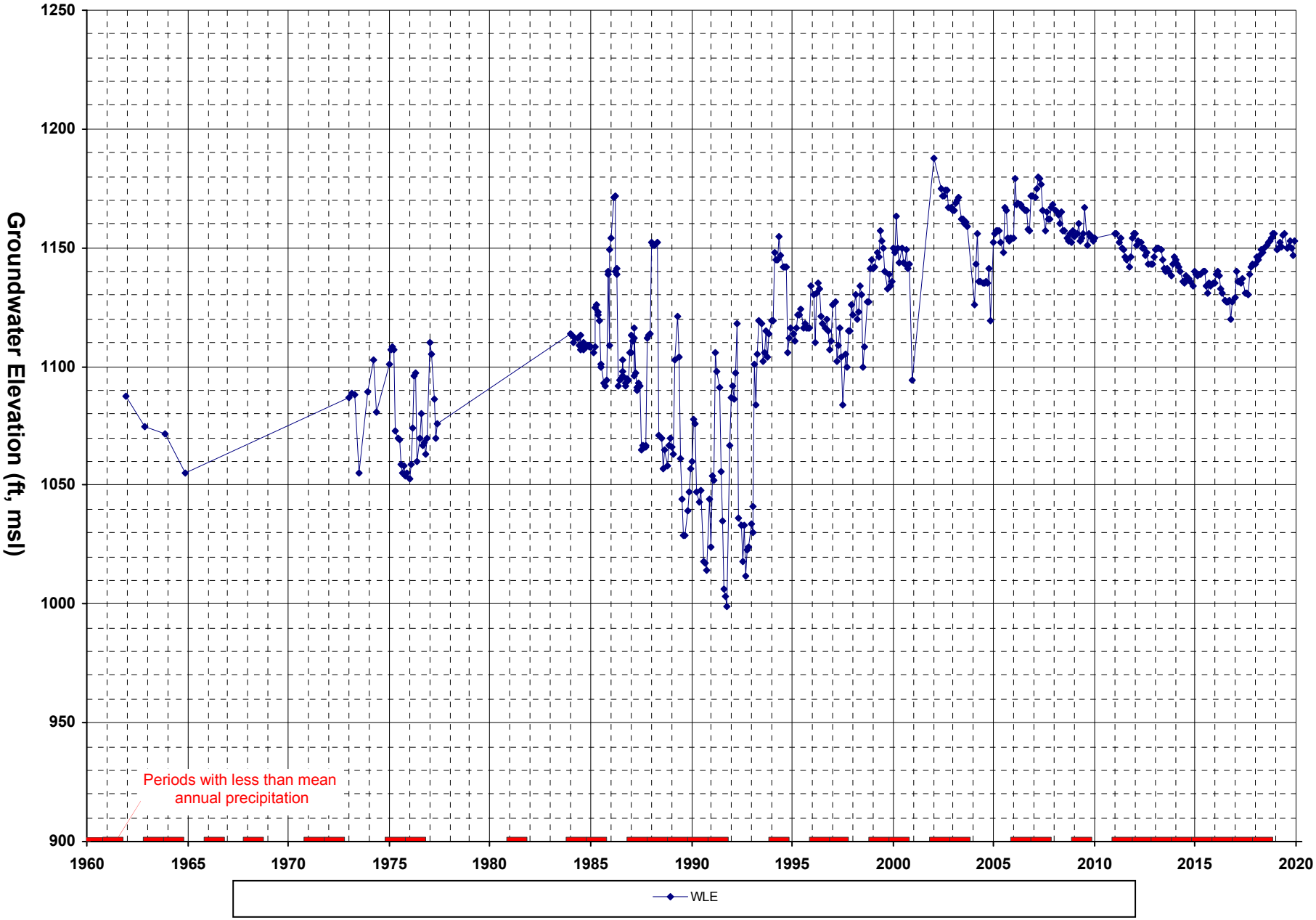
Well Area: Southern Saugus
Ref Point Elevation: 1050
Screen Interval Elevation: 730--750

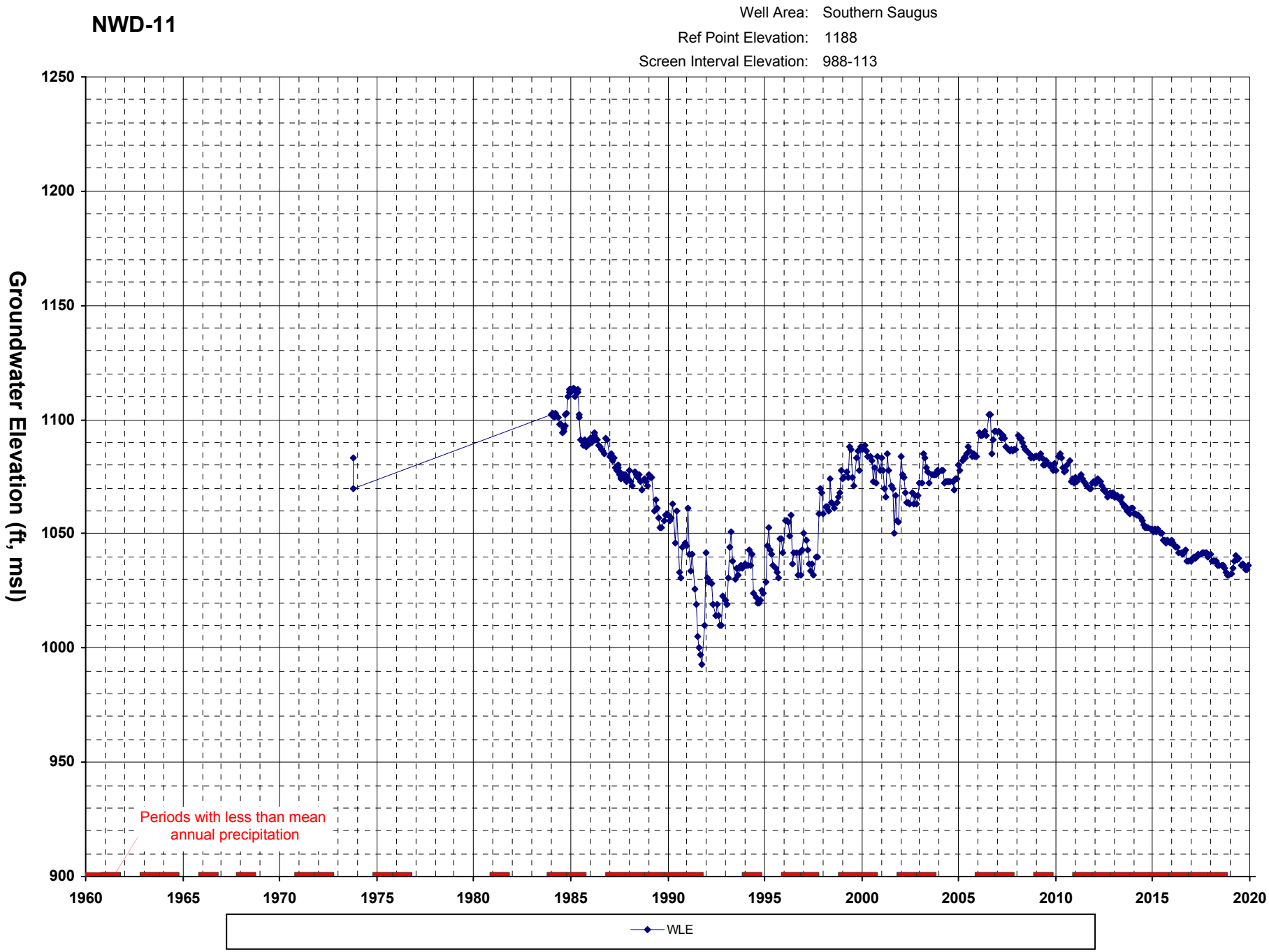


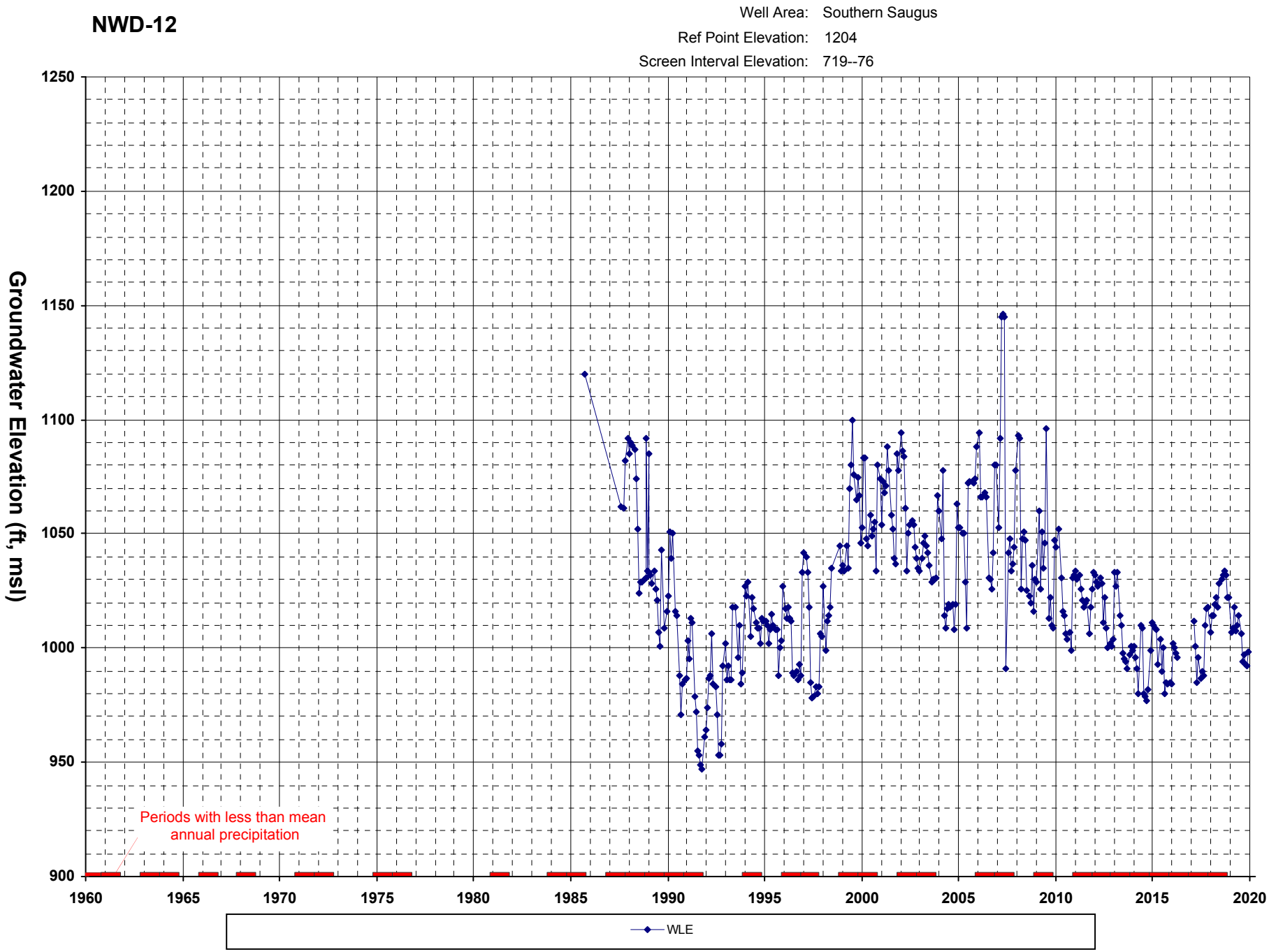

NWD-07
Well Area: Southern Saugus
Ref Point Elevation: 1250
Screen Interval Elevation: 730-276
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

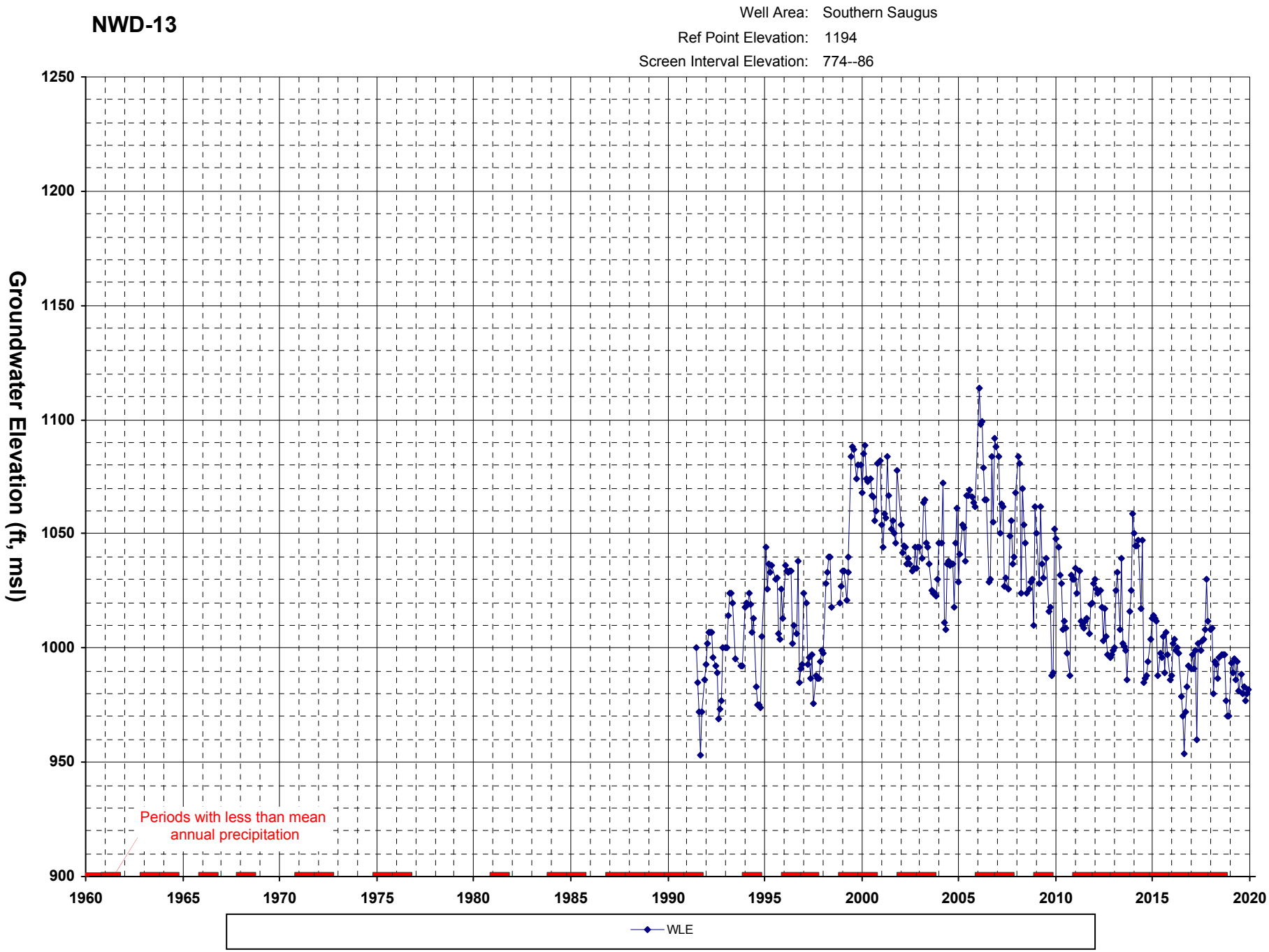
NWD-10

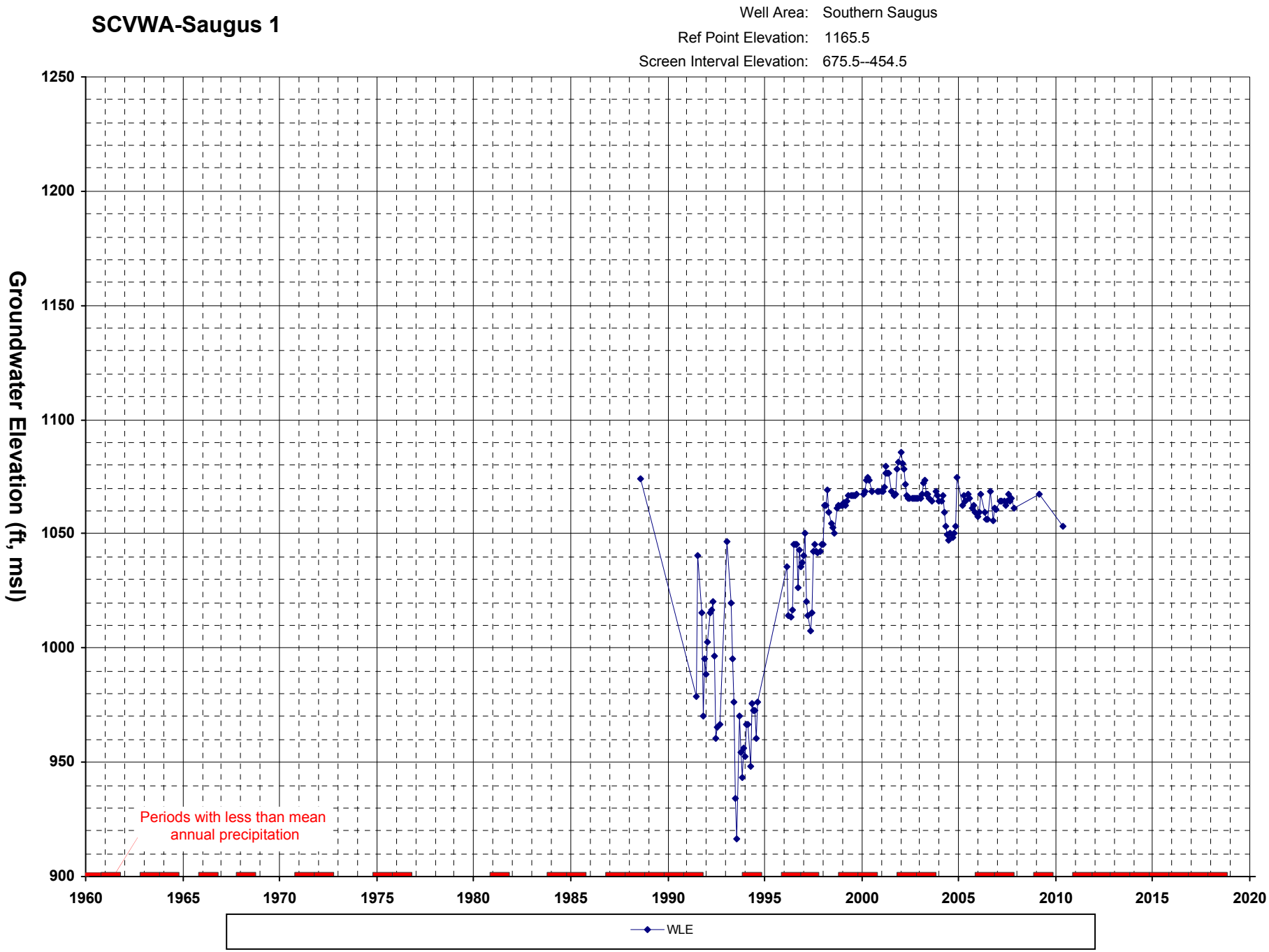
Well Area: Southern Saugus
Ref Point Elevation: 1204
Screen Interval Elevation: 424--340




NWD-11
Well Area: Southern Saugus
Ref Point Elevation: 1188
Screen Interval Elevation: 988-113
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

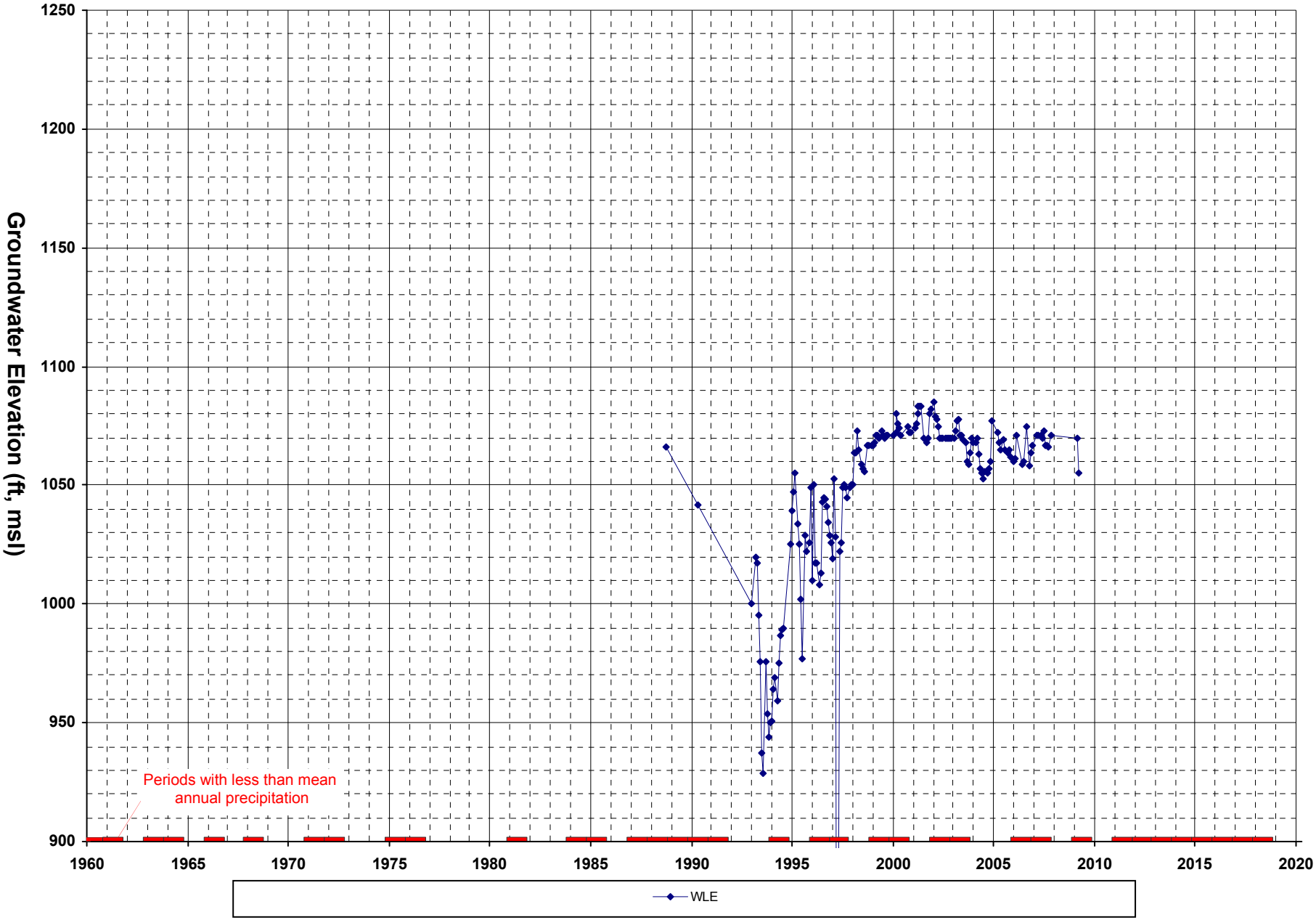

NWD-12
Well Area: Southern Saugus
Ref Point Elevation: 1204
Screen Interval Elevation: 719--76
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

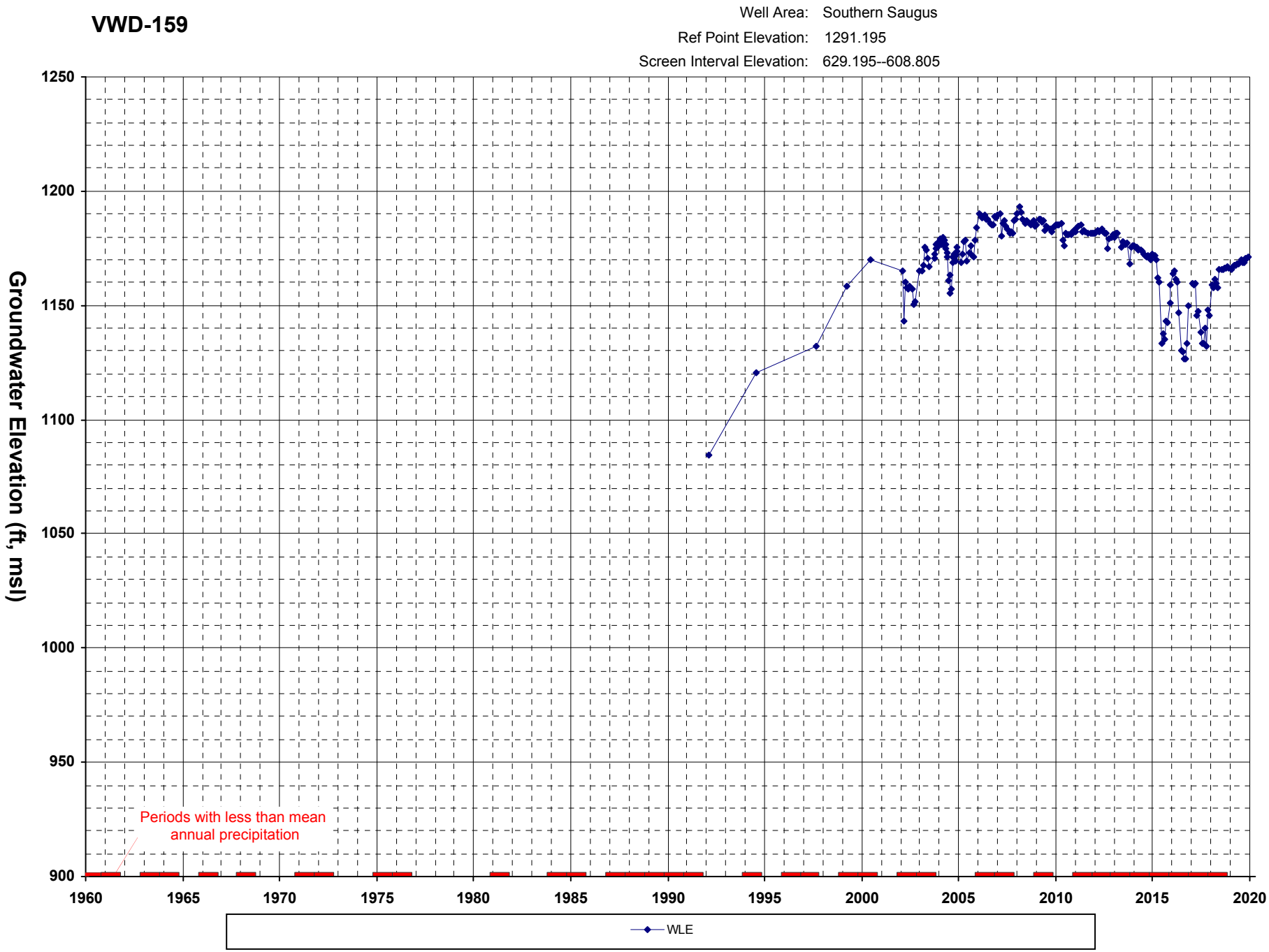

NWD-13
Well Area: Southern Saugus
Ref Point Elevation: 1194
Screen Interval Elevation: 774--86
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE


SCVWA-Saugus 1
Well Area: Southern Saugus
Ref Point Elevation: 1165.5
Screen Interval Elevation: 675.5--454.5
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

SCVWA-Saugus 2

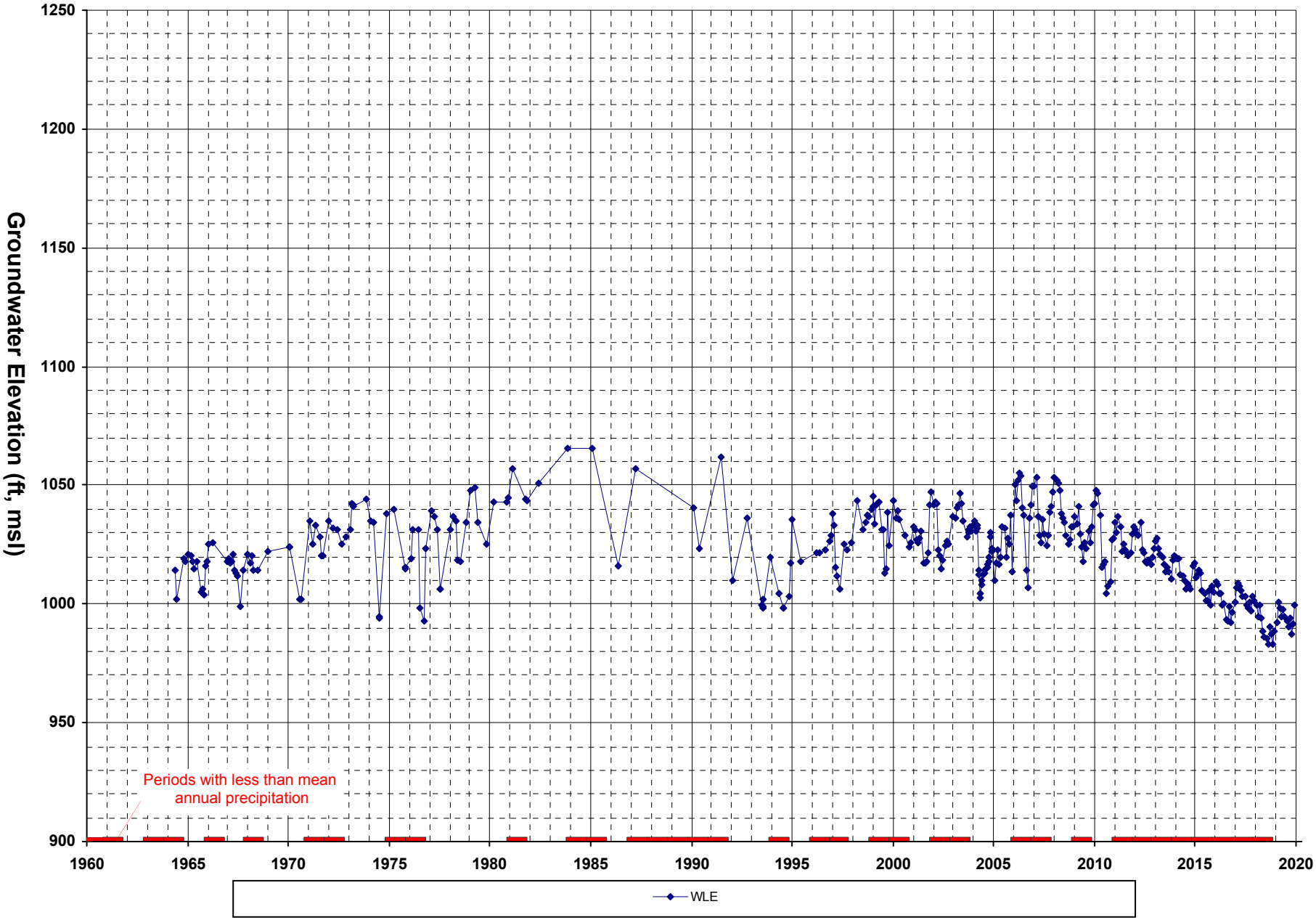
Well Area: Southern Saugus
Ref Point Elevation: 1170
Screen Interval Elevation: 680--421




VWD-159
Well Area: Southern Saugus
Ref Point Elevation: 1291.195
Screen Interval Elevation: 629.195--608.805
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

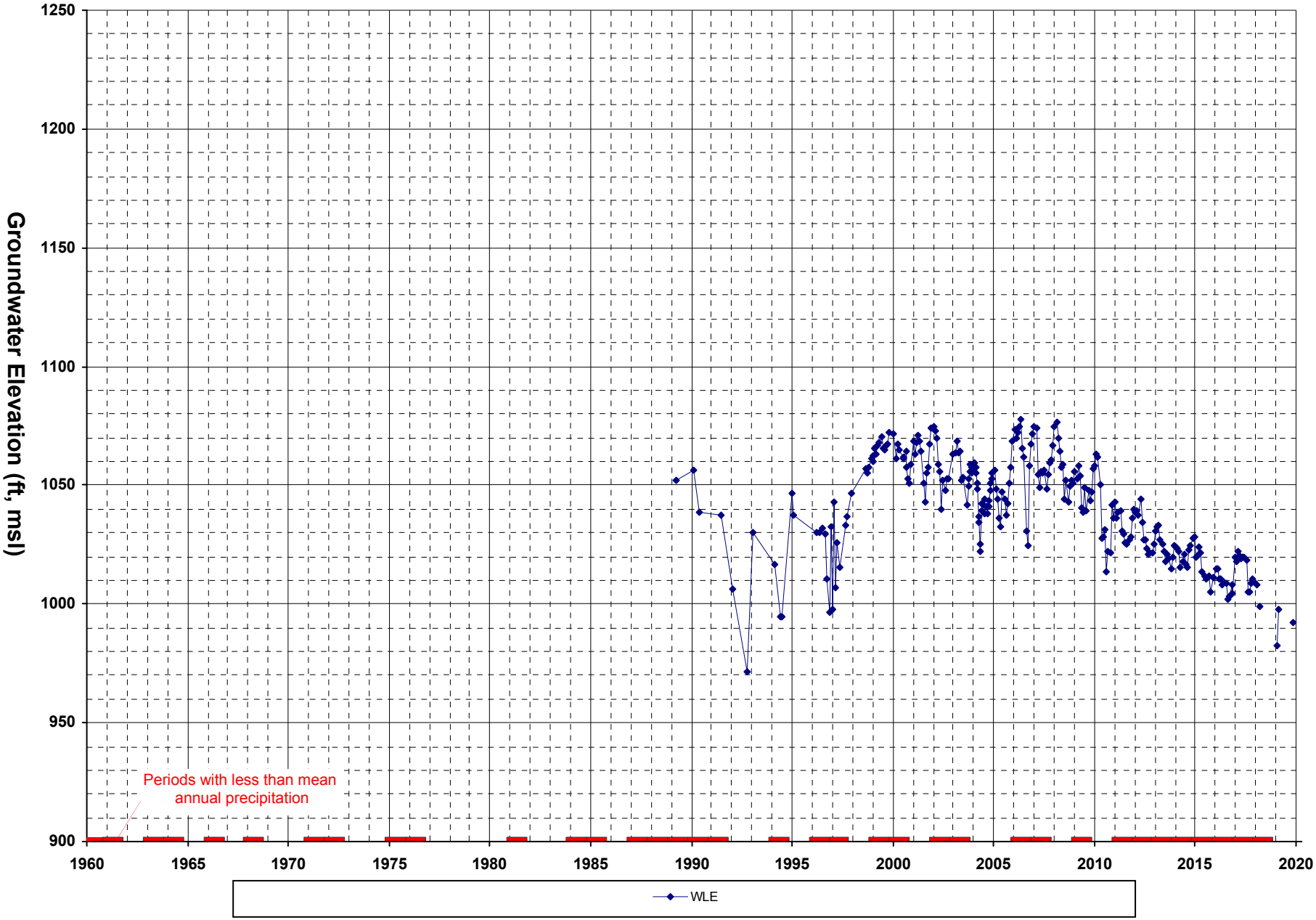
VWD-160

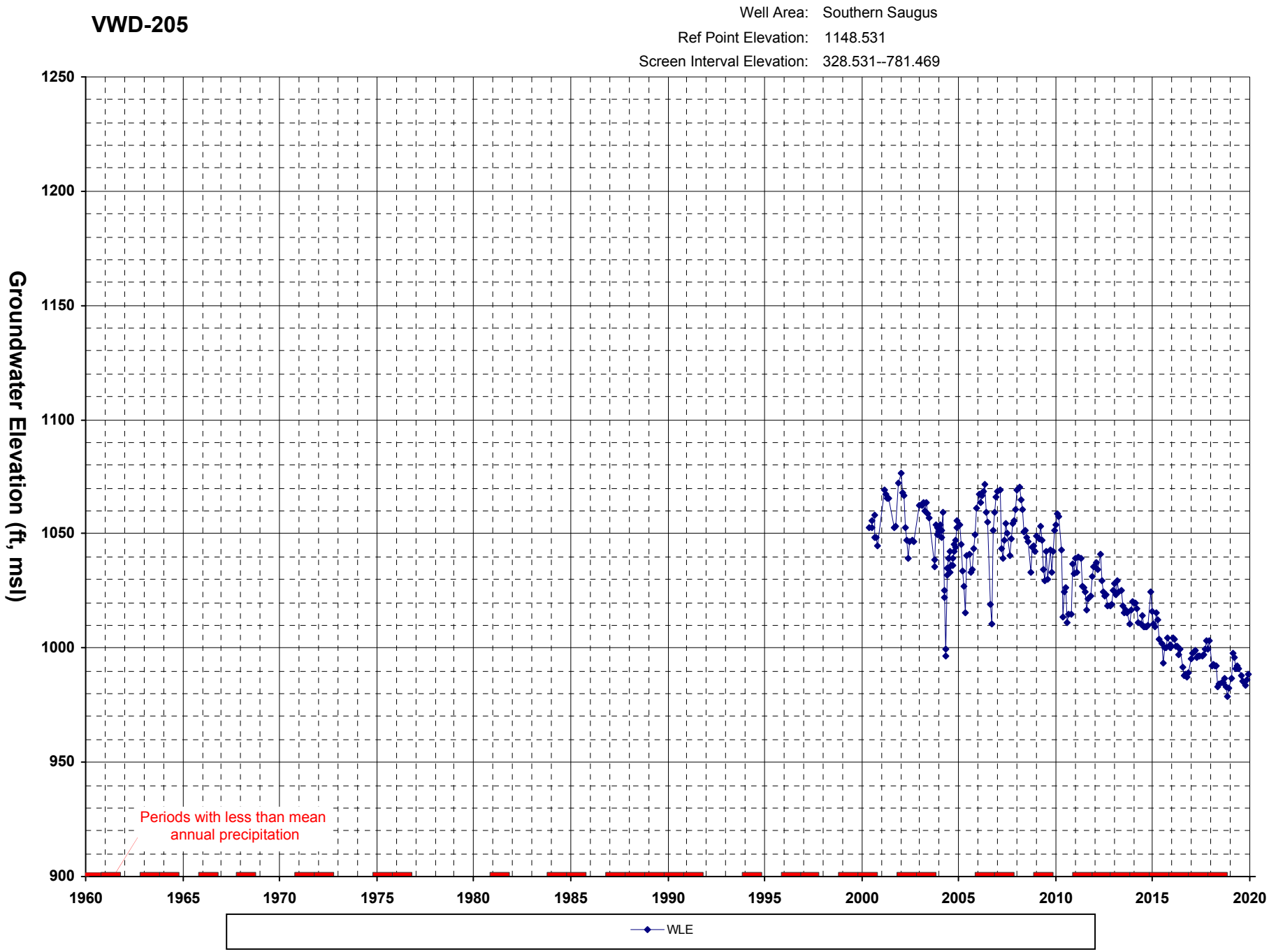
Well Area: Southern Saugus
Ref Point Elevation: 1102.083
Screen Interval Elevation: 152.083--897.917

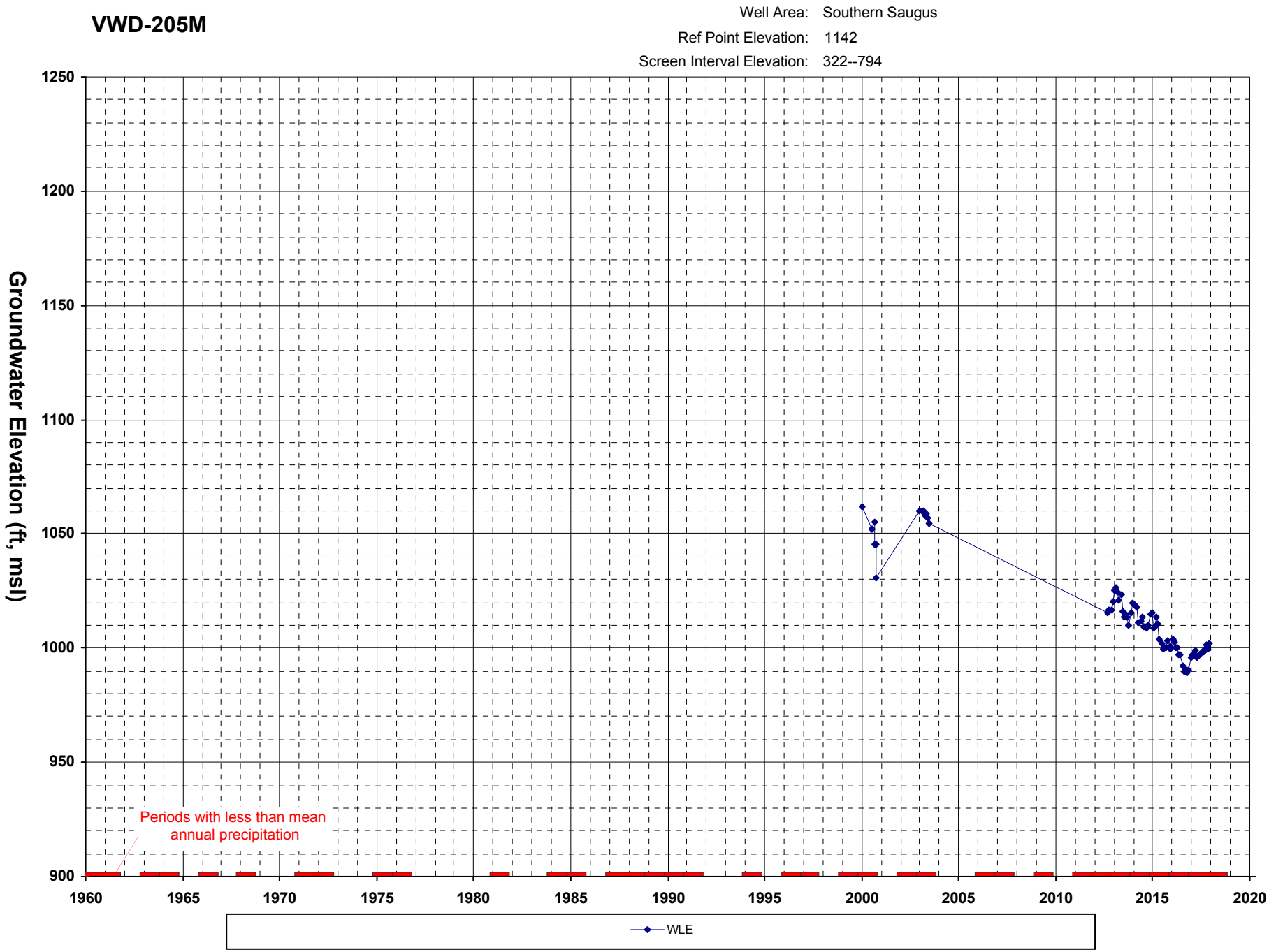


VWD-201

Well Area: Southern Saugus
Ref Point Elevation: 1151.715
Screen Interval Elevation: 611.715--518.285

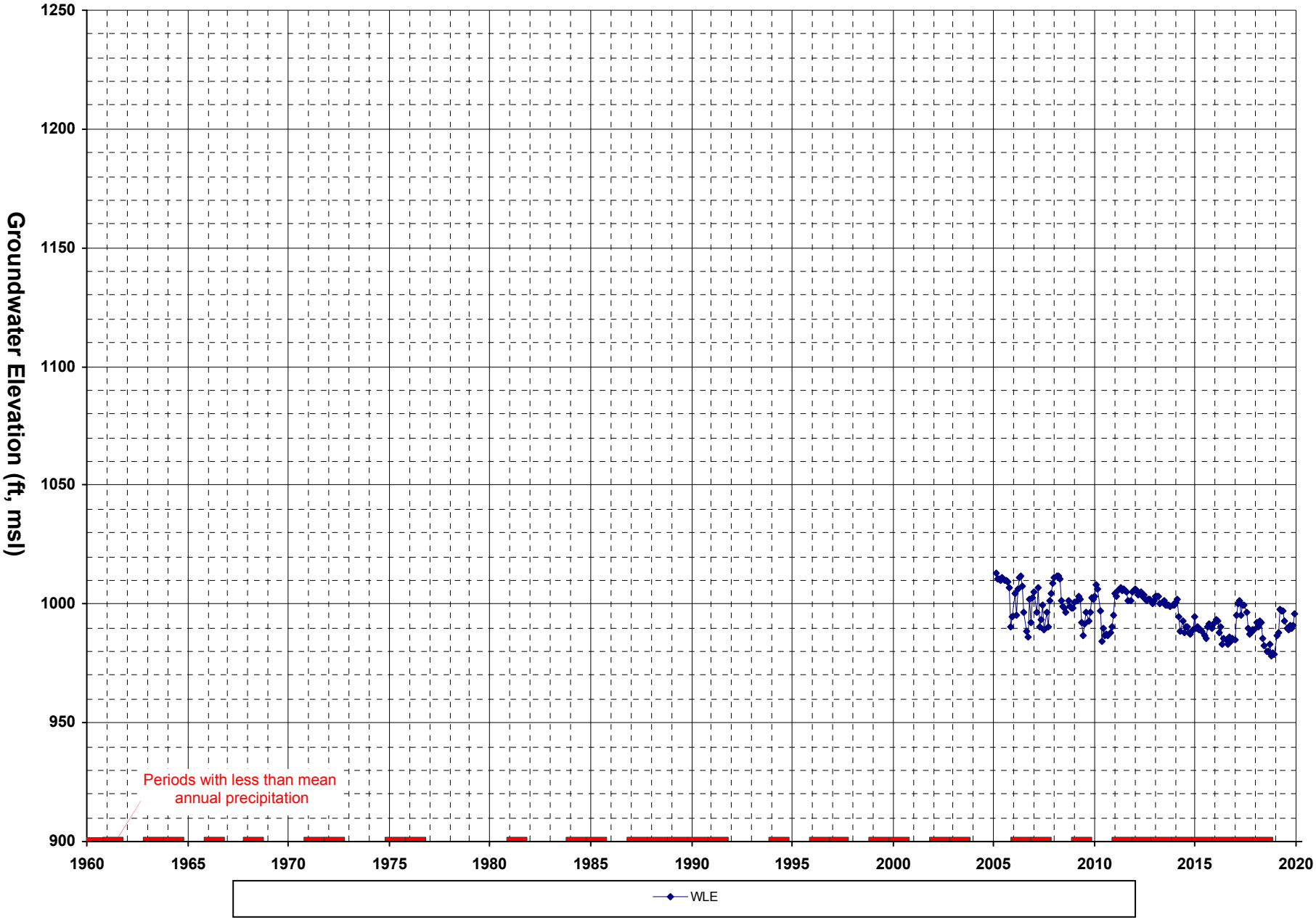


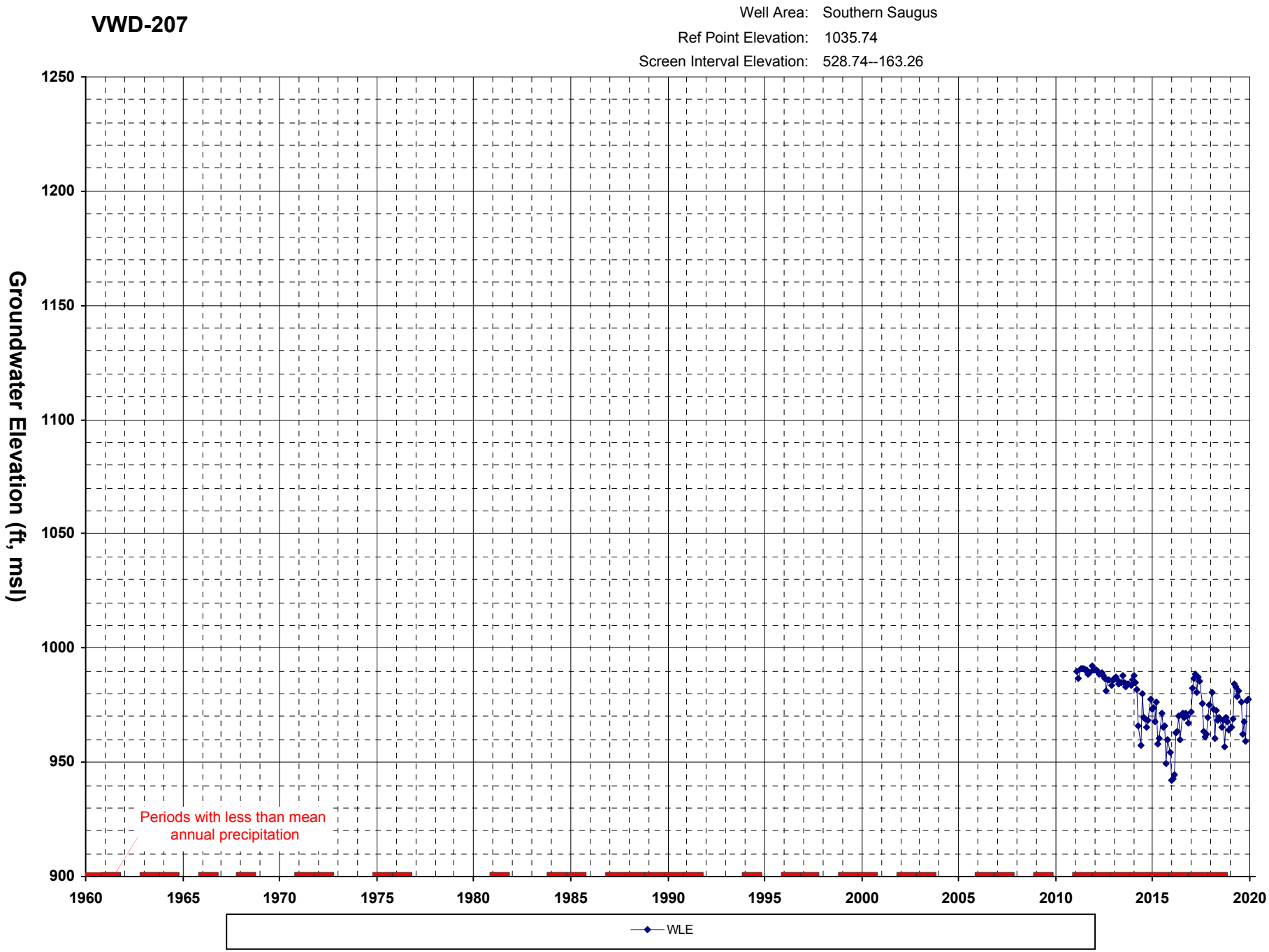

VWD-205
Well Area: Southern Saugus
Ref Point Elevation: 1148.531
Screen Interval Elevation: 328.531--781.469
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE


VWD-205M
Well Area: Southern Saugus
Ref Point Elevation: 1142
Screen Interval Elevation: 322--794
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

VWD-206

Well Area: Southern Saugus
Ref Point Elevation: 1058.587
Screen Interval Elevation: 568.587--981.413

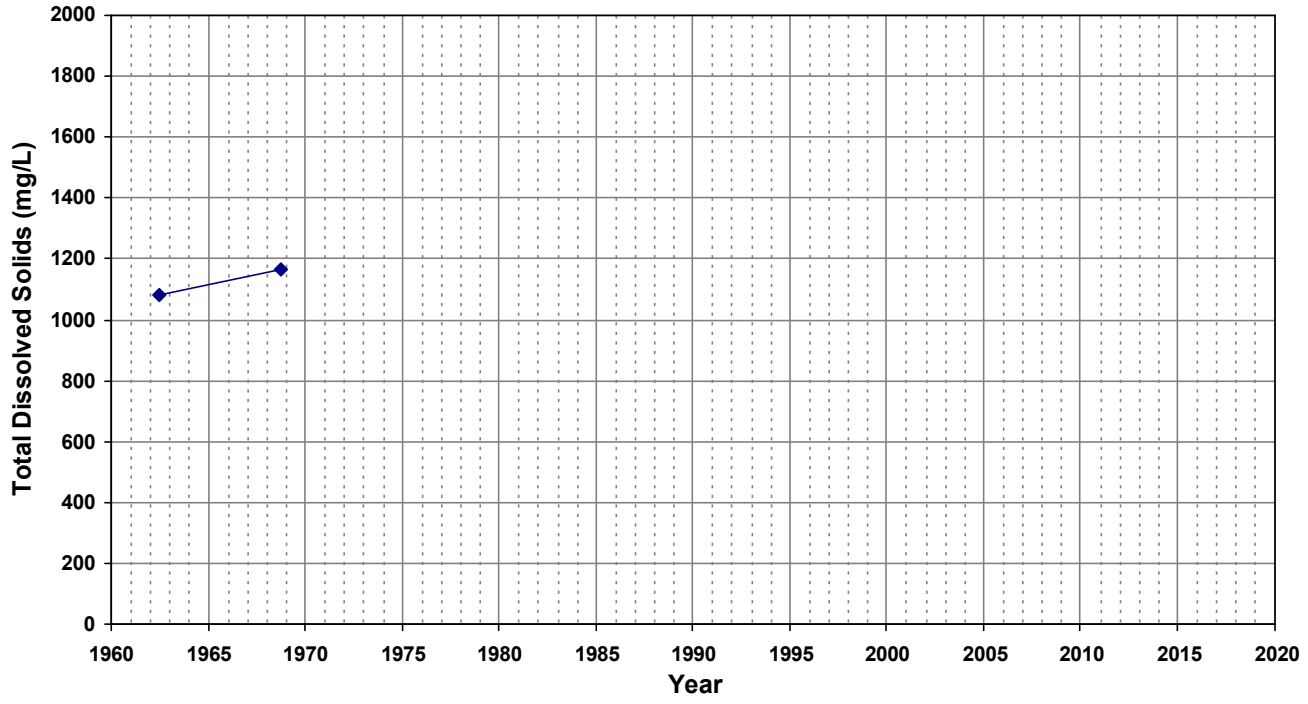



VWD-207
Well Area: Southern Saugus
Ref Point Elevation: 1035.74
Screen Interval Elevation: 528.74--163.26
Groundwater Elevation (ft, msl)
1250
1200
1150
1100
1050
1000
950
900
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Periods with less than mean annual precipitation
WLE

Appendix B
Water Quality Concentration Graphs

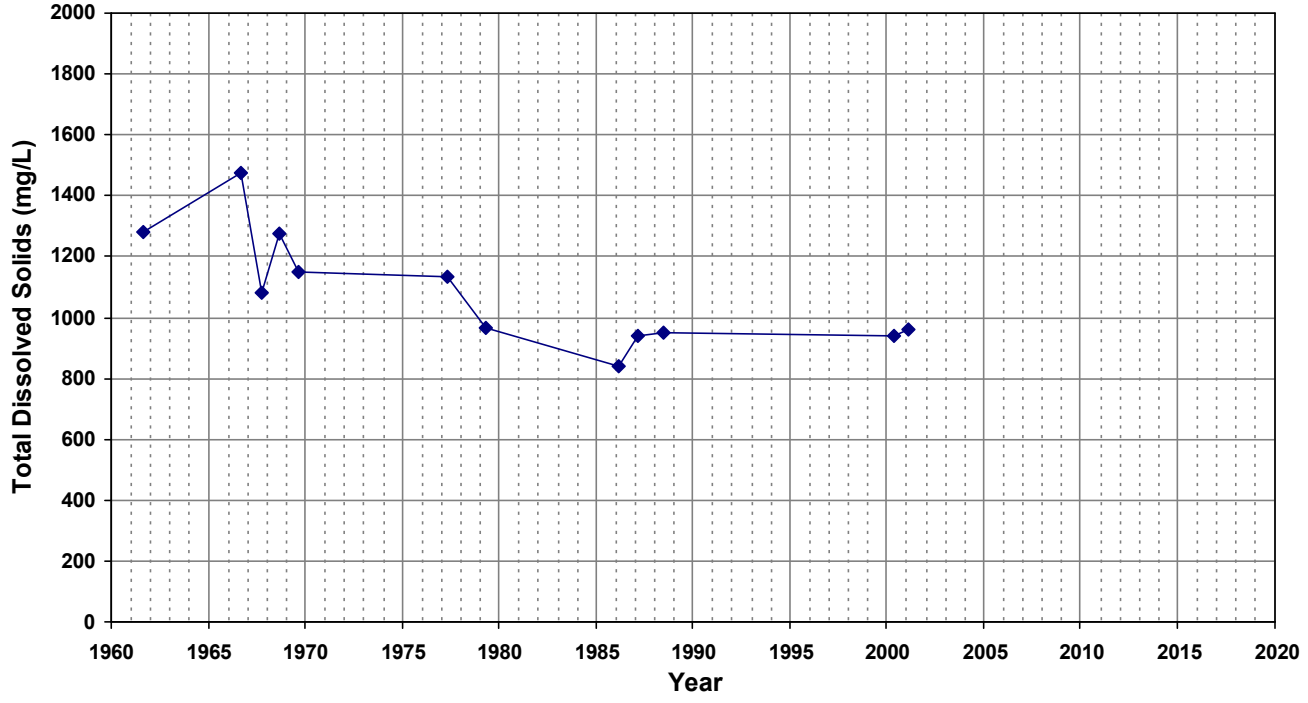
NLF-B5

Well Area: Below Valencia WRP
RPE (ft msl): 892
Well Depth (ft): 126
Screen Elevation (ft msl): 866 - 774



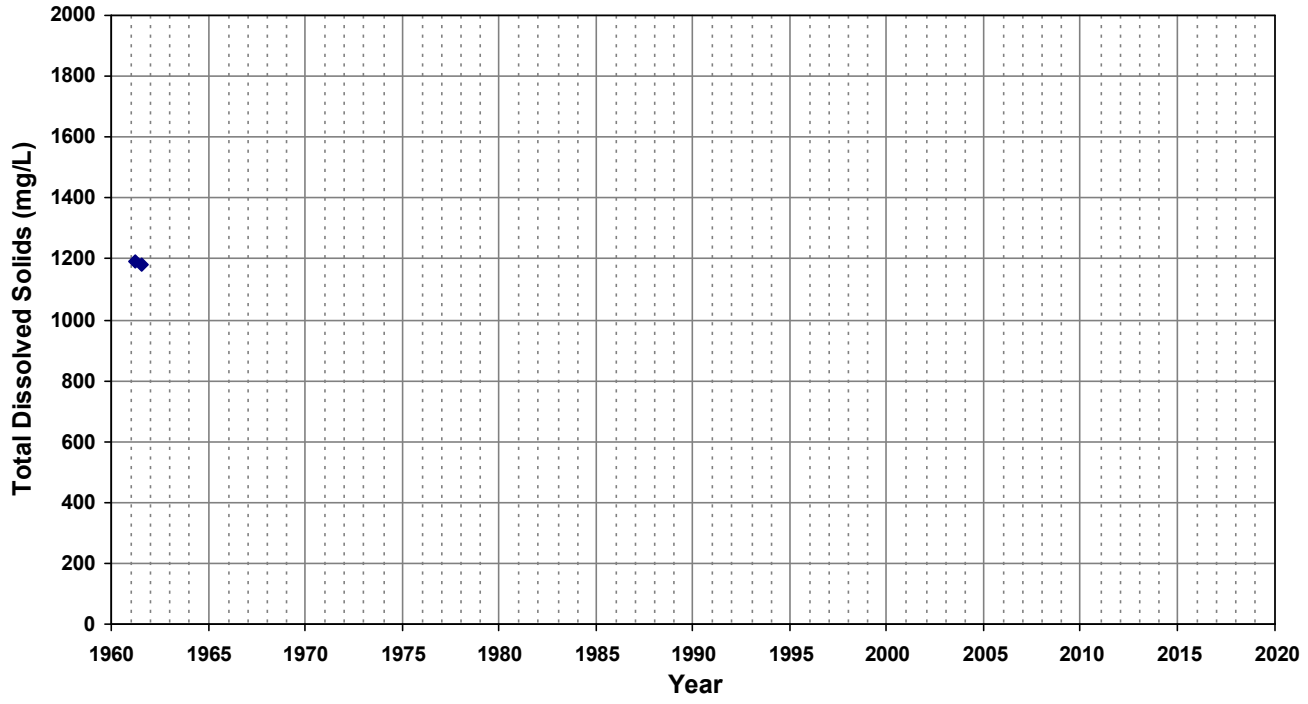
NLF-B6

Well Area: Below Valencia WRP
RPE (ft msl): 896
Well Depth (ft): 117
Screen Elevation (ft msl): 866 - 779



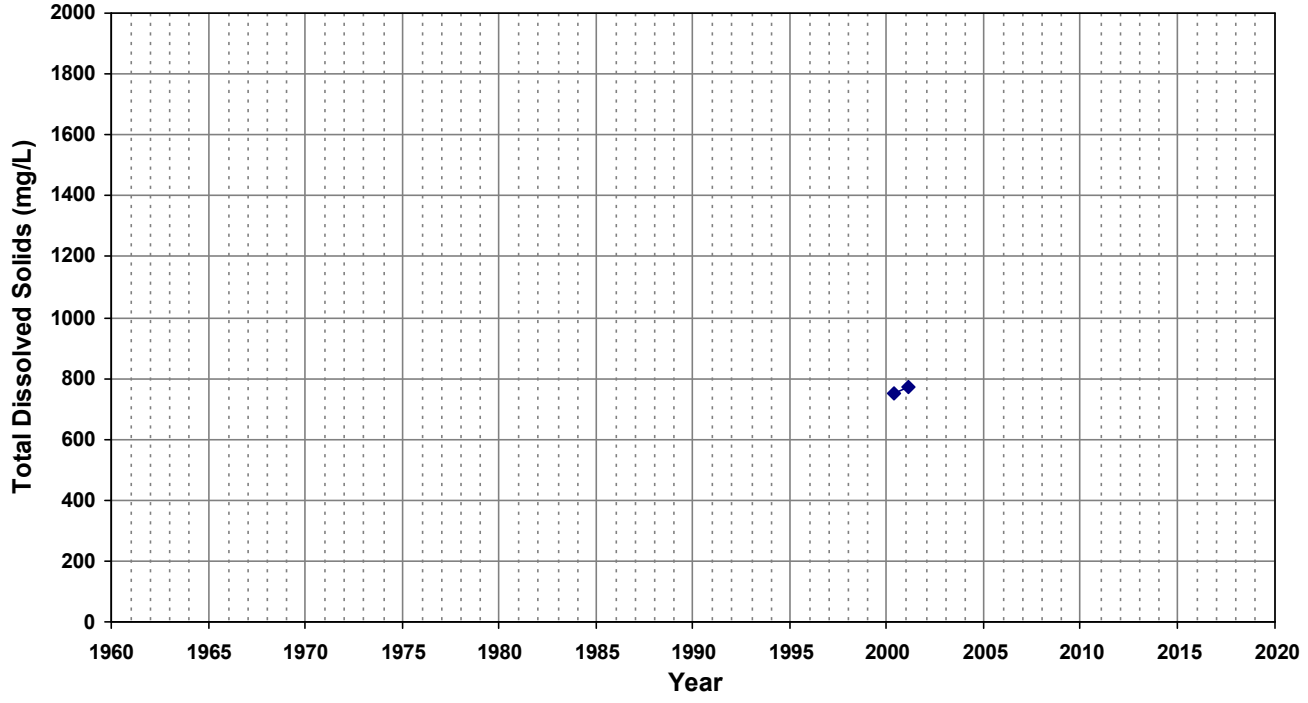
NLF-B7

Well Area: Below Valencia WRP
RPE (ft msl): 899
Well Depth (ft): 102
Screen Elevation (ft msl): 881 - 811



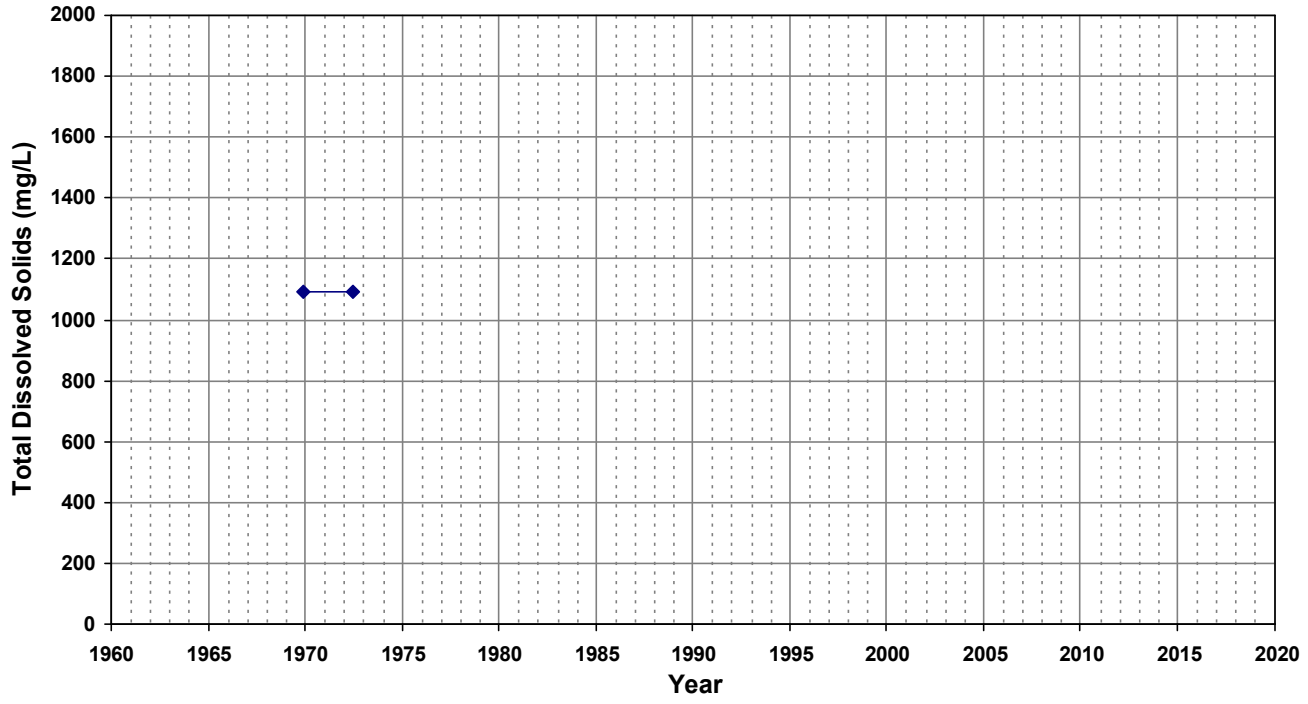
NLF-C

Well Area: Below Valencia WRP
RPE (ft msl): 955
Well Depth (ft): 148
Screen Elevation (ft msl): 875 - 820



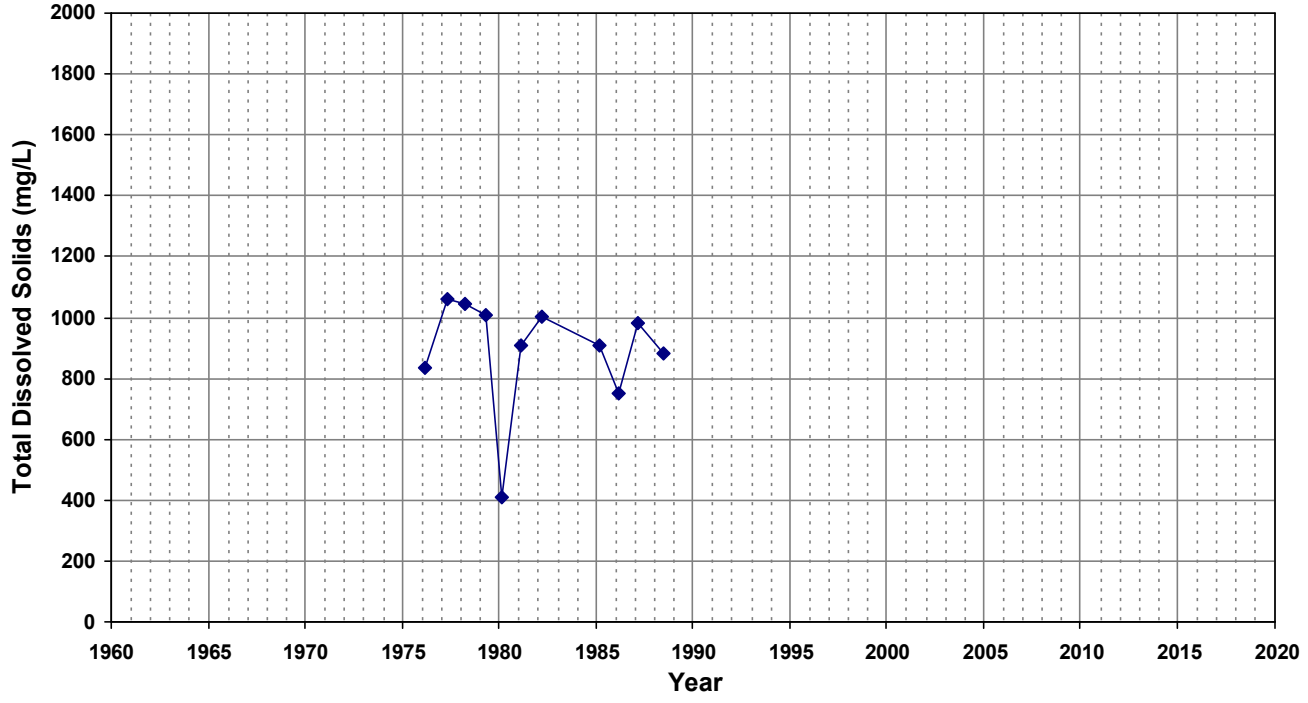
NLF-C5

Well Area: Below Valencia WRP
RPE (ft msl): 955
Well Depth (ft): 139
Screen Elevation (ft msl): 924 - 822



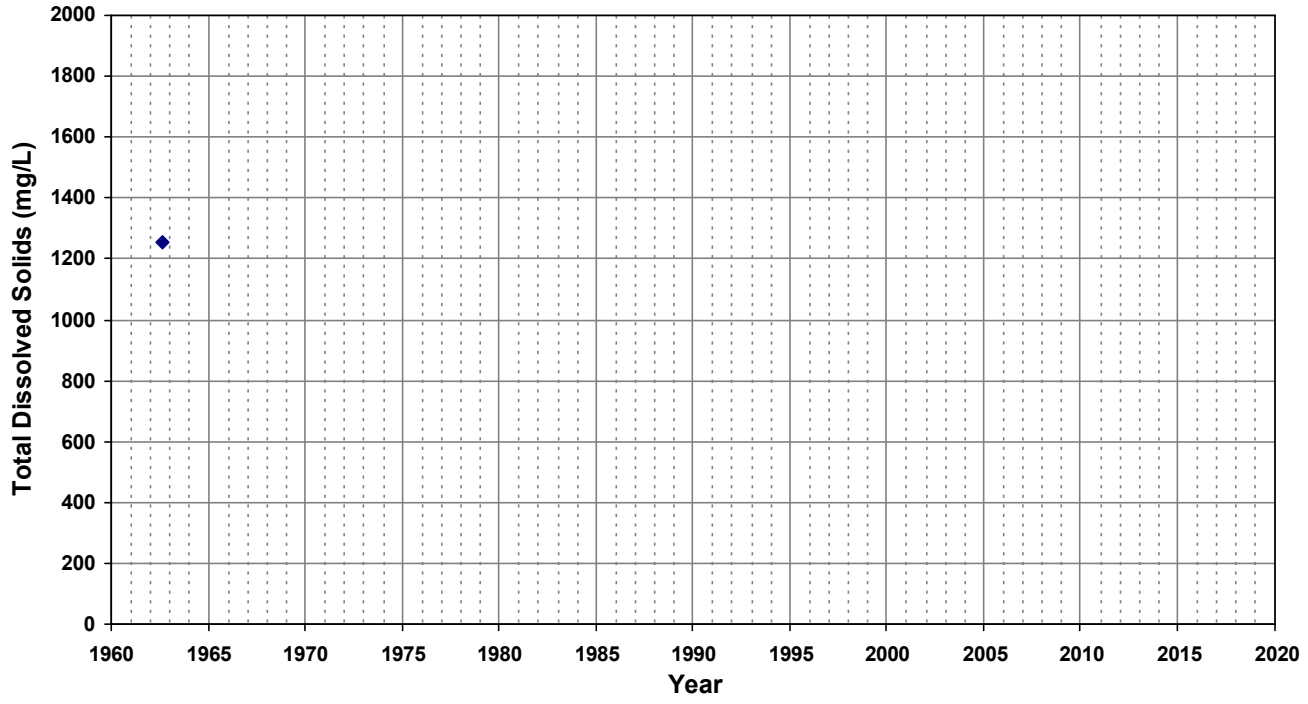
NLF-C6

Well Area: Below Valencia WRP
RPE (ft msl): 961
Well Depth (ft): 103
Screen Elevation (ft msl): 935 - 868



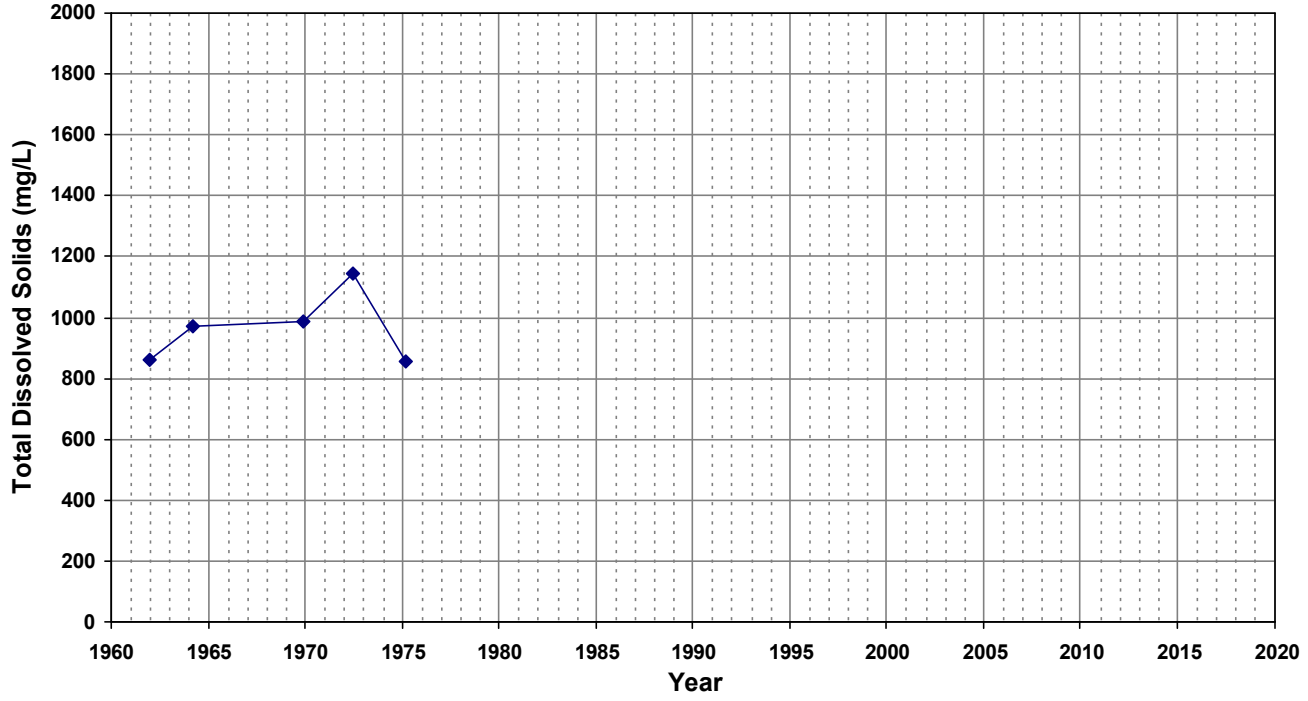
NLF-C7

Well Area: Below Valencia WRP
RPE (ft msl): 958
Well Depth (ft): 132
Screen Elevation (ft msl): 918 - 838



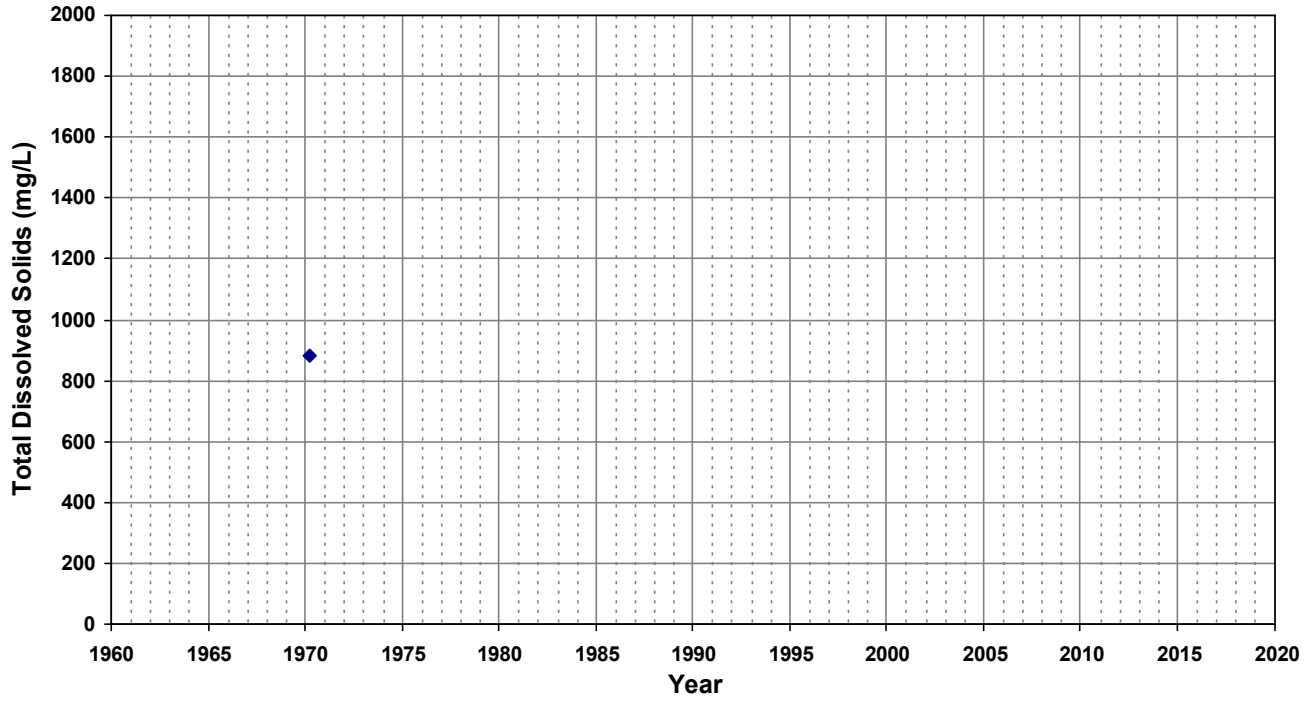
NLF-C8

Well Area: Below Valencia WRP
RPE (ft msl): 951
Well Depth (ft): 280
Screen Elevation (ft msl): 921 - 821



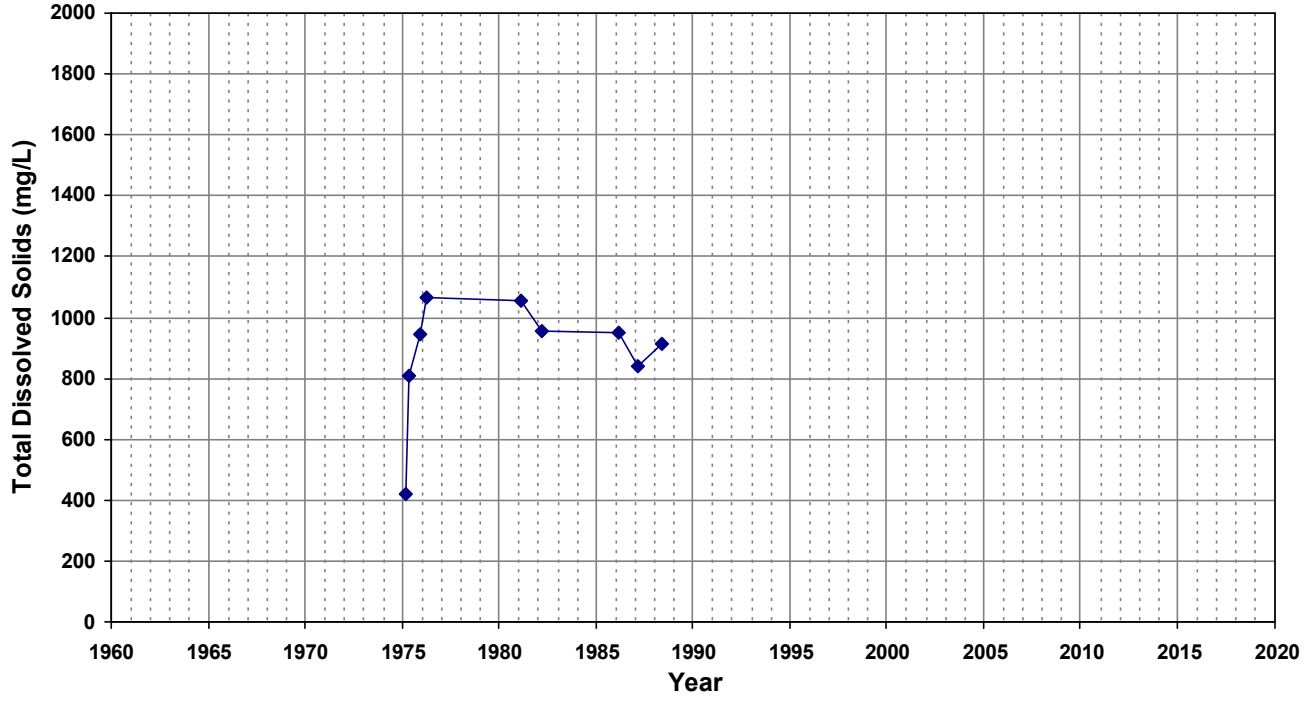
NLF-E3

Well Area: Below Valencia WRP
RPE (ft msl): 991
Well Depth (ft): 255
Screen Elevation (ft msl): 944 - 757



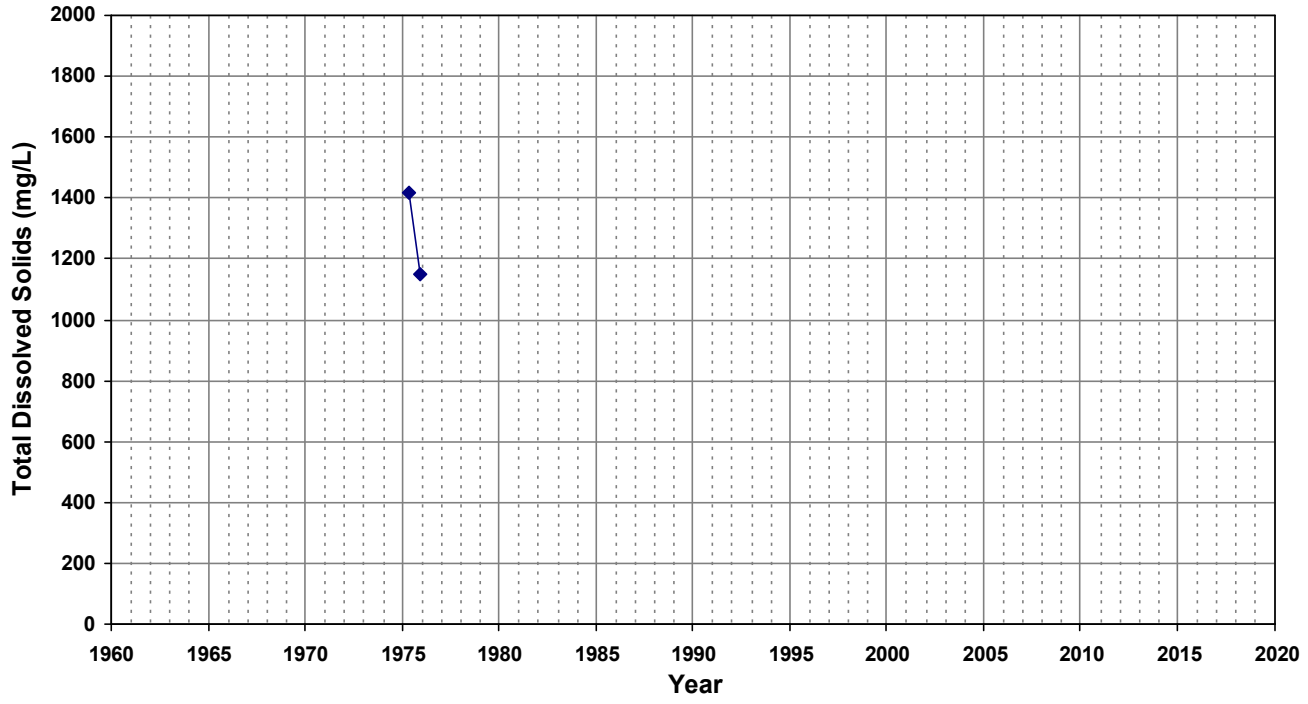
NLF-E4

Well Area: Below Valencia WRP
RPE (ft msl): 991
Well Depth (ft): 142
Screen Elevation (ft msl): 941 - 855



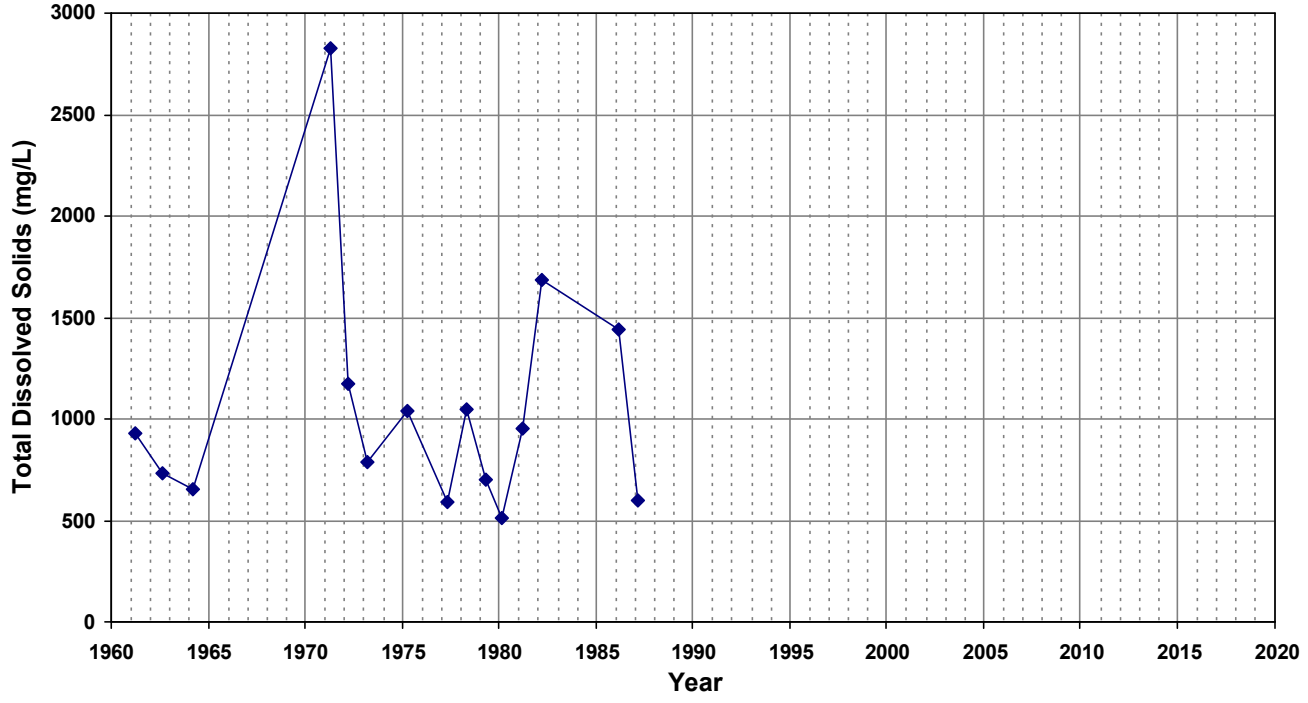
NLF-Q

Well Area: Below Saugus WRP
Well Depth (ft): 151
RPE (ft msl): 1148
Screen Elevation (ft msl): 1068 - 1000



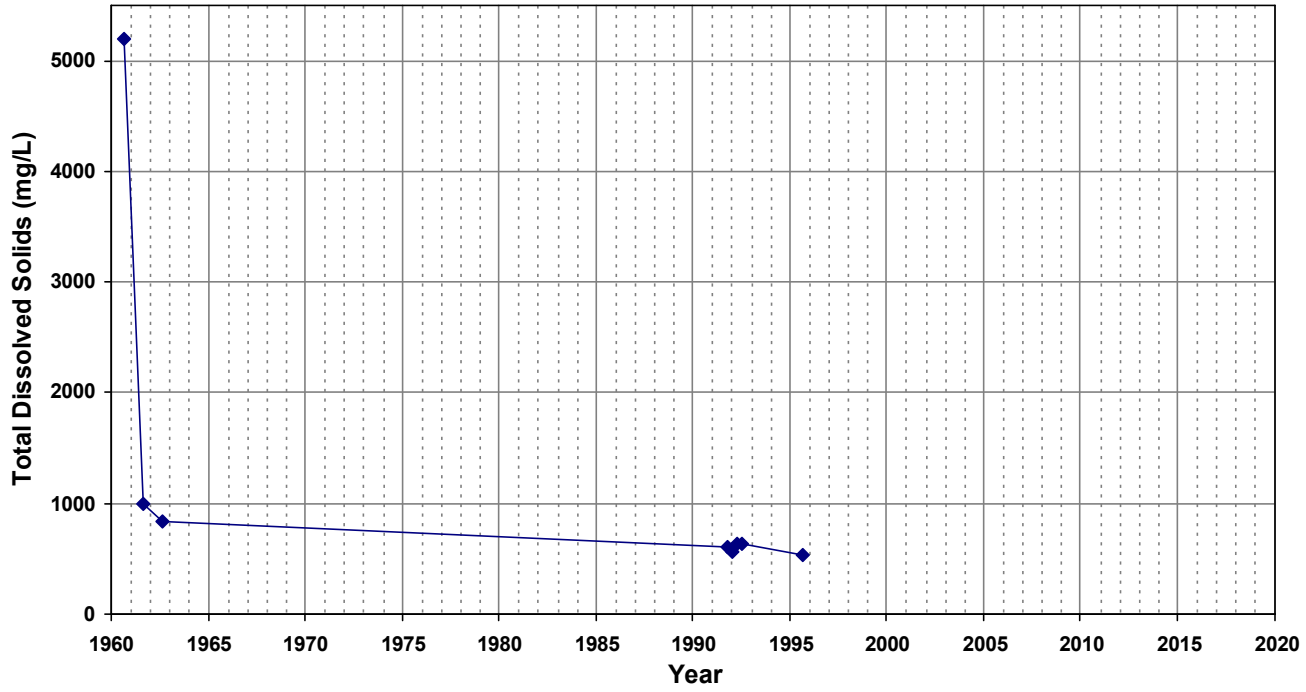
NLF-R2

Well Area: Bouquet Canyon
Well Depth (ft): 130
RPE (ft msl): 1184
Screen Elevation (ft msl): 1144 - 1056



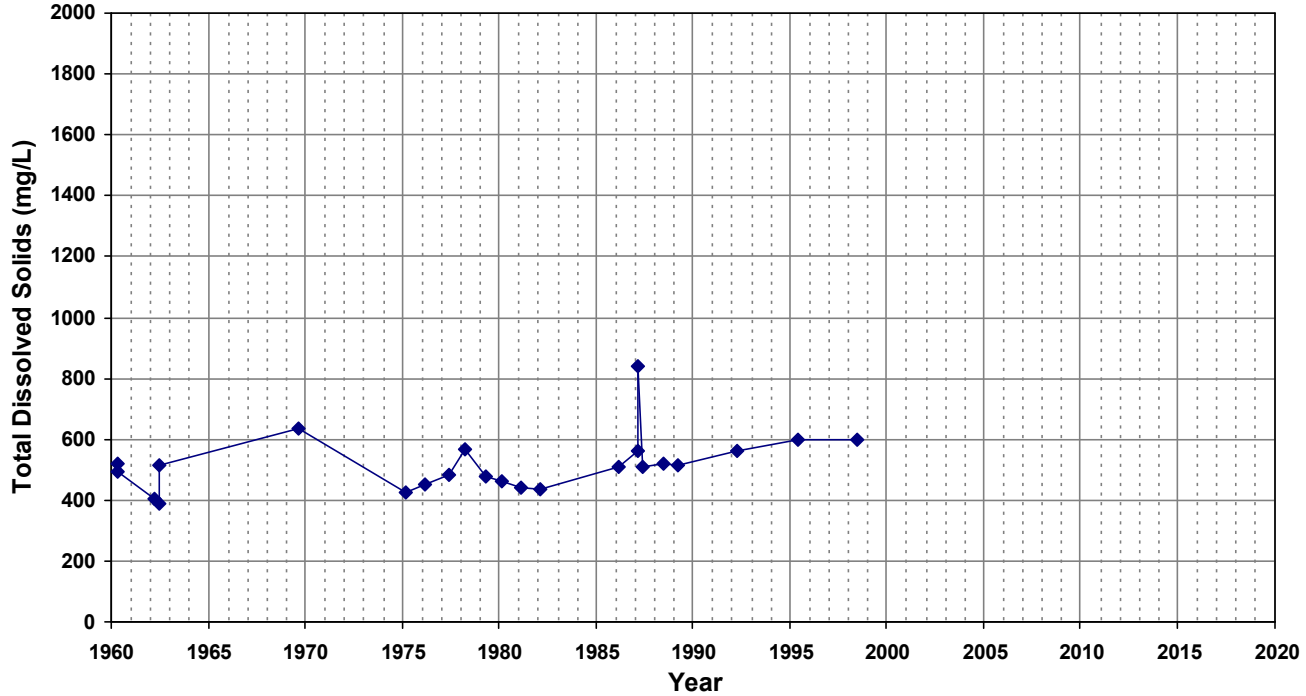
NLF-W4

Well Area: San Francisquito Canyon
RPE (ft msl): 1201
Well Depth (ft): 140
Screen Elevation (ft msl): 1171 - 1066



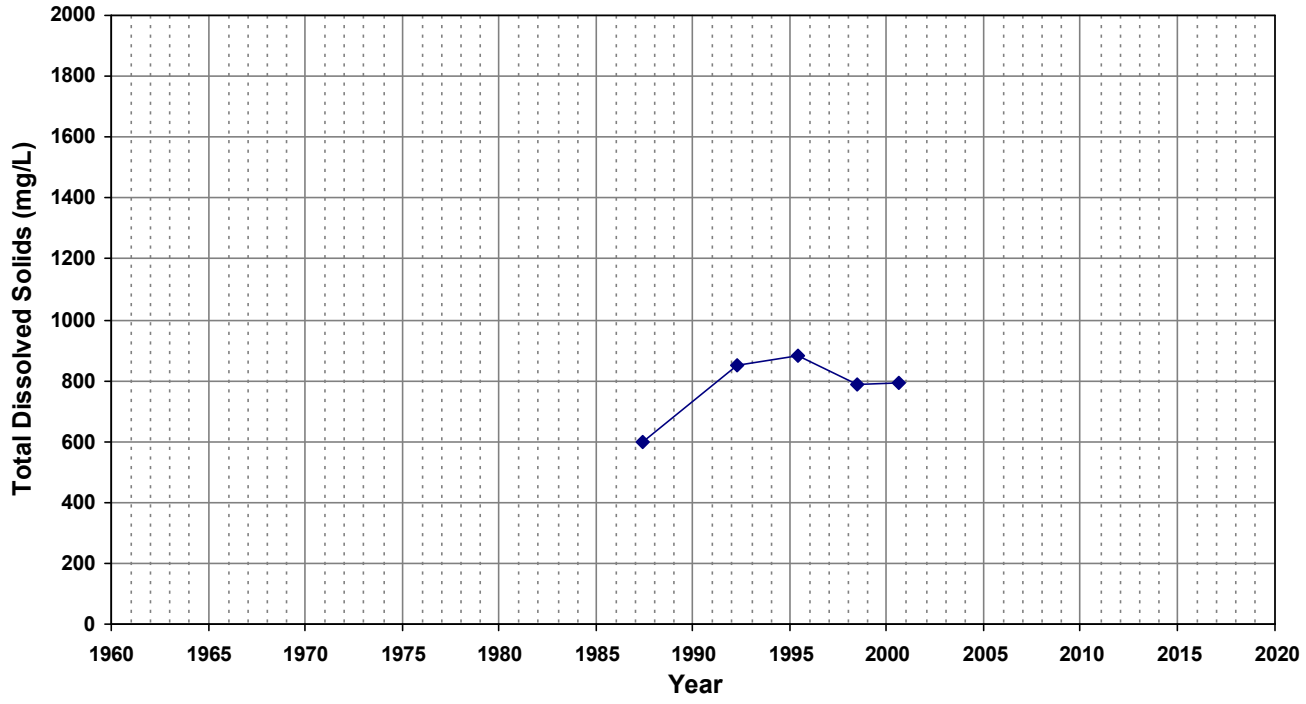
NWD-07

Well Area: Southern Saugus
RPE (ft msl): 1250
Well Depth (ft): 994
Screen Elevation (ft msl): 730 - 276



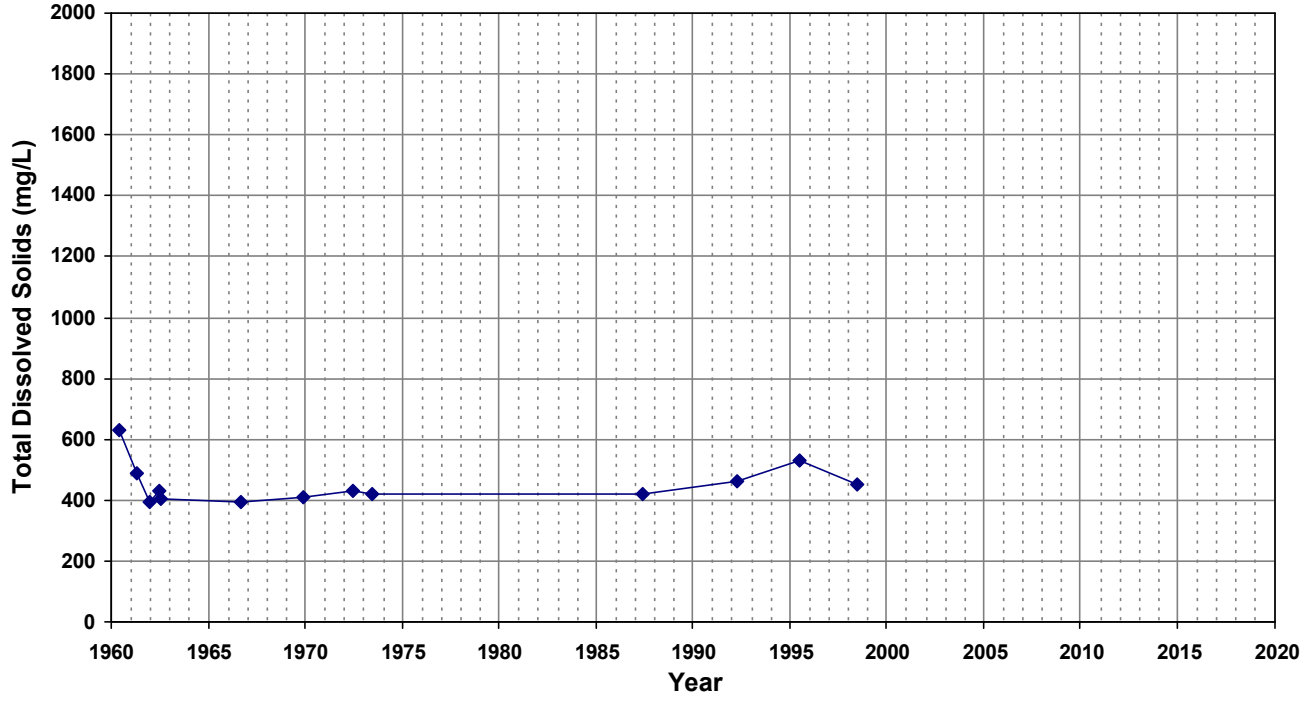
NWD-09

Well Area: Southern Saugus
Well Depth (ft): 675
RPE (ft msl): 1358
Screen Elevation (ft msl): 1047 - 684



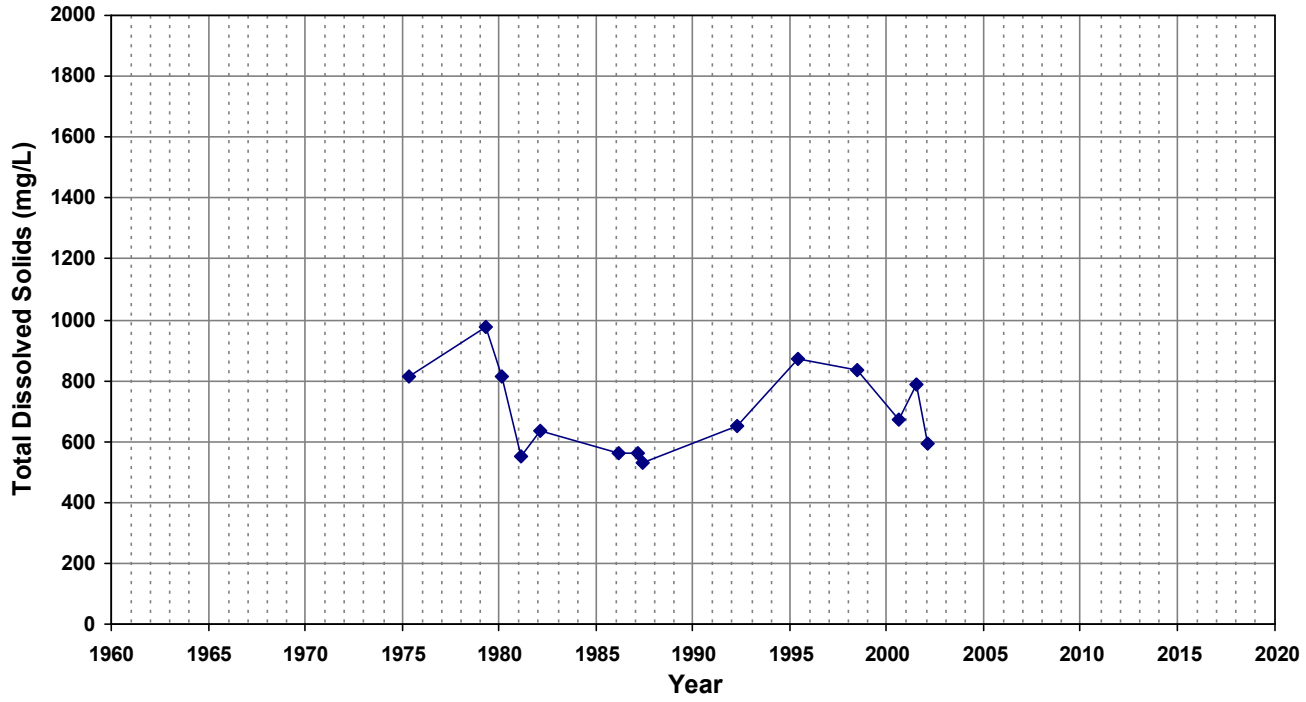
NWD-10

Well Area: Southern Saugus
Well Depth (ft): 1555
RPE (ft msl): 1204
Screen Elevation (ft msl): 424 - -340



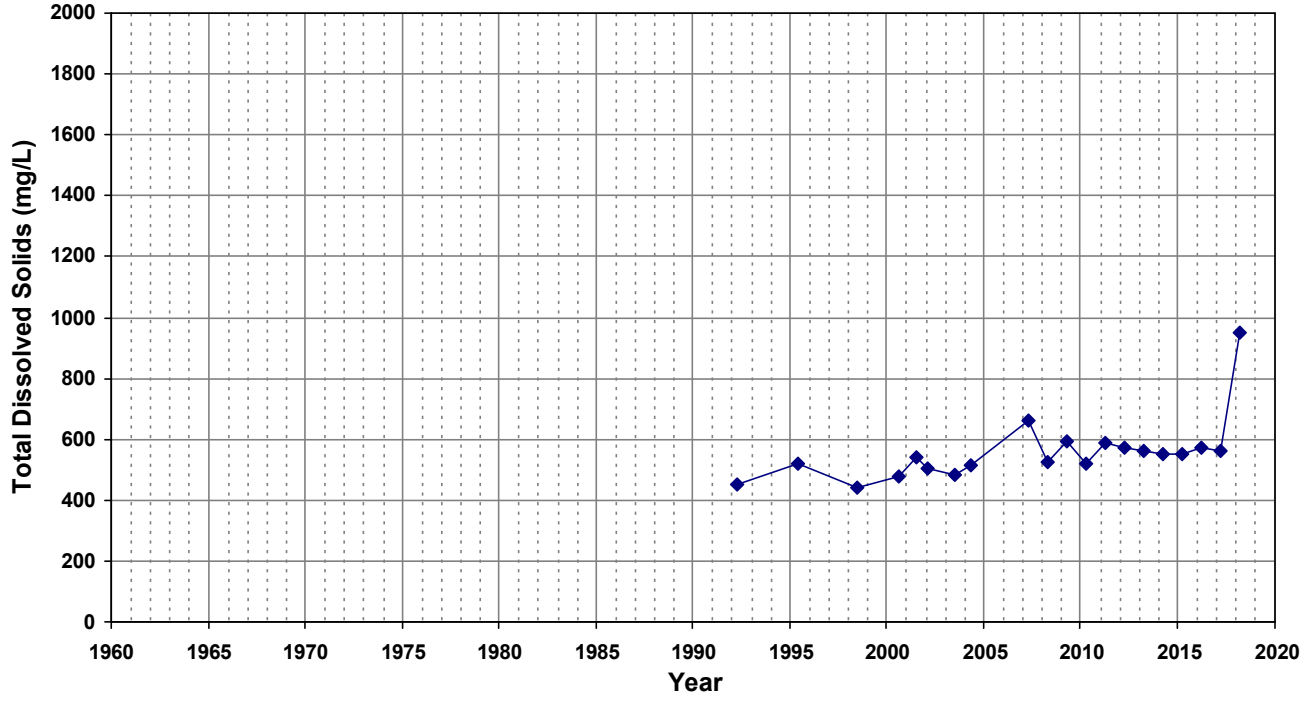
NWD-11

Well Area: Southern Saugus
Well Depth (ft): 1136
RPE (ft msl): 1188
Screen Elevation (ft msl): 988 - 113



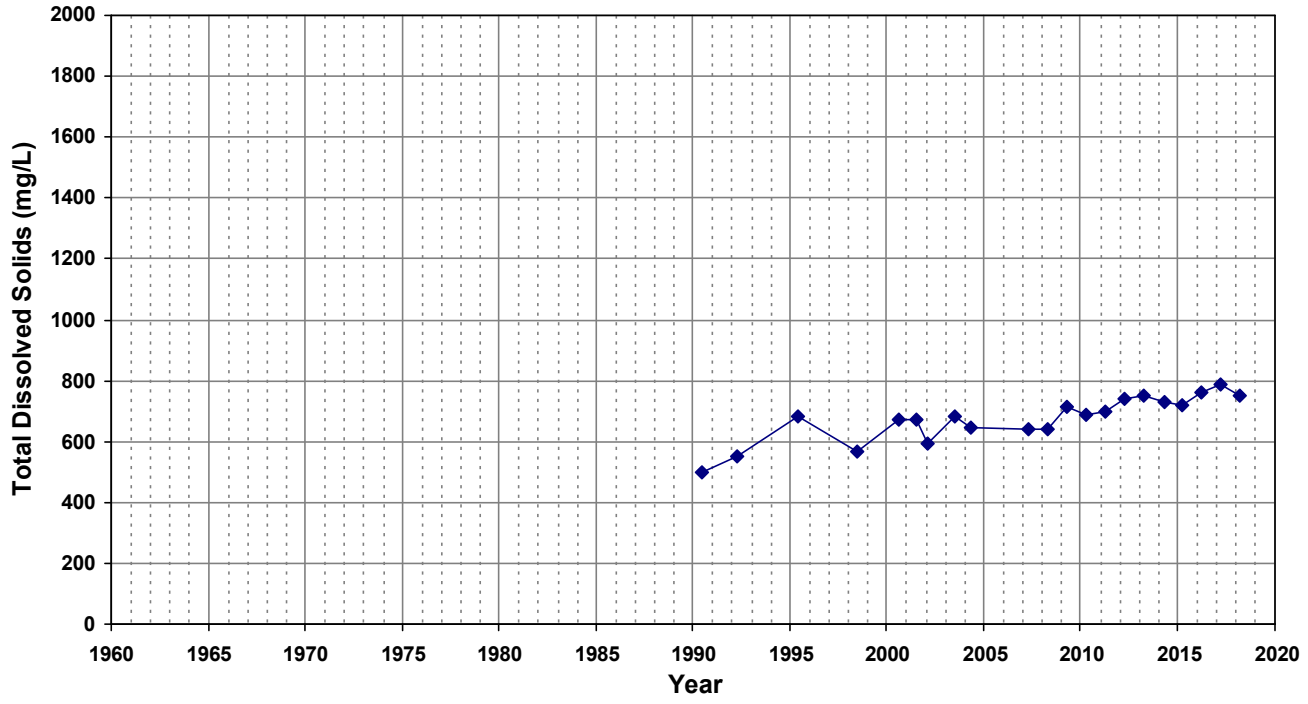
NWD-12

Well Area: Southern Saugus
Well Depth (ft): 1340
RPE (ft msl): 1204
Screen Elevation (ft msl): 719 - -76



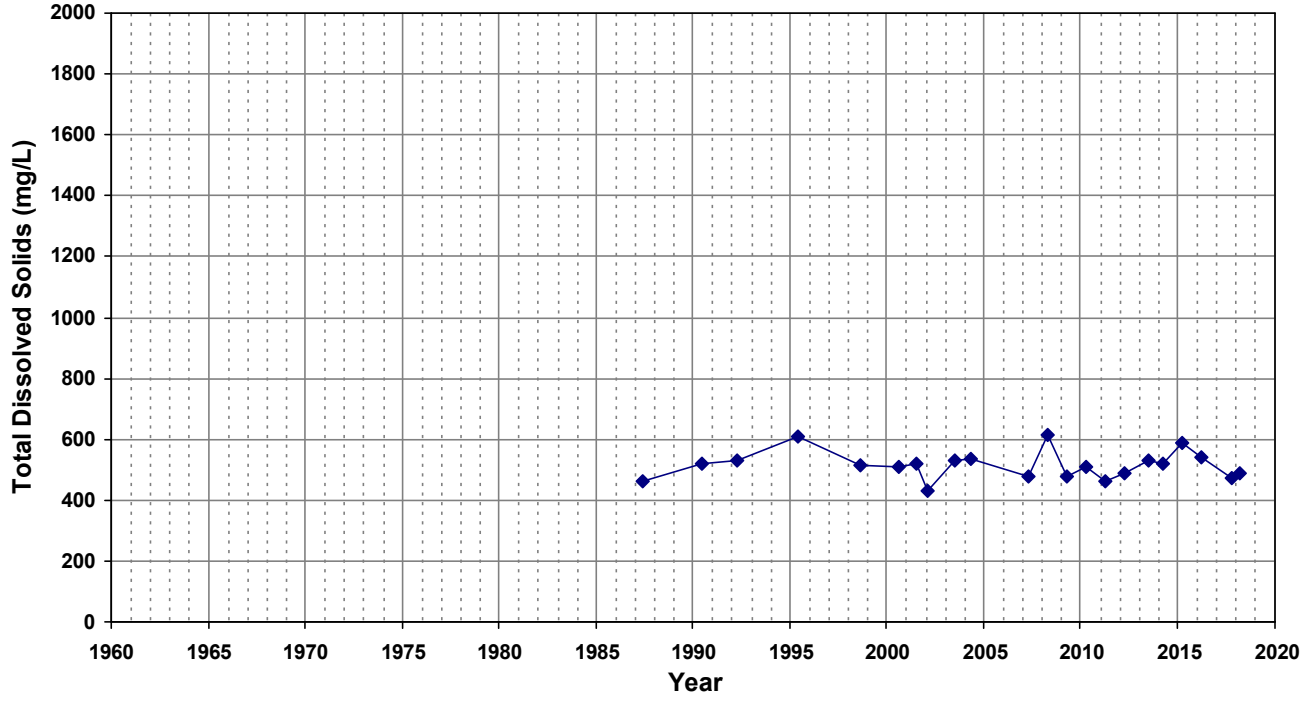
NWD-13

Well Area: Southern Saugus
Well Depth (ft): 1300
RPE (ft msl): 1194
Screen Elevation (ft msl): 774 - -86



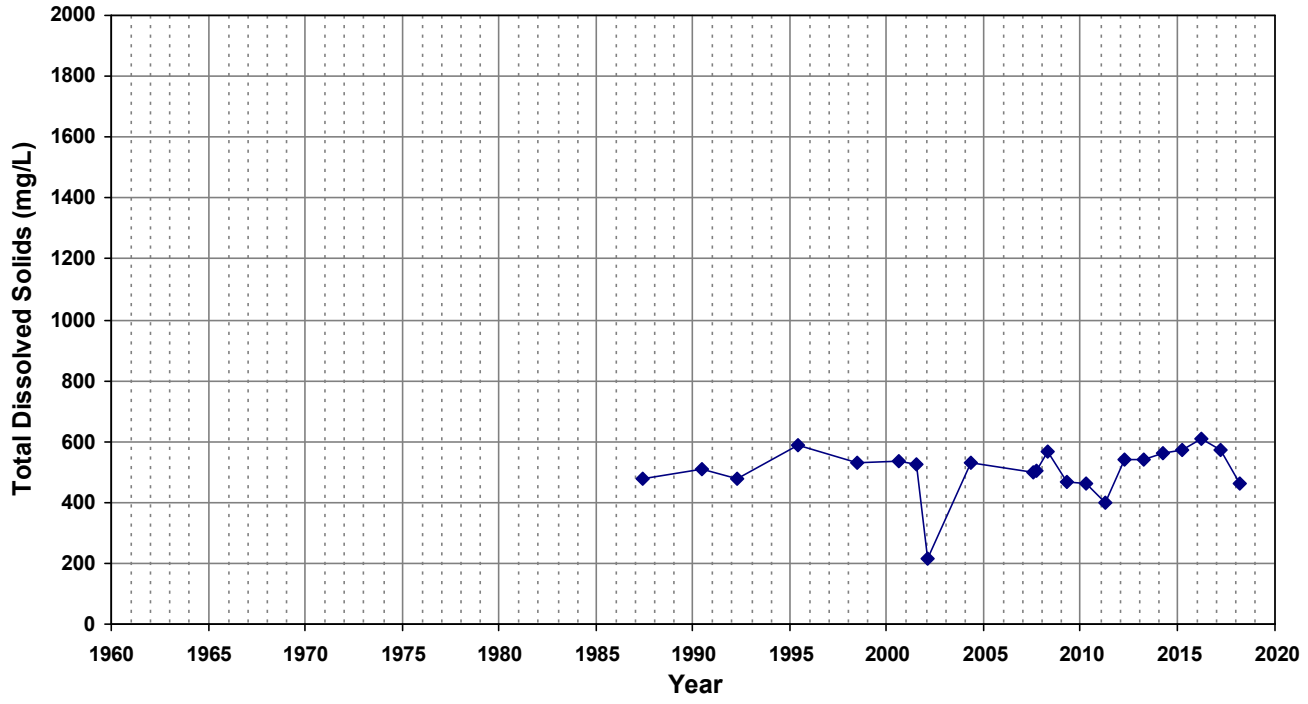
NWD-Castaic 1

Well Area: Castaic Valley
Well Depth (ft): 310
RPE (ft msl): 1129
Screen Elevation (ft msl): 1019 - 832



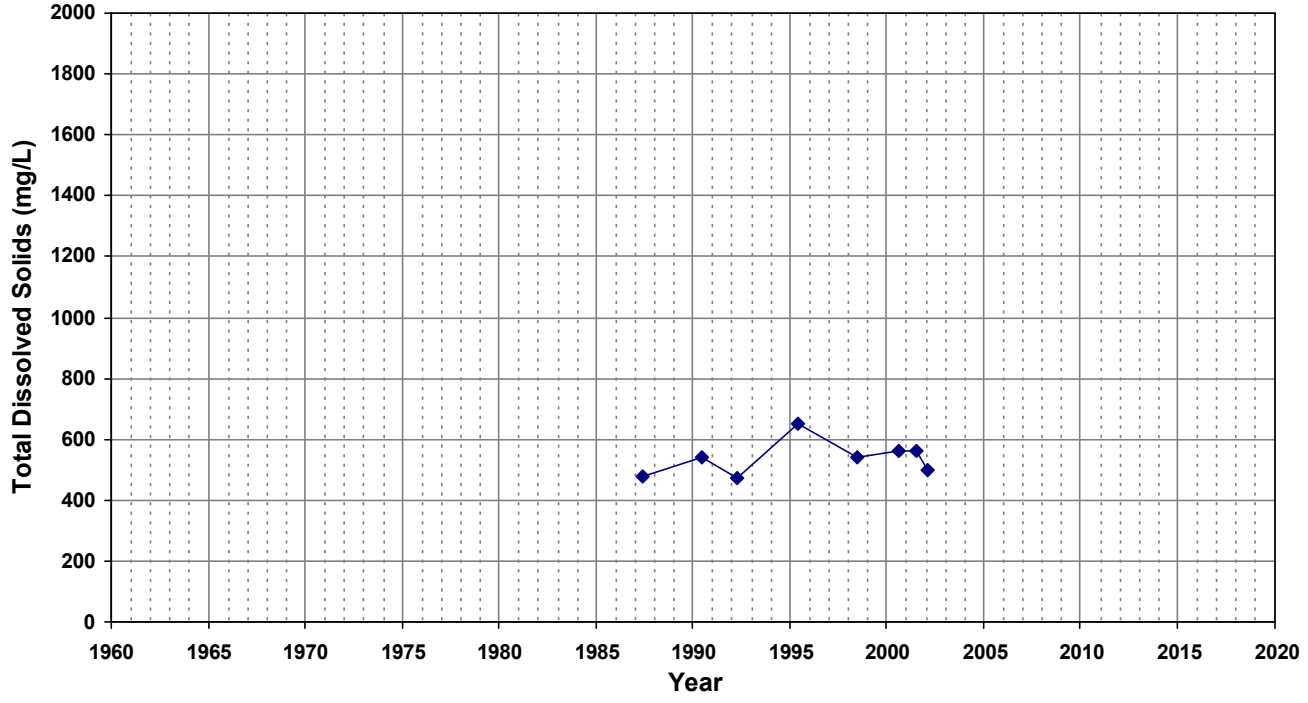
NWD-Castaic 2

Well Area: Castaic Valley
Well Depth (ft): 120
RPE (ft msl): 1135
Screen Elevation (ft msl): Unknown



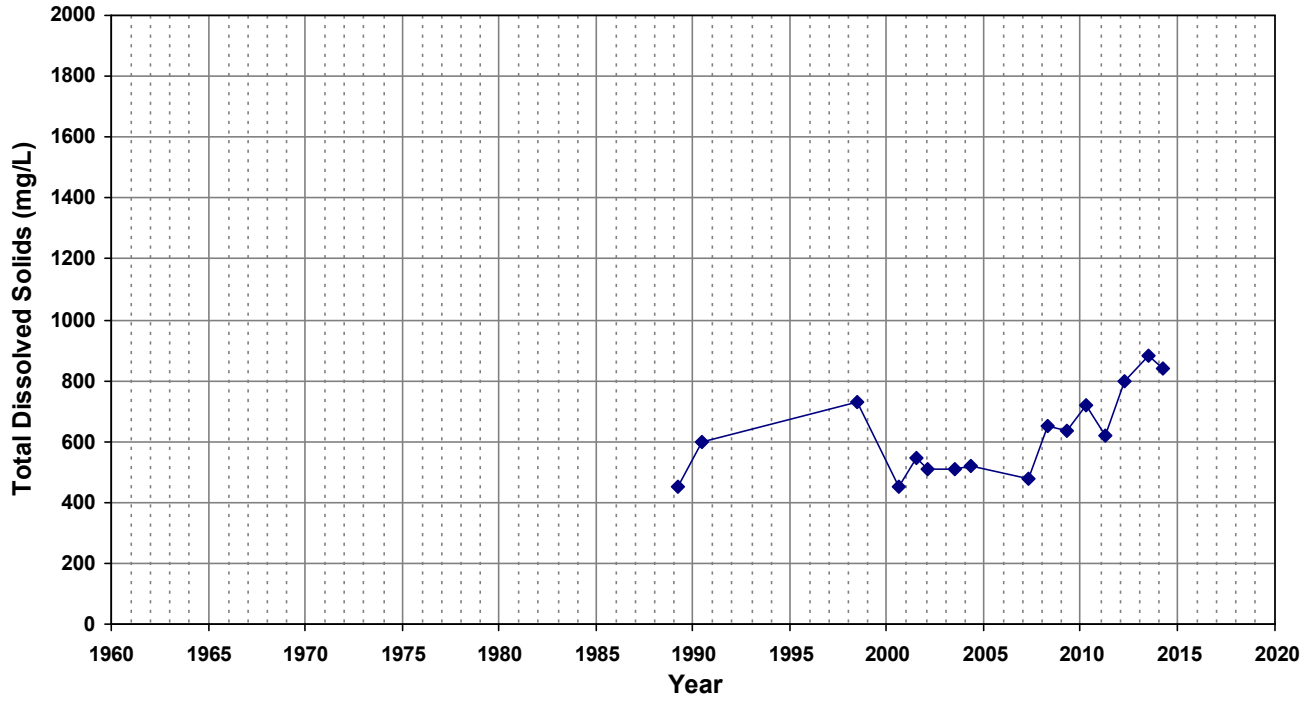
NWD-Castaic 3

Well Area: Castaic Valley
Well Depth (ft): 135
RPE (ft msl): 1135
Screen Elevation (ft msl): 1080 - 999



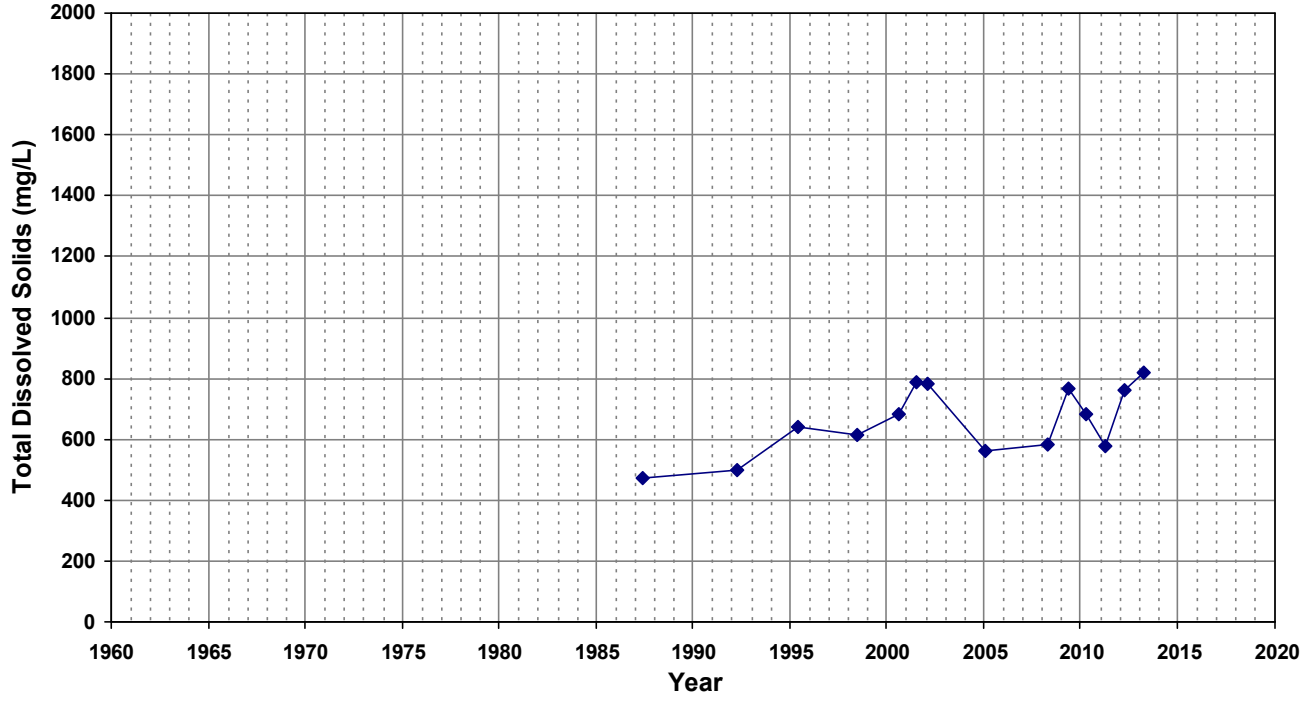
NWD-Castaic 4

Well Area: Castaic Valley
Well Depth (ft): 203
RPE (ft msl): 1129
Screen Elevation (ft msl): Unknown



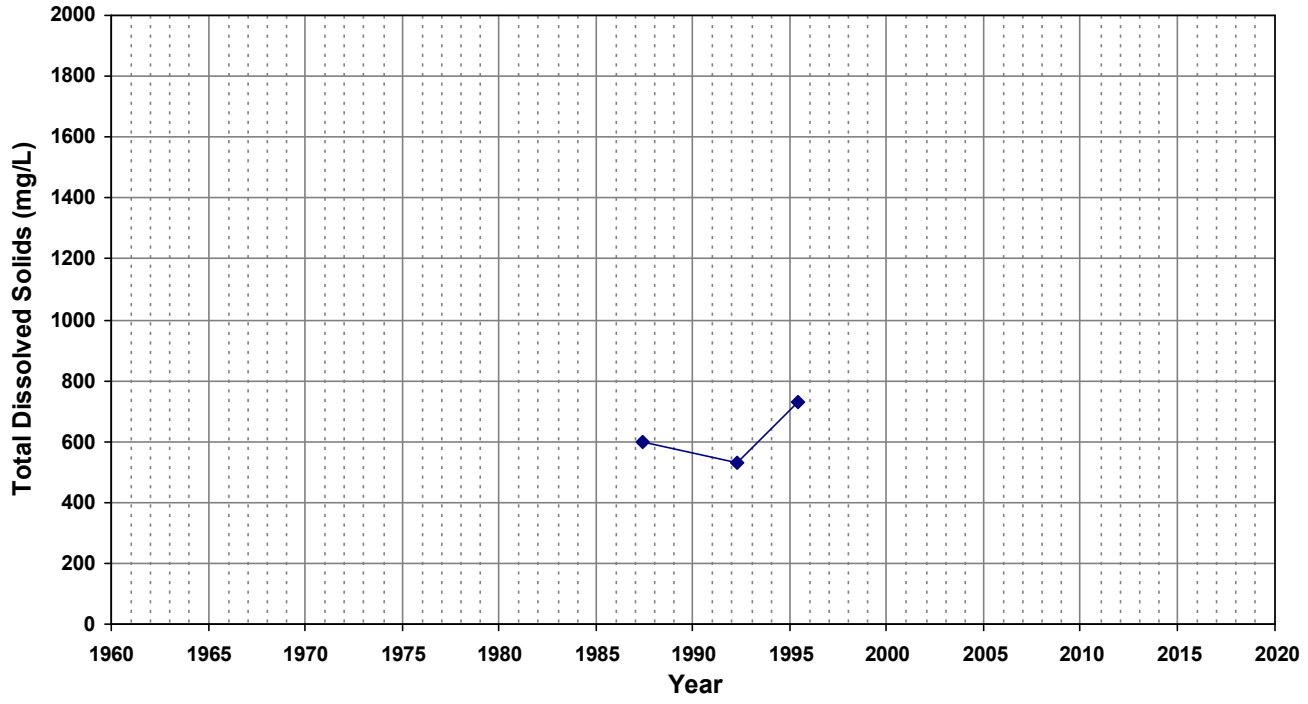
NWD-Pinetree 1

Well Area: Mint Canyon
Well Depth (ft): 235
RPE (ft msl): 1583.5
Screen Elevation (ft msl): 1534 - 1374



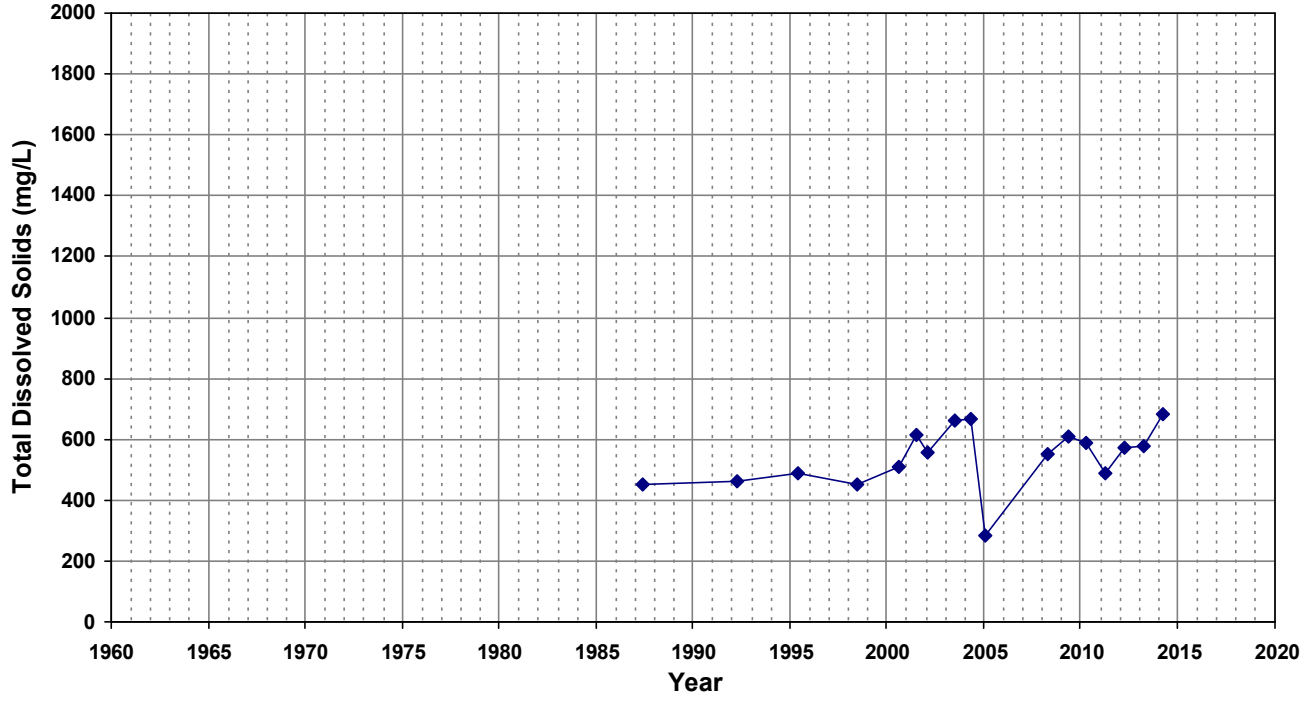
NWD-Pinetree 2

Well Area: Mint Canyon
Well Depth (ft): 132
RPE (ft msl): 1575
Screen Elevation (ft msl): 1525 - 1445



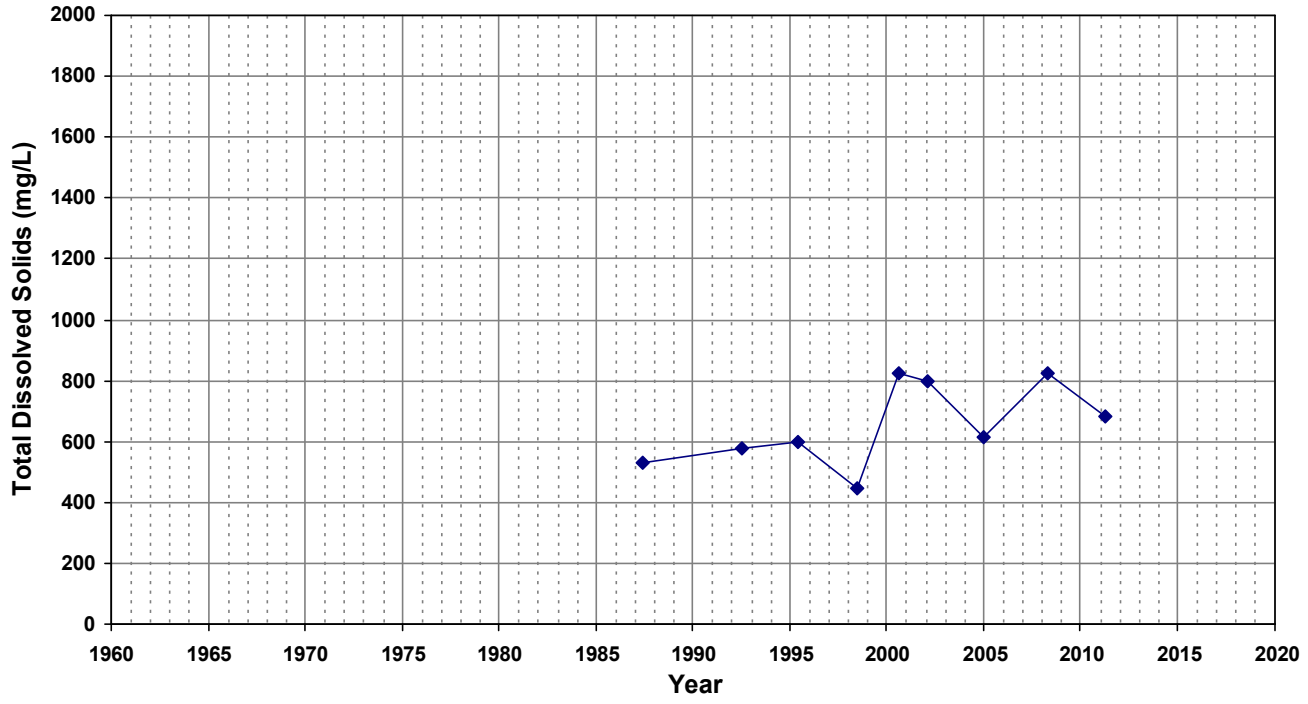
NWD-Pinetree 3

Well Area: Mint Canyon
Well Depth (ft): 146
RPE (ft msl): 1560
Screen Elevation (ft msl): 1510 - 1425



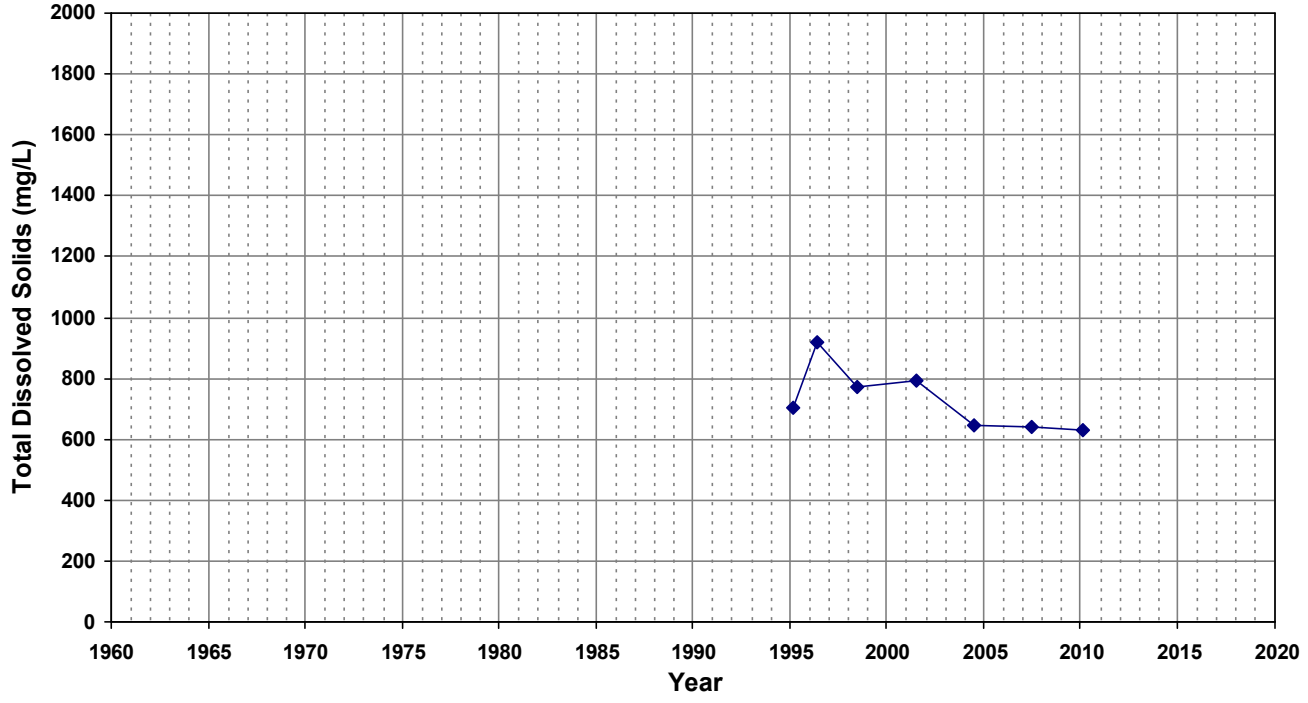
NWD-Pinetree 4

Well Area: Mint Canyon
Well Depth (ft): 185
RPE (ft msl): 1552.5
Screen Elevation (ft msl): 1442 - 1368



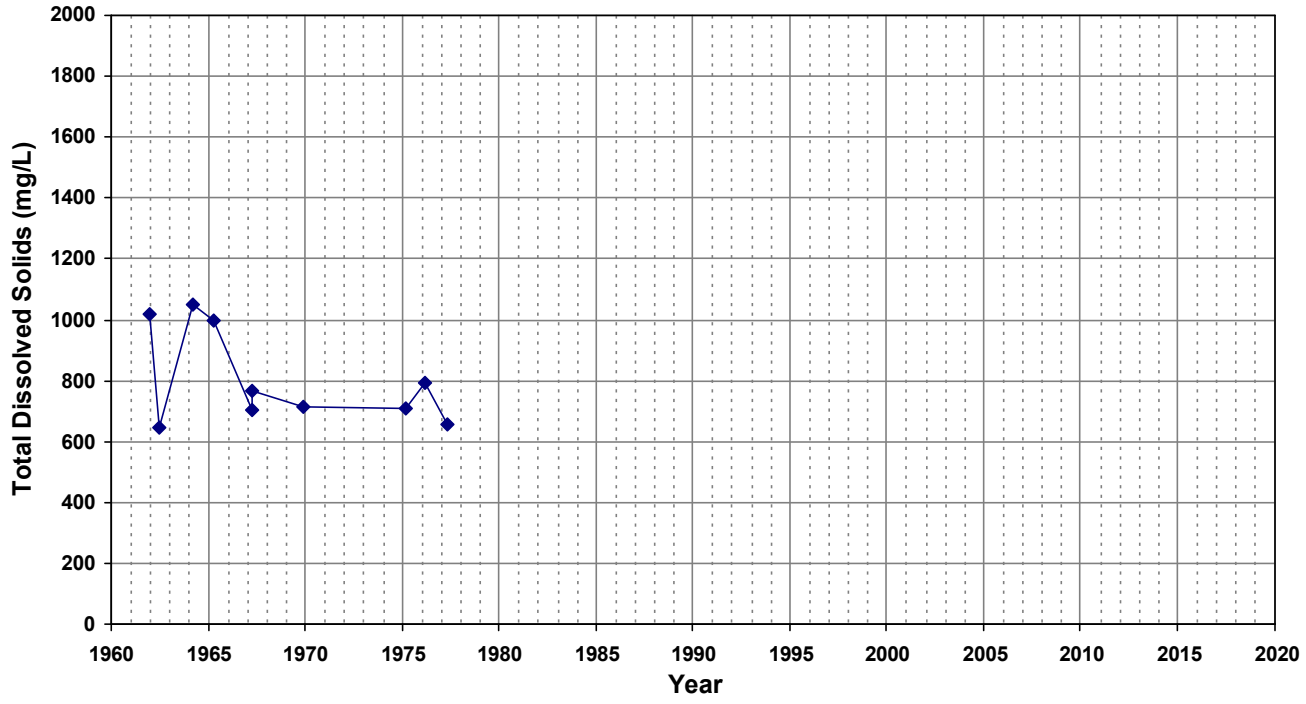
PDC-10

Well Area: Castaic Valley
Well Depth (ft): 110
RPE (ft msl): 1086
Screen Elevation (ft msl): 1059 - 986



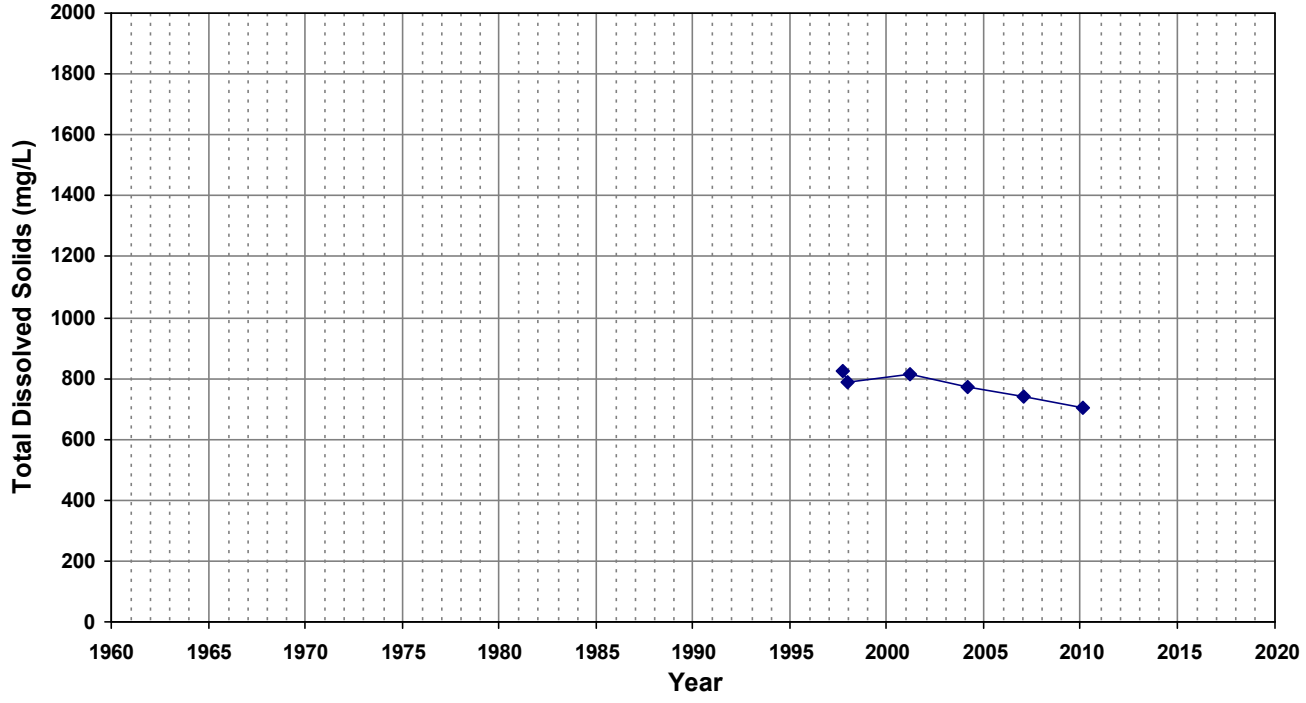
PDC-11 - Old

Well Area: Castaic Valley
Well Depth (ft): 120
RPE (ft msl): 1047
Screen Elevation (ft msl): 997 - 947



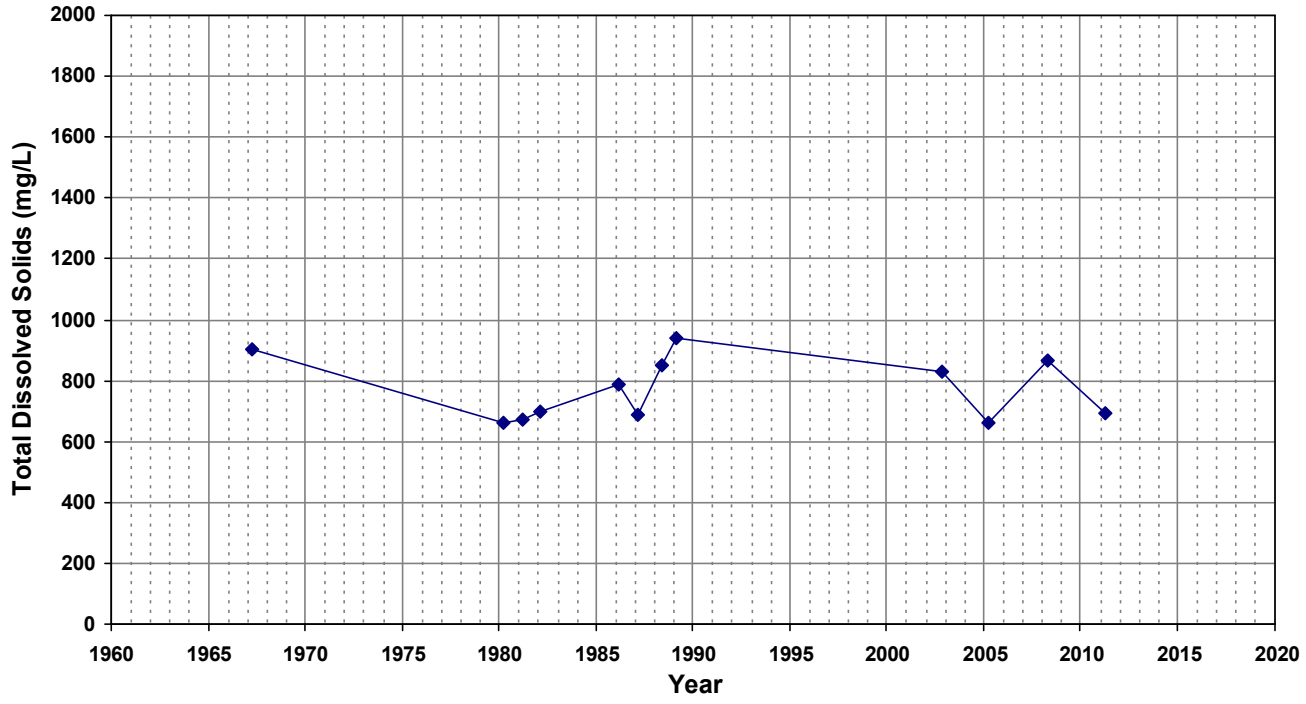
PDC-17

Well Area: Castaic Valley
Well Depth (ft): 110
RPE (ft msl): 1086
Screen Elevation (ft msl): 1051 - 976



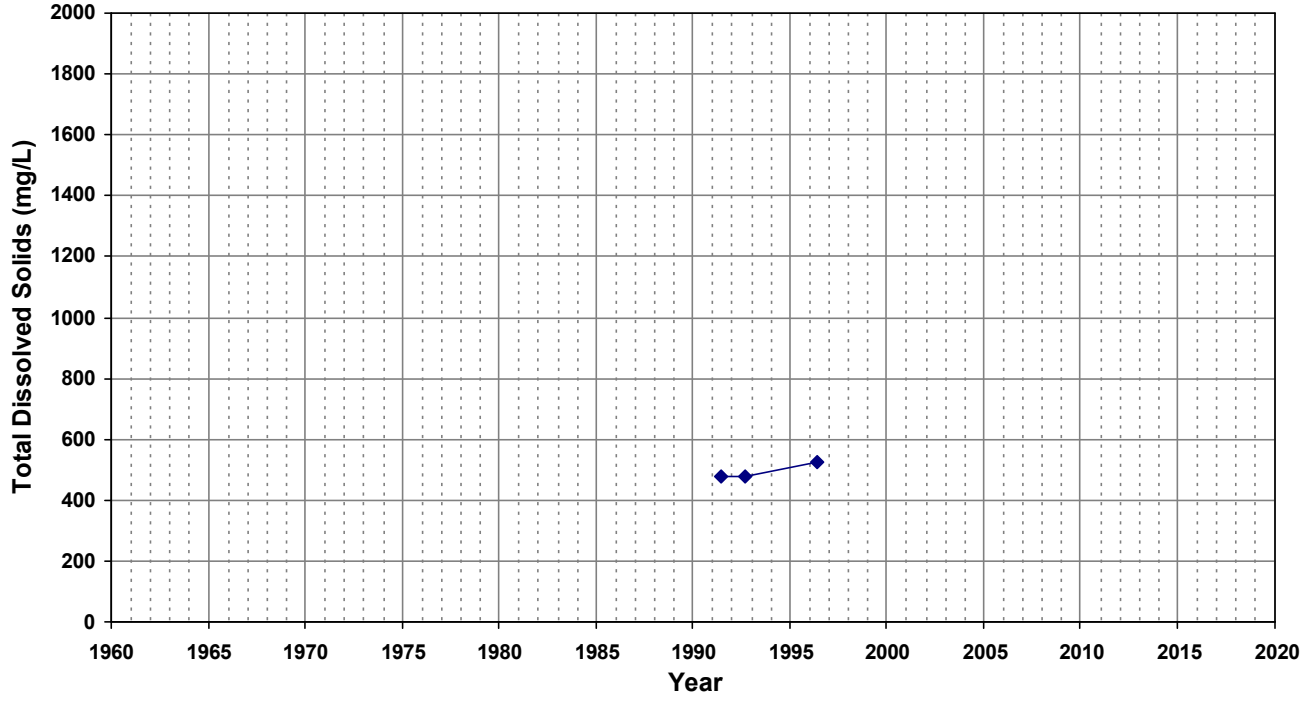
PDC-18 - Old

Well Area: Castaic Valley
Well Depth (ft): 162
RPE (ft msl): 1063
Screen Elevation (ft msl): 1005 - 930



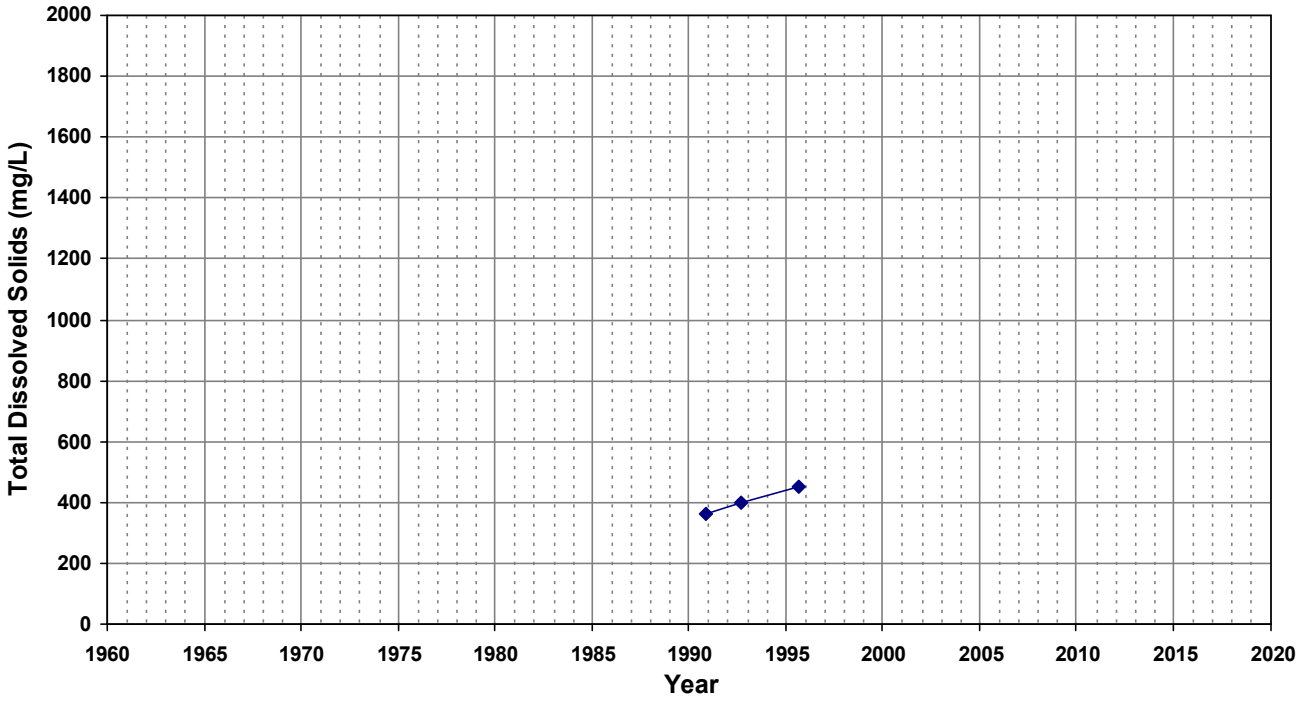
SCVWA-Saugus 1

Well Area: Southern Saugus
Well Depth (ft): 1683
RPE (ft msl): 1165.5
Screen Elevation (ft msl): 676 - -454



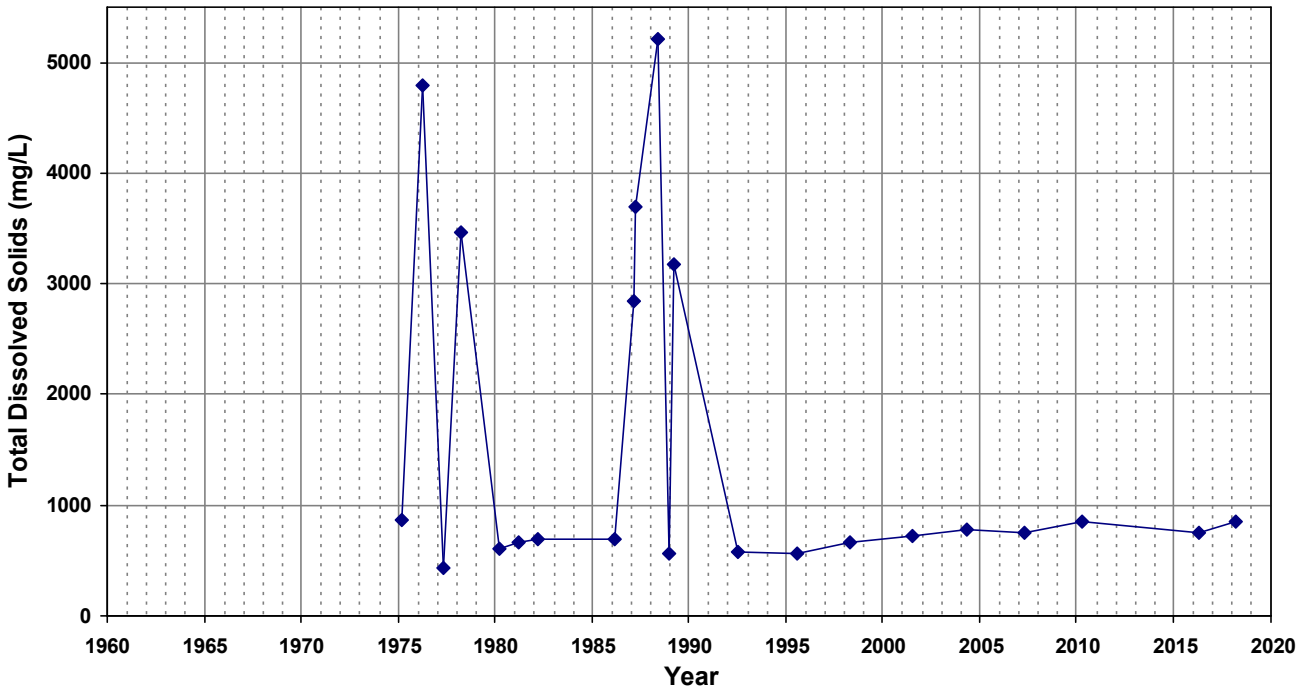
SCVWA-Saugus 2

Well Area: Southern Saugus
Well Depth (ft): 1649
RPE (ft msl): 1170
Screen Elevation (ft msl): 680 - -421



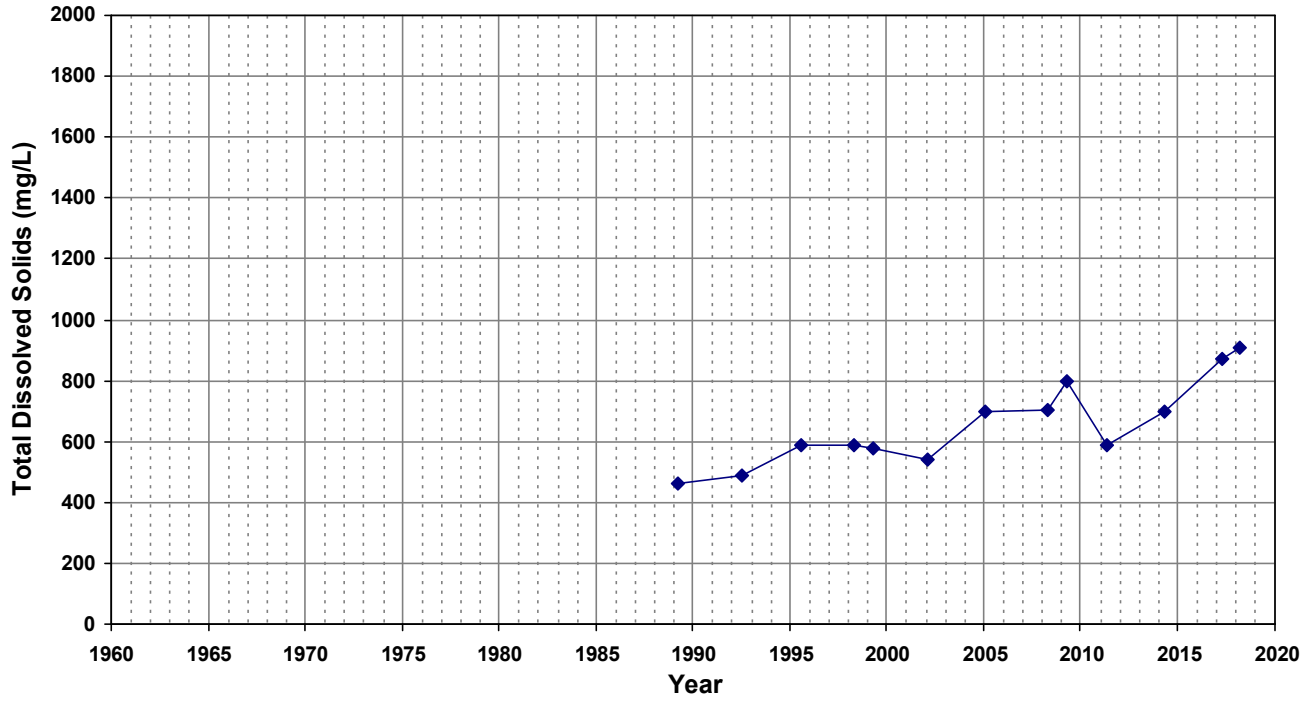
SCWD-Clark

Well Area: Bouquet Canyon
Well Depth (ft): 160
RPE (ft msl): 1253
Screen Elevation (ft msl): 1233 - 1133



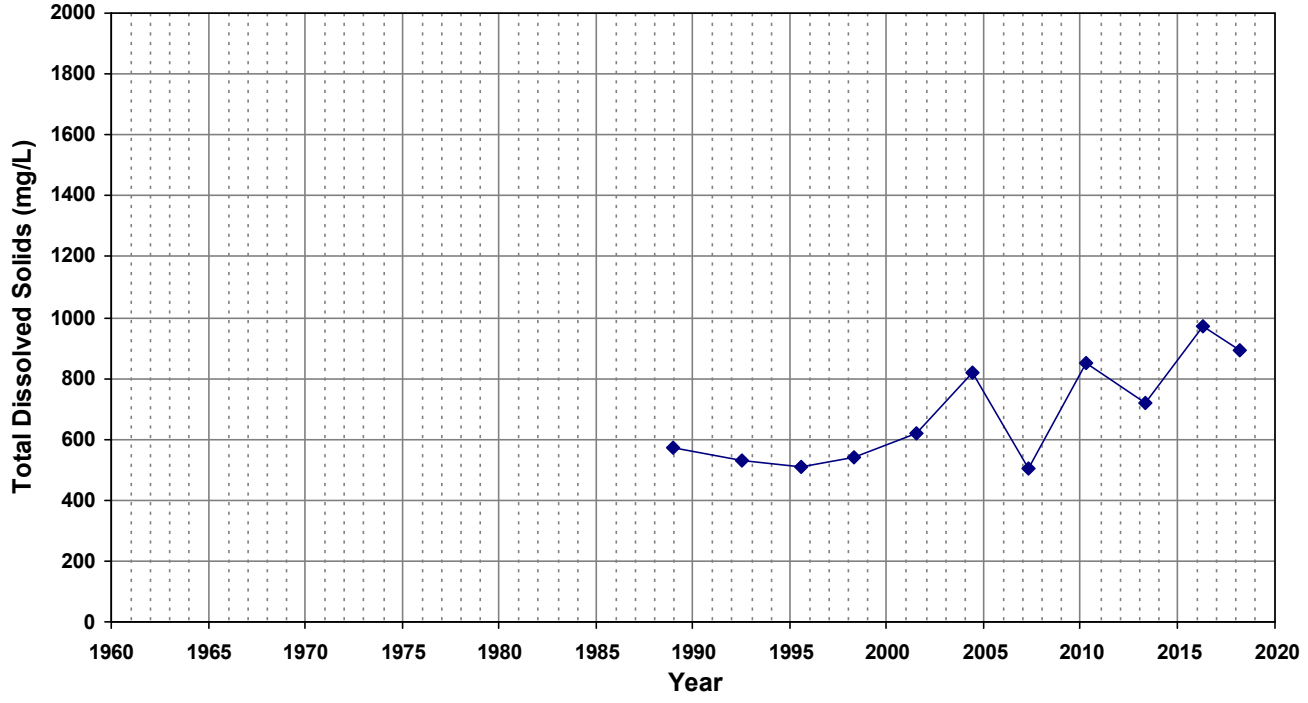
SCWD-Guida

Well Area: Bouquet Canyon
Well Depth (ft): 116
RPE (ft msl): 1342
Screen Elevation (ft msl): 1286 - 1192



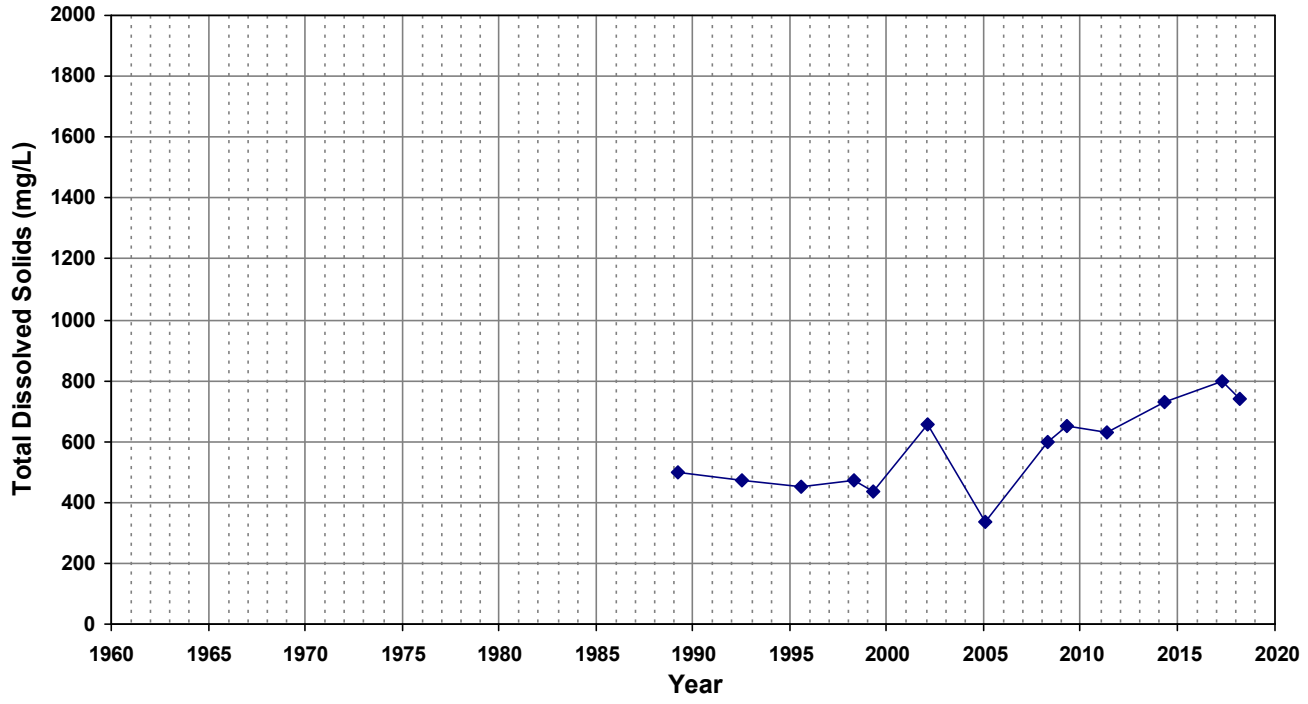
SCWD-Honby

Well Area: Above Saugus WRP
Well Depth (ft): 202
RPE (ft msl): 1280
Screen Elevation (ft msl): 1230 - 1078



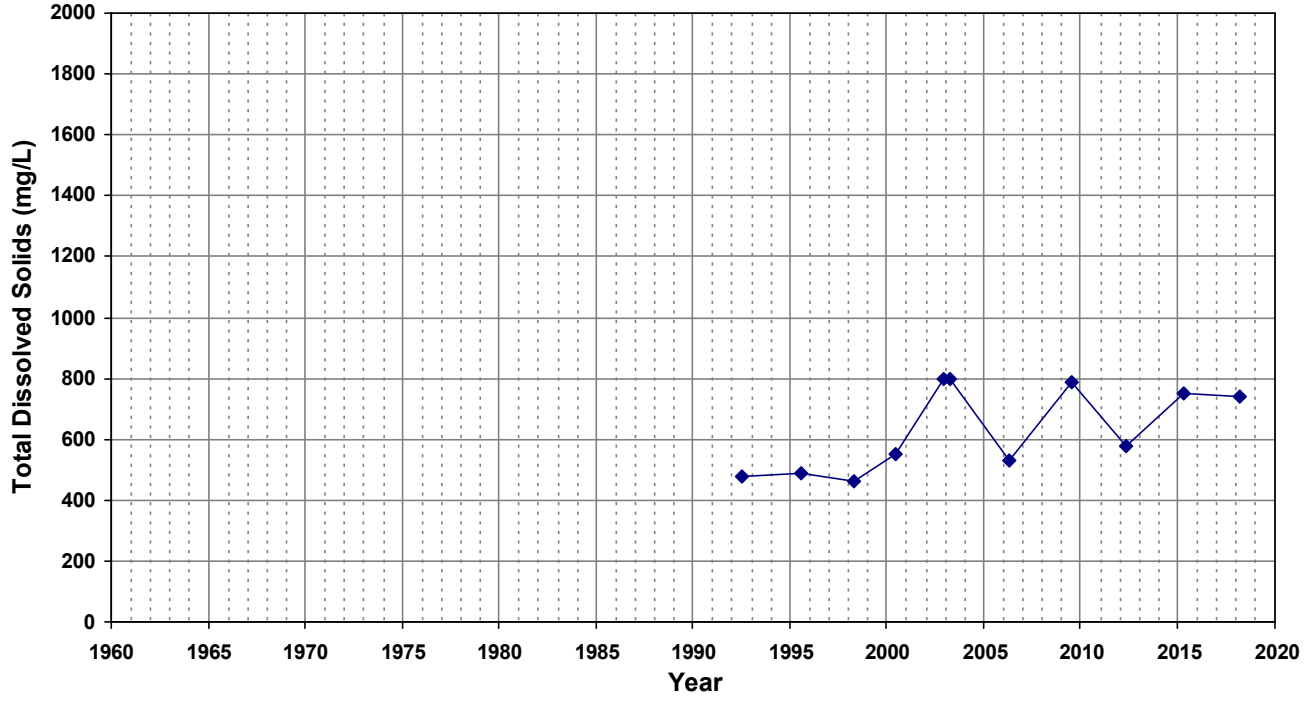
SCWD-Lost Canyon 2

Well Area: Mint Canyon
Well Depth (ft): 310
RPE (ft msl): 1532
Screen Elevation (ft msl): 1437 - 1407



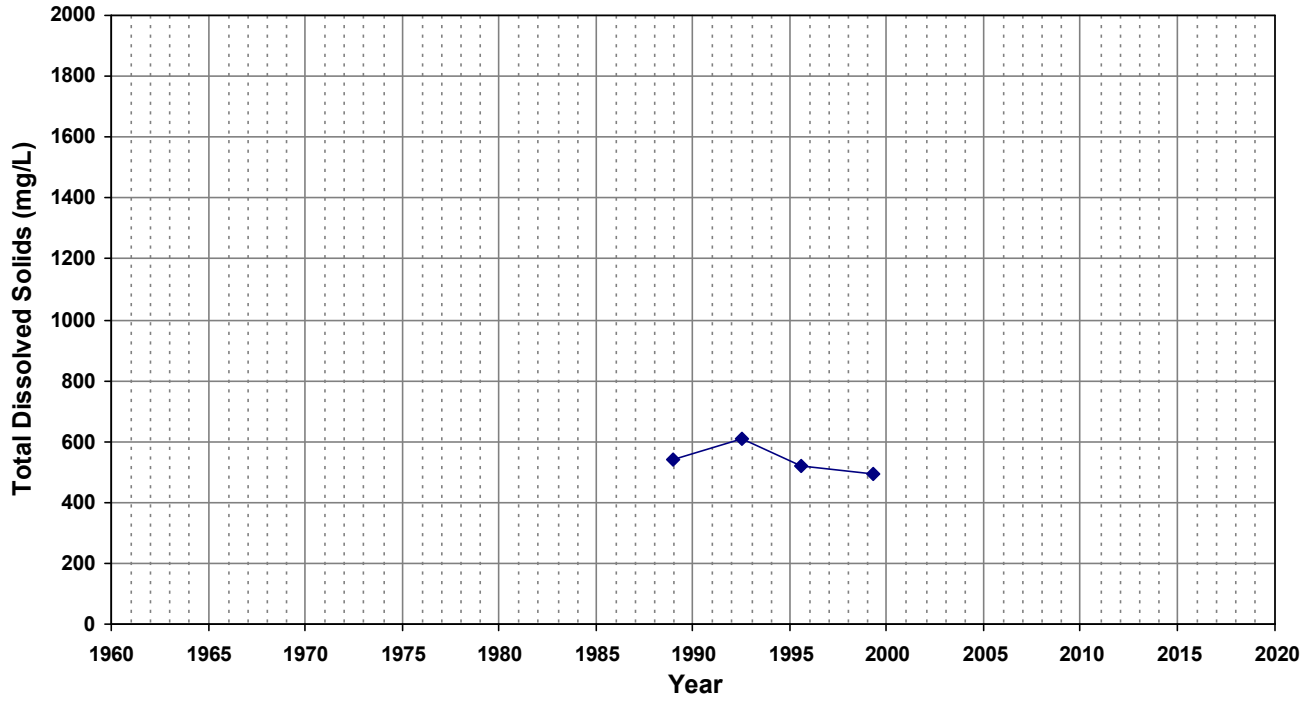
SCWD-Lost Canyon 2A

Well Area: Mint Canyon
Well Depth (ft): 252
RPE (ft msl): 1532
Screen Elevation (ft msl): 1437 - 1407



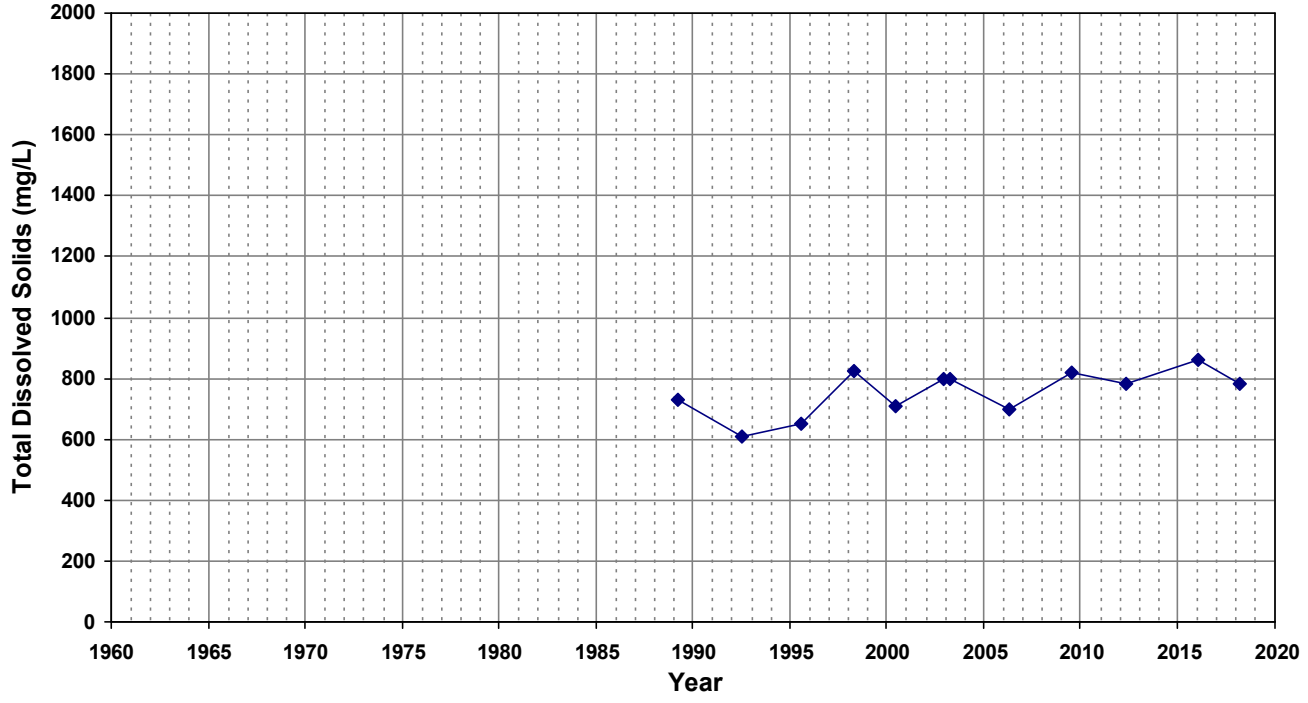
SCWD-Mitchell

Well Area: Mint Canyon
Well Depth (ft): 262
RPE (ft msl): 1486
Screen Elevation (ft msl): 1410 - 1240



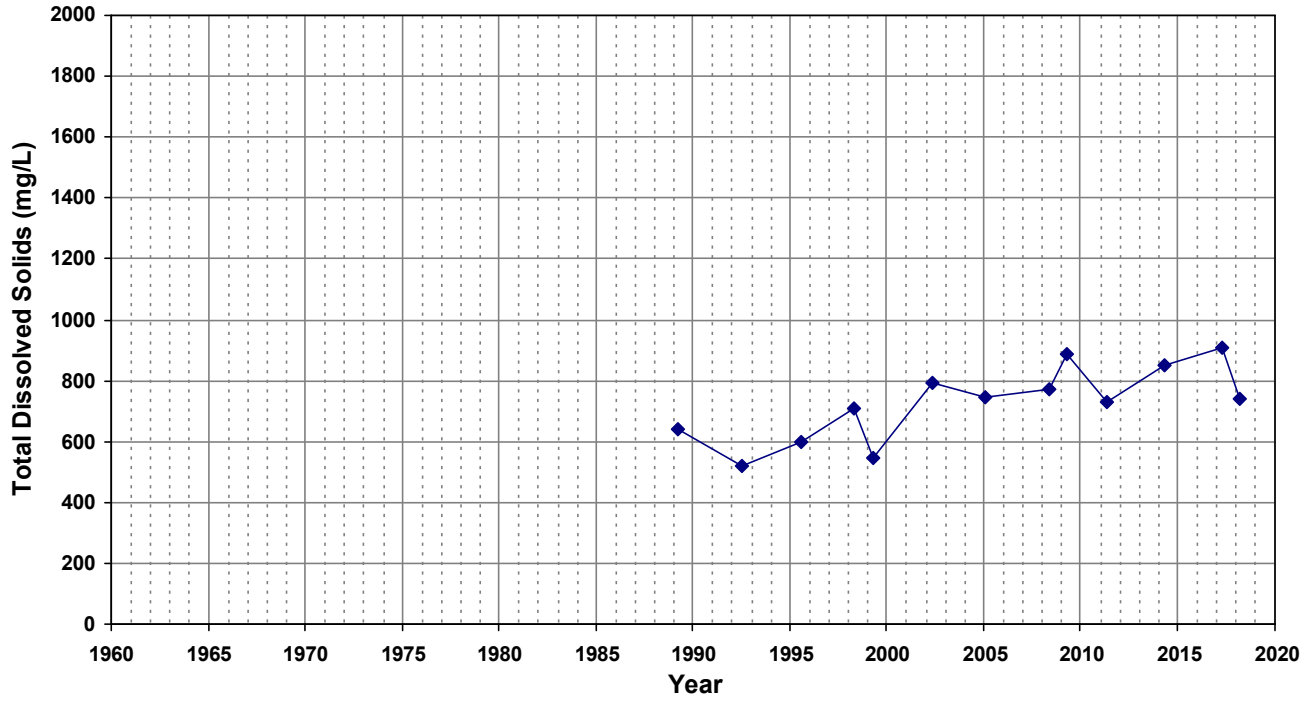
SCWD-N. Oaks Central

Well Area: Mint Canyon
Well Depth (ft): 244
RPE (ft msl): 1391
Screen Elevation (ft msl): 1341 - 1147



SCWD-N. Oaks East

Well Area: Mint Canyon
Well Depth (ft): 150
RPE (ft msl): 1391
Screen Elevation (ft msl): 1310 - 1241



SCWD-N. Oaks West

Well Area: Mint Canyon
Well Depth (ft): 136
RPE (ft msl): 1387
Screen Elevation (ft msl): 1307 - 1269